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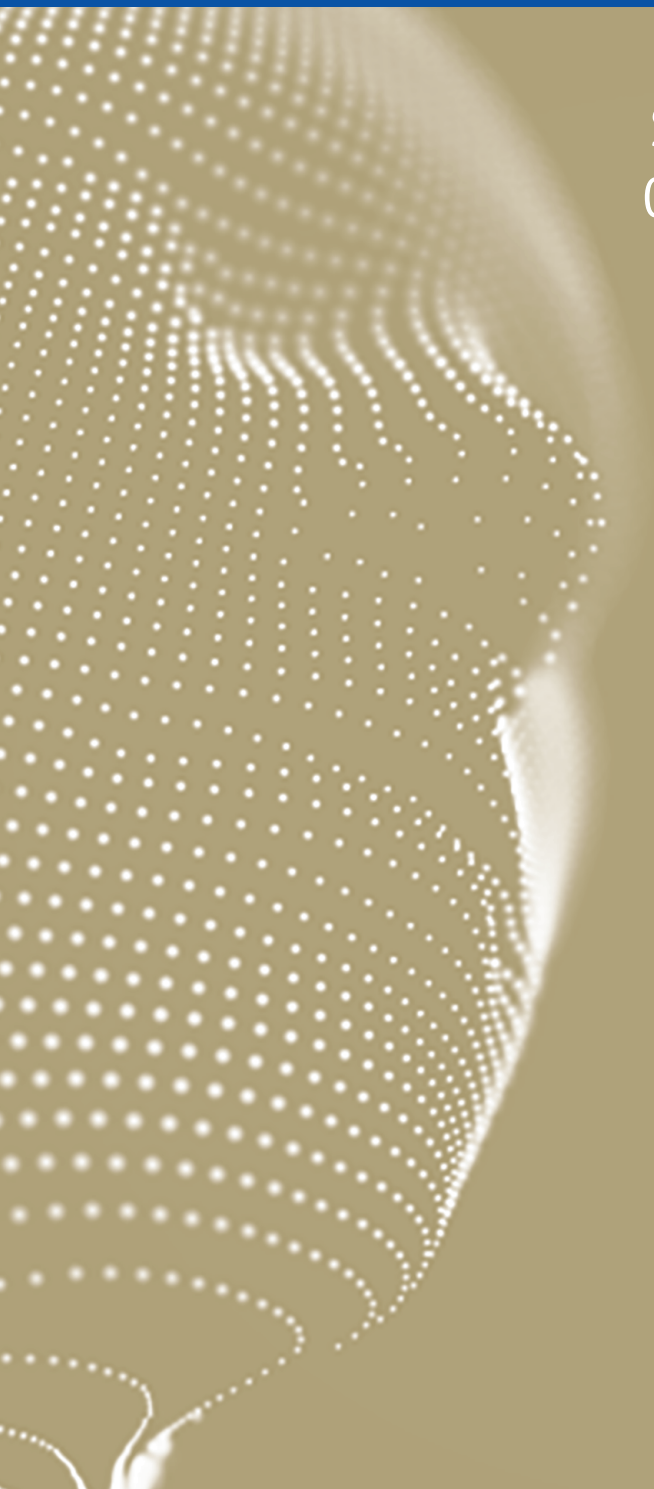
Parameters of Care:
AAOMS Clinical Practice Guidelines for Oral and Maxillofacial Surgery (AAOMS ParCare)
Seventh Edition 2023



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Parameters of Care: Clinical Practice Guidelines for Oral and Maxillofacial Surgery (AAOMS ParCare 2023)

PARAMETERS OF CARE

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Conflict of Interest Disclosures: None of the authors have any relevant financial relationship(s) with a commercial interest.

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The following AAOMS members served on the Special Committee on OMS Parameters of Care for the current revision. These individuals authored the eleven clinical sections that constitute the *Parameters of Care: Clinical Practice Guidelines for Oral and Maxillofacial Surgery (AAOMS ParCare 2023)*.

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INTRODUCTION

"Parameters of care" describes a range of accepted patient management strategies, including guidelines, criteria, and parameters. Treatment modalities for a particular clinical condition can be assessed, not only to assist decision-making about appropriate interventions but to improve the quality of clinical outcomes. These parameters of care are developed by active practitioners of oral and maxillofacial surgery with comments and input from relevant professional societies. All editions of the American Association of Oral and Maxillofacial Surgeons (AAOMS) *Parameters of Care* have been written by oral and maxillofacial surgeons for use by oral and maxillofacial surgeons. They cover the spectrum of care that fellows and members of AAOMS provide. The parameters vary in their specificity and research base but incorporate the best available knowledge about the diagnosis and surgical and adjunctive treatment of diseases, injuries, and defects involving both the functional and esthetic aspects of the hard and soft tissues of the oral and maxillofacial region.

AAOMS ParCare 2023 reflects practice considerations for 11 designated areas of oral and maxillofacial surgery:

- Patient Assessment
- Anesthesia in Outpatient Facilities
- Dentoalveolar Surgery
- Dental and Craniomaxillofacial Implant Surgery
- Surgical Correction of Maxillofacial Skeletal Deformities
- Cleft and Craniofacial Surgery
- Trauma Surgery
- Temporomandibular Joint Surgery
- Diagnosis and Management of Pathological Conditions
- Reconstructive Surgery
- Facial Cosmetic Surgery

Each section begins with an introduction stating the major issues considered in developing parameters for that area of practice. Next, general indications for therapy, therapeutic goals, factors affecting risk, indicated therapeutic parameters, and outcomes assessment indices (eg, favorable therapeutic outcomes, known risks, and complications associated with therapy) are provided. Considerations for the management of the pediatric patient for the specific clinical area are discussed. Finally, for each clinical area, specific conditions treated by the oral and maxillofacial surgeon have been identified, and the corresponding specific indications for therapy, therapeutic goals, factors affecting risk, indicated therapeutic parameters, and outcomes assessment indices are addressed. Each section ends with an updated list of selected references.

AAOMS ParCare 2023 has been developed to provide guidance to oral and maxillofacial surgeons, but the surgeon's strict adherence to the parameters of care should be based on his/her judgment concerning the appropriateness of care for a respective condition in a given patient.

The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon in light of the circumstances presented by each patient. Understandably, there may be good clinical reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well-advised to note in the patient's record the reason for the procedure followed. Moreover, it should be understood that adherence to the parameters does not guarantee a favorable outcome.

The outcome of any surgery may be affected by the surgeon's lack of access to a potentially useful drug or device as a result of regulatory restrictions or product liability litigation. Outcome may also be affected by the decision of an insurer to deny coverage for a procedure or other services deemed necessary by the patient and the surgeon.

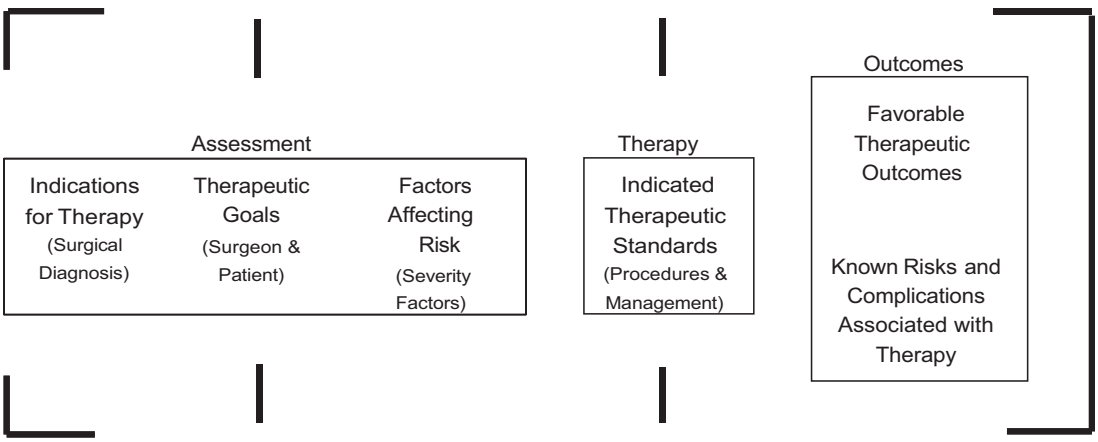
AAOMS recognizes that this document may be used by hospitals and other institutions, managed care organizations, insurance carriers and other payers, attorneys in professional liability cases, and legislators and regulators concerned with healthcare policy. However, the document was not specifically developed for reimbursement, credentialing, or litigation uses. AAOMS cautions that these uses involve various considerations that may be beyond the scope of this document.

AAOMS intends to continue the ongoing process of review and revision following the publication of *AAOMS ParCare 2023*. It will be necessary to revise and update the document as new scientific and clinical information becomes available. The entire document will be reviewed, updated, and reprinted on a regular basis to ensure that the parameters are truly reflective of the current state of clinical practice and its related science. This document will be continually updated and the most recent version should be accessed via AAOMS.org.

APPLICATION OF PARAMETERS OF CARE TO CLINICAL PRACTICE

Each condition within the 11 clinical areas is analyzed around 5 issues considered essential in determining the criteria for satisfactory clinical practice.

I. Indications for Therapy delineate the indications for management, including the symptoms or descriptive characteristics of patients who would be candidates for this type of surgical care. All or some of the indications may be applicable for each condition.



II. Therapeutic Goals describe the favorable outcomes of care desired by both the patient and the oral and maxillofacial surgeon. The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

III. Factors Affecting Risk are severity factors that increase risk and the potential for known complications. They are specific variables, usually descriptive of the patient's characteristics or condition (eg, age, findings in medical history), that may affect the outcome either favorably or unfavorably. For example, patient noncompliance may compromise the success of treatment, while compliance will enhance it.

IV. Indicated Therapeutic Parameters define the operative and other management procedures followed in providing care that have the greatest potential of meeting the therapeutic goals, maximizing the favorable outcomes, and minimizing risks and complications, based on the current state of knowledge.

V. Outcome Assessment Indices are those indicators associated with either favorable or unfavorable (known risks and complications) outcomes associated with therapy. These indices are used by the specialty to assess aggregate outcomes of care:

Favorable therapeutic outcomes consist of the clinical evidence that the expected therapeutic goals of surgery have been achieved. The assessment of aggregate data, based on these favorable outcomes, will be used by the specialty to identify the most effective treatment modalities.

Known risks and complications associated with therapy are those conditions, circumstances, or outcomes that are inherent in the management of patients. These issues can be grouped into 3 categories (eg, assessment, therapy, outcomes) depending on when they occur in the patient care continuum.

APPLICABILITY AND UTILITY OF PARAMETERS OF CARE TO PATIENT CARE

The above diagram illustrates how the previously described issues can be applied to the management of clinical conditions, within the continuum of care:

Assessment. During the initial engagement with the patient, the surgeon assesses the presenting condition(s). The *assessment* includes identification of the *indications for therapy* and the *therapeutic goals* to be achieved. The *factors affecting risk* are those severity factors that increase risk and the potential for known complications. These factors are identified for the condition being treated and considered in the treatment planning process.

Therapy. Once the surgeon has assessed the presenting condition, a plan of treatment is established. The *indicated therapeutic* parameters are those interventions that have been identified as being appropriate for the respective clinical condition(s). The specific therapeutic standard selection the surgeon makes is determined by the information obtained during the assessment phase.

Outcomes. The final phase involves identification of outcomes of therapy. The *outcome assessment indices* (eg, favorable therapeutic outcomes and the known risks and complications associated with therapy) are intended to provide the basis for an objective evaluation of the patient's condition following the therapeutic intervention. Favorable outcomes and known risks and complications associated with therapy are indices used by the specialty, in aggregate, to assess the appropriateness of the care provided. More than 1 outcome indicator may be identified during this evaluation.

This analysis of oral and maxillofacial surgery practice by indications for therapy, therapeutic goals, factors affecting risk, indicated therapeutic parameters, and outcome assessment indices provides the foundation for broad-based performance improvements in the practice of the specialty.

HISTORY OF THE PARAMETERS OF CARE FOR ORAL AND MAXILLOFACIAL SURGERY

ORIGINAL DOCUMENT: In September 1986, under the leadership of Dr Markell W. Kohn, the AAOMS Board of Trustees recognized the implications of the challenge contained within The Joint Commission, formerly the Joint Commission on Accreditation of Healthcare Organizations, Agenda for Change. The board appointed a 22-member committee to develop parameters and criteria for oral and maxillofacial surgery. The committee formed subcommittees to address 7 areas of the specialty: temporomandibular joint surgery, dentoalveolar surgery, orthognathic surgery, anesthesia, reconstructive surgery, implant surgery, and trauma. Subsequently, pathological conditions and maxillofacial cosmetic surgery were viewed as sufficiently broad and encompassing to be added as separate sections rather than being addressed throughout the other sections. A total of 27 oral and maxillofacial surgeons served on the Special Committee on Criteria and Standards of Care, chaired by Dr John F. Helfrick. The special committee first met in 1986, and additional meetings were held during 1987. The process involved a general review of relevant literature, followed by extensive deliberations and analyses by members of the special committee. In the fall of 1987, the Board of Trustees reviewed a draft document and appointed Dr Daniel M. Laskin and Dr Helfrick to edit this draft. Dr Michael Pine, manager, Clinical Indicators, Joint Commission on Accreditation of Healthcare Organizations, was most helpful in an advisory role. Also, the American Society of Anesthesiologists, which developed its own standards in 1986, reviewed and provided very positive comments on the parameters for ambulatory anesthesia. In January 1988, at the AAOMS Clinical Congress in Tucson, Arizona, 3 sections of the parameters were provided to the 500 fellows and members present and an open hearing was held for membership comment.

The steering committee, composed of the chairmen of the various sections, met during 1988 to revise the document based on membership comments. Michael Pine and Associates were retained and contributed significantly to the most formidable and difficult task of refining and standardizing the document. In 1988, the Board of Trustees reviewed the first complete draft, which was mailed to all members. An open hearing on the document was held during the 1988 AAOMS Annual Meeting in Boston, Massachusetts. Further meetings of the special committee's members in 1989, 1990, and 1991 revised the document based on comments from the membership and to achieve a consensus. The process also involved revisions based on new knowledge and technological advances. This would not have been possible without the energies and expertise of AAOMS fellow Dr James F. Kelly. Beginning in 1990, Dr Kelly served as editor of the AAOMS ParCare document coordinating the activities of the special committee, the consulting group, and a newly established coordinating committee with oversight responsibility for parameters of care activities within the specialty.

In 1988, to assess the development of the AAOMS parameters, Drs Helfrick, Kelly, and Pine applied for a grant from the Agency for Health Care Policy and Research. This $1.5 million grant (3 times the next closest project) assessed the following questions: *1)* Did AAOMS members buy into the project? *2)* What was the best method for dissemination? and *3)* Did it change behavior? The first phase of the project was completed with the publication of the AAOMS Parameters of Care-92. The second phase was the dissemination of information that included the mailing of the completed document to the membership in 1992. Additionally, local opinion leaders conducted small group workshops throughout the AAOMS districts during the next 2 years to discuss the AAOMS ParCare.

VERSION 2.0: In 1992, under the chairmanship of Dr John Helfrick, the AAOMS Board of Trustees approved a 33-member Special Committee on Parameters of Care to revise the document. Patient assessment was added to the 9 core sections. Orthognathic surgery was divided into 2 chapters: maxillofacial skeletal deformities and cleft and craniofacial. The first revision draft was completed in 1993 and was presented at an open forum in Chicago, Illinois, in 1994. Feedback obtained from the membership was included in the document. A mailing to 20% of the membership was undertaken in 1994 along with solicitation for input from various communities of interest, including the American Medical Association, American Dental Association, and American Society of Anesthesiologists. The Parameters of Care, Version 2.0 document was distributed to the membership in 1995. This revision represented the third phase of the ParCare documentation process.

VERSION 3.0: Observing the ever-changing face of the healthcare marketplace and increased presence of managed care in the oral and maxillofacial surgery practice, in 1995 the AAOMS Board of Trustees appointed a 5-member Special Subcommittee for Outcomes Assessment to gather data and negotiate with these groups. Dr David Perrott served as chair. This subcommittee acted as the sister committee to the 36-member Special Subcommittee for OMS Parameters of Care chaired by Dr Richard H. Haug. Dr Gerald Laboda served as chair of the Coordinating Committee for Outfrcomes and Parameters, charged with coordinating the efforts of both committees in the development of a ParCare revision, initiating an Oral and Maxillofacial Surgery Outcomes Assessment project, and intimately linking the 2. Under Dr Haug's guidance, and at the direction of Dr Richard Simeone, then AAOMS president, and with the support of the AAOMS Board of Trustees, the ParCare document took on a new look, reflecting the changing face of healthcare in the United States.

In 1997, in Seattle, Washington, the AAOMS Board of Trustees addressed the joint project between the Outcomes Assessment and Parameters of Care subcommittees with renewed commitment. The ParCare revision began in 1997 with a review of the existing document by members of the subcommittee. Input regarding the value, content, and proposed changes of the 1995 document was obtained at both an open forum during the 1998 midwinter meeting in Phoenix, Arizona, and the Annual Scientific Session in New Orleans, Louisiana. During 1998 and 1999, the active revision process was undertaken while funding for outcomes investigation was provided by the OMS Foundation. The first draft was disseminated in 1999 to the associated AAOMS Clinical Interest Groups, related standing committees, state officers, and various healthcare communities of interest. Revisions were made based on input and another draft was provided to the members at an open forum at the 1999 AAOMS Annual Meeting in Boston, Massachusetts. During the early part of 2000, a 5-year retrospective literature review was completed; conceptual changes were made to the document; and *Current Procedural Terminology*, *Current Dental Terminology*, and *International Classification of Diseases, Ninth Revision, Clinical Modification* codes were added. During this period, managed care was a relatively new concept and the economic, social, and political challenges it made to the healthcare professions, including oral and maxillofacial surgery, required a unified and proactive stance. At this time, the Special Committee on OMS Parameters of Care worked hand-in-hand with the Special Committee on Outcomes Assessment to provide credible documentation regarding the specialty's most important and high-profile procedures. Also during this period, algorithms, clinical pathways, and critical pathways become the "buzzwords" most requested by third-party insurance carriers to defend or refute claims. With Dr Haug's guidance, the revised ParCare document provided an explanation of these terms and sample clinical pathways for the specialty. The defense of the scope of practice from both economic competitors and third-party insurance carriers also went through resurgence and specific changes were made to make the OMS scope absolutely clear. Special addenda outlining the differences for pediatric oral and maxillofacial surgery were included. A comprehensive review of the general goals of our indicated therapies, along with known risk factors and unexpected or unfavorable outcomes was undertaken. From Dr Haug's vision, the reference list was completely revised and categorized by topic areas to help the surgeon in practice solve clinical problems and to assist the resident in training and the program directors with appropriate reading material. The ParCare committee reviewed 30,000 peer-reviewed publications and texts, resulting in the annotated bibliography in version 3.0. The *Parameters and Pathways: Clinical Practice Guidelines for Oral and Maxillofacial Surgery*, *Version 3.0*, was published and distributed to the membership early in 2001.

VERSION 4.0: Beginning in 2000, it became clear to the Special Committee on OMS Parameters of Care and the AAOMS leadership that the ParCare document was being used as a template for residency training curricula, as well as the Oral and Maxillofacial Surgery In-Training Examination (later the Oral and Maxillofacial Surgery Self-Assessment Tool), the American Board of Oral and Maxillofacial Surgery examination, and scope of practice with regulatory boards. Dr Haug's unique position as a member of the Oral and Maxillofacial Surgery Self-Assessment Tool committee, an examiner for the American Board of Oral and Maxillofacial Surgery, and as chair of the Special Committee on Parameters of Care permitted an unusual insight into the value and effectiveness of the ParCare document. For Version 4.0, Dr Eric Carlson, a member of the ParCare committee since 1992, was appointed co-chair of the ParCare committee with Dr Haug. He continued to serve as the chair of the Subcommittee on Pathology.

The review and update to prepare version 4.0 began in 2004. New diagnoses and procedures were included and special considerations for the pediatric patient were expanded in each section. The draft of version 4.0 was placed on the AAOMS website for review and comment. An open forum took place at the San Diego, California, Annual Meeting in October 2006. The document was then sent to the Board of Trustees for final approval before publication in early 2007.

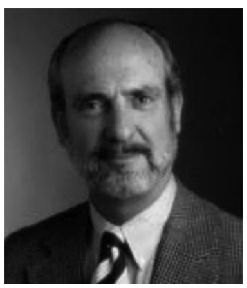
VERSION 5.0: Version 5.0 review and updating used a process similar to version 4.0. In 2010, Drs Eric Carlson and Paul Sims were appointed co-chairs of the committee. Member questions received after the publication of version 4.0 were shared with the appropriate subcommittee for discussion. Extensive literature searches were completed to provide an insight into new topics in the field. The chapters on "Anesthesia in Outpatient Facilities" and "Patient Assessment" were completed on a faster schedule to become appendices for the eighth edition of the AAOMS Office Anesthesia Evaluation Manual. Representatives from each of the committees met in October 2011 at AAOMS headquarters to review changes to the sections and the impact of the changes on other chapters. New topics added in Version 5.0 included sections on obstructive sleep apnea and nonodontogenic soft-tissue infections. Statements related to preoperative antibiotic therapy and radiation being as low as reasonably achievable were also added. After being available to the membership for comments on the website, suggestions were reviewed, changes were made, and the document was presented to the Board of Trustees for final approval in spring 2012 and published in late 2012 as a supplement to the *Journal of Oral and Maxillofacial Surgery.* An electronic copy was made available to membership on the AAOMS website.

VERSION 6.0: For Version 6.0, Dr Paul Sims was appointed chair of the Special Committee on OMS Parameters of Care. Dr Stuart Lieblich was appointed assistant to the chair. The subcommittees appointed for each of the 11 topical areas plus pediatrics met via conference calls in early 2016. Literature reviews for each chapter covered developments and trends in the last 5 years. The subcommittees were asked to consider if geriatric issues should be covered within their topics resulting in sections related to specialized care of the aging population. Subcommittee representatives met in July 2016 to discuss proposed changes to the document. Additions included a section on neurologic defects in each chapter and a new reference section on surgical orthodontics. The revised document was shared with AAOMS membership via an open forum at the 2016 Annual Meeting in Las Vegas and by posting on the member portion of the AAOMS website. Member input was reviewed for changes to the document. The final draft was submitted to the Board for approval in December 2016. The final copy was published in the AAOMS journal in 2017.

VERSION 7.0: For Version 7.0, Dr Paul Sims was appointed chair of the Special Committee on OMS Parameters of Care. Dr Stuart Lieblich was appointed assistant to the chair. The subcommittees appointed for each of the 11 topical areas plus pediatrics met via conference calls in June 2022. Literature reviews for each chapter covered developments and trends in the last 5 years. Subcommittee representatives met to discuss proposed changes to the document. Additions included the utilization of advances in 3-dimensional printing of patient-specific prosthesis, robotic surgery among other innovations in the field. The revised document was shared with AAOMS membership by posting on the member portion of the AAOMS website. Member input was reviewed for changes to the document. The final draft was submitted to the Board for approval in 11/1. The final copy was publishedas a supplement to the AAOMS journal in 2023.

Acknowledgments

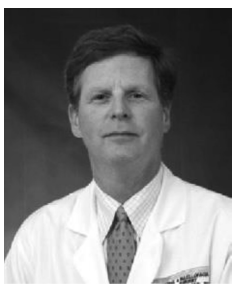
The Special Committee on OMS Parameters of Care and the Board of Trustees of AAOMS wish to acknowledge the enormous effort extended by the many volunteers and staff who devoted countless hours to the creation of the current document. Such effort is exceptional given the complexity and amount of work necessary to make this project meaningful to the membership. Although the list of those who contributed over the years would fill many pages, we would like to recognize the following individuals for their roles in initiating this project and continuing to move it forward with each edition.



Dr Markell W. Kohn in his 1986 incoming Presidential address introduced the concept of national standards of care to define the practice guidelines of oral and maxillofacial surgery. Under his leadership, the Board of Trustees established the Special Committee on the Parameters of Care and launched a major initiative that continues to demonstrate the leadership of oral and maxillofacial surgery in health issues of national importance.

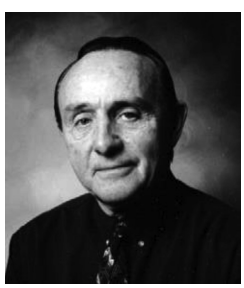
Dr John F. Helfrick appointed to chair the original Special Committee on the Parameters of Care, was able to take a unique concept, visualize the final product, mold it into a workable document, and bring the first edition to press. Under his leadership, the concept of Parameters of Care and Clinical Practice Guidelines were disseminated to AAOMS membership at dozens of open forums and presentations in many of the major American cities. The result was a first revision (second edition) that represented a true consensus document. Dr Helfrick also introduced this topic and the AAOMS ParPath 01 to the international oral and maxillofacial surgery community.

Mr. Bernard J. Degen, II, then-Executive Director of AAOMS, understood the multifaceted benefits of such a document and worked tirelessly to establish support with The Joint Commission on Accreditation of Healthcare Organizations (which was independently introducing the concept of practice guidelines), the American Medical Association, and the Health Care Financing Administration.



Dr Eric Carlson has served as a member of the Parameters of Care since the second edition, has served as Chair of the Pathology subcommittee since the third edition, was appointed co-chair in 2004 and has continued as co-chair of the current committee. Dr Carlson has given the extreme time commitment that it takes to assure that this document is a footprint for the specialty of oral and maxillofacial surgery. His subject knowledge and commitment, along with an eye to paying attention to detail is vital in a project that serves as a guideline. It is evident from his interaction with committee members as he coordinated this immense project that he is friendly, but firm, a team player, excellent listener, and leader.

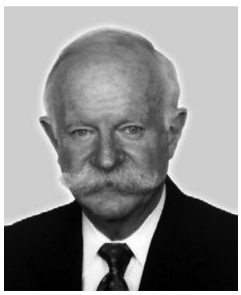
Dr Stuart E. Lieblich has been a strong contributor to the OMS field in academics as well as maintaining a full scope practice, and he brings this knowledge base to the process. He has been involved since the Parameters of Care 2.0. Under the leadership of Dr Haug, he was Chair of the dentoalveolar section and has continued in that role. In 2015, he was appointed by the Board of Trustees to assist the Chair, Dr Sims. Together they worked with the Committee to bring the sixth edition to fruition, continuing the process set by their predecessors.



Dr James F. Kelly, consultant and editor of the original document, worked tirelessly with Dr Helfrick, not only to produce the initial work but also to successfully solicit grant support from the Agency for Healthcare Policy and Research.

Dr Gerald Laboda, at a critical time in the Board of Trustees' decision-making process, lobbied successfully for continuation of the project, firmly establishing the concept that the Parameters of Care as a "work in progress," and a dynamic project that by its very nature requires ongoing review and updating.

Dr Richard H. Haug successfully redefined the significance of the Parameters of Care document for the specialty of oral and maxillofacial surgery. As an educator and accomplished clinical surgeon, he has been instrumental in ensuring that this document serves as a template for residency training program curricula. Under Dr Haug's leadership, the document has become synonymous with the specialty's identity; it defines who they are and what they do.



Dr Paul G. Sims has served as Chair of the Anesthesia subcommittee during the fourth and fifth revision of the Parameters. He was Co-chair of the fifth revision under Dr Eric Carlson. He is editor of the sixth revision along with Dr Stuart Leiblich. He is currently in private practice in rural Montana. In past years, he was an Associate staff member at the residency at UMKC. Dr Sims' leadership and attention to detail and dedication to the development of ParCare will ensure the document remains a current guideline for the specialty. He has an ability to develop collegial relationships and is able to accomplish goals and support the mission of the project and the specialty with the help of numerous members of the committee and subcommittees.

Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

PATIENT ASSESSMENT

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023*, WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE. TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

An appropriate preoperative patient assessment is a critical component of an oral and maxillofacial surgery practice. The proper method of obtaining and documenting a patient's medical history and physical examination findings, as well as appropriate diagnostic tests, is essential to ascertaining an accurate diagnosis and developing an effective treatment plan. In addition, a thorough patient evaluation provides the basis for determining patient-specific surgical and anesthetic risk, thereby minimizing morbidity and optimizing patient care. Several specific comorbid conditions require consideration by the Oral and Maxillofacial Surgeon.

The Oral and Maxillofacial Surgeon is trained to complete a thorough patient assessment. Therefore, this section will not describe how to perform an assessment but will organize the assessment process. The assessment process is divided into phases:

1) indications for surgery; 2) specific surgical goals; 3) factors that may affect surgical risks; and 4) outcome assessment. The patient assessment process described in this section establishes a foundation for patient assessment and management as described in subsequent sections of *ParCare 2023*.

Specific diagnostic techniques and physical assessment protocols are purposely not defined. It is not the intent of this document to dictate the exact methods for performing a patient assessment. The Oral and Maxillofacial Surgeon has the latitude to complete a patient assessment based on the clinical circumstances of the patient and/or institutional standards.

PREAMBLE

The Oral and Maxillofacial Surgeon is responsible for an initial history and physical evaluation to determine the risk factors associated with the management of each patient. In some circumstances, the patient's physician may perform the history and physical examination, but it is the responsibility of the Oral and Maxillofacial Surgeon to ascertain whether the information is complete or whether further assessment is indicated based on the specific patient and planned procedure.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR PATIENT ASSESSMENT

All surgery must be preceded by the patient's or legal guardian's consent, unless an emergent situation dictates otherwise. Emergent circumstances and the indications for treatment should be documented in the patient's record. Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the expected recovery period, alternative treatment options (including no treatment), and any patient- or procedure-specific factors that may affect the risk. The results of the informed consent process must be documented in the patient medical record. In general, an informed consent document is signed by the patient or guardian, but the OMS is well advised to document in the medical record that the informed consent process occurred and that the patient/guardian provided both verbal and written consent that they understand and are willing to proceed with treatment.

Non-English speaking or hearing/visually impaired patients may require a professional interpreter to obtain informed consent.

DOCUMENTATION: Documentation in a patient's medical record contains critical information and is governed by Health Insurance Portability and Accountability Act regulations. The Oral and Maxillofacial Surgeon is responsible for ensuring that all information contained in the medical record is accurate and complete. Additions, corrections, and/or deletions to the medical records should be clearly identified as to the individual making these changes and date of these changes.

Deletions are done with single line strikethrough with initials in written records or via tracking with electronic medical records.

AAOMS ParCare 2023 includes documentation of subjective and objective findings, diagnoses, and patient management interventions. The final judgment of a specific diagnostic test or the need for medical consultation must be made by the individual OMS according to unique circumstances presented by each patient. In instances when another health care provider assesses the patient health status preoperatively, such as a primary care physician, cardiologist, or pediatrician, the OMS must ensure that the documented assessment meets the parameters set forth in *AAOMS ParCare 2023*. Moreover, the Oral and Maxillofacial Surgeon is responsible for the patients' risk assessment and, ultimately, the decision to perform any surgical procedure(s). No other health care provider may assume this responsibility. There may be sound clinical causes to deviate from *AAOMS ParCare 2023*. When an Oral and Maxillofacial Surgeon deviates from a relevant parameter based on specific situations, document the reason for chosen course of action. Moreover, it should be understood that adherence to these parameters does not guarantee a favorable outcome.

AMERICAN SOCIETY OF ANESTHESIOLOGISTS PHYSICAL STATUS CLASSIFICATION SYSTEM: Based on a thorough patient assessment, an American Society of Anesthesiologists (ASA) physical status should be assigned to all surgical patients, according to the most recent guidelines set forth by the ASA (Appendix 1).

PREOPERATIVE GUIDELINES: Certain medical conditions and therapies, (eg, medication-related osteonecrosis of the jaw [MRONJ] or osteoradionecrosis), can increase the risk of poor wound healing, infection, or other serious complications including osteomyelitis and pathologic jaw fracture.

Prophylactic treatment strategies involving regular dental surveillance can reduce the incidence of postoperative complications in at-risk patients. At-risk patients are asymptomatic but have been previously treated with antiresorptive or radiation therapy (RT). (See AAOMS Position Paper on MRONJ for osteoradionecrosis details).

PREOPERATIVE FASTING GUIDELINES: All healthy patients without a risk of gastroparesis who will undergo a sedation or general anesthetic procedure should maintain a "nothing by mouth" (NPO) status (Appendix 2). The ASA recommends a 2-hour fasting period of clear liquids for all patients. The ASA recommends a fasting period for breast milk of 4 hours, and infant formula or nonhuman milk of 6 hours for neonates and infants. For solid foods in most adult patients, the ASA recommends fasting periods of at least 6 hours (light meal such as toast and clear liquid) and 8 hours (fatty or fried foods or meat). For infants and children, please see Appendix 2.

The preoperative use of gastric stimulants, gastric acid secretion blockers (histamine$_2$ receptor antagonist agents), antacids, antiemetic agents, and/or anticholinergic medications (to decrease the risk of pulmonary aspiration) is not routinely recommended. Their use should be based upon the individual patient assessment.

PERIOPERATIVE ANTIBIOTIC THERAPY: Patients with specific cardiac conditions, implantable devices, and joint replacement may require preoperative systemic antibiotics to reduce the risk of distant infections (see Appendix 4 and 5 for specific circumstances). The decision to employ prophylactic perioperative antibiotics is at the discretion of the treating surgeon and should be based upon the patient's clinical condition as well as other comorbidities. Subacute bacterial endocarditis (SBE) antibiotic prophylaxis and total joint replacement (TJR) antibiotic prophylaxis should be based upon the most recent guidelines set forth by the American Heart Association (AHA), American Dental Association (ADA), and AAO (see Appendices).

DISCHARGE CRITERIA: All patients who have had outpatient surgery using sedation or general anesthesia must meet minimal criteria to permit safe discharge from the office or outpatient surgical facility. Such criteria may include either the use of an Aldrete, modified-Aldrete Score, Post-Anesthesia Discharge Scoring System (PADSS or modified PADSS), or equivalent. Also see the *Anesthesia in Outpatient Facilities* chapter. In addition, the patient must arrive at the office or surgical facility with a responsible adult escort for discharge after surgery and anesthesia.

SPECIAL CONSIDERATIONS FOR PEDIATRIC PATIENT ASSESSMENT

The child assessment begins with a careful history, followed by physical examination and radiographic and laboratory evaluation. However, much of the information may be provided by the parents or by both the patient and the parents depending on the maturity of the child. Informed consent for all children, who are considered minors, must be obtained from the parents or legal guardian. Oral and Maxillofacial Surgeons should include children in any discussions about their health and treatment, when appropriate. The Oral and Maxillofacial Surgeon must ascertain that the parent or adult giving the consent is the legal guardian. This is especially critical when the parents are divorced or if the child is living with guardian(s) other than the biologic parents. Emancipated adolescents who are legally responsible for themselves can make their own health care decisions and sign their own consent.

The Oral and Maxillofacial Surgeon must also be aware that the birth sex may not be how the child identifies at the time of care. Careful and thoughtful discussion with the pediatric patient and their parents is necessary to not only utilize the appropriate pronouns for the patient but may also direct the type of care provided. Certain standardized outcomes such as male versus female norms may need to be modified based on the patient's self-identification choice.

Several important aspects of the patient assessment and treatment are distinct to children. The OMS must navigate the child/parent dynamic in regards to the psychological, physical impact of treatment. The surgeon must be the advocate for the minor patient and ensure that all concerned parties understand the procedure, the risks, the benefits, and alternative treatment options. Therapeutic decisions are also affected by the patient's chronologic age and stage of psychological, physical, and dental development. These factors can alter the indications and timing of treatment and must be considered in the final assessment of the pediatric patient. The surgeons must consider the effects of the child's growth on the ultimate outcome of treatment.

Pregnancy status should be assessed in female patients of childbearing age. When evaluating pediatric patients who have congenital or developmental anomalies, a thorough family history and the existence of similar conditions in other relatives or siblings may provide additional useful information. In addition, determining exposure to known teratogens during pregnancy or in the early developmental years is a key component in the evaluation of children who exhibit growth abnormalities.

When performing the physical examination, it is critical to remember the differences between children at various ages compared to adults with regard to anatomy and physiology. For example, children have an epiglottis longer and less rigid

than their adult counterpart and the larynx is more anteriorly and superiorly positioned. Children are more susceptible to hypothermia due to greater body surface area to mass ratio. The autonomic system of a very young child is immature therefore cardiac output is dependent on heart rate.

Oral and Maxillofacial Surgeons are in a unique position to identify child abuse and neglect because a majority of physical signs of abuse occur in the head and neck region. Dentists and physicians are mandated by state laws to report such suspected or confirmed cases of child abuse or neglect. The physical and behavioral diagnostic signs of physical abuse, physical neglect, and sexual abuse include precociousness, unusual redness/tenderness in the oropharyngeal areas, inability to open the mouth, poor hygiene, and wounds and/or fractures in various stages of healing, especially in the younger population, warrant further questioning. The Board of Trustees of AAOMS supported AMA Opinion 2.02 on "Physicians' Obligations in Preventing, Identifying, and Treating Violence and Abuse" adopted in November 2007 and issued in June 2008, supporting the pivotal role of the Oral and Maxillofacial Surgeon in identifying and treating victims of violence and abuse.

PATIENT ASSESSMENT

This section addresses the assessment of the patient's medical history and physical status in all patient care settings, including the documentation of examination findings. The results of the patient assessment are used as a foundation for subsequent clinical sections throughout the remainder of this book.

I. Indications for Patient Assessment

A. Presentation of a patient to an Oral and Maxillofacial Surgeon for evaluation, diagnosis, continuing care, and/or treatment
B. Referral to an Oral and Maxillofacial Surgeon for a second opinion regarding diagnosis and management
C. Planning for inpatient or outpatient surgery or procedure
D. Scheduled follow-up visit for assessment of outcomes resulting from a treatment, surgery, or procedure
E. Return of a patient for new condition, evolving condition, and continuing evaluation

II. Specific Goals for Patient Assessment

A. Perform a problem-focused, age- and ASA-appropriate medical history and physical examination based upon both the history of present illness and the observations of the Oral and Maxillofacial Surgeon
B. Establish an accurate diagnosis
C. Determine the need for care or treatment
D. Identify factors affecting risk to determine patient ability to undergo safe treatment, surgery, and/or anesthesia
E. Establish the rationale for care, treatment, or surgery of diagnosed conditions
F. Develop care or treatment recommendations and alternative treatment options, including no treatment
G. Document findings and recommendations and assign an ASA physical status (Appendix 1)
H. Provide preoperative patient instructions for planned surgery
I. Identify new or previously unrecognized conditions and determine the need for further assessment (eg, laboratory or radiographic) or consultation (eg, with primary care physician or specialist), treatment, surgery, or procedure and perioperative management (eg, autologous blood products)
J. Document outcomes and recommendations for further care or treatment
K. Confirm or refute an established diagnosis as a second opinion
L. Confirm appropriateness of a planned operation or procedure
M. Perform an informed consent discussion: Inform the patient/guardian of the findings, diagnosis, treatment options, and risks and benefits of each treatment option, including no treatment
N. Psychologically prepare the patient for surgery by providing reassurance and review of perioperative expectations
O. Obtain documentation for predetermination of insurance coverage benefits using current International Classification of Diseases (ICD-10) and Current Procedural Terminology (CPT) codes and guidelines
P. If you are an out-of-network provider, ensure all disclosures to the patient, including obtaining patient consent where needed, in accordance with the No Surprises Act

III. Specific Factors Affecting Risk for Patient Assessment

Factors that increase the potential for inadequate assessment:

A. Incomplete initial assessment
B. Patient's failure to return for scheduled follow-up assessment
C. Communication barriers (eg, language or cultural barriers, communication disorders, altered mental status, or level of consciousness)
D. Psychological, social, or gender barriers

PATIENT ASSESSMENT (continued)

E. Patient's, legal guardian's, or responsible party's failure to disclose information regarding patient history
F. Degree of patient's and/or family's cooperation and/or compliance
G. Physical barriers (eg, obesity, trismus, trauma)
H. Situational barriers (eg, life-threatening emergency, pending litigation)
I. Regulatory and/or third-party decisions concerning access to care, indicated therapy, drugs, devices, and/or materials

IV. Indicated Therapeutic Parameters for Patient Assessment

Patient assessment may be categorized into many different forms of encounter. Please refer to both the ICD- 10 *and the* CPT *coding manuals, as necessary. These encounters may be either initial or subsequent and may include but are not limited to the following:*

The level of patient assessment may be determined by time or the level of medical decision making. If the level is determined on medical decision making, factors may include the number and complexity of the problem(s) addressed during the encounter; the amount and complexity of data to be reviewed and analyzed during the encounter; and the risk of complications and/or morbidity or mortality of patient management. Any level of the patient evaluation by may include any or all of the components of a comprehensive history and physical examination.

The CPT published by the American Medical Association should be referred to for guidance when determining the level of evaluation and management services based on time or medical decision making.

Patient assessment should be documented in the medical record. The medical history obtained from the patient, legal guardian, or responsible party; and the physical examination findings form the basis of this document. Documentation of a patient's condition and planned surgery or procedure includes the following elements, as indicated by the patient's presentation or form of encounter. A comprehensive history and physical examination may not be appropriate for all patients, and the components of the history and physical examination should be individualized for each patient.

A. Office or other outpatient services
    1. New patient
    2. Established patient
B. Hospital observation services
C. Hospital inpatient services (eg, admission)
D. Consultations
    1. Office or other outpatient consultations
    2. Initial inpatient consultations
    3. Confirmatory consultation (eg, second opinion)
E. Preoperative assessment for outpatient surgery
F. Emergency department services
G. Other: nursing home, rehabilitation facility
H. Past medical history
    1. Chief complaint
    2. History of present illness
    3. Past medical history, with elaboration of positive and significant negative findings
        a. Medical, dental, and psychological conditions and/or illnesses
        b. Hospitalizations
        c. Anesthesia experience (adverse reactions or complications, such as personal or family history of malignant hyperthermia)
        d. Past surgical history (operations: major and minor)
        e. Past dental history
        f. Medications and dosages (past and present, including herbal medicines, cannabis, and nonprescription/OTC drugs)
        g. Allergies and reactions (including latex allergy)
        h. Vaccination status (COVID, Human Papilloma Virus, etc.)
    4. Review of systems (general and pertinent)
        a. General

PATIENT ASSESSMENT (continued)

b. Head, ears, eyes, nose, and throat (including oral cavity)
c. Cardiovascular (including exercise tolerance quantified by metabolic equivalent of tasks (METs) activity (See Appendix 3*)*
d. Respiratory
e. Gastrointestinal
f. Genitourinary (including the date of the last menstrual period, pregnancy status)
g. Musculoskeletal
h. Integumentary
i. Neurologic
j. Psychiatric
k. Endocrine
l. Hematologic/lymphatic
m. Allergic/immunologic

5. Family history
6. Social history
   a. Biologic sex, gender identification
   b. Occupation
   c. Substance use (eg, tobacco [pack-years], alcohol [daily amount], cannabis, illicit or recreational drugs [specific drugs and frequency of use]), e-cigarette usage (vaping)
   d. Other issues, as indicated by the patient's presentation (eg, religious or philosophical objections to care or treatment)
   e. History of violence and abuse; present or past post-traumatic stress disorder issues
   f. Coinhabitants (eg, partner, children)

I. Physical examination

The surgeon is responsible for documenting an appropriate history and physical examination, although the patient may be referred to another qualified professional for an examination. For most ASA class I and II patients undergoing outpatient surgery, the history and physical examination may be focused. For the surgical inpatient (depending on individual institutional requirements) and/or patients of advanced ASA status, a more comprehensive history and physical examination may be necessary. A patient's refusal to consent to a medical history and physical examination must be documented in the medical record and cosigned by the patient so that there is no misinterpretation of the treatment options offered.

1. General examination (Alert and Oriented [A&O] x 3)
2. Vital signs (heart rate, blood pressure [minimum for patient who will undergo anesthesia], temperature, respiratory rate)
3. Head, ears, eyes, nose and throat (including oral cavity)
4. Neck, including lymph nodes, trachea, and thyroid
5. Chest and lungs (inspection, palpation, percussion, auscultation)
6. Heart and great vessels (auscultation)
7. Breast (deferred, in most cases)
8. Abdomen
9. Pelvic/rectal (deferred, in most cases)
10. Musculoskeletal
11. Neurologic
12. Skin
13. Extremities

J. Adjunctive studies

The decision to obtain any adjunctive studies must be based on the results of the preoperative patient assessment data, ASA physical status, and surgical risk classification. Laboratory or radiologic testing without specific clinical indications is not medically necessary, clinically beneficial, or cost-effective. In determining studies to be performed for imaging purposes, principles of ALARA (as low as reasonably achievable) should be followed. For women of

PATIENT ASSESSMENT (continued)

childbearing age, the decision to perform urine or blood pregnancy testing prior to surgery and anesthesia should be based on an equivocal history of sexual activity and possibility of pregnancy and an uncertainty regarding the date of the last menstrual period. Routine urine or blood pregnancy testing of the pediatric patient is not clinically warranted without a specific indication. Adjunctive studies, when indicated, may include but are not limited to:

Laboratory evaluation:

1. Complete blood count (CBC), white blood cell count, hemoglobin, hematocrit
2. Chemistry-7 (sodium, potassium, chloride, serum bicarbonate, blood urea nitrogen, creatinine, and glucose)
3. Prothrombin time (PT), partial thromboplastin time (PTT), and international normalized ratio (INR)
4. Platelet count
5. Bleeding time
6. Type and screen, type and cross-sensitivity
7. Arterial blood gas
8. Fasting blood glucose, random blood glucose, glucose tolerance test, hemoglobin A_{1c}
9. Pregnancy testing (serum or urine)
10. Pulmonary function tests
11. Liver function tests
12. Urinalysis
13. Blood cultures, C-reactive protein levels

Radiologic examination:

1. Chest radiograph (CXR)
2. Panoramic radiograph
3. Periapical and/or occlusal radiographs
4. Maxillary and/or mandibular radiographs
5. Computed tomography (CT)
6. Computed tomographic angiography (CTA)
7. Cone beam computed tomography (CBCT)
8. Positron emission tomography (PET)
9. Positron emission tomography/computed tomography (PET-CT)
10. Positron emission tomography/magnetic resonance imaging (PET-MRI)
11. Single photon emission computed tomography (SPECT) scan
12. Magnetic resonance imaging (MRI)
13. Magnetic resonance angiography (MRA) (gadolinium, non-iodine based)
14. Ultrasound imaging
15. Radionuclide studies (bone scan)

Other tests:

1. Electrocardiogram (12-lead ECG)
2. Echocardiogram

K. Assessment

The Oral and Maxillofacial Surgeon should compile all of the information related to the results of the patient assessment, ASA status, surgical risk classification, and planned surgical procedure to determine an appropriate differential diagnosis and alternative treatment options, including an option of no treatment. The decisions made at this point in the patient assessment may include a review of the literature and/or consultations with other professionals, such as physicians, dentists, and specialists.

L. Treatment plan

The Oral and Maxillofacial Surgeon may make treatment recommendations based on his/her assessment of the patient's needs and ability to undergo surgery. In general, there are several options for management, and these should be presented to the patient and discussed in terms of risks and benefits of treatment and nontreatment, material risks of the procedures, possible complications, risk of recurrence, and the possible need for additional

PATIENT ASSESSMENT (continued)

procedures. The treatment plan may involve the need to submit a letter to a third-party company for predetermination of benefits for each patient before surgery. As such, it is important to properly code the diagnosis and treatment procedure using the latest ICD-10/CPT terminology.

V. Outcome Assessment Indices for Patient Assessment

Outcome indices are used by the Oral and Maxillofacial Surgeon and Oral and Maxillofacial Surgery specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical functional evaluation of patients and laboratory and radiographic measures.

A. General favorable outcomes associated with patient assessment
   1. Determination of accurate diagnoses
   2. Documentation of care or treatment recommendations based on an evidence-based rationale, when feasible
   3. Identification and documentation of risk factors associated with the patient assessment and recommended care or treatment versus nontreatment
   4. Successful achievement of assessment goals
   5. Accurate coding strategies

B. General unfavorable outcomes associated with patient assessment
   1. Failure of the Oral and Maxillofacial Surgeon to perform a complete history and physical examination, except in urgent/emergent situations when this is not possible
   2. Failure of patient to disclose adequate information contributing to incomplete obtainment of a medical history
   3. Failure of patient to disclose information contributing to an incomplete physical examination
   4. Patient-related factors contributing to incomplete or inaccurate diagnoses
   5. Patient-related factors contributing to incomplete or inaccurate treatment recommendations and/or treatment
   6. Complications resulting from inadequate assessment (eg, unrecognized risk factors, such as immunocompromise and those taking antiresorptive drugs.)
   7. Failure of patient to obtain the necessary informed consent information that a prudent patient would want to know before any surgical procedure, including consideration for non-English speaking and hearing/visually impaired patients.
   8. Failure to understand cultural differences and apply the principles of cultural competency
   9. Failure of the patient to disclose a new or evolving condition
   10. Failure of patient to return for scheduled follow-up assessment and management
   11. Failure to obtain appropriate consultation, when indicated
   12. Failure to recognize the need for adjunctive studies based on patient history, physical examination, or ASA status
   13. Failure to adhere to AHA guidelines regarding SBE (Appendix 4) and ADA guidelines for TJR (Appendix 5) prophylaxis regimes in at-risk patients undergoing at-risk procedures
   14. Inappropriate medication prescribing (eg, allergy, drug interactions, overprescribing)
   15. Failure to recognize prescription medication abuse (eg, narcotics)
   16. Iatrogenic patient injury due to inadequate patient assessment
   17. Failure of patient to disclose use of medications or other legal/illegal agents

SPECIFIC CLINICAL SCENARIOS

On occasion, the Oral and Maxillofacial Surgeon must perform an assessment of patients of advanced ASA status. The following clinical scenarios represent several of the more commonly seen disease processes organized by system and provide recommendations for assessment and management. These are only recommendations, and definitive patient assessment and management must be correlated clinically for each patient. In all cases of ASA class II or greater patients, consideration should be given to consultation with a physician for medical clarification of the patient's physiologic condition, and obtainment of a written medical risk assessment with perioperative recommendations to assist the Oral and Maxillofacial Surgeon in determining the appropriateness for outpatient OMS procedures that may include sedation or general anesthesia. For ASA II and greater patients, determination of the patient's MET level (metabolic equivalent) will give important information

SPECIFIC CLINICAL SCENARIOS (continued)

about their cardiac and respiratory reserve (Appendix 3). The following parameters are recommendations ONLY and should be individualized for each specific surgical patient at the discretion of the Oral and Maxillofacial Surgeon.

I. Cardiovascular System

A. Rheumatic heart disease, valvular heart disease, heart murmurs, congenital heart disease
   1. Consider cardiology consultation, if indicated
   2. Consider ultrasonography or echocardiography for documentation of cardiac valvular function
   3. Follow AHA SBE prophylaxis regimens for the at-risk patients undergoing at-risk procedures (Appendix 4)

B. Ischemic heart disease, hypertension, angina pectoris, myocardial infarction (MI)
   1. Determine current level of control (eg, exercise-tolerance, METs, stable vs unstable angina)
   2. Consider consultation with physician
   3. Consider *Cardiac Risk Stratification for Noncardiac Surgical Procedures* (Appendix 6)
   4. Use stress reduction techniques
   5. Consider deferring elective treatment for 1 month, and ideally 3 months, following MI
   6. Consider discontinuation of antiplatelet therapy only with cardiology consultation. For bare metal stents, the period of antiplatelet therapy is typically 6 months, while drug-eluting stents require 1 year of antiplatelet therapy after placement
   7. Consider limitation of epinephrine dosage contained in local anesthetic solution
   8. Be prepared for basic life support/advanced cardiac life support in emergency situations, as well as Pediatric Advanced Life Support for pediatric patients (see section on pediatric anesthesia outpatient sedation)

C. Congestive heart failure
   1. Determine level of control by history and physical examination (eg, shortness of breath, dyspnea on exertion, paroxysmal nocturnal dyspnea, orthopnea, jugular venous distention, ankle edema)
   2. Consider consultation with physician
   3. Consider ECG, CXR, brain natriuretic peptide level
   4. Consider oxygen supplementation

D. Congenital heart disease

II. Respiratory System

A. Chronic obstructive pulmonary disease, emphysema
   1. Consider consultation with physician
   2. Use supplementary steroids when indicated (Note: patients receiving therapeutic doses of corticosteroids who undergo a surgical procedure do not routinely require stress steroids if they continue their usual daily dose. Patients receiving physiologic replacement steroid doses due to primary hypothalamus-pituitary-adrenal axis disease do require perioperative supplementation)
   3. Use supplemental oxygen cautiously, since that may inhibit respiratory drive
   4. Consider pulmonary function testing to determine the extent of the disease and degree of respiratory reserve

B. Asthma
   1. Consider consultation with physician
   2. Determine severity based on history (eg, childhood asthma that has resolved; frequency of inhaler use, respiratory-related hospitalizations) and careful physical examination including respiratory rate and lung auscultation
   3. Consider prophylactic use of inhaler
   4. Use stress reduction techniques
   5. Consider pulmonary function testing

III. Endocrine System

A. Diabetes mellitus
   1. Determine level of diabetic control (based upon history, fasting blood glucose analysis, glucose tolerance test, hemoglobin A_{1c}; Appendix 7)

      Note: The decision to obtain immediate glucose level depends on many variables, including patient factors and surgical factors, such as clinical signs and symptoms of hypoglycemia or hyperglycemia, whether the patient is taking insulin or oral hypoglycemic agents only, presurgical NPO status, plan

SPECIFIC CLINICAL SCENARIOS (continued)

for local versus intravenous sedation, general anesthesia, length of planned surgery, and patient's self-reporting of level of glucose control
2. Avoid hypoglycemia
3. Consider hypoglycemic agent scheduling adjustment
4. Consider insulin reduction, as necessary (see Appendix 8)
5. Consider discontinuation or reduction of oral hypoglycemic agents before surgery, although second-generation sulfonylureas may be continued. Consideration for discontinuation of metformin prior to surgery, or for those having IV contrast, to prevent the risk of lactic acidosis should be based on an assessment of renal function. Delayed gastric emptying may occur with glucagon-like peptide-1 (GLP-1) receptor agonists with an increased risk of aspiration. These medications may require prolonged preanesthetic cessation
6. Consider rescheduling surgery if blood glucose level is significantly elevated, but this decision should be based on an overall assessment of the patient and their planned procedure
7. Consider prophylactic antibiotics
8. Consider H_2 blockers and prokinetic agents to reduce aspiration risks
9. Consider an extended period of NPO status due to gastroparesis with careful prophylaxis with agents that inhibit acid reflux, as necessary
10. Use stress reduction techniques
11. Consider cardiac evaluation and potential for "silent" heart disease

B. Adrenal insufficiency due to exogenous steroid use
1. Use stress reduction techniques
2. Consider steroid supplementation, although evidence does not support this for the majority of patients on chronic steroid usage

IV. Hematologic Disorders

A. Coagulopathy, bleeding disorders (eg, von Willebrand disease, hemophilia), therapeutic anticoagulation
1. Determine pertinent laboratory values (eg, CBC with platelets, PT, PTT, INR)
2. If necessary, temporary discontinuation of anticoagulation or antiplatelet therapy (with prescribing physician consultation) to achieve a reasonable INR for surgical hemostasis based on specific procedures performed
3. If necessary, discontinuation of anticoagulants (eg, rivaroxaban [Xarelto], dabigatran [Pradaxa], and apixaban [Eliquis]) up to 48 hours prior to surgery, based consultation with prescribing physician (see Appendix 9)
4. Consider the use of a reversal agent if required based upon the specific anticoagulant/antiplatelet drug used (Appendix 9)
5. Consider adjustment of medication(s) for the patient on multiple anticoagulants or antiplatelet medications (eg, clopidogrel [Plavix] and aspirin) if necessary and with consultation with prescribing physician
6. Determine factor level or platelet count if indicated, and supplement as necessary (with hematologist consultation)
7. For extended length cases or for patients at increased risk, deep vein thrombosis prophylaxis maybe considered using compression stockings or subcutaneous medications (eg, heparin, enoxaparin)
8. Consider workup for hypercoagulable states: Factor V Leiden, protein C and S deficiency, prothrombin G20210 mutation, and antithrombin III deficiency
9. The provider should have a detailed history of systemic comorbidities (eg, diabetes, liver failure, and/or kidney failure) when evaluating the INR prior to surgical intervention since studies have suggested that the INR range should be lower than in patients without comorbid disease

B. Anemia
1. Consider a CBC with platelet count
2. Consider auto-donation of blood or blood products if a large percentage of blood volume loss during surgery is anticipated

V. Gastrointestinal Disorders

A. Hepatitis
1. Avoid medications with hepatic metabolism, such as acetaminophen (Tylenol)
2. Consider liver function tests, PT/PTT, INR, platelet count, bleeding time

SPECIFIC CLINICAL SCENARIOS (continued)

3. Consider hepatitis B surface antigen screening
4. Monitor the use of NSAIDs and OTC medications
5. Consider hepatitis C panel

VI. Renal Disease

A. Renal failure
1. Consider avoidance of drugs with renal metabolism
2. Consider hemodialysis or peritoneal dialysis regimen and schedule surgery accordingly
3. Consider the impact of medications removed by hemodialysis
4. Monitor the use of NSAIDs and OTC medications

VII. Neurologic Disorders

Some neurologic disorders, such as intellectual disability, attention-deficit/hyperactivity disorder, autism, and their associated medical treatments may affect the ability of an Oral and Maxillofacial Surgeon to perform an adequate patient assessment and subsequent management. Consideration should be given to comprehensive dental and oral surgical management in an operating facility under sedation or general anesthesia

VIII. Musculoskeletal System

A. TJR
1. Follow ADA recommendations regarding prophylaxis with antibiotics (Appendix 5)

IX. Miscellaneous

A. Obesity
1. Consider body mass index calculation
2. Consider altered airway anatomy
3. Consider decreased respiratory reserve
4. Consider medication dosage adjustment
5. Consider an extended period of NPO status

B. Pregnancy
1. Defer urgent surgery to the second trimester if possible or ideally postpartum
2. Consider drug safety pregnancy profiles (Appendix 10)

C. MRONJ (Also see *Diagnosis and Management of Pathological Conditions* chapter)
1. Consider consultation with prescribing physician
2. Consider discontinuation of bisphosphonate medications as well as other antiresorptive agents for a brief period before and/or after surgery if systemic conditions permit and in consultation with the prescribing physician
3. Consider the risks associated with Rank-L inhibitors such as denosumab (Xgeva)
4. Consider the risks associated with vascular endothelial growth factor inhibitors such as bevacizumab (Avastin)
5. Consider debridement, sequestrectomy, or resection of existing necrotic bone as well as extraction of teeth in already necrotic bone
6. Consider preoperative and perioperative antibiotics and antimicrobial rinses
7. Consider preoperative pentoxifylline (Trental) and tocopherol (vitamin E)

D. Malignant hyperthermia
1. Recognize risk factors, signs, and symptoms
2. Be prepared to manage/transfer patient for treatment

E. Radiation Therapy
1. Ascertain dosage in the area of planned treatment, use of jaw shields, and presence of xerostomia
2. Consider prophylactic hyperbaric oxygen therapy
3. Consider preoperative pentoxifylline (Trental) and tocopherol (vitamin E)
4. Consider preoperative and perioperative antibiotics and antimicrobial rinses
5. Care with general practitioner colleagues about the necessity of oral cavity prep aration and rehabilitation prior to any RT. Consider timing of extractions of any teeth in the field of radiation with poor or guarded prognosis

F. Communicate and coordinate

G. Elderly (>65 years old) patients

SPECIFIC CLINICAL SCENARIOS (continued)

1. Consider progressive functional decline of all major organ systems
2. Consider altered cardiac function and reduced METs
3. Consider increased perioperative morbidity and mortality with preexisting history of cardiovascular disease or MI
4. Consider decreased pulmonary reserve and function
5. Consider advanced age as predictor of postoperative pulmonary complications
6. Consider increased sensitivity to the respiratory-depressant effects of opioids and benzodiazepines
7. Consider impaired hepatic and renal function
8. Consider altered drug metabolism
9. Consider increased sensitivity to the central depressant effects of anesthetic agents and medications
10. Consider increased perioperative morbidity and mortality with inability to achieve acceptable levels of pain control
11. Consider increased incidence of adverse drug reactions and interactions due to polypharmacy
12. Consider increased susceptibility to postoperative delirium and the effect of anesthetic agents on long-term cognition and memory
13. Consider increased risk for nutritional deficiencies
14. Consider cognitive impairment, including effect of opioids if applicable
15. Consider declines in motor function and occupational tasks

H. Pediatric considerations (<12 years old)
1. Obtain thorough medical history from knowledgeable parent/guardian or directly from pediatrician if concerned with quality of information.
2. Consider decreased pulmonary reserve and additive effect of any other pulmonary conditions, especially when planning sedative/anesthetic care.
3. Consider the differences in dosages and pharmacokinetics of medications, including local and general anesthetic agents in comparison to adults.
4. Consider and plan for postoperative pain control with appreciation of the increased risk of airway compromise with opioids in this patient population.

APPENDICES

APPENDIX 1

AMERICAN SOCIETY OF ANESTHESIOLOGISTS PHYSICAL STATUS CLASSIFICATION SYSTEM

ASA class I	A normal healthy patient
ASA class II	A patient with mild systemic disease
ASA class III	A patient with severe systemic disease
ASA class IV	A patient with severe systemic disease that is a constant threat to life
ASA class V	A moribund patient who is not expected to survive without an operation
ASA class VI	A declared brain-dead patient whose organs are being removed for donor purposes

Note: If a surgical procedure is performed emergently, an "E" is added to the previously defined ASA classification.
American Society of Anesthesiologists. https://www.asahq.org/resources/clinical-information/asa-physical-status-classification-system. Accessed January 5, 2022. Reprinted with permission.

APPENDIX 2

AMERICAN SOCIETY OF ANESTHESIOLOGISTS FASTING GUIDELINES

Ingested Material	Minimum Fasting Period
Clear liquids	2 hours
Breast milk	4 hours
Infant formula	6 hours
Nonhuman milk	6 hours
Light meal	6 hours
Fatty meal	8 hours

American Society of Anesthesiologists: Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures. *Anesthesiology* 114:495, 2011. Reprinted with permission.

APPENDIX 3

ESTIMATED ENERGY REQUIREMENTS FOR VARIOUS ACTIVITIES

	Can You		Can You
1 MET	Take care of yourself?	4 METs	Climb a flight of stairs or walk up a hill?
↓	Eat, dress, or use the toilet?	↓	Walk on level ground at 4 mph?
↓	Walk indoors around the house?	↓	Run a short distance?
↓		↓	
↓	Walk a block or 2 on level	↓	Do heavy work around the house like scrubbing floors or lifting or moving heavy
↓	ground at 2-3 mph?	↓	furniture?
4 METs	Do light work around the house	↓	Participate in moderate recreational activities like golf, bowling, dancing, doubles
	like dusting or washing dishes?	↓	tennis, or throwing a baseball or football?
		↓	
		>10 METs	Participate in strenuous sports like swimming, singles tennis, football, basketball, or skiing?

Fleisher LA, Beckman JA, Brown KA, et al: ACC/AHA 2007 guidelines on perioperative cardiovascular evaluation and care for noncardiac surgery. *J Am Coll Cardiol* 50:e159, 2007.

APPENDIX 4

AMERICAN HEART ASSOCIATION PREVENTION OF INFECTIVE ENDOCARDITIS

Cardiac Conditions Associated With the Highest Risk of Adverse Outcome From Endocarditis for Which Prophylaxis With Dental Procedures Is Recommended

Prosthetic cardiac valve Previous IE
Congenital heart disease (CHD)*
- Unrepaired cyanotic CHD, including palliative shunts and conduits
- Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure†
- Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibits endothelialization)

Cardiac transplantation recipients who develop cardiac valvulopathy

* Except for the conditions listed above, antibiotic prophylaxis is no longer recommended for any other form of CHD.
† Prophylaxis is recommended because endothelialization of prosthetic material occurs within 6 months after the procedure.

Dental Procedures for Which Endocarditis Prophylaxis Is Recommended for Patients

*All dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa**

* The following procedures and events do not need prophylaxis: routine anesthetic injections through noninfected tissue, taking dental radiographs, placement of removable prosthodontic or orthodontic appliances, adjustment of orthodontic appliances, placement of orthodontic brackets, shedding of deciduous teeth, and bleeding from trauma to the lips or oral mucosa.

Regimens for a Dental Procedure at a Single Dose 30-60 Minutes Before Procedure

	Regimen: Single Dose 30 to 60 Min Before Procedure		
Situation	**Agent**	**Adults**	**Children**
Oral	Amoxicillin	2 g	50 mg/kg
Unable to take oral medication	Ampicillin	2 g IM or IV	50 mg/kg IM or IV
	OR		
	Cefazolin or ceftriaxone	1g IM or IV	50 mg/kg IM or IV
Allergic to penicillins or ampicillin-oral	Cephalexin*†	2 g	50 mg/kg
	OR		
	Azithromycin or clarithromycin	500 mg	15 mg/kg
	OR		
	Doxycycline	100 mg	<45 kg; 4.4 mg/kg; >45 kg; 100 mg
Allergic to penicillin or ampicillin and unable to take oral medication	Cefazolin or ceftriaxone†	1g IM or IV	50 mg/kg IM or IV

Clindamycin is no longer recommended for antibiotic prophylaxis for a dental procedure.
Abbreviations: IM, intramuscular; IV, intravenous.
* Or other first- or second-generation oral cephalosporin in equivalent adult or pediatric dosage.
† Cephalosporins should not be used in an individual with a history of anaphylaxis, angioedema, or urticaria with penicillins or ampicillin. In: Walter R. Wilson, Michael Gewitz, Peter B. Lockhart, Ann F. Bolger, Daniel C. DeSimone, Dhruv S. Kazi, David J. Couper, et al. Prevention of Viridans Group Streptococcal Infective Endocarditis: A Scientific Statement From the American Heart Association. Circulation 143 (20): e963-978, 2021.

APPENDIX 5

AMERICAN DENTAL ASSOCIATION ANTIBIOTIC PROPHYLAXIS FOR DENTAL PATIENTS WITH TOTAL JOINT REPLACEMENTS

Management of Patients With Prosthetic Joints Undergoing Dental Procedures

Clinical recommendation:

In general, for patients with prosthetic joint implants, prophylactic antibiotics are not recommended prior to dental procedures to prevent prosthetic joint infection.

For patients with a history of complications associated with their joint replacement surgery who are undergoing dental procedures that include gingival manipulation or mucosal incision, prophylactic antibiotics should only be considered after consultation with the patient and orthopedic surgeon.* To assess a patient's medical status, a complete health history is always recommended when making final decisions regarding the need for antibiotic prophylaxis.

Clinical reasoning for the recommendation:

- There is evidence that dental procedures are not associated with prosthetic joint implant infections.
- There is evidence that antibiotics provided before oral care do not prevent prosthetic joint implant infections.
- There are potential harms of antibiotics including risk for anaphylaxis, antibiotic resistance, and opportunistic infections like *Clostridium difficile.*
- The benefits of antibiotic prophylaxis may not exceed the harms for most patients.
- The individual patient's circumstances and preferences should be considered when deciding whether to prescribe prophylactic antibiotics prior to dental procedures.

* In cases where antibiotics are deemed necessary, it is most appropriate that the orthopedic surgeon recommend the appropriate antibiotic regimen and when reasonable write the prescription.ADA Center for Evidence-Based DentistryTM. Sollecito TP, Abt E, Lockhart PB, et al: The use of prophylactic antibiotics prior to dental procedures in patients with prosthetic joints: Evidence-based clinical practice guidelines for dental practitioners. A report of the American Dental Association Council on Scientific Affairs. J Am Dent Assoc 146:11, 2015

APPENDIX 6

CARDIAC RISK* STRATIFICATION FOR NONCARDIAC SURGICAL PROCEDURES

Risk Stratification	Procedure Examples
High (reported cardiac risk often more than 5%)	Aortic and other major vascular surgery Peripheral vascular surgery
Intermediate (reported cardiac risk generally 1 to 5%)	Intraperitoneal and intrathoracic surgery Carotid endarterectomy Head and neck surgery Orthopedic surgery Prostate surgery
Low† (reported cardiac risk generally less than 1%)	Endoscopic procedures Superficial procedure Cataract surgery Breast surgery Ambulatory surgery

* Combined incidence of cardiac death and nonfatal myocardial infarction.
† These procedures do not generally require further preoperative cardiac monitoring. Fleisher LA, Beckman JA, Brown KA, et al. ACC/AHA 2007 guidelines on perioperative cardiovascular evaluation and care for noncardiac surgery. *J Am Coll Cardiol.* 50:e159, 2007

APPENDIX 7

THE RELATIONSHIP AMONG HBA1C, BLOOD GLUCOSE, AND EAG*

Hb_{a1c} %	Blood Glucose (mg/dl)	eAG(mmol/l)
6	126	7.0
6.5	140	7.8
7	154	8.6
7.5	169	9.4
8	183	10.1
8.5	197	10.9
9	212	11.8
9.5	226	12.6
10	240	13.4

* Adapted from: https://professional.diabetes.org/diapro/glucose_calc.

APPENDIX 8

PERIOPERATIVE INSULIN MANAGEMENT

Insulin Regimen	Day Before Surgery	Day of Surgery	Comments
Insulin pump	No change	No change	Use "sick day" or "sleep" basal rates
Long-acting peakless insulins On the day of surgery, the morning dose of basal insulin may be administered	No change	75-100% of morning dose	Reduce nighttime dose if history of nocturnal or morning hypoglycemia on arrival to the ambulatory surgery facility
Intermediate-acting insulins	No change in daytime dose 75% of dose if taken in the evening	50-75% of morning dose	See comments for long- acting insulins
Fixed combination insulins	No change	50-75% of morning dose of intermediate-acting component	Lispro-protamine only available in combination, therefore use insulin instead on the day of surgery. See the comments for long-acting insulins
Short- and rapid-acting insulins	No change	Hold the dose	
Non-insulin injectables	No change	Hold the dose	

Joshi GP, Chung F, Vann MA, et al. Society for Ambulatory Anesthesia consensus statement on perioperative blood glucose management in diabetic patients undergoing ambulatory surgery. *Anesth Analg* 111:1378, 2010. Reprinted with permission.

APPENDIX 9

ANTIPLATELET AND ANTICOAGULANT DRUGS

Anticoagulants (Direct Oral Anticoagulants)		Mechanism of Action	Reversal Agent Generic/ Proprietary	Discontinue (D/C) or Not (N)	Antiplatelet Medication (Novel Oral Antiplatelets/ Others)		Mechanism of Action	Reversal Agent Generic/ Proprietary	Discontinue (D/C) or Not (N)
Generic	**Proprietary**				**Generic**	**Proprietary**			
Warfarin Half-life: 20-60 hours	**Coumadin**	Antagonist of vitamin K, and affecting II,VII,IX,X	**Vitamin K/ Phytonadione Kcentra** **Prothrombin Complex Concentrate (4-factor PCC)**	D/C based upon INR (If > 4 no surgery)	**Acetyl salicylic acid Half-life: 15- 20 min**	**Aspirin, BioPak, Adira**	Inhibits TXA_2 and platelet aggregation	**None**	D/C depends upon dosing: 325 vs 81 mg
Dabigatran Half-life: 12-17 hours	**Pradaxa**	Inhibitor of free thrombin. Thrombin bound to fibrin; inhibits activity of IIa (INR not required)	**Isdarucizumab Praxbind**	N based upon number of teeth to be removed (>2 discuss with physician)	**Dipyridamole**	**Persantine**	Blocks adenosine transport in platelets, erythrocytes and endothelial cells. Acts on platelet A2-receptors increasing cAMP and blocks platelet aggregation	**None**	Works with ASA and not usually used alone. Short half-life D/C based upon dual effects with other antiplatelet drugs
Rivaroxaban Half-life: 9-13 hours	**Xarelto**	Selective factor Xa inhibitors (INR not required)	**Andexanet Alfa Andexxa**	N based upon the number of teeth; ie > 2-3	**Clopidogrel bisulfate Half-life:7-9 hours**	**Plavix, Iscover**	Inhibit platelet aggregation by blocking ADP binding to platelet receptors (P_2Y_{12}) and activation of GPIIb-IIIa complex	**None**	Do not D/C up to 1 year. After 1 year check with physician prior to D/C based upon complexity of procedure
Apixaban Half-life: 9-14 hours	**Eliquis**	Selective factor Xa inhibitors (INR not required)	**Andexanet Alfa Andexxa**	N based upon the number of teeth; ie > 2-3	**Ticlopidine hydrochlorid e**	**Ticlid, Ticlodone**	Inhibits platelet binding to ADP-fibrinogen as well as platelet aggregation	**None**	D/C 10-14 days prior to elective surgery
Heparin (LMWH) Enoxaparin Half-life:4.5 hr Dalteparin Half-life: 2.2 hr	**Lovenox Fragmin**	Inhibit activity of Xa and IIa	**Protamine sulfate** **Protamines**	Used for bridging to avoid undue thromboembolic events	**Cilostazol**	**Pletal**	Prevents platelet aggregation and indices vasodilatory effects	**None**	Must D/C 10-14 day prior to elective surgery
					Prasugrel Half-life: 7 hours	**Effient**	A thieno-pyridine that binds irreversibly to P_2Y_{12} platelet receptors	**None**	N: do not D/C for elective surgery
					Ticagrelor Half-life: 7-9 hours	**Brilique**	A thieno-pyridine that binds irreversibly to P_2Y_{12} platelet receptors	**Bentracimab Brilinta**	N: do not D/C for elective surgery

APPENDIX 10

PREGNANCY RISK CATEGORIES (FDA CATEGORIES)

FDA Pregnancy Category Definition (Language summarized from 21 CFR 201.57)

Category	Definition
A	Adequate and well-controlled (AWC) studies in pregnant women have failed to demonstrate a risk to the fetus in the first trimester of pregnancy (and there is no evidence of a risk in later trimesters).
B	Animal reproduction studies have failed to demonstrate a risk to the fetus and there are no AWC studies in humans AND the benefits from the use of the drug in pregnant women may be acceptable despite its potential risks OR animal studies have not been conducted and there are no AWC studies in humans.
C	Animal reproduction studies have shown an adverse effect on the fetus, there are no AWC studies in humans, AND the benefits from the use of the drug in pregnant woman may be acceptable despite its potential risks OR animal studies have not been conducted and there are no AWC in humans.
D	There is positive evidence of human fetal risk based on adverse reaction data from investigational or marketing experience or studies in humans, BUT the potential benefits from the use of the drug in pregnant women may be acceptable despite its potential risks (eg, if the drug is needed in a life-threatening situation or serious disease for which safer drugs cannot be used or are ineffective).
X	Studies in animals or humans have demonstrated fetal abnormalities OR there is positive evidence of fetal risk based on adverse reaction reports from investigational or marketing experience, or both, AND the risk of the use of the drug in a pregnant woman clearly outweighs any possible benefit (eg, safer drugs or other forms of therapy are available).

Food and Drug Association (FDA) WebWebsiteWeb site. http://www.fda.gov/downloads/advisorycommittees/committeesmeetingmaterials/pediatricadvisorycommittee/ucm272377.pdf. Accessed January 11, 2022. Current FDA labeling has changed to remove these categories. Table is presented for reference purposes only.

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This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation of this document. Citation of the reference material is not meant to imply endorsement of any statement contained in the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

ANESTHESIA IN OUTPATIENT FACILITIES

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023,* WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE. TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

Criteria and parameters in this section refer specifically and exclusively to methods used by Oral and Maxillofacial Surgeons to control the pain and anxiety of patients treated in outpatient facilities (eg, dental school surgery units, ambulatory surgery centers, Oral and Maxillofacial Surgeons' offices, and other facilities where Oral and Maxillofacial Surgery is performed).

Pain and anxiety control, using various techniques of regional (local) anesthesia, all forms of sedation, and general anesthesia, have been an integral part of the practice of Oral and Maxillofacial Surgery since the inception of the specialty. Anxiety, fear, and pain are concerns because each is inherent in the patient's reaction to the proposed treatment. All 3 must be controlled satisfactorily during the perioperative period to permit safe and effective completion of the surgical procedure. These anesthesia criteria have been developed to maximize safety and minimize risk for patients.

The practitioner's selection of a particular technique for controlling pain and anxiety during a specific procedure has to be individually determined for each patient, considering the risks and benefits for each case.

Techniques seldom used or applicable to very few patients are not included in this section. This category includes hypnosis, acupuncture, transcutaneous electrical nerve stimulation, and specific medications and techniques for controlling acute or chronic pain. Behavior modification techniques (biofeedback) and psychiatric management also have been excluded from this section.

In the future, new indications or new anesthetic agents and techniques may lead to changes in equipment. As new pieces of equipment and their techniques for use are evaluated for safety and efficacy and accepted for patient care and treatment, their inclusion in this document will be considered.

DEFINITIONS OF SEDATION AND ANESTHESIA

The following definitions are taken from the American Society of Anesthesiologists (ASA) *Continuum of Depth of Sedation Definition of General Anesthesia and Levels of Sedation/Analgesia* (approved by the ASA House of Delegates on October 13, 1999, last amended on October 15, 2014).

Minimal Sedation is a drug-induced state during which patients respond normally to verbal stimulation. Although cognitive function and physical coordination may be impaired, airway reflexes and ventilatory and cardiovascular functions are unaffected.

Moderate Sedation/Analgesia is a drug-induced depression of consciousness during which patients respond purposefully** to verbal commands, either alone or accompanied by light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation is adequate. Cardiovascular function is usually maintained.

Deep Sedation/Analgesia is a drug-induced depression of consciousness during which patients cannot be easily aroused but respond purposefully** following repeated or painful stimulation. The ability to independently maintain ventilatory function may be impaired. Patients may require assistance in maintaining a patent airway, and spontaneous ventilation may be inadequate. Cardiovascular function is usually maintained.

General Anesthesia is a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation. The ability to maintain ventilatory function is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.

Because sedation is a continuum, it is not always possible to predict how an individual patient will respond. Hence, practitioners intending to produce a given level of sedation should be able to rescue*** patients whose level of sedation becomes deeper than initially intended. Practitioners administering moderate sedation/analgesia should be able to rescue*** patients who enter a state of deep sedation/analgesia, whereas those administering deep sedation/analgesia should be able to rescue*** patients who enter a state of general anesthesia.

** Reflex withdrawal from a painful stimulus is NOT considered a purposeful response.

*** Rescue of a patient from a deeper level of sedation than intended is an intervention by a practitioner proficient in airway management and advanced life support. The qualified practitioner corrects adverse physiologic consequences of the deeper-than-intended level of sedation (such as hypoventilation, hypoxia, and hypotension) and returns the patient to the originally intended level of sedation. It is not appropriate to continue the procedure at an unintended level of sedation.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR ANESTHESIA IN OUTPATIENT FACILITIES

INFORMED CONSENT: All surgery must be preceded by the patient's or legal guardian's consent unless an emergent situation dictates otherwise. These circumstances should be documented in the patient's record.

Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the factors that may affect the risk, the treatment options, and the favorable outcomes.

DOCUMENTATION: The *American Association of Oral and Maxillofacial Surgeons (AAOMS) ParCare 2023* includes documentation of objective findings, diagnoses, and patient management interventions. *The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon in light of the circumstances presented by each patient.*

Understandably, there may be good clinical reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well advised to note in the patient's record the reason for the procedure followed. Moreover, it should be understood that adherence to the parameters does not guarantee a favorable outcome.

FACILITIES: When anesthesia is administered in an office setting by or for an Oral and Maxillofacial Surgeon, that office shall have been evaluated according to the AAOMS bylaws, AAOMS Governing Rules and Regulations 2016-2017 (Bylaws – Chapter III, Component Societies and Counterparts, Section 30. Qualifications, B). Specific language applicable to the facility is as follows: "fulfillment of an on-site office anesthesia evaluation with re-evaluation every five (5) years based on the AAOMS office anesthesia evaluation program or required applicable state or federal regulations." The current edition of the *AAOMS Office Anesthesia Evaluation Manual* is applicable. State laws govern the necessity for inspection of facilities in which Oral and Maxillofacial Surgeons administer anesthesia. When Oral and Maxillofacial Surgeons administer anesthesia in multiple locations, the primary facility must be inspected. The surgeon should ensure that all facilities are held to the same standard of excellence, that facilities are comparably equipped with anesthetic emergency drugs and equipment, and that the staffs are comparably and adequately trained.

When nitrous oxide is used alone or as an adjunct to any of the anesthetic techniques included in this section, appropriate scavenging equipment must be used to reduce trace gas environmental contamination. It is suggested that all staff be educated in the risks of trace gas and exposure to nitrous oxide and techniques to minimize such risks.

The surgeon should successfully complete a course in Advanced Cardiac Life Support (ACLS) at 2-year intervals. The facility must also be equipped to provide ACLS care. When pediatric patients are treated, the completion of a Pediatric Advanced Life Support (PALS) course should be considered and the facility equipped with appropriate age-specific equipment to provide PALS level care.

Each facility where the Oral and Maxillofacial Surgeon provides anesthesia services should be certified by an independent third party to verify the proper functioning of the medical gas lines. This certification must include an analysis of the medical gas delivered by each marked line and an assessment of the functionality of all "fail-safe" mechanisms. Certification should be in accordance with local or state regulations. Regular verification of anesthetic gas administration devices should be obtained per manufacturers guidelines.

PREANESTHETIC PHYSICAL AND LABORATORY ASSESSMENT: Preanesthetic physical assessment is described in the *Patient Assessment* chapter of *AAOMS ParCare2023*. Routine laboratory testing is not indicated. The need for laboratory testing should be based on the history and physical examination of the patient and the nature of the surgical procedure. Laboratory testing should be performed only when the results may alter the management of the patient.

PERIOPERATIVE COMPLICATIONS AND EMERGENCIES: Because adverse outcomes related to anesthesia, though rare, may be catastrophic, the following must be available and/or provided:

A. Mobile auxiliary sources of light and suction that can be used during power failure. In addition to the central source of oxygen, there must be an auxiliary source capable of delivering oxygen under positive pressure for at least 1 hour.
B. Periodic scheduled emergency mock drill sessions for all personnel to demonstrate knowledge and skillful management of potential emergency problems
C. ACLS guidelines and suggestions contained in the *AAOMS Office Anesthesia Evaluation Manual*, which are the recommendations for management of emergencies associated with anesthesia in the oral and maxillofacial surgery outpatient environment
D. Appropriate equipment and drugs, as recommended in the *AAOMS Office Anesthesia Evaluation Manual*

GENERAL THERAPEUTIC GOALS FOR ANESTHESIA IN OUTPATIENT FACILITIES ARE AS FOLLOWS

A. Provision of safe anesthetic care
B. Full recovery within a reasonable period
C. Appropriate understanding by patient (family) of treatment options and acceptance of treatment plan
D. Appropriate understanding and acceptance by patient (family) of favorable outcomes and known risks and complications

GENERAL FACTORS AFFECTING RISK DURING ANESTHESIA IN OUTPATIENT FACILITIES ARE AS FOLLOWS

A. Degree of patient's and/or family's understanding of the origin and natural course of the condition and/or disorder and the knowledge of the patient's and/or family's medical history
B. Presence of coexisting systemic and psychiatric disease (eg, disease that increases a patient's ASA classification to II, III, or IV), as detailed in the *Patient Assessment* chapter
C. Age of patient
D. The use of prescribed or over-the-counter medications and/or herbal medications or vitamins
E. Current or past use of illicit drugs, marijuana, or alcohol
F. History of or present use of tobacco
G. Degree of patient's and/or family's understanding of the therapeutic goals and acceptance of the proposed treatment, resulting in the patient's and family's cooperation and compliance with perioperative anesthetic instructions
H. Conditions that promote airway obstruction
I. Conditions that impede ventilation and/or intubation of the hypopneic/apneic patient
J. Familial history of problems related to anesthesia
K. Diagnosed obstructive sleep apnea (OSA) or class II or class III body mass index (BMI)
L. Presence of infection
M. Pregnancy

GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR ANESTHESIA IN OUTPATIENT FACILITIES ARE AS FOLLOWS

A. Recovery of the patient from the anesthetic effects, returning to his/her preanesthetic physiologic and psychologic state within an appropriate time after the cessation of the administration of the anesthetic drugs
B. Agreement that the anesthetic experience was satisfactory by both the surgeon and the patient
C. Recovery from the administration of sedatives, anesthetic agents, and other adjunctive medications
D. Patient (family) acceptance of procedure and understanding of outcomes

GENERAL KNOWN RISKS AND COMPLICATIONS FOR ANESTHESIA IN OUTPATIENT FACILITIES ARE AS FOLLOWS

A. Syncope
B. Drug overdosage or reaction (allergy or sensitivity)
C. Adverse cardiovascular or pulmonary event
D. Vascular injury
E. Respiratory depression, obstruction, or arrest
F. Airway loss or obstruction requiring a rescue airway maneuver or adjunct airway device placement
G. Inability to ventilate or intubate
H. Prolonged hypoxia or hypercapnia
I. Vomiting and/or aspiration
J. Displacement of foreign body into upper airway or bronchi
K. Development of peripheral neurologic deficit
L. Anesthesia-related organ failure
M. Unplanned hospital admission
N. Dental injury related to anesthetic care
O. Other oral and nasal injuries, such as laceration, hematoma, subcutaneous emphysema, hemorrhage, and edema, related to anesthetic administration
P. Ocular injuries

Q. Thromboembolic phenomena (especially with long duration of immobility during anesthesia)
R. Malignant hyperthermia
S. Airway fire
T. Brain injury
U. Death

SPECIAL CONSIDERATIONS FOR PEDIATRIC ANESTHESIA IN OUTPATIENT FACILITIES

It is important to appreciate that children are not simply "small adults," but have many unique and constantly changing anatomic, physiologic, pharmacologic, and psychological differences. The anesthetic goals for the pediatric patient are safety, cooperation, elimination of pain, reduction of anxiety, and control of behavior to allow completion of the planned intervention.

The initial evaluation of the pediatric patient is unique in several ways. The history is derived almost completely from the caregiver. Systemic diseases and prescription medications are uncommon, and past anesthetic experiences are rare. Instead, a family history of allergies and conditions such as sickle-cell anemia and malignant hyperthermia are of great importance. A targeted physical examination should consist of an airway, heart, and lung evaluation. Recent upper respiratory infection, fever, mucopurulent nasal discharge, audible wheezing, or productive cough should prompt further evaluation, as these conditions often predispose to laryngospasm and accelerated oxygen desaturation. Congenital cardiac defects or the presence of a new cardiac murmur should be evaluated completely prior to proceeding. Female patients of childbearing age (usually 12 years and older) should be questioned and tested for the possibility of pregnancy in all circumstances where a general anesthetic is considered. Sensitivity in performing this assessment is necessary, but the subject should not be ignored. A urine or serum human chorionic gonadotropin may be appropriate and is required by many institutions.

Children have unique anatomical and physiologic characteristics that must be considered during anesthesia. Their small nares, large tongue, and enlarged tonsils/adenoids can cause passive airway obstruction. Children have a large head, yet a short neck, leading to neck flexion and airway obstruction when lying supine. The epiglottis can be long, narrow, and often angled posteriorly. The larynx is higher than in the adult, and funnel shaped, with the narrowest portion located below inclined vocal cords. These factors hamper direct laryngoscopy and can present significant challenges during airway management. The pediatric airway is far more reactive to stimuli such as secretion or foreign bodies than an adult airway. As a result, laryngospasm is a complication that must be quickly identified and skillfully managed. The pediatric heart has less muscle mass and a lower strength of contraction leading to an invariant stroke volume. Although cardiac output can be maintained over a wide range of preloads and rates without failing, young pediatric patients rely almost solely on heart rate to maintain blood pressure. As a result, bradycardia is an ominous sign during any pediatric anesthetic and must be immediately detected and corrected. On reviewing cases of cardiac arrest during pediatric anesthetics, the single most causative factor was found to be an untreated respiratory arrest degenerating to cardiac arrest. This reinforces the importance of airway management in the anesthetic care of pediatric patients.

Pharmacologic considerations demand a thorough knowledge of anesthetic and analgesic agents. Many routes of drug administration are available to the Oral and Maxillofacial Surgeon providing pediatric anesthesia. All pediatric patients should be weighed prior to drug dose selection. Most, if not all, agents should be administered and prescribed as units per kilogram of weight of the child. Intraoperative and postoperative monitoring is instrumental in detecting situations early enough for corrective interventions. Because of the constantly changing morphology of the pediatric patient, appropriately sized equipment is vital to the delivery of anesthesia and rescue during an emergency. PALS protocols may be useful in the resuscitation of children. Those Oral and Maxillofacial Surgeons who administer anesthesia to young children should be PALS certified. In the anxiety of a pediatric anesthetic emergency, the timely calculation of emergency drug dosages may be particularly challenging. Therefore, prior to anesthetic administration, calculations of emergency dosages expressed as mg/kg or ml of the most commonly used drugs that would be required for the pediatric patient being anesthetized can facilitate a smooth, coordinated, and successful outcome.

Although anesthetic care is often necessary for pediatric patients in need of surgical intervention, there are concerns whether anesthetics themselves pose a risk to their later intellectual development. At this time, there is no definitive information to draw any firm conclusions between anesthetic administration and subsequent disabilities.

Safety is paramount to pediatric anesthetic care. Therefore, the age of the patient and preoperative evaluation, difficulty of the planned procedure and the training and experience of the practitioner should guide the Oral and Maxillofacial Surgeon as to the choice of technique and most suitable environment to provide anesthetic care.

SPECIAL CONSIDERATIONS FOR ANESTHETIC MANAGEMENT OF THE PREGNANT PATIENT IN OUTPATIENT FACILITIES

Although elective surgery can usually be delayed until postpartum, there are situations in which a pregnant female will present to the office requiring immediate surgery. The consequences of not providing essential care may present a greater risk than surgical intervention. The anesthetic goals in treating the pregnant patient include the ability to control the patient's pain and anxiety. In addition to maternal safety, anesthetic management must maintain fetal safety, which includes avoiding intrauterine fetal asphyxia and preterm labor.

A thorough knowledge of pharmacologic agents is required. Most local anesthetics are considered relatively safe during pregnancy. Single exposure to the commonly used sedatives, benzodiazepines, opioids, and inhaled anesthesia agents have undetermined risk of teratogenicity. The Oral and Maxillofacial Surgeon should also counsel the patient about analgesics, including over-the-counter medications, because certain medications may not be acceptable during specific stages of pregnancy.

Both physiologic changes of pregnancy and the stage of pregnancy can influence the risk to the fetus and/or mother. Notable physiologic changes that will affect the anesthetic management of the patient include decreased functional residual capacity and increased oxygen consumption. Pregnant patients also develop increased cardiac output, decreased systemic vascular resistance, decreased gastric emptying, and decreased lower esophageal sphincter pressure. These changes make the patient more susceptible to developing hypoxia, becoming hypotensive, and aspirating under anesthesia. Appropriate patient positioning to prevent inferior vena cava positioning when the patient is supine needs to be considered.

Pain and anxiety control options for these patients include local anesthesia, sedation, or general anesthesia. The technique selected depends on multiple factors, including the diagnosis, the ability to treat the patient comfortably, and the stage of pregnancy.

Consultation with the practitioner already managing the pregnant patient's prenatal care may be helpful in determining the most appropriate timing for surgery and the optimal perioperative anesthetic care.

SPECIAL CONSIDERATIONS FOR ANESTHETIC MANAGEMENT OF THE OBESE PATIENT IN OUTPATIENT SETTINGS

Obesity in this country, as well as the entire world, is increasing at an alarming rate. This problem seems to be found in all ages of patients from the very young to the elderly. A patient with obesity presents with special anatomical and physiologic problems that must be addressed when outpatient anesthesia is provided for dental procedures. Obesity can be defined by BMI and is classified as class I (BMI 30-34.9), class II (BMI 35-39.9), and class III (BMI $\geq$40). These classes are associated with increasing risk (high to extremely high) for type 2 diabetes, hypertension, and cardiovascular disease relative to normal weight and waist circumference.

Medical conditions, including diabetes, hypertension, coronary artery disease, cardiovascular disease, osteoarthritis, rheumatoid arthritis, multiple types of cancers, gall bladder disease, stroke, gastroesophageal reflux disease, and OSA are some of the common problems found in a patient with obesity that will influence anesthetic care. Cardiovascular disease seems to be one of the more problematic issues in a patient with obesity. Left ventricular hypertrophy and other physiologic processes put the obese patient at an increased risk of acute coronary syndrome, congestive heart failure, and death.

The anatomical problems in these patients are primarily related to deficiencies of the upper airway, making access more difficult. Both laryngoscopy and anesthetic techniques that do not utilize an artificial airway can be challenging. Comorbid conditions, decreased functional residual capacity, complex airways, and even difficult intravenous access can place a patient with obesity at higher risk for anesthetic complications.

A large percentage of patients with obesity also present with OSA. This problem also occurs in patients without obesity, but it is not as common. Symptoms of OSA include daytime somnolence, insomnia, and difficulty with memory and concentration. Signs of OSA include hypertension, hypoxemia, hypercarbia, polycythemia, and cor pulmonale.

Use of the STOP-BANG questionnaire may be helpful in identifying previously undiagnosed patients with obstructive sleep apnea. Also, questioning the patient's partner may more readily reveal this problem because OSA can go unrecognized by the patient who may be unaware of these episodes of apnea. Questions related to snoring, tiredness, and observed cessation in breathing are important. Providing anesthesia for the OSA patient often requires special consideration. As in a patient with obesity, airway management may be difficult due to the overabundance of soft-tissue or anatomic deficiencies.

Moderate sedation in patients with obesity can result in airway obstruction, oxygen desaturation, hypercarbia, and cardiac arrhythmias. If more extensive procedures are to be performed, or if the patient is apprehensive, intubated or LMA managed anesthesia should be considered. If deep sedation/general anesthesia is to be provided in the office setting, the practitioner should be experienced in airway management, including endotracheal intubation, LMA or other supraglottic

device placement, and even surgical airway procedures specific for patients with obesity. Postprocedural and postdischarge use of opioids should be considered with caution, as the risk of respiratory depression in the patient who already has sleep disordered breathing may be increased.

Specialized equipment and surgical chairs/tables must be adequate for patient support. The surgical team must be trained in patient movement to prevent staff and patient injuries.

SPECIAL CONSIDERATIONS FOR ANESTHETIC MANAGEMENT OF THE GERIATRIC PATIENT IN OUTPATIENT SETTINGS

The US population is aging as a result of the parallel decline in both mortality and fertility rates. According to the US Census Bureau, the number of elderly was 12.9% of the population in 2009. By 2030, the number of elderly will increase to 19% of the US population. As a result, the Oral and Maxillofacial Surgeon should expect an increase in geriatric patients seeking surgical care. Although chronologic age does not always predict physiologic age, it is prudent to consider advancing age, frailty, and comorbid disease as anesthetic risk factors. The goal of geriatric anesthesia is to provide safe and effective care in this increasingly medically complex population.

Completing a preanesthetic evaluation often requires time and patience. Medical consultation may be necessary to complete the medical history or optimize function. Determination of the geriatric patient's mental status is valuable, as postoperative delirium is more common in patients with dementia or preoperative mental status changes. Also, assessing the level of exercise tolerance can be integral to estimating the patient's ability to tolerate the combined stress of anesthesia and surgery. This is best communicated using metabolic equivalents for aerobic activity, with ≥4 metabolic equivalents for aerobic activity (eg, climbing a flight of stairs without rest or shortness of breath) generally considered adequate.

A steady decline of organ function does occur with advancing age. Baroreceptors become dampened, resulting in an increase in orthostatic hypotension. There is a progressive stiffening of both the myocardium and vasculature due to the loss of elastin and increased collagen deposition. This results in an increase in systolic blood pressure and a reduction in cardiac output. The lungs also become stiffer and less compliant. With a concomitant loss of muscle strength in the chest wall and diaphragm, there is an increased incidence of hypoventilation. With advancing age, an impaired cough reflex and diminished laryngeal reflexes create an increasing risk of aspiration. Also, renal function declines, hepatic blood flow is reduced, and liver mass is decreased. This results in decreased albumin production, as well as slower metabolism and elimination of medications.

In the geriatric patient, a practitioner should plan for reduced dosing requirements and expect longer elimination half-lives of anesthetic drugs. This reflects the time proven adage – "start low and go slow." Increased sensitivity to anesthetic agents also results in an increased sensitivity to their side effects. Medications with anticholinergic effects should be limited or avoided and preference should be given to reversible anesthetic agents. Minimizing the number and dosage of agents, avoiding hypercarbia and hypoxia are important goals of anesthetic care in this population. Prolonged recovery should be anticipated in all elderly patients. Consideration should be given to anesthetic techniques that will cause the least disruption to a geriatric patient's routine, when available.

LOCAL ANESTHESIA

I. Indications for Therapy
- A. Need to provide treatment that may create sensations, especially pain, which could interfere with patient comfort and hinder safe and effective treatment

II. Specific Therapeutic Goals for Local Anesthesia
- A. Profound anesthesia in the surgical area
- B. Return of normal sensation within a prescribed period of time

III. Specific Factors Affecting Risk for Local Anesthesia

Severity factors that increase risk and the potential for known complications:

- A. Presence of a general factor affecting risk as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities
- B. Presence of infection
- C. History of drug allergy and/or hypersensitivity to local anesthetic agents
- D. Vasoactivity
- E. Route of administration
- F. Vascularity of site
- G. Rate of administration

LOCAL ANESTHESIA (continued)

H. Presence or absence of vasoconstrictor (especially in those patients with underlying cardiac disease where epinephrine-induced tachycardia may precipitate myocardial ischemia)
I. Dose administered
J. Specific local anesthetic agent used

IV. Indicated Therapeutic Parameters for Local Anesthesia

A. Completion of a medical history questionnaire, signed and dated by the patient or a responsible party
B. Review of medical history by the Oral and Maxillofacial Surgeon, with all significant responses evaluated and noted in the patient's record
C. A brief pretreatment physical evaluation by the Oral and Maxillofacial Surgeon
D. Documentation of baseline vital signs
E. Completion of medical consultation or additional laboratory testing, if indicated, before initiation of treatment
F. Documentation of all drugs, dosages, and times of administration
G. Explanation of postoperative instructions to the patient and/or a responsible adult at the time of discharge
H. Continual observation and supervision of patient throughout the procedure until discharge criteria are met

V. Outcome Assessment Indices for Local Anesthesia

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation.

A. Favorable therapeutic outcome
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities
   2. Localized tissue injury (eg, mucosal, vessel) resulting directly from the administration of the anesthetic
   3. Long-term and/or permanent neurologic changes
   4. Events, such as syncope, hypertensive episode, angina, and ectopy, related to local anesthesia care
   5. Clinical evidence of broken needle and imaging, if indicated, to verify location
   6. Persistent trismus
   7. Evidence of intravascular injection of local anesthetic and/or vasoconstrictive agents
   8. Hematoma
   9. Soft-tissue space infection
   10. Overdose
   11. Methemoglobinemia

MINIMAL SEDATION/MODERATE SEDATION

Sedation may be achieved with nitrous oxide, parenteral agents, oral, rectal, and/or intranasal medications.

I. Indications for Therapy

May include one or both of the following:

A. Need to depress the level of consciousness, anxiety, and/or pain minimally so that the patient can undergo a planned procedure
B. Need to retain the patient's ability to maintain an airway independently and continuously, and respond appropriately to physical stimulation and verbal command

II. Specific Therapeutic Goals for Minimal Sedation/Moderate Sedation

A. The presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities
B. Depressed level of consciousness
C. Reduced anxiety and improved patient cooperation during the surgical procedure
D. Minimal sedation to reduce cardiopulmonary morbidity

MINIMAL SEDATION/MODERATE SEDATION (continued)

E. Ability to respond purposefully to physical stimulation and to spoken commands and ambulate normally without assistance shortly after completion of procedure(s)

III. Specific Factors Affecting Risk for Minimal Sedation/Moderate Sedation

Severity of factors that increase risk and the potential for known complications:

A. The presence of a general factor affecting risk as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities
B. Noncompliance with eating and drinking (nothing by mouth) requirements or physical conditions that could affect gastric emptying

IV. Indicated Therapeutic Parameters for Minimal Sedation/Moderate Sedation

A. Completion of a medical history questionnaire, signed and dated by the patient or a responsible adult
B. Review of medical history by the Oral and Maxillofacial Surgeon on the day of surgery, with all significant responses evaluated and noted in the patient's record (dialogue history)
C. Documentation of assessment for possible pregnancy and test result when appropriate
D. A brief physical evaluation, especially of the heart and lungs, by the Oral and Maxillofacial Surgeon
E. Determination and documentation of the patient's ASA classification and fitness for moderate sedation in the office
F. Documentation of airway assessment
G. Documentation of baseline vital signs
H. Completion of medical consultation or additional laboratory testing, if indicated, before initiation of treatment (except in extreme emergency)
I. Determination and documentation that the patient has been nothing by mouth for an appropriate period of time
J. Maintenance and completion of time-oriented anesthesia record (similar to that provided in the *AAOMS Office Anesthesia Evaluation Manual*) for each anesthetic administration
    1. Documentation of the anesthetic agents, including dosages, routes of administration, and times of administration
    2. Documentation of continuous monitoring appropriate to the level of sedation, including heart rate, blood pressure, ventilation, SpO_2 (arterial oxygen saturation), continuous electrocardiograph monitoring, continuous $ETCO_2$ monitoring
K. Documentation of maintenance (including calibration if appropriate) of the analgesic/anesthetic machine at appropriate intervals
L. Documentation of the presence and identity of each team member throughout the administration of moderate sedation. The team should consist of the surgeon who must be trained and currently competent in ACLS and one additional person trained and currently competent in Basic Life Support for Healthcare Providers.
M. The individual designated to monitor the patient's level of sedation and/or administer the sedation medications (if allowed by state or territory statute) may assist with minor, interruptible tasks within the procedure room once the patient's level of sedation/analgesia and vital signs have stabilized.
N. Nitrous oxide may only be administered in conjunction with supplemental oxygen, and only via apparatus equipped with a failsafe mechanism to maintain nitrous levels below 70%. Supplemental oxygen should be administered during moderate sedation if there is potential for cardiorespiratory depression. The ability and equipment to provide positive pressure oxygen must be available.
O. Intravenous access for patients receiving intravenous medications for moderate sedation should be maintained if the procedure is prolonged or if there is a risk for prolonged cardiorespiratory depression. Consideration for establishing intravenous access for patients who receive moderate sedation by non-intravenous routes, especially if the procedure is prolonged or if there is a risk for prolonged cardiorespiratory depression.
P. Intravenous access using a new infusion set, including a new infusion line and new bag of fluid, for each patient
Q. Positioning of the patient to avoid injury to him/herself or others during the period of moderate sedation
R. Use of mechanical or pharmacological prophylaxis against deep venous thrombosis in at-risk patients
S. Immediate availability of equipment to assess body temperature
T. Facility equipped with emergency drugs and equipment that allow appropriate ACLS intervention, including a device to confirm exhaled CO_2
U. Adherence to recommendations for management of complications and emergencies, as described in the current edition of the *AAOMS Office Anesthesia Evaluation Manual* and in the current ACLS Manual

MINIMAL SEDATION/MODERATE SEDATION (continued)

V. Written postoperative instructions given and explained to the patient and to a responsible adult (when an escort is necessary due to method or depth of sedation)
W. Determination by the surgeon that the patient's vital signs are stable, the patient is mentally alert, and the patient is no longer at risk for cardiorespiratory depression before discharge. A notation should be made in the medical record that the patient has achieved predetermined discharge criteria.
X. Discharge of the patient in the care of a responsible adult if cognitive and/or psychomotor status remains impaired postoperatively

V. Outcome Assessment Indices for Minimal Sedation/Moderate Sedation

I. are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities
B. Known risks and complications associated with therapy
   1. Presence of general known risks or complications, as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities
   2. Events related to minimal sedation/moderate sedation are as follows:
      a. Unintended changes of the patient's level of consciousness (eg, deeper or lighter than intended)
      b. Aspiration
      c. Allergic reaction
      d. Bronchospasm
      e. Respiratory arrest, hypoventilation, or hyperventilation
      f. Hypoxia, hypercarbia, or hypocarbia
      g. Pulmonary edema
      h. Congestive heart failure
      i. Unanticipated need to support the airway
      j. Dental, oral, or airway trauma secondary to intubation or placement of other adjunctive airway devices
      k. Prolonged intubation
      l. Prolonged emergence from anesthesia
      m. Postoperative dysphoria, excitation, or psychogenic sequelae, including postoperative cognitive deficit
      n. Peripheral vascular injury
      o. Peripheral or central neurologic deficit (eg, due to positioning during anesthesia)
      p. Cardiovascular injury
      q. Organ damage
      r. Ocular injury
      s. Flash fire in an oxygen-rich environment
      t. Failure to emerge from anesthesia, requiring hospital admission for observation
      u. Adverse reaction to medication
      v. Death

DEEP SEDATION/GENERAL ANESTHESIA

I. Indications for Therapy

A. Need to depress the patient's level of consciousness, anxiety, pain, and recall during a planned procedure; recognizing that this may result in the partial or complete loss of protective reflexes and/or the patient's ability to maintain an airway independently; as well as possible changes in cardiovascular and pulmonary function

II. Specific Therapeutic Goals for Deep Sedation/General Anesthesia

A. The presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities
B. In deep sedation/general anesthesia, a controlled state of depressed consciousness/loss of consciousness resulting in the following:

DEEP SEDATION/GENERAL ANESTHESIA (continued)

1. An inability to respond purposefully to physical stimulation or verbal command
2. Adequate control of pain and anxiety
3. Probable but not guaranteed inability to recall surgical experience

III. Specific Factors Affecting Risk for Deep Sedation/General Anesthesia

A. The presence of a general factor affecting risk as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities
B. Loss of the ability to respond purposefully to physical stimulation or verbal command and/or loss of protective cardiopulmonary reflexes and the ability to maintain an airway independently
C. Factors compromising airway patency
D. Factors compromising cardiovascular function
E. Noncompliance with or conditions affecting nothing by mouth requirements
F. Psychological aversion to intravenous or intramuscular injections and/or anesthetic mask
G. Presence of severe facial abscess or cellulitis
H. Presence of facial anomalies and anatomical variations that might prevent or impede adequate airway management
I. Presence of a recent or active upper respiratory tract infection
J. Regulatory and/or third-party decisions concerning access to care, indicated therapy, drugs, devices, and/or materials
K. Special needs patients

IV. Indicated Therapeutic Parameters for Deep Sedation/General Anesthesia

A. Completion of an appropriate medical history questionnaire, signed and dated by the patient or a responsible adult
B. Review of the patient's history by an Oral and Maxillofacial Surgeon, on the date of surgery, with all significant responses evaluated and noted in the patient's record. This should include the patient's:
   1. Medical history
   2. Anesthesia and surgical history
   3. Family history
   4. Social history
   5. Current medications
   6. Allergies
C. Completion of medical consultation or additional laboratory testing, if indicated, before initiation of treatment
D. Documentation of patient's last menstrual period or pregnancy test result when appropriate
E. A brief physical evaluation, especially of heart and lungs, by the Oral and Maxillofacial Surgeon
F. Documentation of airway assessment
G. Documentation of baseline vital signs
H. Determination and documentation of the patient's ASA classification and fitness for general anesthesia in the office
I. Documentation of maintenance (including calibration if appropriate) of the anesthetic machine at appropriate intervals
J. Documentation of the presence and identity of each team member throughout administration of general anesthesia. The team should consist of the surgeon, trained and currently competent in ACLS (and PALS where appropriate), and at least 2 additional persons, trained and currently competent in Basic Life Support for Healthcare Providers.
K. The individual designated to monitor the patient's level of sedation should have no other responsibilities.
L. Use of supplemental oxygen throughout the anesthetic period and availability of supplemental oxygen throughout the postoperative period
M. Consideration for intravenous access for patients who receive deep sedation/general anesthesia by non-intravenous routes especially if the procedure is prolonged or if there is a risk for prolonged cardiorespiratory depression
N. Intravenous access using a new infusion set, including a new infusion line and new bag of fluid, for each patient
O. Use of a “timeout” to confirm correct patient, procedure, and equipment prior to initiation of anesthesia
P. Continuous supervision, monitoring of:
   1. Ventilation and oxygenation during the administration of the anesthetic and recovery period
      a. Monitoring of oxygenation should include continuous use of pulse oximetry

DEEP SEDATION/GENERAL ANESTHESIA (continued)

b. Ventilatory monitoring should include all of the following:
   i. Auscultation of breath sounds when appropriate
   ii. Observations of the excursions of the chest wall
   iii. Use of a precordial or pretracheal stethoscope when appropriate
   iv. Observation of the reservoir bag when appropriate
   v. Monitoring color of skin, mucosa, nail beds, and surgical site
   vi. Monitoring of expiratory gases including $ETCO_2$ (capnometry or capnography)
c. When endotracheal intubation or an LMA is used:
   i. Monitoring of $ETCO_2$
   ii. Monitoring of inspired oxygen concentration
   iii. Use of the following when a ventilator is used:
      aa. Disconnect alarm
      bb. High and low respiratory pressure alarms
      cc. Supply pressure indicator
      dd. Respiratory rate and volume alarms
      ee. Adjustable expiratory and tidal volumes

2. The cardiovascular status of the patient:
   a. Including heart rate and blood pressure
   b. Use of the electrocardiograph, which must be continuously displayed and/or recorded until the patient leaves the operating room and documentation of its use in the anesthetic record. This documentation could be a notation of the rhythm present during the procedure or a sample of the rhythm strip.
3. Temperature of the patient (when appropriate)

Q. Positioning and protection of the patient to avoid injury to himself/herself or to others during the period of anesthesia:
   1. Appropriately positioned and padded extremities to minimize peripheral nerve injuries
   2. Appropriately protected eyes to avoid injury

R. Use of mechanical or pharmacological prophylaxis against deep venous thrombosis in at risk patients

S. Equipment to assess body temperature is immediately available
   1. Body temperature must be continuously monitored in all patients who are being anesthetized with agents that can induce malignant hyperthermia, and a plan to treat malignant hyperthermia must be in place.

T. Facility equipped with emergency drugs and equipment that allow appropriate ACLS/PALS intervention, including a device to confirm exhaled CO_2

U. Adherence to recommendations for management of complications and emergencies, as described in the current edition of the *AAOMS Office Anesthesia Evaluation Manual* and in the current ACLS/PALS Manual

V. Written postoperative instructions are given to the patient and a responsible adult and explained to both the patient and a responsible adult at the time of discharge.

W. Determination by the surgeon that the patient's vital signs are stable, the patient is mentally alert, and the patient is no longer at risk for cardiorespiratory depression before discharge. A notation should be made in the medical record that the patient has achieved predetermined discharge criteria.

X. Discharge of the patient into the care of a responsible adult. A responsible adult should be available to provide assisted care to the patient until the patient is fully recovered from the anesthetic.

V. Outcome Assessment Indices for Deep Sedation/General Anesthesia

I. are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities

B. Known risks and complications associated with therapy
   1. Presence of general risks or complications, as listed in the section titled General Criteria, Parameters, and Considerations for Anesthesia in Outpatient Facilities
   2. Events related to deep sedation/general anesthesia

DEEP SEDATION/GENERAL ANESTHESIA (continued)

a. Unintended changes of the patient's level of consciousness (eg, lighter than intended)
b. Recall of events during anesthesia
c. Aspiration
d. Allergic reaction
e. Bronchospasm
f. Respiratory arrest, hypoventilation, or hyperventilation
g. Hypoxia, hypercarbia, or hypocarbia
h. Pulmonary edema
i. Congestive heart failure
j. Unanticipated need to intubate patient
k. Dental, oral, or airway trauma secondary to intubation or placement of other adjunctive airway devices
l. Prolonged intubation
m. Prolonged emergence from anesthesia
n. Postoperative dysphoria, excitation, or psychogenic sequelae, including Postopertative Cognitive Deficit
o. Peripheral vascular injury
p. Peripheral or central neurologic deficit (eg, due to positioning during anesthesia)
q. Cardiovascular injury
r. Organ damage
s. Ocular injury
t. Flash fire in an oxygen-rich environment
u. Failure to emerge from anesthesia, requiring hospital admission for observation
v. Malignant hyperthermia
w. Adverse reaction to medication
x. Death

SELECTED REFERENCES – ANESTHESIA IN OUTPATIENT FACILITIES

This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation of this document. Citation of the reference material is not meant to imply endorsement of any statement contained in the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

DENTOALVEOLAR SURGERY

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023,* WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

Dentoalveolar surgery encompasses those surgical procedures that involve teeth and supporting structures associated with the oral cavity. This section includes the management of the following: odontogenic infections; erupted, unerupted, and impacted teeth; third molars; periradicular pathology; and the revision, reduction, and excision of deformities and defects of the dentoalveolar complex. Implant surgery, traumatic injuries, pathologic conditions, and reconstructive surgery that are applicable to the dentoalveolar complex are not included. These topics are addressed in the chapters *Dental and Craniomaxillofacial Implant Surgery, Trauma Surgery, Diagnosis and Management of Pathological Conditions,* and *Reconstructive Surgery*, respectively. The subject of osteomyelitis is included in the *Diagnosis and Management of Pathological Conditions* chapter.

An understanding of basic surgical principles, as well as an awareness and appreciation of the extent of the biomedical literature, is necessary for the proper interpretation and appreciation of the Dentoalveolar Surgery section.

In the future, significant advances will occur in biomaterials, diagnostic techniques, and management modalities, and each will make an impact on the achievement of favorable outcomes. Such potential for change requires that this document remain dynamic, updated, and revised to include valid new information applicable to patient care.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR DENTOALVEOLAR SURGERY

INFORMED CONSENT: All surgery must be preceded by the patient's or legal guardian's consent, unless an emergent situation dictates otherwise. Emergent circumstances and the indications for treatment should be documented in the patient's record. Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the expected recovery period, alternative treatment options (including no treatment), and any patient or procedure specific factors that may affect the risk. The results of the informed consent process must be documented in the patient medical record. In general, an informed consent document is signed by the patient or guardian, but the Oral and Maxillofacial Surgeon is well-advised to document in the medical record that the informed consent process occurred and that the patient/guardian provided both verbal and written consent that they understand and are willing to proceed with treatment.

PERIOPERATIVE ANTIBIOTIC THERAPY: In certain circumstances, the use of oral antimicrobial rinses, and systemic antibiotics may be indicated to lower the probability of infections related to surgery. The decision to employ prophylactic perioperative antibiotics is at the discretion of the treating surgeon and should be based on the patient's clinical condition as well as other comorbidities that may be present.

DEALING WITH NEUROLOGIC DEFICITS: Injuries to the terminal branches of the trigeminal nerve (eg, lingual, inferior alveolar, long buccal nerves), as well as the facial nerve, are known risks of oral and maxillofacial surgery. It should be noted that the presence of a pathologic craniomaxillofacial condition, dentoskeletal or craniofacial abnormality, or traumatic craniomaxillofacial injury may result in nerve injury before surgical management. In addition, the use of local anesthesia (eg, mandibular block) may increase the risk of nerve injury. Most nerve injuries resolve spontaneously, but some do not, and these may require consideration for nonsurgical and/or surgical intervention. Microneurosurgical repair should be considered when the disability is of concern to the patient, and there is clinical evidence of moderate, severe, or complete neurosensory impairment of various areas of the orofacial region (eg, lips, chin, tongue); paresis or paralysis of facial muscles; loss, decreased, or abnormal taste sensation; or neuropathic pain of peripheral origin. Surgical repair should incorporate specialized microsurgical techniques (eg, operating magnification, nerve grafting), when indicated. Also see the *Reconstructive Surgery* chapter.

USE OF IMAGING MODALITIES: Imaging modalities may include panoramic radiograph, periapical and/or occlusal radiographs, maxillary and/or mandibular radiographs, computed tomography, cone beam computed tomography, positron emission tomography, positron emission tomography/computed tomography, and magnetic resonance imaging. In determining studies to be performed for imaging purposes, principles of ALARA (as low as reasonably achievable) should be followed. For growing patients panoramic radiographs are usually current if taken within 1 year for the assessment of third molar position, indications for extraction and surgical planning. Adult patients without changes in expected pathology or other outcomes may need a less frequent updating of radiographs. The use of cone beam radiographs should be based on a specific need for information not able to be obtained from 2 dimensional imaging with a lower radiation exposure.

DOCUMENTATION: *AAOMS ParCare 2023* includes documentation of objective findings, diagnoses, and patient management interventions. *The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon in light of the circumstances presented by each patient.*

Understandably, there may be good clinical reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well advised to note in the patient's record the reason for the procedure followed. Moreover, it should be understood that adherence to the parameters does not guarantee a favorable outcome.

GENERAL THERAPEUTIC GOALS FOR DENTOALVEOLAR SURGERY:

A. Elimination of acute and/or chronic infection
B. Limitation or elimination of pain
C. Restored anatomical form
D. Restored masticatory function
E. As an adjunct or to facilitate other restorative procedures
F. Preserved vital structures
G. Limited period of disability
H. Diagnosing/Elimination of existing pathology
I. Appropriate understanding by patient (family) of treatment options and acceptance of treatment plan
J. Appropriate understanding and acceptance by patient (family) of favorable outcomes and known risks and complications
K. Prevention of future expected problems (planned radiation therapy, initiation of therapy with drugs known to cause MRONJ (medication-related osteonecrosis of the jaw), or other chemotherapeutic agents that may suppress normal healing)
L. Prophylactic treatment when access to care is expected to be limited in the future (eg, military service, service in third world country)
M. If a delay in surgery would carry significant increase in the potential complications of the surgery

GENERAL FACTORS AFFECTING RISK DURING DENTOALVEOLAR SURGERY: Certain general factors will affect the outcome of dentoalveolar surgery. These severity factors increase the risk and the potential for known complications.

A. Presence of acute and/or chronic infection
B. Presence of coexisting major systemic disease (eg, disease that increases a patient's American Society of Anesthesiologists' classification to II, III, or IV) as detailed in the *Patient Assessment* chapter
C. Age of patient
D. Presence of local or systemic conditions that may interfere with the normal healing process and subsequent tissue homeostasis (eg, diabetes mellitus, chronic renal disease, liver disease, bleeding disorder, steroid therapy, immunosuppression, malnutrition)
E. Degree of patient and/or family understanding of the etiology and natural course of the condition or disorder and therapeutic goals and acceptance of the proposed treatment
F. Presence of behavioral, psychological, neurologic, and/or psychiatric disorders, including habits (eg, substance abuse), seizure disorders, or self-mutilation that may affect surgery, healing, and/or response to therapy
G. Degree of patient's and/or family's cooperation with and/or adherence to preoperative and postoperative instructions and follow-up
H. Location of branches of cranial nerves
I. Location of adjacent teeth and adjacent dental restorations
J. Presence of associated or adjacent pathologic conditions
K. History of or ongoing treatment with radiation, medications known to cause MRONJ, or chemotherapy
L. History of temporomandibular joint disease or disorder
M. History of myofascial pain
N. Limited access to oral cavity (eg, trismus, neurologic disorders, inadequate oral orifice)
O. Patient decisions regarding regulatory and/or third party rules concerning access to care, indicated therapy, drugs, devices, and materials

GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR DENTOALVEOLAR SURGERY:

A. Absence of acute and/or chronic infection

B. Absence of pain
C. Uncomplicated healing of surgical sites
D. Restored and/or improved form and function
E. Limited period of disability
F. Reduced susceptibility to pathologic conditions
G. Restoration, retention, and function of previously diseased tooth or teeth
H. Absence of neurologic dysfunction (sensory)
I. Improved host defenses
J. Patient (family) acceptance of procedure and understanding of outcomes

GENERAL KNOWN RISKS AND COMPLICATIONS FOR DENTOALVEOLAR SURGERY:

A. Unexpected or prolonged pain, swelling, hemorrhage, trismus
B. Prolonged period of disability
C. Symptoms of temporomandibular joint disease or disorder
D. Symptoms of myofascial pain
E. Osteomyelitis (also see the Osteomyelitis section in the *Diagnosis and Management of Pathological Conditions* chapter)
F. Osteoradionecrosis
G. Osteonecrosis of the jaws
H. Postoperative wound infection
I. Unplanned admission to emergency care facility or hospital after surgery
J. Unplanned intubation during the perioperative period
K. Reintubation after surgery or the necessity for a surgically created airway after surgery (for airway impairment)
L. Unplanned need for parenteral drugs and fluids
M. Failure to meet prescribed discharge criteria within 6 hours of elective surgery
N. Facial and/or trigeminal nerve dysfunction after surgery (eg, anesthesia, paresthesia, or neuropathic pain of the lips, teeth, chin, or tongue)
O. Maxillary or mandibular fracture during or after surgery
P. Unplanned Caldwell-Luc, bronchoscopy, or other exploratory procedures associated with surgery
Q. Dental injury and/or damage to adjacent dental restorations during surgery
R. Ocular injury during surgery
S. Unanticipated tissue loss or damage to adjacent vital structures
T. Repeat oral and/or maxillofacial surgery
U. Core temperature of greater than 101 F during the first 72 hours
V. Presence of foreign body or retained root/tooth fragment after surgery
W. Unplanned transfusion(s) of blood or blood components during or after surgery
X. Compromised airway
Y. Adverse systemic sequelae (eg, septicemia, endocarditis)
Z. Respiratory and cardiac arrest
AA. Death

SPECIAL CONSIDERATIONS FOR PEDIATRIC DENTOALVEOLAR SURGERY

Management of odontogenic infections; erupted, unerupted, and impacted teeth; third molars; periradicular pathology; and defects of the dentoalveolar structures is similar in children and adults. However, certain age and development dependent variables must be considered.

Informed consent must be obtained from a parent or guardian with legal authority and should include the child as soon as he/she is old enough to understand the procedure, risks, and benefits. It is especially important to have detailed information related to who will be taking the child home after the procedure.

Maxillofacial infections in children vary according to age and development. In children younger than 5 years, it is more common to have upper face (orbit, soft tissue over maxilla or zygoma) infections of nonodontogenic etiology accompanied by systemic sepsis. Also, there is a more frequent association with sinusitis and otitis in upper face infections. In children older than 5 years, lower face infections are more commonly of odontogenic origin. Nonodontogenic infections may

require broad-spectrum intravenous antibiotics and hydration; odontogenic infections require antibiotics, hydration, drainage, and treatment of the underlying dental problem as indicated.

Behavioral management of the child requiring a dentoalveolar procedure is determined by the patient's age and stage of psychological development. It is important to take enough time with the parent and child to appreciate the behavioral status and make a reasonable judgment on management regarding the use of local anesthesia, sedation, or general anesthesia.

The nature of the dentoalveolar procedure to be performed is greatly affected by the child's age. For example, the most common impacted tooth for extraction in children is the mesiodens compared with the third molar in adults. Neonatal or natal teeth should be removed due to lack of alveolar bone support, poor root development, associated mobility, and aspiration risk. Neonatal teeth represent the early arrival of the primary dentition, so parents need to be counseled regarding the anticipated dental deficit when these have been removed. Riga-Fede disease, a chronic, nonhealing ulceration of the midline ventral aspect of the tongue in infants, is due to the presence of newly erupted mandibular primary incisors. Simple smoothing of the incisal edges will usually suffice, but on occasion these teeth will require removal to avoid "failure to thrive" situations. Children who have late mixed dentition or early adult dentition often require exposure of impacted canines during orthodontic treatment. Timing of surgery is important in children. In general, consideration should be given to waiting until the incisors adjacent to an impacted mesiodens have at least two-thirds root development so that extraction will present less risk to the developing teeth but still allow spontaneous eruption of the incisors. This general principle may be applied to extraction of any impacted supernumerary teeth. Trauma and avulsion of teeth is common in children, and management is governed by the fact that open apices are associated with a better prognosis than the same injury in adults.

Space maintenance is a frequent need following removal of teeth in children. The surgeon should recommend that appropriate consultation with, or referral to, the primary care dental provider or orthodontist be accomplished to address this need.

Ankyloglossia release and labial frenectomy, when indicated, are ideally performed in children before detrimental effects occur. Where a labial frenula is hyperplastic and contributes to the formation and persistence of diastema, excision may be indicated in conjunction with the orthodontic closure of the diastema to prevent recurrence and improve the stability of the orthodontic result and to prevent periodontal issues. Lingual frenectomy, when indicated, is considered early for optimizing feeding. It is important to recognize that a ranula may be confused with lymphatic malformations of the floor of the mouth. Finally, hemangiomas can be seen on the alveolus in infants. These need to be differentiated from eruption cysts. Eruption cysts resolve with eruption of the tooth.

ODONTOGENIC INFECTIONS

Also see the Osteomyelitis section in the Diagnosis and Management of Pathological Conditions *chapter.*

I. Indications for Therapy for Odontogenic Infections

May include 1 or more of the following:

A. Clinical or physical findings
1. Pain
2. Swelling
3. Soft tissue induration
4. Erythema
5. Lymphadenitis
6. Trismus
7. Purulence
8. Fistula
9. Nonvital pulp of tooth
10. Carious tooth
11. Fractured tooth
12. Tooth mobility, furcation involvement
13. Fetor
14. Malaise
15. Fever
16. Chills
17. Diaphoresis
18. Dyspnea
19. Dysphagia
20. Altered function

ODONTOGENIC INFECTIONS (continued)

21. Altered sensation
22. Soft tissue necrosis (eg, necrotizing fasciitis)
23. Systemic sepsis
24. Disseminated infection (eg, prosthetic cardiac valve)

B. Diagnostic imaging findings
1. Dental caries
2. Periodontal bone loss
3. Fractured tooth or tooth root
4. Internal resorption or external resorption of tooth
5. Periapical radiolucency (eg, osteolytic process)
6. Widening of periodontal ligament space
7. Sclerosis or reactive bone
8. Osteolytic area (eg, cystic, bone radiolucency, or degeneration not associated with a tooth)
9. Antral wall destruction or thickening
10. Gas spaces in soft tissue
11. Soft tissue mass, fluid loculation, and abscess cavity

C. Laboratory findings
1. Abnormal complete blood cell count, differential count, sedimentation rate, serum electrolytes, glucose, arterial blood gas
2. Positive microbiologic culture (eg, blood, purulence)
3. Positive Gram stain
4. Elevated temperature

II. Specific Therapeutic Goals for Odontogenic Infections

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Prevention of recurrence

III. Specific Factors Affecting Outcomes From Odontogenic Infections

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Extent of infection (eg, localized, diffuse)
C. Direction and/or rate of extension of infection
D. Presence of impending airway obstruction
E. Susceptibility of organism to antibiotics
F. Virulence of organism
G. Presence of generalized periodontitis
H. Presence of inadequate oral hygiene
I. Presence of dental crowding or malocclusion
J. Proximity to contiguous structures
K. Presence of foreign bodies or implanted materials
L. Dental management objectives that are altered and/or adversely affected by therapy

IV. Indicated Therapeutic Parameters for Odontogenic Infection

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of odontogenic infections are not listed in order of preference:

A. Establishment of airway (eg, intubation, emergency tracheostomy, cricothyroidotomy), if compromised
B. Elimination of source (eg, removal of tooth, endodontic treatment, periodontal therapy, etc.)

ODONTOGENIC INFECTIONS (continued)

C. Incision and drainage (intraorally and/or extraorally of the maxillofacial region)
D. Aspiration
E. Pain control
F. Irrigation and debridement
G. Identification of organism (eg, Gram's stain, aerobic and anaerobic organism culture and sensitivity testing, culture acid-fast bacilli and fungi) when indicated
H. Assessment and support of host defenses (eg, local measures, antipyretics, nutritional support, and hydration, hyperbaric oxygen treatment)
I. Antimicrobial therapeutic management, if indicated (systemic or local therapy)
J. Assessment and management of systemic involvement (eg, sepsis)
K. Assessment and management of coexisting systemic disease (eg, diabetes mellitus)
L. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices for Odontogenic Infections

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
2. Absence of local or systemic signs and/or symptoms of infection
3. Absence of unanticipated tissue loss
4. Restored form and function
5. Improved host defenses
6. Limited period of disability

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
2. Persistence or extension of infection (eg, intracranial extension, sinusitis, cavernous sinus thrombosis, osteomyelitis, mediastinitis, metastatic prosthetic joint infection)
3. Airway impairment
4. Tissue loss or damage to adjacent vital structures
5. Adverse systemic sequelae (eg, septicemia, endocarditis), thatcould lead to organ failure and death
6. Adverse drugs reactions or interaction with existing therapeutic drug regimens
7. Facial, neck scarring, or keloid formation with need for secondary revision surgery
8. Nerve injury secondary to the infection or the surgical intervention
9. Fracture of the maxilla or mandible
10. Onset or exacerbation of symptom(s) related to the temporomandibular joint (TMJ) and surrounding structures

ERUPTED TEETH

I. Indications for Therapy for Erupted Teeth

May include 1 or more of the following:

A. Pain
B. Clinical or imaging findings of:
1. Dental caries
2. Periodontal disease
3. Periapical pathology
4. Nonrestorable tooth
5. Fractured tooth
6. Tooth mobility
7. Internal or external resorption of tooth

ERUPTED TEETH (continued)

8. Infection
9. Severe anomaly of the crown/root precluding prosthetic/restoration treatment
10. Traumatic injuries to tooth

C. Loss of pulp vitality
D. Ectopic position (eg, malposition, supraeruption, traumatic occlusion), that may cause damage to other teeth
E. Adjunct to prosthetic rehabilitation or implant placement
F. Orthodontic considerations (eg, arch length/tooth size discrepancies, interceptive extractions to obtain functional occlusion, ankylosis)
G. Teeth in line of mandibular or maxillary osseous fracture (eg, fractured teeth, abscessed teeth, periodontally involved teeth)
H. Teeth associated with pathologic lesions
I. Medical or surgical condition or treatment (eg, organ transplantation, chemotherapy, radiation therapy, placement of prosthetic heart valves, prosthetic joints, bisphosphonate administration, joint replacement) for which removal of teeth is prophylactic
J. Prevention of injury (eg, natal teeth in nursing mother, psychiatric or motor disorder)
K. Patient refusal of appropriate endodontic and/or periodontal therapy or appropriate surgical exposure to aid orthodontic treatment

II. Specific Therapeutic Goals for Erupted Teeth

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Prevention of pathology
C. Improved esthetics
D. Optimization of occlusion
E. Optimization of prosthetic rehabilitation
F. Optimization of healing of osseous fractures
G. Maintenance of functional teeth
H. Enhanced orthodontic results
I. Normal eruption pattern of teeth
J. Healthy oral and maxillofacial environment for patient undergoing head and neck radiation therapy
K. Healthy oral and maxillofacial environment for patient undergoing systemic therapy (eg, chemotherapy, bisphosphonate drugs, organ transplantation, or heart valve replacement)
L. Elimination of hard and/or soft tissue pathology
M. Optimize implant placement

III. Specific Factors Affecting Risk for Erupted Teeth

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Presence of associated pathologic disease
C. Presence of acute and/or chronic infection
D. Existing active dental, endodontic, or periodontal diseases
E. Presence of adjacent tooth or teeth
F. Presence of extensive dental caries
G. Presence of large restoration in adjacent teeth
H. Presence of associated jaw fracture
I. Size and density of supporting bone (eg, maxilla, mandible)
J. History of endodontic therapy
K. Relationship of tooth or teeth to maxillary antrum
L. Approximation of tooth or teeth to inferior alveolar nerve, lingual nerve, mental nerve, maxillary sinus, or other significant structures

ERUPTED TEETH (continued)

M. Root anatomy (eg, size, shape, number, dilaceration, divergence)
N. Root-to-crown ratio
O. Accessibility (eg, compromised by ectopic eruption or positioning of adjacent teeth)
P. Limited access to oral cavity (eg, trismus, inadequate oral orifice)

IV. Indicated Therapeutic Parameters for Erupted Teeth

The presurgical assessment includes, as a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of erupted teeth are not listed in order of preference:

A. Incision, drainage, and medical management of acute infection (see the Odontogenic Infections section for indicated therapeutic parameters)
B. Endodontic therapy
   1. Nonsurgical
   2. Periapical surgery
C. Hemisection of tooth or root amputation
D. Periodontal surgery
   1. Mucogingival surgery
   2. Alveolar/osseous surgery
   3. Grafting procedures (eg, soft and/or hard tissue, autogenous, alloplastic)
   4. Crown lengthening procedures
   5. Guided tissue augmentation
E. Dental extraction
   1. Simple
   2. Surgical including root amputation
   3. Concomitant augmentation with alloplastic or autogenous graft to maintain alveolar form and function
F. Observation
G. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices for Erupted Teeth

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the sections titled General Criteria, Parameters and Considerations for Dentoalveolar Surgery and Special Considerations for Dentoalveolar Surgery
   2. Maintenance of previously diseased teeth
   3. Improved esthetics
   4. Improved function and occlusion
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
   2. Acute and/or chronic infection
   3. Alveolar osteitis
   4. Injury to adjacent teeth and/or hard and/or soft tissue
   5. Damage to adjacent restorations
   6. Presence of foreign body in surgical site
   7. Presence of portion of tooth intentionally left in alveolus
   8. Presence of portion of tooth unintentionally left in alveolus
   9. Presence of unattached bone fragment intentionally or unintentionally left in surgical site
   10. Mandibular and/or maxillary fractures
   11. Condition that requires unplanned additional surgery (eg, incision and drainage, curettage)
   12. Oroantral and/or nasal fistula formation

ERUPTED TEETH (continued)

13. Displacement of tooth, tooth fragments, or foreign bodies into adjacent anatomical sites (eg, airway, gastrointestinal tract, maxillary sinus, inferior alveolar canal, contiguous soft tissues)
14. Persistent or new pathology (eg, recurrent or residual cyst or tumor)
15. Osteonecrosis related to systemic medications associated with MRONJ or previous radiation therapy to the jaws
16. Persistent exposure of alveolar bone
17. Acute and/or chronic osteomyelitis
18. Damage to lingual or inferior alveolar nerve
19. Onset or exacerbation of symptom(s) related to the temporomandibular joint (TMJ) and surrounding structures

UNERUPTED AND IMPACTED TEETH (OTHER THAN THIRD MOLARS)

An impacted tooth is one that cannot erupt into normal position or function; it is considered to be pathologic.

I. Indications for Therapy for Unerupted and Impacted Teeth (Other Than Third Molars)

May include 1 or more of the following:

A. Pain
B. Clinical findings of:
   1. Dental caries
   2. Periodontal disease
   3. Periapical pathology
   4. Nonrestorable tooth
   5. Internal or external resorption of tooth or adjacent teeth
   6. Infection
   7. Failure of the tooth to spontaneously erupt
   8. Ectopic eruption of a tooth
C. Orthodontic abnormalities (eg, arch length/tooth size discrepancies, ankylosis)
D. Medical or surgical condition or treatment (eg, organ transplantation, chemotherapy, bisphosphonate therapy, radiation therapy, placement of prosthetic heart valves, prosthetic joint replacement) for which removal of teeth is prophylactic
E. Adjunct to prosthetic rehabilitation
F. Teeth in line of osseous fracture
G. Pathology associated with tooth follicle (eg, cysts, tumors)
H. Teeth associated with pathologic lesions
I. Facilitation of management in trauma or orthognathic surgery
J. Insufficient space to accommodate erupting tooth or teeth
K. Traumatic injury to the tooth
L. Anatomical position causing potential damage to adjacent teeth

II. Specific Therapeutic Goals for Unerupted and Impacted Teeth (Other Than Third Molars)

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Prevention or elimination of pathology
C. Optimization of prosthetic rehabilitation, occlusion, and dental esthetics
D. Optimization of management and/or healing of jaw fractures
E. Optimization of orthodontic results

UNERUPTED AND IMPACTED TEETH (OTHER THAN THIRD MOLARS) (continued)

F. Healthy oral and maxillofacial environment for patient undergoing radiation therapy, chemotherapy, bisphosphonate therapy, organ transplantation, or placement of prosthetic heart valves
G. Prevention of complications in orthognathic surgery

III. Specific Factors Affecting Risk for Unerupted and Impacted Teeth (Other Than Third Molars)

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Presence of associated or adjacent pathology
C. Presence of acute and/or chronic infection
D. Size and density of supporting bone (eg, mandible, maxilla)
E. Anatomical relationships of tooth or teeth to:
   1. Maxillary antrum and nasal cavity
   2. Adjacent nerves
   3. Adjacent teeth
   4. Other significant anatomical structures
   5. Adjacent blood vessels
F. Anatomical position of tooth or teeth
G. Tooth root anatomy (eg, dilaceration, divergence, size, shape, number)
H. Presence of gemination or fusion with adjacent tooth
I. Status of adjacent teeth (eg, large restorations, fractured crown, terminal abutment for bridge)
J. Ankylosis of tooth or teeth
K. Presence of associated jaw fracture
L. Accessibility (eg, compromised by ectopic eruption or positioning of adjacent teeth)
M. Limited access to oral cavity (eg, trismus, inadequate oral orifice)
N. History of radiation, chemotherapy, or systemic medications known to cause MRONJ

IV. Indicated Therapeutic Parameters for Unerupted and Impacted Teeth (Other Than Third Molars)

The presurgical assessment includes, as a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the surgical management of unerupted and impacted teeth are not listed in order of preference:

A. Surgical removal of tooth or teeth
B. Surgical exposure with or without placement of orthodontic attachments
C. Coronectomy
D. Surgical repositioning, reimplantation, or transplantation
E. Surgical periodontics
F. Surgical removal of associated cysts
G. Marsupialization of defects with secondary management of associated impacted teeth
H. Removal of associated neoplasms
I. Instructions for posttreatment care and follow-up
J. Interdental corticotomy/osteotomy to assist eruption or other orthodontic intervention
K. Observation

V. Outcome Assessment Indices for Unerupted and Impacted Teeth (Other Than Third Molars)

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
   2. Absence of infection

UNERUPTED AND IMPACTED TEETH (OTHER THAN THIRD MOLARS) (continued)

3. Elimination of associated pathology (eg, odontogenic cysts, neoplasms)
4. Orthodontic and/or prosthetic rehabilitation facilitated

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
2. Acute and/or chronic infection
3. Alveolar osteitis
4. Injury to adjacent teeth and/or hard or soft tissues
5. Injury/damage to adjacent restorations
6. Presence of foreign body in surgical site
7. Presence of portion of tooth intentionally left in alveolus, requiring secondary treatment
8. Presence of portion of tooth unintentionally left in alveolus
9. Presence of unattached bone fragment intentionally or unintentionally left in alveolus
10. Devitalization, ankylosis, and internal or external resorption of surgically exposed or repositioned tooth
11. Mandibular and/or maxillary fracture
12. Condition that requires unplanned additional surgery (eg, incision and drainage, curettage)
13. Oroantral and/or nasal fistula formation
14. Displacement of tooth, tooth fragments, or foreign bodies into adjacent anatomical sites (eg, airway, gastrointestinal tract, maxillary sinus, inferior alveolar canal, contiguous soft tissues)
15. Persistent or new pathology (eg, recurrent or residual cyst or tumor)
16. MRONJ, osteonecrosis, or osteoradionecrosis
17. Acute or chronic osteomyelitis
18. Onset or exacerbation of symptom(s) related to the temporomandibular joint (TMJ) and surrounding structures

THIRD MOLARS

Given the following indications and the desire to achieve therapeutic goals, obtain positive outcomes, and avoid known risks and complications, a decision should be made before the middle of the third decade to remove or continue to observe third molars knowing that future treatment may be necessary based on the clinical situation. There is a growing body of knowledge suggesting that the retention of third molars that are erupted or partially erupted contribute to a higher incidence of periodontal disease. This persistent periodontal disease has both dental and medical consequences for the host and therefore may be an indication for prophylactic removal.

An unerupted third molar is an embedded tooth that will probably erupt by the middle of the third decade.

An impacted third molar is so positioned that it will probably not erupt by the middle of the third decade and may lead to disease with dental and medical consequences. To limit known risks and complications associated with surgery, it is medically appropriate and surgically prudent to remove these impacted third molars before the middle of the third decade and before complete root development. An impacted tooth with completed root formation that is totally covered by bone in a patient beyond the third decade that does not meet the following indications for removal should be monitored for change in position and/or development of disease, thatmay then indicate its removal.

I. Indications for Therapy for Third Molars

May include 1 or more of the following:

A. Erupted third molar tooth: an "erupted tooth" that is so positioned that the entire clinical crown is visible
1. Pain
2. Carious tooth
3. Facilitation of the management of or limitation of progression of periodontal disease
4. Nontreatable pulpal or periapical lesion
5. Acute and/or chronic infection (eg, cellulitis, abscess)
6. Ectopic position (eg, malposition, supraeruption, traumatic occlusion)
7. Abnormalities of tooth size or shape precluding normal function

THIRD MOLARS (continued)

8. Facilitation of prosthetic rehabilitation
9. Facilitation of orthodontic tooth movement and promotion of stability of the dental occlusion
10. Tooth in the line of fracture complicating fracture management
11. Tooth involved in surgical treatment of associated cysts and tumors
12. Tooth interfering with orthognathic and/or reconstructive surgery
13. Preventive or prophylactic removal, when indicated, for patients with medical or surgical conditions or treatments (eg, organ transplants, alloplastic implants, bisphosphonate therapy, chemotherapy, radiation therapy, prosthetic joint replacement)
14. Clinical findings of pulp exposure by dental caries
15. Clinical findings of fractured tooth or teeth
16. Internal or external resorption of tooth or adjacent teeth
17. Patient's informed refusal of non-surgical treatment options
18. Anatomical position causing potential damage to adjacent teeth
19. Difficult access for the patient to maintain normal hygiene

B. Partially erupted third molar tooth: a "partially erupted tooth" that is positioned so that only a portion of the clinical crown is visible
   1. Pain
   2. Pericoronitis
   3. Carious tooth
   4. Facilitation of the management of or limitation of progression of periodontal disease
   5. Nontreatable pulpal or periapical lesion
   6. Acute and/or chronic infection (eg, cellulitis, abscess)
   7. Ectopic position
   8. Abnormalities of tooth size or shape precluding normal function
   9. Facilitation of prosthetic rehabilitation
   10. Facilitation of orthodontic tooth movement and promotion of dental stability
   11. Tooth impeding the normal eruption of an adjacent tooth
   12. Tooth in the line of fracture
   13. Tooth involved in tumor resection
   14. Pathology associated with tooth (eg, cysts, neoplasms)
   15. Preventive or prophylactic removal, when indicated, for patients with medical or surgical conditions or treatments (eg, organ transplants, alloplastic implants, bisphosphonate therapy, chemotherapy, radiation therapy)
   16. Tooth interfering with orthognathic and/or reconstructive jaw surgery
   17. Clinical findings of fractured tooth or teeth
   18. Internal or external resorption of tooth or adjacent teeth
   19. Impacted tooth (as defined previously)
   20. Anatomical position causing potential damage to adjacent teeth
   21. Patient's informed refusal of non-surgical treatment options
C. Unerupted/impacted third molar tooth: an "unerupted/impacted tooth" that has not penetrated through bone and/or soft tissue and entered the oral cavity

Consideration should be given to removal of an unerupted/impacted third molar by the third decade when there is a high probability of disease or pathology and that the tooth will not erupt and when risks associated with early removal are less than anticipated risks of later removal (eg, increased morbidity).

1. Pain
2. Pathology associated with tooth follicle (eg, cysts, tumors)
3. Abnormalities of tooth size or shape precluding normal function
4. Facilitation of the management of or limitation of progression of periodontal disease
5. Resorption of adjacent tooth
6. Facilitation of orthodontic tooth movement and promotion of stability of the dental occlusion
7. Facilitation of prosthetic rehabilitation

THIRD MOLARS (continued)

8. Tooth impeding the normal eruption of an adjacent tooth
9. Tooth in the line of fracture
10. Tooth involved in tumor resection
11. Tooth interfering with orthognathic and/or reconstructive jaw surgery
12. Preventive or prophylactic tooth removal, when indicated, for patients with medical or surgical conditions or treatments (eg, organ transplants, alloplastic implants, bisphosphonate therapy, chemotherapy, radiation therapy)
13. Clinical findings of fractured tooth or teeth
14. Pathology associated with the impacted tooth (eg, odontogenic cysts, neoplasms)
15. Internal or external resorption of tooth or adjacent teeth
16. Need for donor transplant or stem cell harvest
17. Facilitate harvesting of autologous graft
18. Impacted tooth (as defined previously)
19. Anatomical position causing potential damage to adjacent teeth
20. Patient's informed refusal of nonsurgical treatment options

D. Diagnostic imaging: a panoramic radiograph is recommended for management of third molars, although periapical, maxillary, and/or mandibular radiographs and computed tomography may also be used. Indications for cone beam computed tomography for routine third molar surgery should be documented before ordering scans and follow the principles of ALARA (as low as reasonably achievable).

II. Specific Therapeutic Goals for Third Molar Removal

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Prevention of pathology
C. Preservation of periodontal health of adjacent teeth
D. Optimization of prosthetic rehabilitation
E. Optimization of management and/or healing of jaw fractures
F. Optimization of orthodontic results
G. Aid in tumor resection
H. Healthy oral and maxillofacial environment for patient undergoing radiation therapy, chemotherapy, organ transplantation, or placement of alloplastic implants
I. Prevention of complications in orthognathic surgery

III. Specific Factors Affecting Risk for Third Molar Removal

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Size and density of supporting bone (eg, mandible, maxilla)
C. Anatomical relationships of tooth or teeth to:
    1. Maxillary antrum and nasal cavity
    2. Adjacent nerves
    3. Adjacent teeth
    4. Other significant anatomical structures
D. Anatomical position of tooth
E. Tooth root anatomy (eg, dilaceration, divergence, size, shape, number)
F. Status of adjacent teeth (eg, large restorations, fractured crown, terminal abutment for bridge)
G. Ankylosis of tooth or teeth
H. Presence of associated jaw fracture
I. Accessibility (eg, compromised by ectopic eruption or positioning of adjacent teeth)
J. Limited access to oral cavity (eg, trismus, inadequate oral orifice)

THIRD MOLARS (continued)

K. Patient's informed refusal of nonsurgical treatment options
L. Systemic drugs such as bisphosphonates
M. Radiation therapy to surgical sites

IV. Indicated Therapeutic Parameters for Third Molar Removal

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Radiographs are necessary to provide appropriate treatment planning and surgery, if indicated, for the third molar patient. Growth and development of this region will impact the decision of frequency. Therefore timely radiographs are necessary and ideally would be within 1 year of planned surgery. In a fully grown patient, the films may be repeated at a less frequent interval if no other clinical signs are present and a 2 year interval view may be sufficient. Observation of pathology, advancing decay, or periodontal issues may necessitate radiographs at a more frequent interval but should always be dictated by the patient's clinical presentation and the principles of ALARA. Indications for radiographs and type of radiograph should be noted prior to ordering the study. Also see the Patient Assessment *chapter.*

The following procedures for the management of third molars are not listed in order of preference:

A. Surgical removal of tooth or teeth
B. Surgical exposure
C. Surgical repositioning, reimplantation, or transplantation
D. Surgical periodontics
E. Endodontic therapy
F. Coronectomy
G. Marsupialization of associated soft tissue pathology with observation and possible secondary treatment
H. Observation in cases of unerupted teeth completely covered by bone that do not meet indications for surgery
I. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices for Third Molar Removal

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes area assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Known risks and complications associated with therapy
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
    2. Acute and/or chronic infection
    3. Alveolar osteitis
    4. Acute/chronic osteomyelitis
    5. Injury to adjacent teeth and/or hard or soft tissues
    6. Presence of foreign body in surgical site
    7. Osteonecrosis, osteoradionecrosis
    8. Presence of portion of tooth intentionally left in alveolus
    9. Presence of portion of tooth unintentionally left in alveolus
    10. Presence of bone fragments or sequestra in surgical site
    11. Exposure of alveolar bone
    12. Mandibular and/or maxillary fracture
    13. Condition that requires unplanned additional surgery (eg, incision and drainage, curettage)
    14. Oroantral and/or nasal fistula formation
    15. Displacement of tooth, tooth fragments, or foreign bodies into adjacent anatomical sites (eg, airway, gastrointestinal tract, maxillary sinus, inferior alveolar canal, contiguous soft tissues)
    16. Persistent or new pathology (eg, recurrent or residual cyst or tumor)
    17. Onset or exacerbation of symptom(s) related to the temporomandibular joint (TMJ) and surrounding structures

DEFORMITIES AND DEFECTS OF THE DENTOALVEOLAR COMPLEX

I. Indications for Therapy for Deformities and Defects of the Dentoalveolar Complex

May include 1 or more of the following:

A. Clinical findings of osseous or soft tissue deformity or defects (eg, soft tissue abnormalities, exostosis, tori, enlarged tuberosity)
B. Radiographic findings of osseous defects
C. Infection, ulceration, and/or pain
D. Osteomyelitis
E. Speech abnormality
F. Masticatory dysfunction
G. Dysphagia
H. Periodontal disease
I. Interference with prosthetic rehabilitation or orthodontic treatment
J. Diastema
K. Medical or surgical condition or treatment (eg, organ transplantation, chemotherapy, radiation therapy, placement of prosthetic heart valves, prosthetic joints, bisphosphonate administration, joint replacement) for which the correction of a dentoalveolar complex defect is prophylactic
L. Facilitate implant placement or subsequent implant restoration

II. Specific Therapeutic Goals for Deformities and Defects of the Dentoalveolar Complex

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Absence of deformities and defects of the dentoalveolar complex
C. Retention of previously diseased tooth or teeth
D. Improved masticatory function
E. Improved appearance
F. Recovery to a degree that permits prosthetic rehabilitation or orthodontic treatment or placement of dental implants
G. Improved speech

III. Specific Factors Affecting Risk for Deformities and Defects of the Dentoalveolar Complex

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
B. Anatomical location, size, and extent of defect or deformity
C. Anatomical relationships to:
    1. Maxillary antrum and nasal cavity
    2. Adjacent teeth, existing fixed prosthesis, or dental implants
    3. Adjacent nerves and other significant anatomical structures
D. Acute or chronic sinus disease
E. Anti-resorptive or previous radiation therapy

IV. Indicated Therapeutic Parameters for Deformities and Defects of the Dentoalveolar Complex

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

A. Surgical alteration, repair, graft, excision, reduction, or augmentation of hard and/or soft tissues, including but not limited to:
    1. Reduction of tuberosity fibrous and/or osseous reduction
    2. Reduction or excision of exostosis, mandibular tori, or torus palatinus
    3. Maxillary, mandibular, and lingual frenotomy, frenectomy, or frenoplasty

DEFORMITIES AND DEFECTS OF THE DENTOALVEOLAR COMPLEX (continued)

4. Corticotomy
5. Reconstruction, repair and/or revision of hard tissue defects
6. Distraction osteogenesis
7. Reconstruction, repair, and/or revision of soft tissue defects
8. Vestibuloplasty, including extension, soft tissue grafts, muscle reattachment, revision of soft tissue, and management of hypertrophied or hyperplastic soft tissue
9. Lowering of floor of mouth with or without skin or mucosal grafting
10. Alveoloplasty and/or alveolectomy
11. Destruction of lesions of the dentoalveolar structures
12. Mucogingival surgery
13. Soft and hard tissue recontouring
14. Oronasal, oroantral, or orocutaneous fistula closure
15. Ridge preservation when implant placement is anticipated
16. Ridge preservation when implant placement is not anticipated

B. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices for Deformities and Defects of the Dentoalveolar Complex

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
2. Adequate soft and hard tissue base for prosthetic reconstruction and rehabilitation
3. Improved physiologic condition of supporting structures of teeth (eg, periodontium, alveolar bone)
4. Improved:
   a. Mastication
   b. Speech
   c. Appearance
5. Relief from pain
6. Facilitated prosthetic reconstruction
7. Aided orthodontic treatment
8. Creation of an alveolar contour and volume of bone that will allow placement of dental implants
9. Absence of oral/antral communication

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
2. Acute and/or chronic infection
3. Unanticipated loss of hard and/or soft tissues
4. Condition that requires unplanned additional surgery
5. Failure to complete planned staged treatment (eg, insufficient bone for endosseous implants)
6. Oroantral and/or nasal fistula formation
7. Nerve injury
8. Vascular injury
9. Onset or exacerbation of symptom(s) related to the temporomandibular joint (TMJ) and surrounding structures

SELECTED REFERENCES - DENTOALVEOLAR SURGERY

This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation of this document. Citation of the reference material is not meant to imply endorsement of any statement contained in

the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

DENTAL AND CRANIOMAXILLOFACIAL IMPLANT SURGERY

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023,* WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE. TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

Reconstructive dental and craniomaxillofacial implant surgery encompasses the use of implants to rehabilitate and restore form and function to the edentulous or partially edentulous jaws and the craniomaxillofacial skeleton of patients using fixed and removable prostheses. Implants also assist in the stabilization of prostheses that replace missing maxillofacial parts, such as the nose, eyes, and ears. Implant reconstruction enables patients to regain normal mastication, speech, and deglutition; resolves pain, gagging, and dysfunction from conventional removable prostheses; and improves the symmetry and appearance of the face. Thus, it promotes self-esteem and restores both masticatory function and a sense of well-being in patients with congenital, developmental, and acquired orofacial deficits and deformities. The conditions are described generically and listed without any judgment regarding priority.

Advances in implant science, biomaterials, and biotechnology, together with a better understanding of the biology of osseointegration, the bone-implant interface, and biomechanics, has resulted in improved outcomes and expanded applications for implants. Improved methods of imaging for diagnosis, a diverse availability of implants with varied geometry and surfaces, and refinement of augmentation and reconstructive techniques have enabled previously rejected or inadequately rehabilitated patients to be treated. Nanotechnology manipulates biomaterials on an atomic and molecular scale. The reconstruction techniques include guided bone regeneration, autogenous grafting from the maxillofacial region and other sites, and use of bone substitutes, composite grafts, and bone. The techniques involve materials using the concepts of osteogenesis, osteoinduction, osteoconduction, and osteopromotion. Soft tissue procedures, in combination with implant surgery, have improved the health and esthetics of the peri-implant tissues. Increased understanding of biological, biomechanical, and patient- and clinician-related risk factors, as well as a growing consensus of biologically acceptable patient treatment protocols, has improved the safety and efficacy of dental and craniomaxillofacial implant surgery.

The use of implants (temporary, provisional) may provide function and esthetics during the reconstructive phase of treatment.

The team approach, involving a restorative dentist, dental technician, and surgeon in the management of dental implant patients emphasizes that the restoration is the primary factor that drives the implant placement and the requirements for adjunctive grafting procedures. Proper patient selection and presurgical consultation with a restorative dentist involved in the treatment planning using appropriate available assessment tools is recommended. Implant dentistry is a recognized method for reconstruction and rehabilitation of missing parts in the maxillofacial region.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR DENTAL AND CRANIOMAXILLOFACIAL IMPLANT SURGERY

INFORMED CONSENT: Every surgery must be preceded by the patient's or legal guardian's consent, unless an emergent situation dictates otherwise. Emergent circumstances and the indications for treatment should be documented in the patient's record. Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the expected recovery period, alternative treatment options (including no treatment), and any patient- or procedure-specific factors that may affect the risk. The results of the informed consent process must be documented in the patient medical record. In general, an informed consent document is signed by the patient or guardian, but the Oral and Maxillofacial Surgeon is well-advised to document in the medical record that the informed consent process occurred and that the patient/guardian provided both verbal and written consent that they understand and are willing to proceed with treatment.

PERIOPERATIVE ANTIBIOTIC THERAPY: The administration or prescribing of antibiotics may not be needed for otherwise healthy patient, and thus the decision to employ prophylactic perioperative antibiotics is at the sole discretion of the treating surgeon and should be based on the patient's clinical condition as well as other comorbidities which may be present.

DEALING WITH NEUROLOGIC DEFICITS: Injuries to the terminal branches of the trigeminal nerve (eg, lingual, inferior alveolar, long buccal nerves, infraorbital, as well as the facial nerve, are known risks of oral and maxillofacial surgery. It should be noted that the presence of a pathologic craniomaxillofacial condition, dentoskeletal or craniofacial abnormality, or traumatic craniomaxillofacial injury may result in nerve injury prior to surgical management. In addition, the use of local anesthesia (eg, mandibular block) may increase the risk of nerve injury. Most nerve injuries resolve spontaneously, but some do not, and these may require consideration for nonsurgical and/or surgical intervention. Microneurosurgical repair should be considered when the disability is of concern to the patient, and there is clinical evidence of moderate, severe, or complete neurosensory impairment of various areas of the orofacial region (eg, lips, chin, and tongue); paresis or paralysis of facial muscles; loss, decreased, or abnormal taste sensation; or neuropathic pain of peripheral origin or if the progression of

spontaneous nerve recovery slows or halts. Surgical repair should incorporate specialized microsurgical techniques (eg, operating magnification, nerve grafting), when indicated. Also see the *Reconstructive Surgery* chapter.

USE OF IMAGING MODALITIES: Imaging modalities may include panoramic radiograph, periapical and/or occlusal radiographs, maxillary and/or mandibular radiographs, computed tomography, cone beam computed tomography, positron emission tomography, positron emission tomography/computed tomography, and magnetic resonance imaging. In determining studies to be performed for imaging purposes, principles of ALARA (as low as reasonably achievable) should be followed.

DOCUMENTATION: *AAOMS ParCare 2023* includes documentation of objective findings, diagnoses, and patient management interventions. *The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon in light of the circumstances presented by each patient.*

Understandably, there may be good clinical reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well-advised to note in the patient's record the reason for the procedure followed. Moreover, it should be understood that adherence to the parameters does not guarantee a favorable outcome.

GENERAL THERAPEUTIC GOALS FOR DENTAL AND CRANIOMAXILLOFACIAL IMPLANT SURGERY

A. Restored function
B. Improved appearance
C. Improved social and psychological well-being
D. Limited pain (enhanced function, comfort, and minimized pain and discomfort).
E. Limited period of disability
F. Provision of stable anchorage
G. Achievement of uncomplicated healing
H. Achievement of patient satisfaction
I. Appropriate understanding by patient (family) of treatment options and acceptance of treatment plan
J. Appropriate understanding and acceptance by patient (family) of favorable outcomes and known risks and complications
K. Preservation and protection of existing bone from continual resorption.

GENERAL FACTORS AFFECTING RISK DURING DENTAL AND CRANIOMAXILLOFACIAL IMPLANT SURGERY

A. Magnitude of deformity/anomaly.
B. Inadequate quality or quantity of alveolar bone and soft tissues.
C. Presence of bone and/or soft tissue infection, (eg, periapical and periodontal disease, maxillary sinus).
D. Presence of bone and/or soft tissue pathology.
E. Factors that are known to influence osseointegration adversely
    1. Implant material
    2. Implant geometry (macrostructure)
    3. Implant surface (microstructure)
    4. Status of recipient bone (eg, inadequate bone quality and volume)
    5. Trauma to host bone (eg, fracture, thermal injury, and dehiscence)
    6. Bone healing potential
F. Inadequate prosthetic or surgical treatment planning
G. Unfavorable prosthetic design and loading conditions
H. Presence of behavioral, psychological, neurologic, or psychiatric disorders, including habits (eg, substance abuse), seizure disorders, or self-mutilation that may affect surgery, healing, and/or response to therapy
I. Degree of patient and/or family understanding of the origin and natural course of the condition or disorder, therapeutic goals, and acceptance of proposed treatment
J. Parafunctional habits
K. Pre-existing neurologic dysfunction
L. Presence of local or systemic conditions that may interfere with the normal healing process and subsequent tissue homeostasis (eg, previously irradiated tissue, diabetes mellitus, chronic renal disease, liver disease, blood disorder, steroid therapy, contraceptive medication, immunosuppression, and malnutrition), history of local trauma, acute or chronic infection(s) including active or refractory periodontal disease, failed endodontic therapy, osteoporosis, and multiple

surgical interventions at the site in question that could interfere with healing. Various drug groups that promote the osteonecrosis of the jaw include intravenous bisphosphonates, oral bisphosphonates, RANK ligand inhibitors, and angiogenesis inhibitors. The prevalence of medication-related osteonecrosis of the jaw is seen more commonly in cancer patients receiving antiresorptive therapy compared to those receiving treatment for osteoporosis alone. The common oral bisphosphonates used are: alendronate sodium, risedronate sodium, and ibandronate sodium. The common intravenous bisphosphonates used are: ibandronate, pamidronate disodium, and zoledronate. Denosumab (Xgeva and Prolia) is in a new group of medications that are essentially a humanized monoclonal antibody administered subcutaneously. Other antiangiogenic agents include sunitinib and sorafenib (tyrosine kinase inhibitors); bevacizumab, another humanized monoclonal antibody; and sirolimus (rapamycin), an immunosuppressant for patients at risk of organ rejection secondary to renal transplants

M. Degree of patient's and/or family's co-operation and/or compliance
N. Inadequate hygiene
O. Age of patient (eg, developmental status of alveolar bone)
P. Proximity of implant placement site to adjacent structures (eg, teeth, other dental implants, nerve, brain, and sinus)
Q. Presence of coexisting major systemic disease (eg, disease that increases a patient's American Society of Anesthesiologists classification to II, III, or IV) as detailed in the *Patient Assessment* chapter
R. Regulatory and/or third-party decisions concerning access to care, indicated therapy, drugs, devices, and/or materials.

GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR DENTAL AND CRANIOMAXILLOFACIAL IMPLANT SURGERY

A. Retained, stable, and functional implant(s) capable of supporting prosthesis
B. Minimal bone height loss after the first year of service
C. No evidence of peri-implant radiolucency
D. Peri-implant soft tissue health (eg, absence of inflammation, exudate, and bleeding on probing of peri-implant soft tissues)
E. Patient satisfaction with function, esthetics, and ability to maintain implants supported prosthesis in a healthy state
F. Improved social and psychological well-being
G. Limited period of pain and disability
H. Patient (family) acceptance of procedure and understanding of outcomes.

GENERAL KNOWN RISKS AND COMPLICATIONS FOR DENTAL AND CRANIOMAXILLOFACIAL IMPLANT SURGERY

A. Unstable implant
B. Loss of implant
C. Anesthesia, paresthesia, hyperesthesia, and hypoesthesia
D. Excessive vertical and horizontal bone loss greater than 2.0 mm
E. Presence of signs and symptoms, such as pain, infection, neuropathies, or paresthesia
F. Infection (acute and/or chronic)
G. Unanticipated bony deficiency, dehiscence, or fenestration
H. Dental injury during surgery (ie, injury to adjacent teeth)
I. Mandible fracture
J. Unfavorable axial inclination of adjacent teeth
K. Failure of bone graft augmentation
L. Nasal or sinus fistula
M. Nonrestorable implants
N. Implant or component failure (eg, fracture, screw loosening)
O. Improper implant positioning, causing prosthetic compromise
P. Hemorrhage
Q. Hyperplastic soft tissue response
R. Aberrant frenum or mobile mucosal tissues
S. Prolonged period of disability
T. Facial and/or trigeminal nerve dysfunction after surgery
U. Unplanned Caldwell-Luc, bronchoscopy, or other exploratory procedures associated with surgery
V. Ocular injury during surgery

W. Unanticipated repeat oral and/or maxillofacial surgery
X. Core temperature of greater than 101 °F 72 hours after elective surgery
Y. Postsurgical radiograph indicating presence of a foreign body
Z. Unplanned transfusion(s) of blood or blood components during or after surgery
AA. Readmission for complications or incomplete management from previous surgery
BB. Respiratory and/or cardiac arrest
CC. Death.

SPECIAL CONSIDERATIONS FOR PEDIATRIC DENTAL AND CRANIOMAXILLOFACIAL IMPLANT SURGERY

Craniomaxillofacial implants have the following 3 primary applications in the pediatric population: restoration of missing dentition, as an anchoring device for orthodontic manipulation, and for prosthetic reconstruction of the missing structures.

Dental implants can provide optimal restoration for children with hypodontia syndrome or with segments of lost dentition. Congenitally missing teeth are referred to as hypodontia (1 to 5 missing teeth), oligodontia (6 or more missing teeth), and anodontia (missing all permanent teeth in one or both jaws). Agenesis generally refers to missing individual teeth. Missing teeth in a growing individual can be a disabling condition, which must be addressed with consideration for both physical and psychological development. Achievement and maintenance of osseointegrated implants in healthy children have been shown to be possible. There is no fixed chronologic age at which implants may be placed in children. Children younger than 2 years may have unsuitably soft or thin cortical bone for implant placement. In general, growth and skeletal development should be completed or nearly completed before implants are placed. Skeletal maturity can be assessed in a number of ways, including superimposition of serial cephalometric films obtained at 6-month to 1-year intervals. In cases of anodontia and oligodontia, dental implants may be placed before the pubertal growth period. It must be understood, however, that dental implants will not erupt together with adjacent teeth during dentoalveolar development, and they will not be displaced in space as natural teeth are during growth and development. When dental implants are anticipated to manage situations where primary teeth have no successors, maintenance of the primary dentition to maintain the bone available for future implant placement may be appropriate. Orthodontic movement of teeth into and away from implant sites may also benefit the availability of bone to support implants.

Osseous dental implants may serve as anchoring devices for orthodontic and orthopedic mechanisms. In combination with elastic or active spring devices, dental segments may be moved into more ideal positions. This procedure should be undertaken in conjunction with an orthodontist familiar with these mechanisms.

Prosthetic reconstruction may be indicated for the missing ear or severe grade II type microtia. Currently, it is still difficult to achieve an esthetic-appearing ear using autogenous materials and local flaps. A maxillofacial prosthodontist should see the child before surgery to determine the child's suitability as a candidate for an extraoral prosthesis and possible implant placement to retain the prosthesis. And that calvarial bone is of adequate dimension to achieve the necessary thickness for implant placement by approximately 5 or 6 years of age.

SPECIAL CONSIDERATIONS REQUIRING IMPLANTS

I. Neurologic Dysfunction

Certain motor disorders affecting the orofacial musculature and sensory disorders affecting the overlying soft tissues adversely affect masticatory function and the patient's ability to function with a conventional removable prosthesis.

A. Pain
   1. Nerve compression
   2. Soft tissue irritation
B. Neuromuscular disorders
   1. Parkinsonism
   2. Cerebrovascular accident
   3. Multiple sclerosis
   4. Epilepsy
   5. Orofacial dyskinesia
   6. Oral mandibular dystonia
   7. Tardive dyskinesia
   8. Hyperactive gag reflex

SPECIAL CONSIDERATIONS REQUIRING IMPLANTS (continued)

C. Parafunctional habits (eg, bruxism, clenching, tongue thrusting, and finger sucking).

II. Tissue Intolerance

Possible reactions to methyl methacrylate or base metal alloys are: lack of fixed, keratinized soft tissue; and a propensity to chronic inflammatory or autoimmune conditions (eg, Sjögren's syndrome) may contribute to masticatory dysfunction with a conventional prosthesis.

III. Inadequate Orthodontic or Orthopedic Anchorage

Use of implants can enable the orthodontist to manage a variety of clinical problems related to anchorage control and missing teeth. By virtue of its rigid orthopedic anchorage in bone, the osseointegrated implant or the biointegrated implant can be used both to move teeth orthodontically and as root form implants to support single or multiple tooth restorations.

Orthodontic implants may also be used as osseous handles to guide orthopedic development and as bone anchors for distraction osteogenesis.

Implants may be used as absolute anchorage where the anchoring unit remains stationary under orthodontic forces. Certain skeletal deformities may be corrected using titanium screw anchorage.

IV. Patients With Congenitally Missing Teeth or Developmental Anomalies, Including Those With Ectodermal Dysplasia

ADJUNCTIVE DIAGNOSTIC/IMAGING AND SURGICAL PROCEDURES

A. Imaging for implant treatment planning
B. Guided surgery
C. Navigational and/or robotic assisted surgery
D. Virtual treatment planning
E. Implant stability and resonance frequency analysis
F. Mini-implants
G. Flapless surgery
H. Orthodontic tooth extrusion
I. Immediate loading protocols
J. Vascularized pedicle flaps
K. Interpositional osteotomy for posterior mandibular ridge augmentation
L. Zygomatic implant placement (trans-sinus,extra sinus)
M. Angled implant placement
N. Ridge preservation and site development
O. Ridge expansion and splitting
P. Subepithelial connective tissue grafting
Q. Bone morphogenetic protein (BMP 2/7, PDGF-bb)
R. Platelet-rich plasma and platelet-rich fibrin
S. Bone marrow concentrates
T. Subperiosteal tunneling
U. Sinus floor grafting (direct, indirect, palatal approach, transalveolar osseodentification).

GENERAL AND SPECIFIC CONSIDERATIONS

I. Indications for Therapy

May include one or more of the following:

A. General
1. Prevention of alveolar bone resorption and loss of osseous support

GENERAL AND SPECIFIC CONSIDERATIONS (continued)

2. Clinical or imaging evidence of hard or soft tissue defect(s) in the maxillofacial region, including defects resulting from tooth loss, oncologic therapy, and trauma (eg, mandibular, maxillary, nasal, orbital, and ear)
3. Masticatory dysfunction (eg, maxillary and/or mandibular partial edentulism and/or alveolar atrophy)
4. Aesthetic deficiency and/or compromise
5. Speech impairment
6. Behavioral and/or psychological impairment
7. Neurologic dysfunction
   a. Nerve compression
   b. Soft tissue irritation
8. Intolerance to and/or inability to accommodate to tooth and/or soft tissue–borne prostheses
9. Reaction to materials used in tooth and/or soft tissue–borne prosthetic reconstruction.

B. Specific

1. Partial edentulous ridge
   a. Preservation of natural tooth by avoiding tooth preparation for a fixed and/or removable prosthesis
   b. Inadequate natural teeth to support a fixed and/or removable prosthesis
   c. Prevention of occlusal overloading of remaining natural dentition.

2. Isolated Partial Edentulism in the Esthetic Zone
   a. Restoration or improvement of esthetics
   b. Preservation of natural tooth by avoiding tooth preparation for fixed and/or removable prosthesis
   c. Inadequate natural teeth to support a fixed and/or removable prosthesis
   d. Prevention of occlusal overloading of remaining natural dentition.

3. Edentulous Mandible
   a. Absence of natural teeth to support a fixed and/or removable prosthesis
   b. Intolerance to and/or inability to accommodate to a complete denture.

4. Edentulous Maxilla
   a. Absence of natural teeth to support a fixed and/or removable prosthesis
   b. Intolerance to and/or inability to accommodate to a complete denture
   c. Combination syndrome (anterior maxillary resorption, maxillary hyperplasia, and bulbous tuberosities)
   d. Maxillary and/or mandibular vertical, transverse, and anterior-posterior skeletal discrepancies.

5. Reconstructed Mandible (Partially and Edentulous)
   a. Preservation of natural tooth by avoiding tooth preparation for fixed and/or removable prosthesis
   b. Inadequate natural teeth to support a fixed and/or removable prosthesis
   c. Prevention of occlusal overloading of remaining natural dentition
   d. Relative position of genial tubercle
   e. Relative position of the floor of mouth and salivary glands and ducts.

6. Reconstructed Maxilla (Partially and Edentulous)
   a. Preservation of natural tooth by avoiding tooth preparation for fixed and/or removable prosthesis
   b. Inadequate natural teeth to support a fixed and/or removable prosthesis
   c. Prevention of occlusal overloading of remaining natural dentition
   d. Combination syndrome (eg, anterior maxillary resorption, papillary hyperplasia, and bulbous tuberosities).

7. Irradiated Bone
   a. Unstable obturator
   b. Provision of a stable prosthesis in the irradiated jaw with low tolerance to soft and hard tissue irritation or trauma
   c. Provision of retention and anchorage for maxillofacial, nasal, orbital, and ear prosthesis in irradiated tissue
   d. Provision of retention and support of a prosthesis in a xerostomic patient.

8. Reconstructed Alveolar Cleft
   a. Inadequate ridge for prosthetic reconstruction (eg, implant placement)
   b. Preservation of the natural tooth by avoiding preparation for fixed and/or removable prosthesis
   c. Inadequate natural teeth to support a fixed and/or removable prosthesis
   d. Prevention of occlusal overloading of remaining natural dentition.

GENERAL AND SPECIFIC CONSIDERATIONS (continued)

9. Developmental or Acquired Craniofacial Deformities
   a. Improvement on conventional retention of maxillofacial prosthesis
   b. Clinical or imaging evidence of hard or soft tissue defect (eg, congenital, traumatic, or oncologic loss of eye, ear, nose, hair, or other hard or soft tissue structure)
   c. Intolerance to and/or inability to accommodate a conventional prosthesis
   d. Adverse reaction to materials used in prosthesis construction.

II. Therapeutic Goals

A. General

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

The primary goal of implant reconstruction is to provide long-term, stable anchorage for a prosthesis. The implant, in combination with the prosthesis, may then provide one or more of the following:

1. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Dental and Craniomaxillofacial Implant Surgery
2. Prevention of alveolar atrophy and loss of supportive bone
3. Improved mastication
4. Improved speech
5. Improved deglutition
6. Prevention of gagging
7. Enhanced esthetics.

B. Specific

1. Partial Edentulism
   a. Preservation of remaining natural dentition
   b. Prevention of occlusal overloading of remaining natural dentition
   c. Enabling of successful orthodontic treatment
   d. Improved stability of obturators.

2. Isolated Partial Edentulism in the Esthetic Zone
   a. Maintenance or improvement of esthetics
   b. Preservation of remaining natural dentition
   c. Prevention of alveolar atrophy and loss of supportive bone
   d. Prevention of occlusal overloading of remaining natural dentition
   e. Improved patient social confidence and self-esteem.

3. Reconstructed Mandible (Partially and Edentulous)
   a. Prevention of occlusal overloading of remaining natural dentition
   b. Prevention of loss of reconstructed alveolar and supporting bone
   c. Preservation of overlying soft tissue.

4. Reconstructed Maxilla (Partially and Edentulous)
   a. Prevention of loss of reconstructed alveolar and supporting bone
   b. Preservation of overlying soft tissue
   c. Prevention of occlusal overloading of remaining natural dentition.

5. Irradiated Bone
   a. Prevention of loss of soft tissue integrity to minimize contribution to osteoradionecrosis
   b. Provision of anchorage of maxillofacial, nasal, orbital, and ear prosthesis
   c. Diminished risk of osteoradionecrosis secondary to trauma from conventional removable prosthesis
   d. Preservation of remaining natural dentition
   e. Improved stability of obturators
   f. Provision of anchorage of maxillofacial, nasal, orbital, and ear prosthesis.

6. Reconstructed Alveolar Cleft
   a. Prevention of loss of reconstructed alveolar bone

GENERAL AND SPECIFIC CONSIDERATIONS (continued)

b. Preservation of overlying soft tissue
c. Prevention of occlusal overloading of remaining natural dentition.

III. Factors Affecting Risk

A. General

Severity factors that increase risk and the potential for known complications:

1. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Dental and Craniomaxillofacial Implant Surgery
2. Ridge relationship of opposing arch (eg, retrognathia, laterognathia, and prognathia)
3. Unfavorable ridge morphologic features
4. Unfavorable access (eg, trismus, macroglossia)
5. Presence of severe atrophy
6. Prior radiation
7. Past or present use of medication-related osteonecrosis of the jaw inducing agents
8. Quality and quantity of alveolar bone.

B. Specific

1. Partial Edentulism

a. Position of the roots of the adjacent dentition within the alveolar bone
b. Tooth/ridge relationship of opposing arch (eg, overbite, overjet, cross-bite, and supraeruption).

2. Isolated Partial Edentulism in the Esthetic Zone

a. The presence of anatomical variations (eg, "high smile line," crown length, and maxillary hyperplasia)
b. Position of the roots of the adjacent dentition within the alveolar bone
c. Insufficient or excessive interdental space
d. Tooth/ridge relationship of opposing arch (eg, overbite, overjet, cross-bite, supraeruption)
e. Unfavorable ridge morphologic features
f. Vertical maxillary deficiency with reduced reconstructive soft tissue envelope
g. Compromised bone volume on adjacent natural dentition
h. Unfavorable axial inclination of adjacent teeth
i. Inadequate orthodontic retention
j. Unrealistic patient expectations
k. Gingival biotype (inadequate orofacial soft tissue thickness less than 2.0 mm required to mask underlying implant components or for lateral biologic width requirements)
l. Shape of tooth crowns (triangular indicates high risk; ovoid, medium risk; and square, low risk)
m. Restorative status of adjacent teeth (virgin indicates low risk; subgingival restoration with ideal biological acceptance, medium risk; and subgingival restoration with inflammatory response, high risk)
n. Immediate implant placement at esthetic extraction sites with inadequate facial bone
o. Immediate implant placement at esthetic extraction sites with facial bone defects that compromise the bone crests on the adjacent dentition
p. Two or more adjacent implants in the esthetic zone.

3. Edentulous Mandible

a. Relative position of soft tissue, muscle attachments, and the inferior alveolar and mental nerve foramen
b. Location of adjacent vascular structures
c. Relative position of genial tubercle
d. Relative position of the floor of mouth and salivary glands and ducts.

4. Edentulous Maxilla

a. Relative position of soft tissue and muscle attachments
b. Location of adjacent vascular structures
c. Pneumatized maxillary sinuses
d. Maxillary sinus disease (eg, obstructed ostium)
e. Enlarged incisive canal.

5. Reconstructed Maxilla (Partially and Edentulous)

a. Potential vascular compromise of grafted area

GENERAL AND SPECIFIC CONSIDERATIONS (continued)

b. Position of the roots of the adjacent dentition
c. Anatomical relationship of maxillary sinus and nasal fossa
d. Size and location of incisive canal.

6. Reconstructed Mandible (Partially and Edentulous)
a. Potential vascular compromise of grafted area
b. Potential for grafted bone to be inadequately fixated, consolidated, and/or incorporated.

7. Irradiated Bone
a. Tissue hypoxia
b. Tissue hypocellularity
c. Potential for tumor recurrence
d. Xerostomia
e. Diminished reparative capability of tissue
f. Potential for radiation-induced cervical caries
g. Low tolerance of overlying mucosa and skin to trauma
h. Radiation dose
i. Absorbed radiation dose to the implant region
j. Diminished potential for osseointegration
k. Correlation between implant lengths and implant losses
l. Higher frequency of implant loss in craniofacial bones (frontal bone, followed by zygoma, maxilla, and mastoid process of the temporal bone)
m. Interval between irradiation and implant placement
n. Smoking habits of patient
o. Radiation-associated trismus in addition to difficult surgical access
p. Radiation source (eg, internal source of radiation, such as iridium implants, increase risk for radiation damage)
q. Radiation fractionation
r. Potential for reparative fibrosis, demineralization of bone, and increased susceptibility to infection and avascular necrosis.

8. Reconstructed Alveolar Cleft
a. Ridge relationship of opposing arch
b. Presence of severe atrophy
c. Position of the roots of the adjacent dentition
d. Size and location of incisive canal.

9. Developmental or Acquired Craniofacial Deformities
a. Relative position of vital structures (eg, nerves, cranial contents, vasculature)
b. Relative position of craniofacial sinus.

IV. Indicated Therapeutic Parameters

The presurgical assessment includes, at a minimum, a history and a clinical and an imaging evaluation, as well as a prosthetic treatment plan. Also see the Patient Assessment *chapter.*

Proper patient selection; flap design; prevention of thermal injury; selection of site, angle, position, and trajectory; and primary implant stability are critical factors in achieving favorable outcomes. Magnitude and time of implant loading must be taken into consideration.

The following procedures are indicated for the management of implant surgery (not listed in order of preference):

A. General
1. Placement of endosteal osseointegrated type implant(s), including, when appropriate, immediate placement and immediate provisionalization with and without occlusal loading.
2. Augmentation with autogenous, allogeneic, xenogeneic, or alloplastic graft(s) or growth factors, bone morphogenetic protein, PDGF (platelet-derived growth factor) and autologous and allogeneic stem cells to facilitate implant reconstruction, including sinus/nasal floor grafts.

GENERAL AND SPECIFIC CONSIDERATIONS (continued)

3. Harvesting of autogenous grafts from intraoral or extraoral sites, including but not limited to mandibular ramus, ramus body, symphysis, alveolar ridge and retromolar region, maxillary tuberosity, zygomatic buttress ilium, cranium, or tibia.
4. Supplemental procedures:
   a. Guided tissue regeneration (resorbable, guided tissue regeneration; nonresorbable)
   b. Soft tissue augmentation (eg, grafts and local flaps)
   c. Maxillary or mandibular osteotomy with or without bone graft and rigid fixation or osseous distraction
   d. Ridge preservation at time of extraction and hard or soft tissue site development.
5. Instructions for post-treatment care and follow-up.

B. Specific

1. Partial Edentulous Ridge

2. Isolated Partial Edentulism in the Esthetic Zone

a. Placement of osseointegrated type implant(s), including, when appropriate, early and/or immediate placement and immediate provisionalization without occlusal loading.

3. Edentulous Mandible

a. Placement of transosseous implant
b. Placement of subperiosteal implant.

4. Edentulous Maxilla

a. Supplemental procedures:
   i. Placement of pterygoid, zygomatic, and palatal implants
   ii. Alveoloplasty, alveolectomy, and vestibuloplasty.

5. Reconstructed Mandible (Partially or Edentulous)

a. Placement of transosseous implant
b. Placement of subperiosteal implant.

6. Irradiated Bone

a. Use of microsurgically revascularized bone grafts
b. Use of hyperbaric oxygen
c. Instructions for post-treatment care and follow-up (implant maintenance procedure).

7. Reconstructed Alveolar Cleft

a. Placement of pterygoid, zygomatic, and palatal implants.

8. Developmental or Acquired Craniofacial Deformities

a. Use of skeletal anchorage implants for correction of some skeletal deformities.

V. Outcome Assessment Indices

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. General

1. Favorable therapeutic outcomes

a. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Dental and Craniomaxillofacial Implant Surgery
b. Improved speech
c. Achievement of favorable esthetics
d. Improved deglutition
e. Improved mastication
f. Preservation of alveolar supportive bone
g. Prevention of gagging
h. Improved patient social confidence and self-esteem.

2. Known risks and complications associated with therapy

a. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Dental and Craniomaxillofacial Implant Surgery.

GENERAL AND SPECIFIC CONSIDERATIONS (continued)

B. Specific

1. Partial Edentulous Ridge

a. Favorable therapeutic outcomes
   i. Preservation of natural dentition
   ii. Prevention of occlusal overloading of remaining natural dentition
   iii. Successful orthodontic treatment
   iv. Improved stability of obturators

b. Known risks and complications associated with therapy
   i. Loss of or damage to adjacent dentition.

2. Isolated Partial Edentulism in the Esthetic Zone

a. Favorable therapeutic outcomes
   i. Achievement of favorable or harmonious esthetics
   ii. Preservation of natural dentition
   iii. Prevention of occlusal overloading of remaining natural dentition

b. Known risks and complications associated with therapy
   i. Loss of or damage to adjacent dentition
   ii. Fibrotic wound healing, resulting in an unaesthetic result
   iii. Loss of alveolar bone and soft tissues, resulting in esthetic, phonetic, and functional compromise.

3. Edentulous Mandible

a. Favorable therapeutic outcomes

b. Known risks and complications associated with therapy
   i. Mandibular fracture
   ii. Salivary duct/gland injuries
   iii. Soft tissue hyperplasia
   iv. Life threatening hemorrhage.

4. Edentulous Maxilla

a. Favorable therapeutic outcomes
   i. Improved stability of obturators

b. Known risks and complications associated with therapy
   i. Oral nasal and oro-antral fistulae
   ii. Maxillary sinus infection and/or disease.

5. Reconstructed Mandible (Partially and Edentulous)

a. Favorable therapeutic outcomes

b. Known risks and complications associated with therapy
   i. Salivary duct/gland injuries.

6. Reconstructed Maxilla (Partially and Edentulous)

a. Favorable therapeutic outcomes
   i. Prevention of occlusal overloading of remaining natural dentition
   ii. Improved stability of obturators

b. Known risks and complications associated with therapy
   i. Oral nasal and oro-antral fistula
   ii. Maxillary sinus infection and/or disease
   iii. Orbital injuries with zygomatic implants.

7. Irradiated Bone

a. Favorable therapeutic outcomes
   i. Preservation of remaining dentition
   ii. Improved stability of obturators
   iii. Provision of anchorage of maxillofacial, nasal, orbital, and ear prosthesis
   iv. Diminished risk of osteoradionecrosis secondary to trauma from conventional removable prosthesis

b. Known risks and complications associated with therapy
   i. Diminished potential for osseointegration

GENERAL AND SPECIFIC CONSIDERATIONS (continued)

ii. Osteoradionecrosis
iii. Delayed healing of overlying mucosa skin
iv. Risk of tumor recurrence mimicking inflammation/infection
v. Increased healing time.

8. **Reconstructed Alveolar Cleft**
   a. Favorable therapeutic outcomes
      i. Prevention of occlusal overloading of remaining natural dentition
   b. Known risks and complications associated with implant therapy
      i. Neurosensory disturbances
      ii. Soft tissue hyperplasia
      iii. Failed implant
      iv. Peri-implantitis.
9. **Developmental or Acquired Craniofacial Deformities**
   a. Favorable therapeutic outcomes
      i. Preservation of natural dentition
      ii. Improved stability of obturators
      iii. Improved retention of maxillofacial prosthesis
   b. Known risks and complications associated with therapy
      i. Loss of remaining soft or hard tissue
      ii. Need for replacement of implant and/or prosthesis
      iii. Damage to adjacent structures (eg, intracranial contents, neurovascular structures, craniofacial sinus).

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This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation of this document. Citation of the reference material is not meant to imply endorsement of any statement contained in the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

SURGICAL CORRECTION OF MAXILLOFACIAL SKELETAL DEFORMITIES

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023,* WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE. TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

The surgical correction of maxillofacial skeletal deformities includes the reconstructive procedures that correct deformities of the maxilla, mandible, facial skeleton, and associated soft tissue structures. The etiology of maxillofacial skeletal deformities may be congenital, developmental, or acquired. Deformities may be evident at birth or may manifest during subsequent growth and development, creating functional, degenerative, cosmetic, and/or psychosocial problems. The timing of corrective surgery can be critical and may occur during or after completion of growth. Radiographic evaluation prior to and following a treatment is critical but should be used judiciously as clinically indicated. With advancing technology, integrated computer and radiographic techniques can be an integral part of planning and treatment. Orthodontic consultation and treatment in conjunction with surgical correction are frequently necessary and highly favorable in most cases. The use of clear aligners can be used in place of conventional orthodontic appliances for the combined treatment approach. Treatment planning can involve single or multiple separate, staged, surgical, and nonsurgical treatments. The temporal order for orthodontic and surgical intervention may take place at any time during treatment. Earlier surgical intervention with a "surgery-first" approach can be considered when it will benefit the patient and may have specific advantages over a more traditional "orthodontics first" treatment sequence. Other nonsurgical specialties (eg, speech therapy, sleep medicine, psychology, and prosthodontics) may also be helpful or necessary for completion of treatment in more complicated cases. The principal goal for surgical correction of the maxillofacial skeletal deformity is to create or restore form, function, and health, while minimizing potential negative short-term and long-term sequelae. Diversity is an important element when addressing patients' esthetic concerns and individualized component approaches can improve outcomes.

Procedures used for the correction of maxillofacial skeletal deformities may also be necessary to correct obstructive sleep apnea (OSA). It is recognized that OSAdue to upper airway obstruction can effectively be corrected with maxillomandibular advancement (MMA) procedures, whether traditional cephalometric landmarks and analysis diagnose a specific maxillofacial skeletal abnormality.

Cosmetic alterations may result after the treatment of maxillofacial surgical deformities. Treatment planning for the correction of maxillofacial skeletal deformities normally entails basic cosmetic tenets and guidelines to maximize patient outcomes both functionally and esthetically. Discussion of the patient's gender identification is necessary to achieve outcomes consistent with the patient's self-image. The parameters for the correction of cosmetic deformities are included in the *Facial Cosmetic Surgery* chapter.

Congenital, developmental, and acquired abnormalities of the temporomandibular joint (TMJ) can result in functional alterations, distortion, and/or disfigurement of the mandible, maxilla, and related structures. Distortion and disfigurement of the maxillofacial skeleton can also cause TMJ problems. Surgical correction of the maxillofacial skeletal structures may include surgical and nonsurgical treatment of the temporomandibular joint. Parameters for management of TMJ pathology are included in the *Temporomandibular Joint Surgery* chapter.

Cleft lip and palate and/or craniofacial deformities often occur in conjunction with other maxillofacial skeletal deformities and are not independent of each other. Recognition and treatment of these associated cleft and craniofacial deformities may influence or change treatment guidelines for maxillofacial skeleton deformities.

Parameters for management of cleft lip/palate and craniofacial deformities are included in the *Cleft and Craniofacial Surgery* chapter.

These parameters were prepared with the recognition that there is more than one approach to treating specific deformities of the maxillofacial skeleton. Each patient may require an individualized treatment based on several contributing factors. Consequently, flexibility has been incorporated into this document to allow the practitioner to select the most appropriate treatment option in each case. Newer diagnostic and surgical adjuvants, including computed tomography (CT), 3-dimensional modeling, computer-aided surgical simulation (CASS), virtual surgical planning (VSP), CT-generated surgical guides, patient-specific implants and custom fixation may be indicated to reduce surgical risk and improve outcomes. This is particularly true in more severe deformities and/or developmental anomalies with abnormal anatomical variants requiring complicated surgical maneuvers. In addition, navigational and endoscopic surgical techniques are rapidly evolving and may offer an advantage over traditional surgical techniques in selected instances. The future application of robotic surgery may even develop into a useful surgical tool for the treatment of maxillofacial skeletal deformities and adjunctive procedures. Surgically assisted osteogenic orthodontics is also a promising treatment modality comprised of techniques such as selective alveolar corticotomies, grafting, and temporary anchorage devices. These combined procedures, when clinically indicated, are potential outpatient treatment options in the preparation and correction of maxillomandibular skeletal deformities. Advantages may include lower morbidity, early recovery, decreased duration of orthodontic therapy, and presurgical orthodontic decompensation via a temporary phase of accelerated tooth movement known as regional acceleratory phenomenon (RAP). Future changes in the treatment of maxillofacial skeletal deformities, resulting from new research findings and evolving technologic developments, will undoubtedly extend the capabilities for treatment and enable an even higher quality of patient care.

The surgical correction of maxillofacial skeletal deformities requires clear mutual understanding, by both surgeon and patient, of stated treatment objectives and expectations regarding the proposed treatment and expected outcome, recognizing that different treatment modalities for the same deformity may not only be acceptable but may also present different risks, benefits, and outcomes.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR SURGICAL CORRECTION OF MAXILLOFACIAL SKELETAL DEFORMITIES

INFORMED CONSENT: All surgery must be preceded by the patient's or legal guardian's consent, unless an emergent situation dictates otherwise. Emergent circumstances and the indications for treatment should be documented in the patient's record. Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the expected recovery period, alternative treatment options (including no treatment), and any patient or procedure specific factors that may affect the risk. The results of the informed consent process must be documented in the patient medical record. In general, an informed consent document is signed by the patient or guardian, but the Oral and Maxillofacial Surgeon is well-advised to document in the medical record that the informed consent process occurred and that the patient/guardian provided both verbal and written consent that they understand and are willing to proceed with the treatment.

PERIOPERATIVE ANTIBIOTIC THERAPY: The administration or prescribing of antibiotics may not be needed for an otherwise healthy patient, and thus the decision to employ prophylactic perioperative antibiotics is at the sole discretion of the treating surgeon and should be based on the patient's clinical condition as well as any other comorbidities which may be present.

DEALING WITH NEUROLOGIC DEFICITS: Injuries to the terminal branches of the trigeminal nerve (eg, lingual, inferior alveolar, and long buccal nerves), as well as the facial nerve, are known risks of oral and maxillofacial surgery. It should be noted that the presence of a pathologic craniomaxillofacial condition, dentoskeletal or craniofacial abnormality, or traumatic craniomaxillofacial injury may result in nerve injury prior to surgical management. In addition, the use of local anesthesia (eg, mandibular block) may increase the risk of nerve injury. Most nerve injuries resolve spontaneously, but some do not, and these may require consideration for nonsurgical and/or surgical intervention. Microneurosurgical repair should be considered when the disability is of concern to the patient, and there is clinical evidence of moderate, severe, or complete neurosensory impairment of various areas of the orofacial region (eg, lips, chin, and tongue); paresis or paralysis of facial muscles; loss, decreased, or abnormal taste sensation; or neuropathic pain of peripheral origin or if the progression of spontaneous nerve recovery halts. Surgical repair should incorporate specialized microsurgical techniques (eg, operating magnification and nerve grafting), when indicated. Also see the *Reconstructive Surgery* chapter.

USE OF IMAGING MODALITIES: Imaging modalities may include panoramic radiograph, periapical and/or occlusal radiographs, maxillary and/or mandibular radiographs, CT, cone beam CT, positron emission tomography, positron emission tomography/CT, and magnetic resonance imaging. In determining studies to be performed for imaging purposes, principles of ALARA (as low as reasonably achievable) should be followed.

DOCUMENTATION: *AAOMS ParCare 2023* includes documentation of objective findings, diagnoses, and patient management interventions. *The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon considering the circumstances presented by each patient. Understandably, there may be good clinical reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well-advised to note the reason for the procedure followed in the patient's record. Moreover, adherence to the parameters does not guarantee a favorable outcome.*

COMPREHENSIVE CARE: Comprehensive care in the surgical correction of maxillofacial skeletal deformities usually includes orthodontic therapy. In cases where orthodontics is not included, adequate documentation is recommended. Other comprehensive care may include any necessary evaluations or interventions for medical, dental, psychological, speech, or airway concerns before surgery.

GENERAL INDICATIONS FOR THERAPY FOR SURGICAL CORRECTION OF MAXILLOFACIAL SKELETAL DEFORMITIES

A. Physical evidence of musculoskeletal, dento-osseous, and/or soft tissue deformity
B. Imaging evidence of musculoskeletal, dento-osseous, and/or soft tissue deformity
    1. Deviation from cephalometric norms
    2. Other imaging disclosure of abnormality

C. Malocclusion that cannot be reasonably corrected by a nonsurgical means (eg, unstable or traumatic occlusion, compromised esthetics, and protracted treatment time)
D. Speech pathology
E. Masticatory and swallowing abnormalities
F. Incomplete correction or unstable result of previous treatment
G. Dental and/or periodontal pathology
H. Social and psychological impairment
I. Associated TMJ disorders
J. Associated muscular disorder (surgical correction may be useful when reversible occlusal alteration demonstrates relief of symptoms)
K. Sleep disordered breathing
L. Gender affirmation for feminization or masculinization

GENERAL THERAPEUTIC GOALS FOR SURGICAL CORRECTION OF MAXILLOFACIAL SKELETAL DEFORMITIES

A. Improved musculoskeletal, dento-osseous, and/or soft tissue relationships
B. Improved masticatory and swallowing
C. Improved occlusion
D. Improved quality of speech
E. Enhanced stability of orthodontic result
F. Improved dental and periodontal health
G. Improved social and psychological well-being
H. Improved associated TMJ and/or muscular disorders
I. Limited period of disability
J. Improved airway, including improvement of signs and symptoms of sleep disordered breathing

GENERAL FACTORS AFFECTING RISK DURING SURGICAL CORRECTION OF MAXILLOFACIAL SKELETAL DEFORMITIES

A. Degree of patient and/or family understanding of the origin and natural course of the condition or disorder and therapeutic goals and acceptance of proposed treatment.
B. Presence of coexisting major systemic disease (eg, disease that increases a patient's American Society of Anesthesiologists classification to II, III, or IV), as detailed in the *Patient Assessment* chapter
C. Age of patient
D. Active and/or disproportionate maxillofacial growth
E. Presence and severity of TMJ and/or muscular disorders
F. Progression or instability that stems from idiopathic condylar resorption
G. Severity of maxillofacial skeletal deformity (eg, severe hemifacial microsomia syndromes, distorted or unusual anatomy, malocclusions with large occlusal discrepancies (generally >1 cm))
H. Presence and severity of acquired maxillary and/or mandibular skeletal, dento-osseous, or soft tissue deformities (eg, secondary to facial trauma, compromised dentoalveolar health, and previous surgical treatment)
I. Presence of parafunctional habits (eg, bruxism, clenching, tongue thrusting, and finger sucking)
J. Presence of local or systemic conditions that may interfere with the normal healing process and subsequent tissue homeostasis (eg, previously irradiated tissue, diabetes mellitus, chronic renal disease, liver disease, blood disorder, steroid therapy, contraceptive medication, immunosuppression, and malnutrition)
K. Presence of behavioral, psychological, neurologic, or psychiatric disorders, including habits (eg, substance abuse), seizure disorders, or self-mutilation that may affect surgery, healing, and/or response to therapy
L. Degree of patient's and/or family's cooperation and/or compliance
M. Regulatory and/or third-party decisions concerning access to care, indicated therapy, drugs, devices, and/or materials
N. Presence of sleep disordered breathing, including OSA, upper airway resistance syndrome, and the potential for OSA (recognizing that patients with borderline airway issues can be pushed into frank OSA with an imprudent treatment plan)
O. Subsequent operative surgery to correct suboptimal results from prior maxillofacial skeletal surgery
P. Subsequent operative surgery due to prior planned/staged maxillofacial skeletal surgery
Q. Maxillofacial skeletal surgery after prior adjunctive hard and soft tissue surgery (eg, pharyngeal flap, cleft repair, and distraction osteogenesis)

R. Correction of traumatic deformities
S. Preoperative deformity, condition, and/or TMJ disease complicating the establishment of a secure airway for surgery (eg, significant retrognathia, TMJ hypomobility/ankylosis, macroglossia, and scleroderma)

GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR SURGICAL CORRECTION OF MAXILLOFACIAL SKELETAL DEFORMITIES

A. Long-term improvement in the musculoskeletal, dento-osseous, and/or soft tissue relationships
B. Stable functional occlusion
C. Improved masticatory and swallowing function
D. Improved speech
E. Satisfactory temporomandibular function
F. Satisfactory range of motion
G. Stable orthodontic result
H. Improved dental and periodontal health
I. Improved social and psychological well-being
J. Uncompromised facial esthetics
K. Stable surgical result
L. Satisfactory surgical wound healing
M. Limited period of disability
N. Patient (family) acceptance of procedure and understanding of options and outcomes
O. Improvement or elimination of OSA

GENERAL KNOWN RISKS AND COMPLICATIONS FOR SURGICAL CORRECTION OF MAXILLOFACIAL SKELETAL DEFORMITIES

A. Unplanned admission to intensive care unit after elective surgery
B. Unplanned intubation for longer than 12 hours after surgery
C. Reintubation or tracheostomy after surgery
D. Use of parenteral drugs and/or fluids for longer than 72 hours after elective surgery
E. Failure to ambulate within 48 hours of elective surgery
F. Failure to begin or maintain adequate nutritional intake following surgery
G. Facial and/or trigeminal nerve dysfunction after surgery
H. Facial fracture during or after surgery
I. Unplanned Caldwell-Luc, bronchoscopy, or other exploratory procedures associated with surgery
J. Dental injury during surgery
K. Soft tissue and/or osseous periodontal injury
L. Ocular and orbital injury during surgery
M. Repeat oral and/or maxillofacial surgery
N. Core temperature of greater than 101° F 72 hours after elective surgery
O. Postsurgical radiograph indicating presence of foreign body
P. Surgical anesthesia risks and complications
Q. Unplanned transfusion(s) of blood or blood components during or after surgery
R. Readmission for complications or incomplete management of problems during previous hospitalization
S. Respiratory and/or cardiac arrest
T. Impaired dental occlusion
U. Impaired airway or worsening of sleep disordered breathing
V. Impaired social and psychological well-being
W. Deterioration of facial appearance
X. Onset or exacerbation of temporomandibular disorders
Y. Clinically significant neurologic deficit
Z. Failure of bone to heal (eg, delayed or nonunion)
AA. Damage or loss of teeth, bone, and/or soft tissue
BB. Dental pathology requiring treatment
CC. Infection (eg, acute or chronic)
DD. Unplanned need for removal of internal fixation
EE. Hemorrhage (may include unplanned blood transfusion)

FF. Pain
GG. Restricted mandibular range of motion
HH. Skeletal relapse and/or unstable surgical result
II. Onset of parafunctional habits
JJ. Prolonged period of disability
KK. Delayed wound healing
LL. Scar
MM. Excess or deficiency of anticipated growth after surgery
NN. Growth disturbance
OO. Death

SPECIAL CONSIDERATIONS FOR THE SURGICAL CORRECTION OF PEDIATRIC MAXILLOFACIAL SKELETAL DEFORMITIES

The Oral and Maxillofacial Surgeon performing orthognathic surgery in children must make a special effort to ensure that the parent/guardian and the child (depending on age) understand the indications, risks, and benefits, and the change in appearance that will accompany the correction of maxillofacial skeletal deformities. The relationship between the child patient and the parents may complicate the patient–physician relationship. It is important for the surgeon to develop a relationship with the child and the family to understand their concerns and expectations. Psychological consultation may be required.

The principles of management of maxillofacial skeletal deformities in children are similar to those for adults. The major difference is related to determining the proper timing for surgery. The patient's age, stage of development, growth history, and the nature of the deformity and its consequences for the child must be considered when establishing the timing and sequencing of treatment. For example, the rate of growth in height, in the years immediately preceding an evaluation, is helpful in judging where a child is on the growth curve. Information on the height of siblings and parents may be helpful. For females, the time of the onset of menses is informative. Most females stop growing approximately 2.5 to 3 years after the beginning of menstruation. The hand-wrist radiograph may be helpful because skeletal maturity in normal jaw growth correlates with closure of the radial and ulnar epiphyses. Correlative indices based on cervical vertebral maturation have been developed. Bone scanning and serial cephalometric radiographs, along with clinical examinations, photographs, and models, can provide additional information concerning growth, particularly with abnormal or disproportionate growth and cases of delayed pubertal onset. Facial growth, whether normal or abnormal, is not entirely predictable even with the best technology.

Newer approaches to surgical orthodontic sequencing include the advent of a “surgery-first” protocol that has been shown to significantly shorten total treatment time (orthodontics and surgery) for those patients determined to benefit from this approach. Other desirable advantages of the surgery-first protocol for the pediatric or young adult patient may include early improvement in facial esthetics, dental function, speech, and swallowing along with more rapid postsurgical orthodontic movements, increased patient cooperation, and a stable result comparable to other approaches.

The nature of the deformity and an understanding of the growth pattern of the maxillofacial skeleton also help the Oral and Maxillofacial Surgeon decide on the timing of surgery. For example, surgery for mandibular prognathism is generally delayed until the patient reaches skeletal maturity and mandibular growth has ceased.

Similarly, surgery for class III malocclusion secondary to maxillary hypoplasia may be delayed to avoid relapse secondary to late mandibular growth. Examples of reasons for exceptions include the management of sleep-disordered breathing, psychological issues secondary to severe facial deformities, associated condylar procedures to halt excessive abnormal mandibular growth, or a staged treatment plan, such as the one that might involve distraction osteogenesis at the LeFort III level to correct upper third facial deficiencies exclusive of the occlusion. If a malocclusion remains stable in the context of proportionate maxillomandibular growth, surgical correction may be appropriate before the completion of active growth. In the case of vertical maxillary excess, surgery can be undertaken after the permanent canines and second molars have erupted because there is little vertical growth of the maxilla after these developmental milestones. In the case of mandibular retrognathism, correction can often be performed during growth. If the jaw grows after correction, it will be in a direction that counters the tendency for relapse. Active facial growth has a sufficient degree of variability, necessitating those decisions concerning surgical timing be based on the individual patient's findings, using the known norms as general guidelines.

The consequences of hypoplasia can be mitigated in the growing skeleton with either classic osteotomies or distraction osteogenesis techniques. Mandibular retrusion and maxillary protraction utilizing temporary anchorage devices such as screw-retained plating systems and miniscrews may be considered as a more conservative, cost-efficient, and less morbid treatment alternative for developing skeletal class III malocclusion in preadolescent and early adolescents. Other examples

would include the treatment of OSA due to severe mandibular or midface hypoplasia. Speech abnormalities, especially obligate articulation errors, may occasionally be treated in this developing population. Severe lip incompetence, sialorrhea, and significant masticatory problems resulting from a skeletal deformity may also indicate a need for surgery before the completion of growth (also see the *Cleft and Craniofacial Surgery* chapter). Because there are many valid reasons for a particular treatment that falls outside accepted norms, treatment planning that significantly deviates from standard accepted practice should be clearly documented and should include documentation of appropriate multidisciplinary consultation.

The presence of developing teeth, the relative positions of anatomical landmarks, and the character of young bone require the modification of adult orthognathic surgical techniques for use in the pediatric patient. For example, internal fixation methods will also have to be modified to account for these differences, and the postoperative management may also require alteration.

Distraction osteogenesis can be a useful technique in the pediatric population and may overcome many anatomical challenges encountered with classic osteotomies and fixation techniques. Distraction techniques, however, impose a significant additional burden on a child and family beyond that encountered with classic osteotomies.

Distraction osteogenesis is a more expensive technique due to the additional cost of the distraction devices and the second operation required for their removal. Additional patient visits are also required compared with classic techniques. Furthermore, distraction cannot predictably achieve the same precise 3-dimensional anatomical correction of classic osteotomies. Surgeons should consider these limitations and must have a clear rationale for the use of distraction osteogenesis in place of immediate surgical repositioning for correction of a given deformity.

Condylar changes involving overgrowth with hyperplasia or deficiency via hypoplasia or idiopathic condylar resorption often involved increased monitoring, diagnostic measures, treatment planning, and subsequent management. Due to the added advantages of lower costs and morbidity, fast recovery, and decreased duration of orthodontic therapy and decompensation, surgically assisted osteogenic orthodontics may be considered as a treatment option when clinically indicated.

CASS can greatly enhance the efficiency and accuracy of dentofacial deformity correction particularly in the pediatric patient. VSP can illustrate the multidimensional correction required at both the skeletal and dental level, provide preoperative insight into the surgical intervention (segment orientation, fixation requirements, grafting needs, and so on) and has proven to be accurate in the transfer of the virtual plan to the operating room. This method can be utilized to fabricate anatomic templates, jigs, and cutting guides to aid in the transfer of the virtual plan to the operating room. This method improves efficiency, accuracy, and patient outcomes.

Advances in computer-assisted surgery (ie, laser surface scans, 3-dimensional photography, 3-dimensional diagnostics, 3-dimensional treatment planning, patient-specific implants, along with surgical simulation, rapid prototyping for surgical guide fabrication, and intraoperative navigational techniques) are rapidly evolving and may offer an advantage over traditional surgical techniques in selected cases.

SPECIAL CONSIDERATIONS FOR THE GERIATRIC PATIENT

With advances in the diagnosis and treatment of medical and dental disease, the geriatric population requires more advanced oral and maxillofacial surgical care. Increased lifespans have resulted in a larger geriatric population with multifaceted dental and oral needs. Surgical care is safer, more predictable, and continues to evolve, although the consequences of aging may dictate modifications of traditional protocols for treatment. As a result of improved health and longer lifespans, the goals of dental rehabilitation are evolving with more focus on the maintenance of an active lifestyle with an emphasis on function and esthetics.

Traditional removable dental prosthetics are no longer the only or best option available to the geriatric patient with advanced dental disease. Patients with moderate to severe bone loss can create or exacerbate skeletal discrepancies making dental and oral rehabilitation challenging without surgical correction. Orthodontics, even in a compromised periodontium, is often indicated and may require adjunctive surgery or more traditional dentofacial skeletal correction. Intricate implant-supported fixed and removable prosthetics can provide the geriatric patient with improved mastication, esthetics, speech, and oral function, but advanced dental restoration of the geriatric patient without correction of dentofacial deformities can result in compromised outcomes, poor function, or early failure of dental reconstruction.

Orthotics and mandibular repositioning appliances may be implemented by dental practitioners for acute management of active facial pain related to internal derangement of the TMJ and conservative management of mild OSA, respectively. Close monitoring of these patients is encouraged, as long-term use of an appliance can negatively alter the occlusion.

Esthetic surgery in the geriatric patient often requires correction of dentofacial deformities with traditional or adjunctive procedures to restore facial proportions and volume. OSA is more common in the geriatric population, and surgical correction is often indicated to correct anatomical deficiencies of the airway. TMJ replacement due to advanced autoimmune or degenerative joint disease may require simultaneous dentofacial skeletal correction. Treatment for head and neck cancer

can result in poor dental function, requiring correction of congenital or acquired deformities with traditional or adjunctive procedures.

CASS, VSP, and a "surgery-first" approach have an obvious benefit in the geriatric population and may be the treatment approach of choice for many patients, particularly as technology continues to advance.

MANDIBULAR PROGNATHISM/HYPERPLASIA

I. Indications for Therapy for Mandibular Prognathism/Hyperplasia

May include one or more of the following:

A. One or more indications for therapy, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Bilateral condylar hyperplasia

II. Specific Therapeutic Goals for Mandibular Prognathism/Hyperplasia

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. One or more therapeutic goals, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities

III. Specific Factors Affecting Risk for Mandibular Prognathism/Hyperplasia

Factors that increase risk and the potential for known complications are as follows:

A. Presence of one or more general factors affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Existing or recently removed impacted mandibular third molars
C. Presence of sleep disordered breathing preoperatively
D. Active pathologic growth process

IV. Indicated Therapeutic Parameters for Mandibular Prognathism/Hyperplasia

The presurgical evaluation includes, at a minimum, a history and physical examination, and diagnostic records, including a panoramic radiograph, cephalometric analysis, photographic documentation, and dental model assessment. CT scanning and computer-assisted surgical techniques, including 3-dimensional modeling, computational planning, and rapid prototyping of surgical guides, may be indicated in select cases. Also see the Patient Assessment chapter.

Navigational surgical techniques may also be indicated in select cases based on the surgical deformity, proposed procedures, surgeon experience and preference, and potential for an improved outcome.

The following procedures for the management of mandibular prognathism are not listed in order of preference:

A. Sagittal split ramus osteotomy
B. Other ramus osteotomies (e.g. intraoral vertical, inverted L, extraoral ramal procedures, others)
C. Supplemental procedures
    1. Le Fort I maxillary osteotomy
    2. Mandibular symphysis vertical osteotomy
    3. Subapical or body osteotomy/ostectomy
    4. Grafting procedures (eg, autogenous, allogeneic bone, alloplasts, and bone morphogenetic protein)
    5. Genioplasty
    6. Contour augmentation and/or reduction
    7. Coronoidectomy
    8. High condylectomy (in severe cases demonstrating continuous abnormal growth)
    9. Alveolar bone grafting in preparation for orthodontic movement
    10. Surgically assisted orthodontic movement (includes skeletal anchorage devices and corticotomies)
    11. Partial glossectomy
    12. Dental extractions (includes third molar removal)
    13. Speech and swallowing therapy
D. Instructions for posttreatment care and follow-up

MANDIBULAR PROGNATHISM/HYPERPLASIA (continued)

V. Outcome Assessment Indices for Mandibular Prognathism/Hyperplasia

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities

MANDIBULAR RETROGNATHISM/HYPOPLASIA

I. Indications for Therapy for Mandibular Retrognathism/Hypoplasia

May include one or more of the following:

A. Presence of one or more indications for therapy, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Associated developmental, pathologic, or acquired condylar disorders (eg, ankylosis and idiopathic condylar resorption)
C. Associated airway obstruction (eg, OSA or upper airway resistance syndrome, when confirmed by appropriate sleep studies as part of a multidisciplinary approach to treatment)

II. Specific Therapeutic Goals for Mandibular Retrognathism/Hypoplasia

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of one or more general therapeutic goals, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Correction of airway obstruction and signs and symptoms of OSA

III. Specific Factors Affecting Risk for Mandibular Retrognathism/Hypoplasia

A. Presence of one or more general factors affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Presence of or recent removal of impacted mandibular third molar

IV. Indicated Therapeutic Parameters for Mandibular Retrognathism/Hypoplasia

The presurgical evaluation includes, at a minimum, a history and physical examination and diagnostic records, including a panoramic radiograph, cephalometric analysis, photographic documentation, and dental model assessment. CT scanning and computer-assisted surgical techniques, including 3-dimensional modeling, computational planning, and rapid prototyping of surgical guides, may be indicated in selected cases. Also see the Patient Assessment chapter.

Navigational surgical techniques may also be indicated in select cases based on the surgical deformity, proposed procedures, surgeon experience and preference, and potential for improved outcomes.

The following procedures for the management of mandibular retrognathism are not listed in order of preference:

A. Sagittal split ramus osteotomy with rigid fixation
B. Inverted "L" osteotomy with bone grafting and rigid fixation
C. Supplemental procedures
   1. Le Fort I maxillary osteotomy
   2. Mandibular symphysis vertical osteotomy
   3. Grafting procedures (eg, autogenous, allogeneic bone, and alloplasts)
   4. Subapical or alveolar osteotomies

MANDIBULAR RETROGNATHISM/HYPOPLASIA (continued)

5. Genioplasty
6. Contour augmentation and/or reduction (augmentation with prosthesis, bone graft, or osteoplasty)
7. Myotomy
8. Hyoid suspension
9. Genial tubercle advancement
10. Reconstruction (condyle/mandible)
11. Alveolar bone grafting in preparation for orthodontic movement
12. Surgically assisted orthodontic movement (includes skeletal anchorage devices and corticotomies)
13. Dental extractions (includes third molar removal)
14. Pharmaceutical management to minimize temporomandibular instability

D. Distraction osteogenesis both for mandibular widening and lengthening
E. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices for Mandibular Retrognathism/Hypoplasia

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. Presence of general favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
   2. Improved airway (OSA patients)
B. Known risks and complications associated with therapy
   1. Presence of general known risks and/or complications, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
   2. Unimproved airway
   3. Altered growth
   4. Degenerative condylar disease (idiopathic condylar resorption and rheumatoid arthritis)

MANDIBULAR ASYMMETRY

Mandibular asymmetry may result from congenital, developmental, or acquired condylar anomalies. It may be manifested as hyperplasia with overgrowth or hypoplasia with deficiency and may also be present without apparent condylar involvement.

The condition may be isolated to the transverse plane or demonstrate transverse, sagittal, and vertical skeletal deformity.

I. Indications for Therapy for Mandibular Asymmetry

May include one or more of the following:

A. Presence of one or more indications for therapy, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Associated developmental, pathologic, or acquired condylar disorders affecting mandibular symmetry
C. Vertical and/or horizontal asymmetry of the ramus and/or body of the mandible

II. Specific Therapeutic Goals for Mandibular Asymmetry

The goal of therapy is to restore form and/or function. However, risk factors, soft tissue abnormalities, severe skeletal deformities, and potential complications may preclude complete restoration of form and/or function.

A. Presence of one or more general therapeutic goals, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities

III. Specific Factors Affecting Risk for Mandibular Asymmetry

Severity factors that increase risk and the potential for known complications:

MANDIBULAR ASYMMETRY (continued)

A. Presence of one or more of the general factors affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Severity of mandibular condylar deformity
C. Etiology of condylar deformity (eg, tumor, idiopathic condylar resorption, ankylosis)
D. Associated soft tissue asymmetry
E. Severity of mandibular asymmetry
F. Lack of functional condylar articulation

IV. Indicated Therapeutic Parameters for Mandibular Asymmetry

The presurgical evaluation includes, at a minimum, a history and physical examination, and diagnostic records, including a panoramic radiograph, cephalometric analysis, photographic documentation, and dental model assessment. CT scanning and computer-assisted surgical techniques, including 3-dimensional modeling, computational planning, and rapid prototyping of surgical guides, may be indicated in select cases. Also see the Patient Assessment chapter.

Navigational surgical techniques may also be indicated in select cases based on the surgical deformity and proposed procedures, surgeon experience and preference, and potential for improved outcomes.

The following procedures for the management of mandibular asymmetry are not listed in order of preference:

A. Sagittal split ramus osteotomy, vertical ramus osteotomy, inverted "L" osteotomy
B. Partial or complete condylectomy
C. Supplemental procedures
    1. Mandibular symphysis vertical osteotomy
    2. Le Fort I osteotomy with or without segmentalization
    3. Grafting procedures (eg, autogenous, allogeneic bone, and alloplasts)
    4. Genioplasty
    5. Contour augmentation and/or reduction, including soft tissue augmentation (eg, fat grafting and soft tissue flaps)
    6. TMJ surgery including total joint replacement
    7. Genial tubercle advancement
    8. Alveolar bone grafting in preparation for orthodontic movement
    9. Surgically assisted orthodontic movement (includes skeletal anchorage devices and corticotomies)
    10. Dental extractions (includes third molar removal)
    11. Pharmaceutical management to minimize temporomandibular instability
D. Distraction osteogenesis
E. Soft tissue grafts or flaps (eg, microvascular transfer of adipofascial flap for soft tissue augmentation)
F. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices for Mandibular Asymmetry

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Known risks and complications associated with therapy
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
    2. Soft tissue response to hard/soft tissue augmentation or reduction
    3. Continued facial asymmetry

MAXILLARY HYPERPLASIA

Maxillary hyperplasia consists of three component subsets: vertical, horizontal, and transverse. Items listed under this condition are applicable to all subsets of this condition unless otherwise designated.

I. Indications for Therapy for Maxillary Hyperplasia

May include one or more of the following:

A. Presence of one or more indications for therapy, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Airway obstruction (eg, sleep-disordered breathing and nasal airway obstruction)
C. Associated soft tissue deformities (eg, lip incompetence)

II. Specific Therapeutic Goals for Maxillary Hyperplasia

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities

III. Specific Factors Affecting Risk for Maxillary Hyperplasia

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Presence of or recent removal of impacted maxillary third molars

IV. Indicated Therapeutic Parameters for Maxillary Hyperplasia

The presurgical evaluation includes, at a minimum, a history and physical examination, and diagnostic records, including a panoramic radiograph, cephalometric analysis, photographic documentation, and dental model assessment. CT scanning and computer-assisted surgical techniques, including 3-dimensional modeling, computational planning, and rapid prototyping of surgical guides, may be indicated in select cases. Also see the Patient Assessment chapter.

Navigational surgical techniques may also be indicated in select cases based on the surgical deformity and proposed procedures, surgeon experience and preference, and potential for improved outcomes.

The following procedures for the management of maxillary hyperplasia are not listed in order of preference:

A. Segmental maxillary alveolar osteotomies
B. Le Fort I osteotomy with or without segmentalization
C. Supplemental procedures
    1. Grafting procedures (eg, autogenous, allogeneic bone, and alloplasts)
    2. Contour augmentation and/or reduction
    3. Septorhinoplasty
    4. Turbinoplasty and/or turbinectomy
    5. Genioplasty
    6. Mandibular osteotomy
    7. Dental extractions (includes third molar removal)
    8. Soft tissue procedures (eg, V-Y closure, nasal cinch, and buccal fat removal)
    9. Biopsy or debridement and removal of maxillary sinus pathology (eg, mucous retention cyst, mucocele, and polyp)
    10. Palatal or alveolar cleft repair with/without bone grafting
    11. Surgically assisted orthodontic movement (includes skeletal anchorage devices and corticotomies)
    12. Malar osteotomies/augmentation
D. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices for Maxillary Hyperplasia

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

MAXILLARY HYPERPLASIA (continued)

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
   2. Improved airway
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
   2. Impaired nasal and/or sinus function
   3. Unfavorable nasal changes, including over rotation of nasal tip, alar base widening, and nasal septal deviation
   4. Epiphora

MAXILLARY HYPOPLASIA

Maxillary hypoplasia consists of three component subsets: vertical, horizontal, and transverse. Items listed under this condition are applicable to all subsets of this condition unless otherwise designated. Also see the Cleft and Craniofacial Surgery chapter.

I. Indications for Therapy for Maxillary Hypoplasia

May include one or more of the following:

A. Presence of one or more indications for therapy, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Transverse maxillary discrepancies not amenable to orthodontic correction
C. OSA, upper airway resistance syndrome
D. Airway obstruction (eg, nasal airway)
E. Exorbitism with risk of exposure keratopathy (LeFort III level)
F. Posttraumatic

II. Specific Therapeutic Goals for Maxillary Hypoplasia

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Improved airway

III. Specific Factors Affecting Risk for Maxillary Hypoplasia

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Severity of maxillary deformity
C. Presence of or recent removal of impacted maxillary third molars
D. Presence of cleft palate or prior palatal surgery (eg, uvulopalatopharyngoplasty)

IV. Indicated Therapeutic Parameters for Maxillary Hypoplasia

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. May include a panoramic radiograph, cephalometric analysis, photographic documentation, and dental model assessment. CT scanning and computer-assisted surgical techniques, including 3-dimensional modeling, computational planning, and rapid prototyping of surgical guides, may be indicated in select cases. Also see the Patient Assessment chapter.

Navigational surgical techniques may also be indicated in select cases based on the surgical deformity and proposed procedures, surgeon experience and preference, and potential for improved outcomes.

MAXILLARY HYPOPLASIA (continued)

The following procedures for the management of maxillary hypoplasia are not listed in order of preference:

A. Segmental maxillary alveolar osteotomies
B. Le Fort I, II, or III osteotomy with or without segmentalization
C. Distraction osteogenesis
D. Supplemental procedures
    1. Grafting procedures (eg, autogenous, allogeneic bone, and alloplasts)
    2. Contour augmentation and/or reduction
    3. Malar osteotomies/augmentation
    4. Septorhinoplasty
    5. Turbinoplasty and/or turbinectomy
    6. Genioplasty
    7. Mandibular osteotomy
    8. Dental extractions (includes third molar removal)
    9. Soft tissue procedures (eg, V-Y closure, nasal cinch, and buccal fat removal)
    10. Biopsy or debridement and removal of maxillary sinus pathology (eg, mucous retention cyst, mucocele, and polyp)
    11. Palatal or alveolar cleft repair with/without bone grafting
    12. Surgically assisted orthodontic movement (includes skeletal anchorage devices and corticotomies)
    13. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices for Maxillary Hypoplasia

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
    2. Improved airway
B. Known risks and complications associated with therapy
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
    2. Impaired nasal and/or sinus function
    3. Unfavorable nasal changes, including nasal tip over rotation, alar base widening, and septal deviation
    4. Epiphora

SKELETAL OPEN BITE (APERTOGNATHIA)

Skeletal open bite can be developmental or acquired, as well as secondary to local factors influencing tooth eruption and dentoalveolar growth. The condition may be isolated to the vertical dimension in one or both jaws, may be seen in conjunction with sagittal and transverse problems, and may occur anteriorly or posteriorly, both unilaterally or bilaterally.

I. Indications for Therapy for Skeletal Open Bite (Apertognathia)

May include one or more of the following:

A. Presence of one or more indications for therapy, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Associated developmental, pathologic, or acquired condylar disorders resulting in open bite (eg, ankylosis, idiopathic condylar resorption, osteochondroma, and rheumatoid arthritis)
C. Associated soft tissue deformities (eg, lip incompetence)
D. Dry mouth
E. Mouth breathing gingivitis

SKELETAL OPEN BITE (APERTOGNATHIA) (continued)

II. Specific Therapeutic Goals for Skeletal Open Bite (Apertognathia)

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Improvement in lip incompetence

III. Specific Factors Affecting Risk for Skeletal Open Bite (Apertognathia)

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Severity of open bite
C. Presence and severity of localized conditions (eg, tongue posture, tongue size, and mode of respiration as it influences jaw posture)
D. Active condylar disease (eg, rheumatoid arthritis and idiopathic condylar resorption)

IV. Indicated Therapeutic Parameters for Skeletal Open Bite (Apertognathia)

The presurgical evaluation includes, at a minimum, a history and physical examination and diagnostic records, including a panoramic radiograph, cephalometric analysis, photographic documentation, and dental model assessment. CT scanning and computer-assisted surgical techniques, including 3-dimensional modeling, computational planning, and rapid prototyping of surgical guides, may be indicated in select cases. Also see the Patient Assessment chapter.

Navigational surgical techniques may also be indicated in select cases based on the surgical deformity and proposed procedures, surgeon experience and preference, and potential for improved outcomes.

The following procedures for the management of skeletal open bite are not listed in *order of preference:*

A. Le Fort I, II, or III osteotomy with or without segmentalization
B. Segmental maxillary alveolar osteotomies
C. Sagittal split ramus osteotomy with rigid fixation
D. Inverted "L" osteotomy with bone grafting and rigid fixation
E. Vertical ramus osteotomies in conjunction with mandibular setback procedures
F. Supplemental procedures
    1. Grafting procedures (eg, autogenous, allogeneic bone, and alloplasts)
    2. Septorhinoplasty
    3. Partial glossectomy
    4. Distraction osteogenesis
    5. Speech therapy
    6. Turbinoplasty and/or turbinectomy
    7. Reconstruction (condyle/mandible)), including autogenous or alloplastic total joint reconstruction
    8. Dental extractions (includes third molar removal)
    9. Soft tissue procedures (eg, V-Y closure, nasal cinch, and buccal fat removal)
    10. Biopsy or debridement and removal of maxillary sinus pathology (eg, mucous retention cyst, mucocele, and polyp)
    11. Palatal or alveolar cleft repair with/without bone grafting
    12. Surgically assisted orthodontic movement (includes skeletal anchorage devices and corticotomies)
    13. Pharmaceutical management to minimize temporomandibular instability

V. Outcome Assessment Indices for Skeletal Open Bite (Apertognathia)

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

SKELETAL OPEN BITE (APERTOGNATHIA) (continued)

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
   2. Improved airway
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities

SPECIAL CONSIDERATIONS FOR SLEEP DISORDERED BREATHING

Surgical correction of maxillofacial skeletal deformities is often indicated for the treatment of sleep-disordered breathing, which includes most commonly OSA and upper airway resistance syndrome. Untreated, the disorder can increase the risk of cardiovascular disease, cerebrovascular disease, diabetes, and other metabolic and endocrine dysfunctions. It may also increase the risk for work-related injuries and motor vehicle collisions and may exacerbate psychiatric conditions. In the pediatric population, sleep-disordered breathing can have a profound impact on a child's achievement of developmental milestones and quality of life. Neuropsychological manifestations predominate with behavioral and attention deficit disorders, with learning disabilities being the most frequent issue. In severe cases, sleep apnea may result in failure to thrive. A thorough history with screening questionnaires and diagnostic evaluation, including polysomnography (PSG), radiography, and clinical evaluation, can be essential for diagnosing OSA and subtler forms of sleep-disordered breathing so that an appropriate treatment plan can be developed.

MMA procedures demonstrate well-documented success in the treatment of OSA. Consideration for a surgery-first approach in the patient with OSA may be appropriate, especially in those individuals intolerant to continuous positive pressure airway (CPAP) and other forms of nonsurgical therapeutic mechanisms.

Ancillary/adjunctive procedures, such as hyoid suspension, genioglossus advancement, tonsillectomy and/or adenoidectomy, uvulopalatopharyngoplasty, hypoglossal nerve simulator, radiofrequency tongue base reduction, tracheostomy, and turbinectomy, can also provide relief and may be indicated for the treatment of OSA in both children and adult patients. As with the surgical correction of maxillofacial skeletal deformities, proper patient assessment and informed consent are critical to maximizing results. It is important to note that for some patients with a history of OSA undergoing surgery for maxillofacial skeletal deformities, inpatient overnight observation with consideration given to intensive care monitoring, may be indicated.

OSA

I. Indications for Therapy for OSA

May include one or more of the following:

A. One or more indications for therapy, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. An elevated Respiratory Disturbance Index (RDI) or Apnea Hypopnea Index (AHI), as measured objectively by PSG
C. Nocturnal hypoxia
D. Excessive daytime sleepiness (as measured by Epworth Sleepiness Scale)
E. Positive STOP-BANG sleep apnea questionnaire
F. Reduced quality of life
G. Cardio-pulmonary disease
H. Upper airway obstruction or collapse as documented by imaging of the upper airway
I. Drug-induced sleep endoscopy to evaluate the dynamic upper airway changes
J. Maxillary or mandibular retrognathism (ie, hypoplasia)
K. Cleft and craniofacial syndromes
L. Nocturnal enuresis
M. Cognitive delays, behavioral problems, and attentional deficits in pediatric population
N. Failure to thrive

OSA (continued)

II. Specific Therapeutic Goals for OSA

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. One or more therapeutic goals as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Reduce RDI and/or AHI
C. Reduce nocturnal hypoxia
D. Improve nocturnal esophageal pressure (Pes)
E. Improve esophageal pH
F. Reduce daytime sleepiness
G. Improve quality of life
H. Improve cardiovascular health
I. Reduce upper airway obstruction or collapse
J. Improve form and function of the upper airway by increasing upper airway space
K. Reduce snoring
L. Reduce or eliminate need for CPAP and/or tracheostomy
M. Improve cognitive and behavioral function and development

III. Specific Factors Affecting Risk for OSA

Factors that increase risk and the potential for known complications:

A. Presence of one or more general factors affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
B. Associated comorbid conditions including obesity, cardio-pulmonary disease, hypertension, history of stroke, history of myocardial infarction, diabetes, neuromuscular disorders, and metabolic disease
C. Drug and alcohol dependence
D. Presence and severity of localized conditions (eg, tongue posture, tongue size, periodontal disease, and impacted teeth)
E. TMJ and jaw deformities (eg, ankylosis, Pierre Robin sequence, and hemifacial microsomia)
F. TMJ pain and dysfunction
G. Cleft and craniofacial disorders
H. Family history of OSA

IV. Indicated Therapeutic Parameters for OSA

The presurgical evaluation includes, at a minimum, a history and physical examination. Lifestyle changes, such as losing weight, alcohol cessation before bed, and CPAP, can result in clinical improvement. When specific anatomical conditions may exist, diagnostic records should be obtained and can include a panoramic radiograph, cephalometric analysis, photographic documentation, dental model assessment, PSG sleep study (with or without Pes), upper airway endoscopy, esophageal pH monitoring, or other studies. CT scanning and computer-assisted surgical techniques, including 3-dimensional modeling, computational planning, and rapid prototyping of surgical guides, may be indicated in select cases. Specialty consultations may be indicated to optimize the treatment of comorbid conditions prior to surgical correction of OSA. Also see the Patient Assessment chapter.

Navigational surgical techniques may also be indicated in select cases based on the surgical deformity, proposed procedures, surgeon experience and preference, and potential for an improved outcome.

The following procedures for the management of OSA are not listed in order of preference:

A. MMA to improve form and function of the upper airway
B. Consideration of specific adjunctive surgical techniques to maximize stability of MMA, minimize neurosensory deficits, and promote normal wound healing include the following:
    1. Mandibular advancement
    2. Maxillary and/or mandibular expansion
    3. Chin advancement

OSA (continued)

4. Genial advancement
5. Hyoid (suprahyoid muscle complex) advancement
6. Uvulopalatophargoplasty (or variant)
7. Tracheostomy
8. Nasal septoplasty/polypectomy/turbinectomy
9. Tonsillectomy and adenoidectomy
10. Partial glossectomy (or variant)
11. Tongue suspension
12. Orthodontics
13. Prosthetics
14. Oral appliances
15. Diaphragmatic stimulator
16. Hypoglossal nerve stimulator

C. Consideration of specific postoperative management strategies to minimize wound healing problems, establish normal TMJ function, functional occlusion, and promote recovery of mandibular mobility
D. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices for OSA

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
   2. Reduction in OSA with reduction in AHI and RDI, as measured objectively by PSG
   3. Routine postoperative course including uneventful wound healing
   4. Imaging documentation of positive upper airway change, adequate bone healing, and stability of MMA or adjunctive procedures
   5. Establish and maintain functional occlusion and normal TMJ function
   6. Minimal neurosensory dysfunction

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Surgical Correction of Maxillofacial Skeletal Deformities
   2. Perioperative hypertension, cardiovascular events, respiratory, and venous thromboembolic events
   3. Persistent OSA requiring additional treatment such as CPAP or tracheostomy
   4. Need for further upper airway surgery
   5. Revision surgery
   6. Unintended negative alteration of facial appearance

SELECTED REFERENCES–SURGICAL CORRECTION OF MAXILLOFACIAL SKELETAL DEFORMITIES

This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation of this document. Citation of the reference material is not meant to imply endorsement of any statement contained in the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

CLEFT AND CRANIOFACIAL SURGERY

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023*, WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

The optimal management of patients with cleft and craniofacial deformities has traditionally been under the direction of the interdisciplinary team. The American Cleft Palate-Craniofacial Association *Parameters for Evaluation and Treatment of Patients with Cleft Lip/Palate or Other Craniofacial Anomalies* and *Standards for Cleft Palate and Craniofacial Teams* have provided guidelines for these activities. This document more specifically addresses the optimal surgical management of individuals who have these conditions.

The *AAOMS ParCare 2023* chapters on *Surgical Correction of Maxillofacial Skeletal Deformities* and *Facial Cosmetic Surgery* will not be supplanted by this section; in fact, cross-references to these sections are included for thoroughness. The Oral and Maxillofacial Surgeon is referred to the special considerations for pediatric cleft and craniofacial surgery section for the management of pediatric patients with cleft and craniofacial deformities.

Parameters of care for cleft lip and palate deformities and for craniofacial deformities are described separately. The management of cleft lip and palate is divided into the following conditions:

- Primary cleft lip
- Primary cleft palate
- Velopharyngeal dysfunction
- Residual cleft lip and/or nasal problems requiring secondary management
- Maxillary alveolar clefts
- Residual maxillofacial skeletal problems requiring secondary management.

The craniofacial surgery section is divided into the following conditions:

- Craniofacial deformities: those not requiring an intracranial approach for repair
- Craniofacial deformities: primary cranial deformities requiring treatment through an intracranial approach
- Craniofacial deformities: secondary cranial deformities requiring treatment through an intracranial approach
- Orbital and/or naso-orbital deformities

These parameters were prepared with the appreciation that there is more than one approach to treating certain clinical problems; consequently, flexibility has been allowed so that the practitioner may select different therapeutic options. Future changes in this area of oral and maxillofacial surgery, resulting from new research findings and evolving technological developments, will undoubtedly extend and expand the capabilities for treatment and enable an even higher quality of patient care.

The surgical correction of these deformities requires a clear understanding by the surgeon, patient, and/or family of the therapeutic goals. In turn, the Oral and Maxillofacial Surgeon should determine through careful dialog that the patient and/or family have realistic expectations regarding the proposed therapy.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR CLEFT AND CRANIOFACIAL SURGERY

INFORMED CONSENT: All surgery must be preceded by the patient's or legal guardian's consent, unless an emergent situation dictates otherwise. Emergent circumstances and the indications for treatment should be documented in the patient's record. Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the expected recovery period, alternative treatment options (including no treatment), and any patient or procedure specific factors that may affect the risk. The results of the informed consent process must be documented in the patient's medical record. In general, an informed consent document is signed by the patient or guardian, but the Oral and Maxillofacial Surgeon is well-advised to document in the medical record that the informed consent process occurred and that the patient/guardian provided both verbal and written consent that they understand and are willing to proceed with treatment.

PERIOPERATIVE ANTIBIOTIC THERAPY: The administration or prescribing of antibiotics may not be needed for otherwise healthy patients, and thus the decision to employ prophylactic perioperative antibiotics is at the sole discretion of the treating surgeon and should be based on the patient's clinical condition as well as other comorbidities that may be present.

DEALING WITH NEUROLOGIC DEFICITS: Injuries to the terminal branches of the trigeminal nerve (eg, lingual, inferior alveolar, and long buccal nerves), as well as the facial nerve, are known risks of oral and maxillofacial surgery. It should be noted that the presence of a pathologic craniomaxillofacial condition, dentoskeletal or craniofacial

abnormality, or traumatic craniomaxillofacial injury may result in nerve injury prior to surgical management. In addition, the use of local anesthesia (eg, mandibular block) may increase the risk of nerve injury. Most nerve injuries resolve spontaneously, but some do not, and these may require consideration for nonsurgical and/or surgical intervention. Microneurosurgical repair should be considered when the disability is of concern to the patient and there is clinical evidence of moderate, severe, or complete neurosensory impairment of various areas of the orofacial region (eg, lips, chin, tongue); paresis or paralysis of facial muscles; loss, decreased, or abnormal taste sensation; or neuropathic pain of peripheral origin; or if the progression of spontaneous nerve recovery halts. Surgical repair should incorporate specialized microsurgical techniques (eg, operating magnification, nerve grafting) when indicated. Also see the *Reconstructive Surgery* chapter.

USE OF IMAGING MODALITIES: Imaging modalities may include panoramic radiograph, periapical and/or occlusal radiographs, maxillary and/or mandibular radiographs, computed tomography (CT), cone beam CT, positron emission tomography, positron emission tomography/CT, and magnetic resonance imaging. In determining studies to be performed for imaging purposes, principles of as low as reasonably achievable should be followed.

DOCUMENTATION: *AAOMS ParCare 2023* includes documentation of objective findings, diagnoses, and patient management interventions. *The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon in light of the circumstances presented by each patient.*

Understandably, there may be good clinical reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well advised to note in the patient's record the reason for the procedure followed. Moreover, it should be understood that adherence to the parameters does not guarantee a favorable outcome.

TEAM APPROACH: Favorable therapeutic outcomes are optimized when a multidisciplinary team plans the treatment.

GENERAL THERAPEUTIC GOALS FOR CLEFT AND CRANIOFACIAL SURGERY:

A. Appropriate understanding by patient (family) of treatment options and acceptance of treatment plan
B. Appropriate understanding and acceptance by patient (family) of favorable outcomes and known risks and complications
C. Optimizing the psychological impact on patient and family
D. Improved social and psychological development
E. Limited period of disability
F. Absence of infection
G. Minimal scar formation
H. Limited adverse maxillofacial growth and development
I. Optimizes function

GENERAL FACTORS AFFECTING RISK DURING CLEFT AND CRANIOFACIAL SURGERY:

A. Degree of patient and/or family understanding of the origin and natural course of the condition or disorder and therapeutic goals and acceptance of proposed treatment
B. Degree of patient's and/or family's cooperation and/or compliance
C. Presence of coexisting major systemic disease (eg, disease that increases a patient's American Society of Anesthesiologists classification to II, III, or IV), as detailed in the *Patient Assessment* chapter
D. Presence of local or systemic conditions that may interfere with the normal healing process and subsequent tissue homeostasis (eg, previously irradiated tissue, diabetes mellitus, chronic renal disease, liver disease, blood disorders, steroid therapy, contraceptive medication, immunosuppression, malnutrition)
E. Presence of behavioral, psychological, neurologic, or psychiatric disorders, including habits (eg, substance abuse), seizure disorders, or self-mutilation, which may affect surgery, healing, and/or response to therapy
F. Hospital and professional staff's familiarity and experience with pediatric anesthesia, surgery, and perioperative care
G. Severity of deformity
H. Presence of syndrome and/or other congenital or acquired craniofacial deformities (eg, Crouzon disease)
I. Age of patient
J. Inadequate nutrition and/or growth and development
K. Communication problems (eg, language differences)
L. Hearing impairment
M. Problems with the physical environment
N. Regulatory and/or third-party decisions concerning access to care, indicated therapy, drugs, devices, and/or materials

GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR CLEFT AND CRANIOFACIAL SURGERY:

A. Patient (family) acceptance of procedure and understanding of outcomes
B. Satisfactory surgical wound healing
C. Limited period of disability
D. Minimal scar formation
E. Improved nutritional status and systemic growth and development
F. Limited adverse effect on maxillofacial growth and development
G. Improved social and psychological status

GENERAL KNOWN RISKS AND COMPLICATIONS FOR CLEFT AND CRANIOFACIAL SURGERY:

A. Unplanned admission to intensive care unit after elective surgery
B. Unplanned intubation for longer than 12 hours after surgery
C. Reintubation or tracheostomy after surgery
D. Use of parenteral drugs and/or fluids for longer than 72 hours after elective surgery
E. Facial and/or trigeminal nerve dysfunction after surgery
F. Facial fracture during or after surgery
G. Unplanned Caldwell-Luc, bronchoscopy, or other exploratory procedures associated with surgery
H. Dental injury during surgery
I. Ocular injury during surgery
J. Repeat oral and/or maxillofacial surgery
K. Core temperature of greater than 101 °F 72 hours after elective surgery
L. Postsurgical radiograph indicating presence of foreign body
M. Unplanned transfusion(s) of blood or blood components during or after surgery
N. Readmission for complications or incomplete management of problems during previous hospitalization
O. Respiratory and/or cardiac arrest
P. Wound dehiscence
Q. Infection
R. Postsurgical nasal deformity (may be predicted in some cases)
S. Residual lip and/or nose deformity (may be predicted in some cases)
T. Adverse effect on the patient's and family's psychological well-being
U. Impaired healing
V. Prolonged period of disability
W. Hypertrophic and/or keloid scar formation
X. Postoperative hemorrhage
Y. Pain
Z. Abnormal maxillofacial growth and development
AA. Death

SPECIAL CONSIDERATIONS FOR PEDIATRIC CLEFT AND CRANIOFACIAL SURGERY

Cleft and craniofacial surgery corrects congenital malformations and developmental deformities, most of which occur in children. All the special pediatric considerations described in the *Patient Assessment* chapter are applicable to children with cleft and craniofacial anomalies.

In the pediatric patient with cleft/craniofacial anomalies, particular attention must be paid to the interaction among the primary problem, treatment, and facial growth. The Oral and Maxillofacial Surgeon must determine whether the treatment will adversely affect growth and then ascertain the ideal time for treatment. It is not uncommon for the family to push for treatment at a time that may not be ideal, and the surgeon must resist this pressure. For a child dealing with significant psychosocial problems, surgery may be undertaken at a time that is not ideal relative to facial growth. Especially in these cases, clear documentation of treatment decisions and indications must be included within the informed consent recordings.

In the pediatric patient with cleft lip/palate, the Oral and Maxillofacial Surgeon must be aware of the effects of the malformation and its treatment on middle ear function, speech-airway, and facial growth. Timing is also important relative to alveolar cleft bone grafting, placement of dental implants, and orthognathic surgery.

Secondary revisions of the lip and nose may be judiciously performed at any time during growth, although final revision should be deferred until growth has ceased.

In the pediatric patient with congenital craniofacial anomalies, genetic evaluation is critical to determine the genetic (chromosome and gene location) basis for the anomaly when possible. This provides useful information for treating professionals in regard to comorbid medical conditions and possible future stigmata associated with some syndromes, for the family with regard to future children, and for the patient to make decisions about having offspring in the future. Advances in molecular genetics will aid in the understanding, prevention, and molecular treatment of craniofacial problems in the future.

The most significant difference between managing children and adults with cleft and craniofacial anomalies is the need to consider the fourth dimension of time/growth and development during treatment planning. This information affects the timing of operation and choice of proper procedure and hardware for stabilization. Genetic evaluation and counseling are also critical, as are psychological counseling and speech therapy when indicated. Outcomes assessment must include evaluation at the end of growth, number of operations required to achieve the final result, and success of preventive measures.

PRIMARY CLEFT LIP

I. Indications for therapy for primary cleft lip treatment

May include one or more of the following:

A. Evidence of congenital anatomical and/or functional lip malformation
B. Evidence of congenital anatomical and/or functional nasal malformation

II. Specific therapeutic goals for primary cleft lip treatment

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Restoration of lip function and anatomical features
C. Restoration of nasal form and/or function

III. Specific factors affecting risk for primary cleft lip treatment

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Severity of the cleft malformation (eg, width, unilateral vs bilateral, complete vs incomplete)
C. Potential for hypertrophic and/or keloid scar formation

IV. Indicated therapeutic parameters for primary cleft lip treatment

The presurgical assessment includes, at a minimum, both a history and a clinical evaluation. Also see the Patient Assessment *chapter.*

The lip is repaired within the first 6 months of life, if possible.

The following procedures for the management of primary cleft lip are not listed in order of preference:

A. Unilateral cleft lip/nose
    1. Presurgical orthopedics or nasal alveolar molding in selected cases
    2. Insertion of nasal conformers
    3. Lip adhesion
    4. Lip taping
    5. Lip/nasal repair
    6. Excision of lip pits
    7. Instructions for post-treatment care and follow-up
B. Bilateral cleft lip/nose
    1. Presurgical orthopedics or nasal alveolar molding in selected cases
    2. Insertion of nasal conformers
    3. Lip adhesion
    4. Lip taping
    5. Definitive lip/nose repair
    6. Excision of lip pits
    7. Instructions for post-treatment care and follow-up

PRIMARY CLEFT LIP (continued)

V. Outcome assessment indices for primary cleft lip treatment

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Restoration of lip form and function
   3. Lip symmetry with alignment of anatomical landmarks
   4. Nasal symmetry, including nostril size, alar position, and nostril sill position
   5. Patent nasal passages

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Unfavorable postsurgical functional or anatomical lip problem
   3. Unfavorable functional or anatomical nasal problem
   4. Hypertrophic, prominent, or keloid scar formation

PRIMARY CLEFT PALATE

I. Indications for therapy for primary cleft palate

May include one or more of the following:

A. Physical evidence of palatal cleft
B. Feeding problems
C. Developing or existing hypernasal speech
D. Abnormal oronasal function (eg, reflux)

II. Specific therapeutic goals for primary cleft palate treatment

The goal of therapy is to restore form and/or function; however, risk factors and potential complications may preclude complete restoration of form and/or function.

A. The presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Restoration of palatal form and/or function
C. Normalize speech development
D. Normalize feeding
E. Resolution of nasal regurgitation, if present
F. Separate oral and nasal cavities
G. Elimination of need for prosthetic appliances
H. Improved eustachian tube and middle ear function
I. Improve environment for dental management

III. Specific factors affecting risk for primary cleft palate treatment

Severity factors that increase risk and the potential for known complications:

A. The presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Severity of the cleft palate (eg, width, unilateral vs bilateral, complete vs incomplete)
C. Potential major vascular abnormalities (eg, Velo-cardio-facial syndrome)
D. Known or suspected airway abnormalities (eg, Robin sequence)
E. Presence of a craniofacial syndrome
F. Concurrent systemic syndromic abnormalities

PRIMARY CLEFT PALATE (continued)

IV. Indicated therapeutic parameters for primary cleft palate treatment

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

Palatal repair is performed by 12 months of age in the normally developing child to optimize speech development. The exact age will vary according to general development and other systemic abnormalities. Submucous clefts should be repaired on the basis of documented evidence of speech abnormalities.

The following procedures are indicated for the management of primary cleft palate deformities (not listed in order of preference):

A. Primary repair of the hard and soft palates utilizing one or 2 stage procedure
B. Instructions for post-treatment care and follow-up

V. Outcome assessment indices for primary cleft palate treatment

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Normalized speech
   3. Normalized oral and/or nasal function
   4. Normalized feeding
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Unacceptable speech development (eg, hypernasal speech, compensatory misarticulations)
   3. Oronasal fistula
   4. Airway compromise
   5. Abnormal archform development

VELOPHARYNGEAL DYSFUNCTION

I. Indications for therapy for velopharyngeal dysfunction

May include one or more of the following:

A. Hypernasal speech/compensatory misarticulations that have detrimental effects on communication and do not respond to a reasonable period of speech therapy
B. Clinical and/or imaging evidence of velopharyngeal incompetence (eg, nasoendoscopy, videofluoroscopy, perceptual speech evaluation, nasometry)
C. Hypernasal speech documented to be due to palatal fistulae
D. Enlarged tonsils and adenoids affecting velopharyngeal function

II. Specific therapeutic goals for velopharyngeal dysfunction

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Normalized speech
C. Minimize obstructive impact on the airway
D. Avoidance of hyponasality
E. Elimination of hypernasality

VELOPHARYNGEAL DYSFUNCTION (continued)

III. Specific factors affecting risk for velopharyngeal dysfunction

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Size of velopharyngeal gap
C. Presence of enlarged tonsils and/or adenoids
D. Known or suspected airway abnormalities
E. Limited patient cognitive abilities
F. Pharyngeal hypomobility disorders
G. Hearing disorders
H. Known obstructive sleep apnea
I. Technique used for original repair
J. Healing complications from original repair

IV. Indicated therapeutic parameters for velopharyngeal dysfunction

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The determination for surgery is made by a team that includes a speech pathologist who has assessed the patient and agrees with the need for surgical management.

The following procedures for the management of velopharyngeal incompetence are not listed in order of preference:

A. Pharyngeal flap
B. Pharyngoplasty
C. Pharyngeal wall augmentation
D. Revision palatoplasty (eg, Furlow or intravelar veloplasty)
E. Tonsillectomy and/or adenoidectomy may be indicated in combination and sequenced with a pharyngeal flap or other type of pharyngoplasty
F. Speech prosthesis
G. Instructions for post-treatment care and follow-up

V. Outcome assessment indices for velopharyngeal dysfunction

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
    2. Elimination of hypernasal speech
    3. No hyponasal speech
    4. No adverse impact on the airway
    5. No adverse impact on swallowing
B. Known risks and complications associated with therapy
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
    2. Hyponasal speech
    3. Persistent hypernasal speech
    4. Obstructive sleep apnea or other sleep disordered breathing

RESIDUAL CLEFT LIP AND/OR NASAL PROBLEMS REQUIRING SECONDARY MANAGEMENT

I. Indications for therapy for residual cleft lip and/or nasal problems requiring secondary management

May include one or more of the following:

A. Patient's and/or family's desire for improvement of form and function
B. Evidence of anatomical and/or functional lip problems
C. Evidence of anatomical and/or functional nasal problems

II. Specific therapeutic goals for residual cleft lip and/or nasal problems requiring secondary management

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Restoration of lip function and anatomical features
C. Restoration of nasal form and/or function

III. Specific factors affecting risk for residual cleft lip and/or nasal problems requiring secondary management

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Severity of the secondary cleft lip and/or nasal problem
C. Number of previous operative procedures in the region
D. Potential for hypertrophic, prominent, or keloid scar formation
E. Presence of microstomia or a constricted nostril

IV. Indicated therapeutic parameters for residual cleft lip and/or nasal problems requiring secondary management

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

For a comprehensive review, see the Facial Cosmetic Surgery chapter.

The following procedures for the secondary management of residual cleft lip and/or nasal problems are not listed in order of preference:

A. Cheiloplasty
B. Rhinoplasty (primary and revision)
C. Instructions for post-treatment care and follow-up

V. Outcome assessment indices for residual cleft lip and/or nasal problems requiring secondary management

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Restored lip symmetry, form and/or function
   3. Restored nasal symmetry, form and/or function
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Residual anatomic or functional lip and/or nasal problem
   3. Nostril constriction or obstructed nasal airway

MAXILLARY ALVEOLAR CLEFTS

I. Indications for therapy for maxillary alveolar clefts

May include one or more of the following:

A. Clinical and imaging evidence of maxillary alveolar cleft
B. Inadequate bone to support erupting teeth
C. Inadequate bone to support orthodontic correction tooth movement
D. Inadequate ridge for prosthetic reconstruction (eg, implant placement)
E. Dental arch collapse
F. Oronasal communication
G. Speech abnormalities
H. Mobility of the premaxilla

II. Specific therapeutic goals for maxillary alveolar clefts

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

Reconstruction of the maxilla and/or alveolus to allow and/or provide for:

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Maxillary alveolar ridge continuity for tooth eruption and indicated orthodontic correction of malocclusions and crossbites
C. Alveolar bone support of adjacent teeth
D. Restoration of alveolar ridge form
E. Elimination of need for prosthetic tooth replacement in cases where teeth are present and can be brought into occlusion
F. Stabilization of the premaxilla in bilateral clefts
G. Alar Base Support
H. Elimination of oronasal communication and inflammation
I. Improved appearance of lip
J. Improved speech
K. Minimize bone graft donor site morbidity

III. Specific factors affecting risk for maxillary alveolar cleft repair

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Number of previous operative procedures involving this region
C. Health of the teeth, gingiva, and periodontium
D. Teeth in the cleft region
E. Exposed dental roots in the area of the bone graft
F. Lack of orthodontic and/or surgical treatment coordination
G. Width of cleft
H. Lack of adequate healthy adjacent tissue required for closure of cleft
I. Inferior turbinate hypertrophy into the defect
J. Age-related factors (eg, postcanine eruption)
K. Position of the premaxilla relative to the secondary palate

IV. Indicated therapeutic parameters for maxillary alveolar cleft repair

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

Timing of grafting is determined primarily by the state of dental development and in a coordinated team effort with planned orthodontic treatment.

The following procedures for the management of maxillary alveolar cleft deformities are not listed in order of preference:

MAXILLARY ALVEOLAR CLEFTS (continued)

A. Maxillary expansion or archform coordination when indicated
B. Closure of oronasal fistula with local or distant tissue
C. Graft to alveolar cleft
D. Stabilization of premaxilla after grafting
E. Inferior turbinate surgery
F. Instructions for post-treatment care and follow-up

V. Outcome assessment indices for maxillary alveolar cleft repair

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Restoration and preservation of anatomical form
   3. Elimination of the oronasal fistula
   4. Primary soft tissue healing
   5. Healthy bone and soft tissue support for teeth
   6. Maintenance of bone at graft site
   7. Improved nasal hygiene and function
   8. Ability of the patient to undergo indicated orthodontic treatment
   9. Minimal donor site morbidity
   10. Stabilization of the premaxilla
   11. Adequate bone for implant placement
   12. Improved speech
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Partial or complete loss of bone graft
   3. Recurrent oronasal fistula
   4. Lack of adequate bone and/or soft tissue support
   5. Soft tissue flap necrosis
   6. External root resorption
   7. Failure of dental eruption into and through graft
   8. Donor site morbidity
   9. Collapse of maxillary segments
   10. Loss of vestibular depth
   11. Inadequate attached gingiva adjacent to teeth in bone graft area

RESIDUAL CLEFT-RELATED SKELETOFACIAL DIFFERENCES REQUIRING SECONDARY MANAGEMENT

I. Indications for therapy for residual cleft-related skeletofacial differences requiring secondary management

May include one or more of the following:

A. Physical evidence of musculoskeletal, dental, and/or soft tissue growth problems or disproportions
B. Imaging evidence of musculoskeletal, dental, and/or soft tissue growth problems or disproportions
   1. Deviation from cephalometric norms
   2. Other imaging disclosure of abnormality
C. Malocclusions that cannot be reasonably corrected by orthodontic and/or prosthetic means alone
D. Social and psychological impairment
E. Masticatory and/or swallowing abnormalities
F. Speech pathology (eg, resonance or articulation issues)

RESIDUAL CLEFT-RELATED SKELETOFACIAL DIFFERENCES REQUIRING SECONDARY MANAGEMENT (continued)

G. Incomplete correction or unstable result of previous treatment
H. Dental and/or periodontal pathology
I. Airway obstruction (eg, peripheral obstructive sleep apnea, snoring)
J. Chin disproportions (eg, microgenia, macrogenia, asymmetry)
K. Associated soft tissue facial differences (eg, paranasal, labiomental fold, chin-neck contour, nasolabial and melolabial folds)

II. Specific therapeutic goals for residual cleft-related skeletofacial differences requiring secondary management

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Improved musculoskeletal, dento-osseous, and/or soft tissue relationships
C. Improved mastication and/or swallowing
D. Improved occlusion
E. Improved dental and periodontal health
F. Improved appearance
G. Improved quality of speech
H. Improved airway
I. Improved self-esteem
J. Closed oronasal fistula and residual maxillary alveolar cleft
K. Stabilization of maxillary segments

III. Specific factors affecting risk for residual cleft-related skeletofacial differences requiring secondary management

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Presence and severity of coexisting maxillary and/or mandibular skeletal, dental, or soft tissue problems (eg, vertical maxillary hypoplasia, congenital absence of dentition, neuromuscular disorders)
C. Presence and severity of localized conditions or disorders (eg, nasal airway)
D. Active maxillofacial growth
E. Number of previous operations
F. Severity of lip, palate, or vestibular scarring
G. Presence of parafunctional habits (eg, bruxism, clenching, tongue thrusting, finger sucking)
H. Because of the higher incidence of morbidity in orthognathic surgery performed in the cleft patient, evaluation of the following factors is indicated:
    1. Presence of a pharyngeal flap
    2. Marginal velopharyngeal function
    3. Severely scarred soft tissues
    4. Unrepaired alveolar cleft and/or oronasal fistula
    5. Nasal septal deviation
    6. Enlarged nasal turbinate(s)
    7. Number of previous palatal and/or maxillary procedures performed
    8. Severity of anterior-posterior discrepancy
    9. Tight upper lip and vestibular deficiency
    10. Status of the dentition
    11. Vascular supply to maxilla
    12. Bilateral versus unilateral cleft

RESIDUAL CLEFT-RELATED SKELETOFACIAL DIFFERENCES REQUIRING SECONDARY MANAGEMENT (continued)

IV. Indicated therapeutic parameters for residual cleft-related skeletofacial differences requiring secondary management

The presurgical evaluation includes, at a minimum, a history, physical examination, and diagnostic records, including a panoramic radiograph, cephalometric radiograph and analysis, photographic documentation, dental model assessment, and speech evaluation. After evaluation of factors affecting risk, an orthognathic surgical approach should be developed that takes into account the identified risk factors, thereby maximizing favorable outcomes and minimizing known risks and complications (also see the Surgical Correction of Maxillofacial Skeletal Deformities, Dental and Craniomaxillofacial Implant Surgery, Temporomandibular Joint Surgery*, and* Patient Assessment *chapters*).

The following procedures for the management of residual cleft-related differences are not listed in order of preference and a majority of the time have a component of maxillary hypoplasia, with isolated cleft palate related to Pierre Robin sequence being the main exception:

A. Le Fort I, II, or III osteotomy with or without segmentalization
B. Distraction osteogenesis
C. Supplemental procedures
    1. Grafting procedures (eg, autogenous, allogeneic bone, alloplasts)
    2. Contour augmentation and/or reduction
    3. Malar osteotomies/augmentation
    4. Septorhinoplasty
    5. Turbinoplasty and/or turbinectomy
    6. Genioplasty
    7. Mandibular osteotomy
    8. Dental extractions (includes third molar removal)
    9. Soft tissue procedures (eg, V-Y closure, nasal cinch, buccal fat removal)
    10. Biopsy or debridement and removal of maxillary sinus pathology (eg, mucous retention cyst, mucocele, polyp)
    11. Palatal or alveolar cleft repair with/without bone grafting
    12. Surgically assisted orthodontic movement (includes skeletal anchorage devices and corticotomies)
    13. Instructions for post-treatment care and follow-up

V. Outcome assessment indices for residual cleft-related skeletofacial differences requiring secondary management

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
    2. Permanent improvement in the musculoskeletal, dental, and/or soft tissue relationships
    3. Improved function
        a. Improved masticatory function (eg, mastication, deglutition)
        b. Improved speech
        c. Improved airway
    4. Enhanced orthodontic result
    5. Improved dental and periodontal health
    6. Improved appearance
B. Known risks and complications associated with therapy
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
    2. Impaired masticatory function
    3. Impaired dental occlusion

RESIDUAL CLEFT-RELATED SKELETOFACIAL DIFFERENCES REQUIRING SECONDARY MANAGEMENT (continued)

4. Impaired speech
5. Unfavorable change of facial appearance
6. Onset or exacerbation of temporomandibular disorders, restricted mandibular range of motion
7. Clinically significant neurologic deficit
8. Failure of bone to heal (eg, delayed or nonunion)
9. Unanticipated loss of teeth, bone, and/or soft tissue
10. Dental pathology requiring treatment
11. Skeletal relapse
12. Onset of parafunctional habits
13. Development of hypernasal speech
14. Increased incidence of skeletal relapse
15. Increased potential for avascular sequelae when maxillary surgery is performed, especially in bilateral cleft with a mobile premaxilla
16. Failure to correct oronasal communications
17. Creation and/or enlargement of oronasal communications
18. Airway obstruction
19. Adverse psychological sequelae

CRANIOFACIAL DEFORMITIES: THOSE NOT REQUIRING AN INTRACRANIAL APPROACH FOR REPAIR

I. Indications for therapy for craniofacial deformities: those not requiring an intracranial approach for repair

May include one or more of the following:

A. Physical or imaging evidence of deformity of cranial or orbital bones
B. Physical or imaging evidence of cosmetic and/or functional deformity of the nose secondary to developmental or acquired anomalies
C. Evidence of anatomical and/or functional deformity of the ears secondary to developmental or acquired anomalies
D. Evidence of anatomical and/or functional deformity of soft tissue, skeletal, and/or dento-osseous structures of the face secondary to developmental or acquired anomalies
E. Evidence of airway obstruction secondary to developmental or acquired anomalies
F. Evidence of abnormal masticatory and/or jaw function secondary to developmental or acquired anomalies
G. Evidence of abnormal speech and/or swallowing secondary to developmental or acquired anomalies

II. Specific therapeutic goals for craniofacial deformities: those not requiring an intracranial approach for repair

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Improved function and appearance of the cranial and orbital areas
C. Improved nasal form and/or function
D. Improved ear appearance and function
E. Improved appearance and function of the soft tissue, skeletal, and/or dento-osseous structures of the face
F. Absence of upper airway problems
G. Improved masticatory and/or jaw function
H. Improved speech and swallowing

CRANIOFACIAL DEFORMITIES: THOSE NOT REQUIRING AN INTRACRANIAL APPROACH FOR REPAIR (continued)

III. Specific factors affecting risk for craniofacial deformities: those not requiring an intracranial approach for repair

Severity factors that increase risk and potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Severity of deformity
C. Presence of a syndrome
D. Number of previous operative procedures involving this region
E. Presence of airway abnormalities
F. Potential for hypertrophic or keloid scar formation

IV. Indicated therapeutic parameters for craniofacial deformities: those not requiring an intracranial approach for repair

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

Timing of surgery is determined by the nature of the abnormality, which requires evaluation of growth and function. Deformities involving growth should be treated at a time that would minimize adverse effects on facial growth.

The following procedures for the management of craniofacial deformities not requiring an intracranial approach for repair are not listed in order of preference:

A. Diagnostic records, including a panoramic radiograph, cephalometric analysis, photographic documentation, and dental model assessment. In most cases, CT scans (possibly 3-dimensional CT scans), magnetic resonance imaging, and the use of computer assisted planning may be indicated.
B. Extracranial procedures:
    1. Le Fort I, II, or III with or without grafting
    2. Rhinoplasty
    3. Naso-orbital reconstruction with or without grafting
    4. Malar reconstruction
    5. Frontal bone reconstruction
    6. Otoplasty
    7. Temporal fossa reconstruction
    8. Implants to the craniomaxillofacial region
    9. Mandibular reconstruction with or without grafting
    10. Tissue expansion
    11. Local or free tissue transfer to correct deformity of the craniomaxillofacial region
    12. Midfacial and mandibular distraction osteogenesis
C. Instructions for post-treatment care and follow-up

V. Outcome assessment indices for craniofacial deformities: those not requiring an intracranial approach for repair

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
    2. Improved airway function
    3. Stability of changes in soft tissue, skeletal, and/or dento-osseous structures of the craniomaxillofacial area
    4. Improved ocular, nasal, and ear form and/or function

CRANIOFACIAL DEFORMITIES: THOSE NOT REQUIRING AN INTRACRANIAL APPROACH FOR REPAIR (continued)

5. Improved appearance
6. Improved speech, mastication and/or swallowing

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
2. Skeletal relapse
3. Loss of teeth, bone, and/or soft tissue
4. Postsurgical functional or anatomical deformity of cranium, eyes, nose, and ears
5. Postsurgical functional and anatomical deformity of the face or jaws
6. Blindness, diplopia, and/or other ocular changes
7. Neurologic injury
8. Ptosis
9. Eyelid ptosis
10. Incisional alopecia

CRANIOFACIAL DEFORMITIES: PRIMARY CRANIAL DEFORMITIES REQUIRING TREATMENT THROUGH AN INTRACRANIAL APPROACH

I. Indications for therapy for craniofacial deformities: primary cranial deformities requiring treatment through an intracranial approach

May include one or more of the following:

A. Evidence on examination of cranio-orbital malformation or craniosynostosis
B. Radiologic (CT or plain film) evidence of craniosynostosis
C. Ophthalmic changes (papilledema, change in visual acuity, exposure keratopathy)
D. Neurologic changes (eg, altered cerebrospinal fluid dynamics)

II. Specific therapeutic goals for craniofacial deformities: primary cranial deformities requiring treatment through an intracranial approach

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Release of prematurely fused suture to allow for improved cranial growth when indicated
C. Improved head shape
D. Improved intracranial volume
E. Reconstruction to improve skull, forehead, and/or orbital shape
F. Improved neurologic function (eg, improved cerebrospinal fluid dynamics)

III. Specific factors affecting risk for craniofacial deformities: primary cranial deformities requiring treatment through an intracranial approach

Severity factors that increase risk and potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Severity of condition and extent of suture involvement
C. Multiple suture involvement
D. Presence of a syndrome
E. Presence of neurologic symptoms or failure to meet developmental milestones
F. Presence of hydrocephalus

CRANIOFACIAL DEFORMITIES: PRIMARY CRANIAL DEFORMITIES REQUIRING TREATMENT THROUGH AN INTRACRANIAL APPROACH (continued)

G. Presence of increased intracranial pressure or symptoms that may indicate possible increased intracranial pressure (eg, papilledema, engorged scalp veins, bulging fontanelle)

IV. Indicated therapeutic parameters for craniofacial deformities: primary cranial deformities requiring treatment through an intracranial approach

A team approach is encouraged, and consultations with the appropriate pediatric subspecialty should be obtained. A neurologic surgeon should be involved when intracranial surgery is undertaken. The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

A. Craniectomy/suturectomy for craniosynostosis
B. Cranial orthotic in select cases
C. Bifrontal bone flap
D. Recontouring with multiple osteotomies and bone autografts
E. Encephaloceles, dermoid cysts, gliomas, or other pathological conditions
F. Endoscopic strip craniectomy with cranial molding helmet
G. Instructions for post-treatment care and follow-up

V. Outcome assessment indices for craniofacial deformities: primary cranial deformities requiring treatment through an intracranial approach

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Improved head, forehead, and orbital shape
   3. Improved intracranial volume
   4. Improved neurologic function (eg, improved cerebrospinal fluid dynamics)

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Need for additional surgery
   3. Neurologic disorders
   4. Skull and/or forehead defects and irregularities
   5. Eyelid dysfunction (eg, ptosis)
   6. Anosmia
   7. Lacrimal dysfunction (eg, dacryocystitis)
   8. Canthal displacement
   9. Diplopia
   10. Blindness
   11. Death

CRANIOFACIAL DEFORMITIES: SECONDARY CRANIAL DEFORMITIES REQUIRING TREATMENT THROUGH AN INTRACRANIAL APPROACH

I. Indications for therapy for craniofacial deformities: secondary cranial deformities requiring treatment through an intracranial approach

May include one or more of the following:

A. Presence of increased intracranial pressure

CRANIOFACIAL DEFORMITIES: SECONDARY CRANIAL DEFORMITIES REQUIRING TREATMENT THROUGH AN INTRACRANIAL APPROACH (continued)

B. Neurologic deterioration
C. Abnormal cranial development, with normal brain growth
D. Abnormal frontal and/or orbital development
E. Abnormal facial development
F. Malocclusion
G. Abnormal nasal development
H. Eyelid dysfunction
I. Diplopia, visual field loss, and progressive visual loss
J. Upper airway dysfunction
K. Abnormal speech and swallowing

II. Specific therapeutic goals for craniofacial deformities: secondary cranial deformities requiring treatment through an intracranial approach

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Improved neurologic function and development
C. Improved head shape
D. Improved forehead-orbital shape
E. Improved facial harmony
F. Improved occlusion
G. Improved upper airway
H. Improved eyelid function
I. Improved speech and swallowing
J. Improved vision

III. Specific factors affecting risk for craniofacial deformities: secondary cranial deformities requiring treatment through an intracranial approach

Severity factors that increase risk and potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Extent of neurologic impairment
C. Number and type of previous operations
D. Presence of shunts and/or alloplasts
E. Lacrimal dysfunction and/or dacryocystitis
F. Increased intracranial pressure
G. Presence of hydrocephalus
H. Sinus and nasal disease

IV. Indicated therapeutic parameters for craniofacial deformities: secondary cranial deformities requiring treatment through an intracranial approach

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

A pediatric ophthalmologic consultation may be considered when indicated, and a pediatric neurologic surgeon should be involved when intracranial surgery is undertaken. Timing of surgery is determined by the nature of the abnormality that requires evaluation of growth and function. Deformities involving growth should be treated at a time that would minimize adverse effects on growth.

A. Craniectomy for craniosynostosis

CRANIOFACIAL DEFORMITIES: SECONDARY CRANIAL DEFORMITIES REQUIRING TREATMENT THROUGH AN INTRACRANIAL APPROACH (continued)

B. Bifrontal bone flap
C. Recontouring with multiple osteotomies and bone autografts
D. Extracranial procedures
    1. Le Fort I, II, or III with or without grafting
    2. Rhinoplasty
    3. Naso-orbital reconstruction with or without grafting
    4. Malar reconstruction
    5. Frontal bone reconstruction
    6. Otoplasty
    7. Temporal fossa reconstruction
    8. Implants to the craniomaxillofacial region
    9. Reconstruction with or without grafting as an adjunctive procedure
    10. Tissue expansion
    11. Local or free tissue transfer to correct deformity of the craniomaxillofacial region
    12. Midfacial and mandibular distraction osteogenesis
E. Instructions for post-treatment care and follow-up

V. Outcome assessment indices for craniofacial deformities: secondary cranial deformities requiring treatment through an intracranial approach

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
    2. Improved head, forehead-orbital, nasal, and facial harmony
    3. Improved masticatory function
    4. Improved eyelid function
    5. Improved upper airway, speech and swallowing
    6. Improved neurologic function (eg, improved cerebrospinal fluid dynamics and meets developmental milestones)
B. Known risks and complications associated with therapy
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
    2. Anosmia
    3. Eye muscle imbalance
    4. Diplopia
    5. Ocular injury
    6. Globe position
    7. Neurologic deficit
    8. Impaired speech and swallowing
    9. Lacrimal dysfunction
    10. Loss of teeth, bone, and/or soft tissue
    11. Canthal dystopia and/or telecanthus
    12. Blindness
    13. Ptosis
    14. Cerebrospinal leak

ORBITAL AND/OR NASO-ORBITAL DEFORMITIES

I. Indications for therapy for orbital and/or naso-orbital deformities

May include one or more of the following:

A. Malpositioned orbits, with CT scan documentation
B. Naso-orbital deformity (eg, encephalocele or nasofrontal dysplasia)
C. Microphthalmia
D. Visual impairment (eg, diplopia and/or muscle imbalance)

II. Specific therapeutic goals for orbital and/or naso-orbital deformities

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Improved orbital position
C. Improved nasal form
D. Improved visual function
E. Improved canthal position
F. Improved sinus and/or nasal function

III. Specific factors affecting risk for orbital and/or naso-orbital deformities

Severity factors that increase risk and potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
B. Extent of neurologic impairment
C. Number and type of previous operations
D. Telecanthus and/or canthal dystopia
E. Soft tissue excess
F. Soft tissue hypoplasia
G. Ocular adnexal conditions
H. Sinus and/or nasal disease
I. Lacrimal dysfunction
J. Ocular cleft

IV. Indicated therapeutic parameters for orbital and/or naso-orbital deformities

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

An ophthalmologic consultation should be considered when indicated, and a neurologic surgeon should be involved when intracranial surgery is undertaken.

A. Surgical correction of orbital deformity and position by osteotomy with or without graft
B. Surgical correction of naso-orbital deformity by osteotomy with or without graft
C. Surgical correction of microphthalmia
D. Repair of encephalocele
E. Instructions for post-treatment care and follow-up

V. Outcome assessment indices for orbital and/or naso-orbital deformities

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
    2. Improved orbital form and position
    3. Improved eyelid position and function
    4. Improved vision

ORBITAL AND/OR NASO-ORBITAL DEFORMITIES (continued)

5. Improved nasal form and function

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Cleft and Craniofacial Surgery
   2. Eye muscle imbalance
   3. Diplopia
   4. Lacrimal dysfunction and/or obstruction
   5. Canthal dystopia and/or telecanthus
   6. Ptosis
   7. Nasal airway impairment
   8. Sinus disease
   9. Anosmia
   10. Interference with dental development
   11. Blindness

SELECTED REFERENCES – CLEFT AND CRANIOFACIAL SURGERY

This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation of this document. Citation of the reference material is not meant to imply endorsement of any statement contained in the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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ORBITAL AND/OR NASO-ORBITAL DEFORMITIES

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Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

TRAUMA SURGERY

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023,* WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE. TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

Trauma remains a major health and social issue in the United States. Every year, hundreds of thousands of people of all ages sustain facial injuries from automobile and other vehicular collisions, firearms, athletic activities, or altercations. The result may be soft-tissue damage to the ears, scalp, and face. Many of these injuries are maxillofacial fractures, such as fractures of the lower jaw, upper jaw, palate, cheekbones, nose, bone surrounding the eyes, skull, or combination injuries. Moreover, injuries to the teeth and supporting structures may result.

Treatment of these patients often requires hospitalization and the skills of professionals trained in trauma management. The emergent management of the patient should follow the guidelines established by the American College of Surgeons Subcommittee on Trauma, as outlined in the *Advanced Trauma Life Support for Doctors*.

Maxillofacial injuries may result in life-threatening complications and significant cosmetic or functional problems, such as abnormalities in mastication, swallowing, breathing, smelling, and vision. The patient may have chronic pain and those with extensive residual defects frequently develop psychosocial disorders.

The principles of treatment for facial fractures are the same as those for fractures of other skeletal structures (eg, arm, leg). The parts of the bone must be aligned (reduced) and held in position (immobilized and/or stabilized) long enough for healing to occur. The length of time required for healing depends on the patient's age, the anatomical site, the complexity of the fractures, and the surgical procedure used. When fractures are extensive, multiple incisions may be needed to access the bones, thereby allowing a combination of reduction and fixation techniques.

The principles for treatment of maxillofacial soft-tissue injuries are often specialized. They involve not only closure of the wound to prevent infection and improve cosmesis but also possibly specialized procedures (eg, microvascular or microneurosurgery) directed at restoring specialized form and function. The use of suturing, local or regional flaps, and grafting, including microvascular free tissue transfer, are included in this therapy.

Although some complications and undesirable outcomes may be unavoidable, proper diagnosis and timely management of the injuries can significantly reduce the post-traumatic functional and cosmetic defects associated with facial trauma. The following section on trauma management presents parameters for care that, if properly applied, will improve the quality of care received by patients who have sustained facial injuries.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR TRAUMA SURGERY

INFORMED CONSENT: All surgery must be preceded by the patient's or legal guardian's consent, unless an emergent situation dictates otherwise. Emergent circumstances and the indications for treatment should be documented in the patient's record. Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the expected recovery period, alternative treatment options (including no treatment), and any patient or procedure specific factors that may affect the risk. The results of the informed consent process must be documented in the patient medical record. In general, an informed consent document is signed by the patient or guardian, but the Oral and Maxillofacial Surgeon is well advised to document in the medical record that the informed consent process occurred and that the patient/guardian provided both verbal and written consent that they understand and are willing to proceed with treatment.

PERIOPERATIVE ANTIBIOTIC THERAPY: The administration or prescribing of antibiotics may not be needed for otherwise healthy patients and thus the decision to employ prophylactic perioperative antibiotics is at the sole discretion of the treating surgeon and should be based on the patient's clinical condition as well as other comorbidities which may be present.

DEALING WITH NEUROLOGIC DEFICITS: Injuries to the terminal branches of the trigeminal nerve (eg, lingual, inferior alveolar, long buccal nerves), as well as the facial nerve, are known risks of oral and maxillofacial surgery. It should be noted that the presence of a pathologic craniomaxillofacial condition, dentoskeletal or craniofacial abnormality, or traumatic craniomaxillofacial injury may result in nerve injury prior to surgical management. In addition, the use of local anesthesia (eg, mandibular block) may increase the risk of nerve injury.

Most nerve injuries resolve spontaneously, but some do not, and these may require consideration for nonsurgical and/or surgical intervention. Microneurosurgical repair should be considered when the disability is of concern to the patient, and there is clinical evidence of moderate, severe, or complete neurosensory impairment of various areas of the orofacial region (eg, lips, chin, tongue); paresis or paralysis of facial muscles; loss, decreased, or abnormal taste sensation; or neuropathic pain of peripheral origin or if the progression of spontaneous nerve recovery halts. Surgical repair should incorporate specialized microsurgical techniques (eg, operating magnification, nerve grafting), when indicated. Also see the *Reconstructive Surgery* chapter.

USE OF IMAGING MODALITIES: Imaging modalities may include panoramic radiograph, periapical and/or occlusal radiographs, maxillary and/or mandibular radiographs, computed tomography (CT) possibly with angiography, cone beam CT, positron emission tomography, positron emission tomography/CT, and magnetic resonance imaging. In determining studies to be performed for imaging purposes, principles of ALARA (as low as reasonably achievable) should be followed.

DOCUMENTATION: *AAOMS ParCare 2023* includes documentation of objective findings, diagnoses, and patient management interventions. *The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon in light of the circumstances presented by each patient.*

Understandably, there may be good clinical reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well advised to note in the patient's record the reason for the procedure followed. Moreover, it should be understood that adherence to the parameters does not guarantee a favorable outcome.

GENERAL THERAPEUTIC GOALS OF TRAUMA SURGERY

A. Protection and/or establishment of an adequate airway
B. Control of hemorrhage
C. Restoration of premorbid form and function
D. Preservation of tissue
E. Limited period of disability
F. Limited psychological morbidity
G. Limited pain
H. Uncomplicated healing
I. Avoidance of infection
J. Appropriate understanding by patient (family) of treatment options and acceptance of treatment plan
K. Appropriate understanding and acceptance by patient (family) of favorable outcomes and known risks and complications
L. Avoidance of secondary deformities
M. Optimized esthetic result

GENERAL FACTORS AFFECTING RISK DURING TRAUMA SURGERY: Effects of the host and environment, care available, and understanding by the patient and caregiver may affect both risk factors and potential complications associated with trauma surgery.

A. Presence of airway impairment
B. Presence of hemorrhage
C. Degree of patient and/or family understanding of the origin and natural course of the condition or disorder and therapeutic goals and acceptance of proposed treatment
D. Presence of coexisting major systemic disease (eg, disease that increases a patient's American Society of Anesthesiologists classification to II, III, or IV), as detailed in the *Patient Assessment* chapter
E. Inability to complete the preoperative evaluation due to the urgency of the patient's clinical condition
F. Age of the patient
G. Crush, thermal, chemical, and/or electrical injury
H. Presence of underlying fracture
I. Presence of tissue loss (eg, avulsive injuries)
J. Adequacy of blood supply to affected tissues
K. Presence of infection and/or pathology associated with injury
L. Availability of instruments or equipment
M. Presence of concomitant medical or surgical problems that may delay management (eg, severe intracranial injury, cervical spine injury, pulmonary injury, and cardiac injury)
N. Presence of local or systemic conditions that may interfere with the normal healing process and subsequent tissue homeostasis (eg, previously irradiated tissue, diabetes mellitus, chronic renal disease, liver disease, blood disorder, steroid therapy, contraceptive medication, immunosuppression, and malnutrition)
O. Presence of behavioral, psychological, neurologic, or psychiatric disorders, including habits (eg, substance abuse), seizure disorders, or self-mutilation that may affect surgery, healing, and/or response to therapy
P. Degree of patient's and/or family's cooperation and/or compliance
Q. Regulatory and/or third-party decisions concerning access to care, indicated therapy, drugs, devices, and/or materials

R. Time elapsed since injury. Evidence-based medicine has not documented that a significant delay (up to 5 days from the time of injury) in the repair of uncomplicated maxillofacial fractures increases the risk of postoperative complications.
S. History or presence of keloid or hypertrophic scar formation
T. Patient's stage of skeletal and/or dental development (eg, growing child, deciduous, mixed, or permanent dentition)
U. Presence of coexisting or previous maxillofacial injury
V. Presence of coexisting or previous neurologic abnormalities (eg, sensory or motor disturbance)
W. Presence of a pre-existing dentofacial abnormality
X. Cause of injury and degree of contamination

GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR TRAUMA SURGERY

A. Healed soft and hard tissues
    1. Osseous union
    2. Primary soft-tissue healing of incisions or lacerations
    3. Retention of premorbid tissue
B. Restored facial form (maybe influenced by premorbid condition)
C. Restored physiologic function
D. Limited period of disability
E. Limited pain
    1. Absence of infection
F. Absence of neurologic dysfunction (sensory or motor)
G. Absence of skeletal deformity
H. Absence of soft-tissue deformity
I. Absence of growth disturbance in children
J. Patient (family) acceptance of procedure and understanding of outcomes

GENERAL KNOWN RISKS AND COMPLICATIONS OF TRAUMA SURGERY

A. Infection
B. Scarring (eg, from incisions and/or injury)
C. Chronic pain
D. Prolonged or chronic disability
E. Psychological impairment
F. Wound breakdown
G. Unplanned admission to intensive care unit after surgery
H. Unplanned intubation for more than 12 hours after surgery
I. Unplanned tracheostomy
J. Reintubation or tracheostomy after surgery
K. Use of parenteral drugs and/or fluids for more than 72 hours after surgery
L. Failure to ambulate within 48 hours of elective surgery
M. Facial fracture during or following surgery
N. Failure of fixation of fractured segments (open or closed reductions)
O. Unplanned Caldwell-Luc, bronchoscopy, or other exploratory procedures associated with surgery
P. Dental injury during surgery
Q. Ocular injury during surgery
R. Repeat oral and/or maxillofacial surgery
S. Core temperature of more than 101°F 72 hours after surgery
T. Postsurgical radiograph indicating presence of foreign body
U. Unplanned transfusion(s) of blood or blood components during or after surgery
V. Readmission for complications or incomplete management of problems on previous hospitalization
W. Respiratory and/or cardiac arrest
X. Chronic neurologic abnormality (eg, motor and/or sensory dysfunction)
Y. Malunion and/or nonunion
Z. Cerebrospinal fluid leak
AA. Death

SPECIAL CONSIDERATIONS FOR PEDIATRIC TRAUMA SURGERY

Although maxillofacial traumatic injuries in children are less common than in adults, they are associated with considerable morbidity in the pediatric age group. Children aged less than 5 years represent less than 1% of patients with maxillofacial injuries reported from general hospitals and those between the ages of 5 and 12 years represent approximately 4% to 6% of the total. The most common causes are falls and motor vehicle accidents.

Treatment principles for children sustaining maxillofacial injury are similar to those for adults and have been described and outlined in this document. However, special considerations are based on the child's anatomy, size, and stages of dental and psychological development. Complications unique to children include growth abnormalities and psychosocial problems related to post-traumatic facial deformity.

Treatment goals in the pediatric population are the same as those described for adults, with the addition of limiting growth abnormalities and ensuring that both the patient and parents obtain adequate counseling to deal with any functional or anatomical deficits resulting from the injury.

Psychosocial factors must be considered in the pediatric patient group. Parents often feel guilty about the circumstances surrounding the injury and counseling may be required to help them understand and deal with potential problems. Age-appropriate counseling may also be required to help the child deal with functional disability or anatomical deformity. The specter of child abuse must be entertained, and where suspicion is aroused, it must be investigated appropriately according to ethical and local legal requirements.

The major additional risks to the patient are related to the stage of growth. For example, between the ages of 4 and 7 years and 11 and 13 years, condylar fractures present the risk of abnormal growth of the mandible, with resultant malocclusion and asymmetric or symmetric dentofacial deformity. Midface injuries in those aged less than 10 years present the risk of decreased growth, resulting in midface hypoplasia and class III malocclusion. Finally, injuries during the deciduous and mixed dentition stages present the risk of direct or treatment-related iatrogenic damage to the permanent teeth, with subsequent late eruption, failure of eruption, or abnormal tooth structure. Consideration should be given for not reimplanting and stabilizing teeth that have been avulsed for more than 1 hour (unless kept in physiologic solution or milk) due to the known risk for root resorption and/or ankylosis.

Specific treatment of fractures in children is similar to that in adults, with some exceptions due to age-related anatomic and physiologic variables. When planning open reduction and internal fixation of fractures in children, care must be taken to be aware of and avoid unerupted teeth that may be in the path of plates and screws.

Furthermore, in children who have deciduous and mixed dentition, the bone may be soft and it may be difficult to find adequate bone stock to hold screws. In the mixed stages of dental development, the process of active tooth eruption may compensate for minor misalignments of alveolar fracture reductions.

Treatment of condylar fractures warrants special mention. The goals should be to achieve preinjury occlusion and normal motion. Special care should be taken to avoid maxillomandibular fixation for more than 7 to 10 days in children with condylar fractures because this significantly increases the incidence of hypomobility and ankylosis. Significantly displaced condylar fractures in children aged less than 5 years are often associated with condylar remodeling or regenesis.

Midface injuries in children are treated similarly to adults. Plates and screws placed in the calvaria of children aged less than 2 years may migrate toward the dura as the skull grows and probably should be removed.

Alternatively, bioresorbable materials may be used in both maxillary and mandibular fractures in this age group. Nasal fractures should be reduced, and treatment is rarely associated with growth disturbance. On the other hand, severely comminuted nasal fractures, with loss of nasal septal cartilage, are often associated with midfacial growth disturbance. The diagnosis of nasal fractures in children may be improved with the use of ultrasound imaging techniques.

Soft-tissue injuries are managed similarly to that described for adults. In the case of avulsive injuries, tissue sometimes serves as biological dressing. Children heal well but often experience excessive scarring. For this reason, most sutures should be placed subdermally and long-term skin dressing support implemented. Tissue glues are easily applied for the approximation of tension-free lacerations.

FRACTURED TEETH

I. Indications for Therapy for Fractured Teeth

May include 1 or more of the following:

A. Physical evidence of a crown fracture and/or root fracture
B. Imaging evidence of a crown fracture and/or root fracture
C. Physical evidence of a malocclusion
D. Physical evidence of tooth mobility

FRACTURED TEETH (continued)

E. Tooth sensitivity to percussion, manipulation, or mastication
F. Sensitivity to thermal stimuli
G. Physical evidence of injury to the adjacent gingiva, alveolar process, or basal bone
H. Imaging evidence of associated alveolar process or basal bone fracture
I. Pain in the absence of noxious stimuli

II. Specific Therapeutic Goals for Fractured Teeth

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Preservation of tooth structures
C. Preservation of alveolar architecture
D. Restoration of occlusion, function, and esthetics

III. Specific Factors Affecting Risk for Fractured Teeth

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Amount of protrusion of the upper incisors
C. Malocclusion
D. Labial competence
E. Vector of impact
F. Pre-existing periodontal disease
G. Pre-existing caries
H. Pre-existing endodontic therapy
I. Pre-existing dental restorations (eg, crown and bridge)
J. Extent of root development
K. Size of pulp chamber and root canal
L. Location of fracture

IV. Indicated Therapeutic Parameters for Fractured Teeth

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of fractured teeth are not listed in order of preference:

A. Debridement of small tooth fragments
B. Stabilization of loose teeth
C. Endodontic therapy for pulp exposures (eg, pulp cap, pulpotomy)
D. Elimination of sharp edges
E. Pulp protection until restoration
F. Antimicrobials as indicated
G. Extraction in cases of nonrestorable teeth
H. Control of pain
I. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Fractured Teeth

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery

FRACTURED TEETH (continued)

2. Preserved teeth and tooth structures
3. Restored occlusion, function, and esthetics

B. Known risks and complications
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
2. Ankylosis
3. Root resorption (internal/external)
4. Discoloration
5. Malocclusion
6. Loss of tooth or teeth
7. Periodontal defects
8. Pulpal disease
9. Alveolar ridge resorption

LUXATED AND/OR AVULSED TEETH

I. Indications for Therapy for Luxated and/or Avulsed Teeth

May include 1 or more of the following:

A. Physical evidence of a missing tooth or teeth
B. Physical evidence of a mobile tooth or teeth
C. Physical evidence of an intruded tooth or teeth
D. Physical evidence of an extruded tooth or teeth
E. Physical evidence of a laterally positioned tooth or teeth
F. Bleeding from the gingival sulcus
G. Malocclusion
H. Physical evidence of an alveolar process injury
I. Physical evidence of a mandibular or maxillary fracture
J. Imaging evidence of an alveolar process fracture
K. Imaging evidence of widened periodontal ligament
L. Imaging evidence of a displaced or missing tooth

II. Specific Therapeutic Goals for Luxated and/or Avulsed Teeth

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Preservation of teeth and tooth structures
C. Preservation of alveolar architecture
D. Restoration of occlusion, function, and esthetics

III. Specific Factors Affecting Risk for Luxated and/or Avulsed Teeth

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Amount of protrusion of the upper incisor
C. Malocclusion
D. Labial competence
E. Vector of impact
F. Pre-existing periodontal disease
G. Pre-existing caries
H. Pre-existing endodontic therapy

LUXATED AND/OR AVULSED TEETH (continued)

I. Pre-existing dental restorations (eg, crown and bridge)
J. Extent of root development
K. Size of pulp chamber and root canal
L. Associated tooth fracture
M. Postinjury transportation media
N. Time elapsed since injury and/or reimplantation
O. Alveolar ridge resorption

IV. Indicated Therapeutic Parameters for Luxated and/or Avulsed Teeth

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of luxated and/or avulsed teeth are not listed in order of preference:

A. Reimplantation of adult avulsed teeth
B. Irrigation of tooth socket
C. Repositioning of luxated or extruded teeth
D. Stabilization of mobile teeth or avulsed adult teeth
E. Observation for the eruption of intruded teeth
F. Consideration for endodontic therapy
G. Management of associated alveolar process, mandible, or maxillary fractures
H. Extraction (or no reimplantation) in cases of nonsalvageable teeth
I. Antimicrobials as indicated
J. Control of pain
K. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Luxated and/or Avulsed Teeth

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Preserved teeth and tooth structures
   3. Restored occlusion, esthetics, and phonation
B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Ankylosis
   3. Root resorption (internal/external)
   4. Discoloration
   5. Malocclusion
   6. Loss of tooth or teeth
   7. Periodontal defects
   8. Pulpal disease

ALVEOLAR PROCESS INJURIES

I. Indications for Therapy for Alveolar Process Injuries

May include 1 or more of the following:

A. Physical evidence of fracture
B. Imaging evidence of fracture
C. Malocclusion

ALVEOLAR PROCESS INJURIES (continued)

D. Masticatory dysfunction
E. Injuries to associated soft tissue
F. Sensory nerve deficits
G. Fractures or mobility of the dentition

II. Specific Therapeutic Goals for Alveolar Process Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Preservation of teeth and alveolar bone
C. Restoration of premorbid sensory nerve function
D. Restoration of occlusion, function, and esthetics

III. Specific Factors Affecting Risk for Alveolar Process Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Presence of abnormal dental occlusion or lack of occlusion (eg, partial edentulism)
C. Presence of fractured teeth
D. Presence of teeth in line of fracture
E. Presence of periodontal disease, infection, or pathology associated with teeth fracture
F. Degree of displacement of fracture
G. Presence of multiple fractured segments or fracture comminution
H. Presence of compound fracture
I. Inadequacy of blood supply to fracture segment(s) and/or overlying soft tissue

IV. Indicated Therapeutic Parameters for Alveolar Process Injuries

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of alveolar process injuries are not listed in order of preference:

A. Observation and appropriate diet based on limited severity of fracture, displacement, and mobility
B. Closed reduction in cases of
    1. Compound fractures
    2. Complex fractures
    3. Medical and/or anesthetic contraindication to open reduction
C. Open reduction alveolus—stabilization of teeth open reduction splinting
    1. Unstable fractures
    2. Patient or surgeon preference for early or immediate function
    3. Inability to perform closed reduction
    4. Injuries associated with soft or other bony tissue
    5. Inadequate dentition (inability to apply dental splinting)
D. Removal of teeth
E. Antimicrobials as indicated
F. Control of pain
G. Drains for management of dead spaces or contaminated wounds when judgment dictates
H. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Alveolar Process Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

ALVEOLAR PROCESS INJURIES (continued)

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Osseous union
   3. Restored pretrauma arch form, function, and occlusion
   4. Restored esthetics
   5. Normal speech, deglutition, and respiration
B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Loss of teeth and/or supporting structures
   3. Periodontal defects
   4. Devitalized teeth
   5. Nonunion
   6. Post-treatment facial deformity
      a. Skeletal deformity or malunion
      b. Facial soft-tissue deformity (eg, scarring)
   7. Abnormal oral and maxillofacial function
      a. Malocclusion and/or masticatory dysfunction
      b. Dysphonia
   8. Alveolar ridge resorption

MANDIBULAR INJURIES (ANGLE, BODY, RAMUS, AND SYMPHYSIS)

I. Indications for Therapy for Mandibular Injuries (Angle, Body, Ramus, and Symphysis)

May include 1 or more of the following:

A. Physical evidence of fractured mandible
B. Imaging evidence of fractured mandible
C. Malocclusion
D. Mandibular dysfunction
E. Abnormal relationship of jaws
F. Deficits of sensory and/or motor nerves
G. Fractured or mobile dentition
H. Continuity defects
I. Presence of foreign bodies
J. Injuries to associated soft or other bony tissue
K. Airway compromise

II. Specific Therapeutic Goals for Mandibular Injuries (Angle, Body, Ramus, and Symphysis)

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restoration of pretrauma occlusion
C. Preservation of teeth and bone structure
D. Restoration of motor and/or sensory nerve function
E. Adequate jaw function, including opening of greater than 40 mm

MANDIBULAR INJURIES (ANGLE, BODY, RAMUS, AND SYMPHYSIS) (continued)

III. Specific Factors Affecting Risk for Mandibular Injuries (Angle, Body, Ramus, and Symphysis)

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Degree of displacement and/or mobility of fracture
C. Presence of multiple fractured segments (fracture comminution)
D. Presence of compound fracture
E. Presence of abnormal dental occlusion or lack of occlusion (eg, edentulism)
F. Presence of fractured teeth
G. Presence of teeth in line of fracture
H. Presence of infection or pathology associated with a fracture or associated teeth
I. History or presence of temporomandibular joint disorder, pathology, or infection
J. Presence of coexisting alveolar process or maxillary injury

IV. Indicated Therapeutic Parameters for Mandibular Injuries (Angle, Body, Ramus and Symphysis)

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of mandibular angle, body, ramus, and symphysis injuries are not listed in order of preference:

A. Observation and appropriate diet based on limited severity of fracture, displacement, and mobility
B. Closed reduction in cases of
    1. Stable fracture
    2. Reduction and stabilization of fracture achievable with closed method and maxillomandibular fixation and/or external fixation
    3. Medical and/or anesthetic contraindication to open reduction
C. Open reduction in cases of
    1. Unstable fractures
    2. Continuity defects
    3. Patient or surgeon preference for early or immediate mobilization or function
    4. Injuries to associated soft or other bony tissue
    5. Need for vascular or neurologic exploration or repair
    6. Associated midface fractures (LeFort level fractures)
D. Antimicrobials as indicated
E. Use of advanced imaging, when appropriate, to evaluate the post-treatment reduction for comminuted mandibular fractures and/or mandibular fractures with concomitant panfacial fractures
F. Use of medical modeling, when appropriate, to facilitate the anatomic reduction of fractures involving large continuity defects or severely comminuted fractures with concomitant panfacial fractures
G. Control of pain
H. Drains for management of dead spaces or contaminated wounds when judgment dictates
I. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Mandibular Injuries (Angle, Body, Ramus, and Symphysis)

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
    2. Primary healing of soft-tissue incisions
    3. Osseous union

MANDIBULAR INJURIES (ANGLE, BODY, RAMUS, AND SYMPHYSIS) (continued)

4. Normal speech, deglutition, and respiration
5. Occlusion at premorbid status
6. Adequate jaw mobility including opening and excursive movements

B. Known risks and complications
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
2. Nonunion
3. Postmanagement facial deformity
   a. Skeletal deformity and/or malunion
   b. Deformity of facial soft tissue
   c. Abnormal oral and mandibular function (may be influenced by premorbid condition)
4. Malocclusion and/or masticatory dysfunction
   a. Dysphonia and/or dysphagia
   b. Partial or complete respiratory obstruction
5. Loss of tooth or teeth vitality
6. Loss of tooth or teeth
7. Loss of bony structures
8. Damage caused by plate and screw fixation
9. Damage to motor and sensory nerves
10. Facial widening for symphyseal fractures

MANDIBULAR CONDYLE INJURIES

I. Indications for Therapy for Mandibular Condyle Injuries

May include 1 or more of the following:

A. Physical evidence of fracture
B. Imaging evidence of fracture
C. Malocclusion
D. Mandibular dysfunction
E. Presence of foreign bodies
F. Lacerations and/or hemorrhage in external auditory canal
G. Hemotympanum
H. Cerebrospinal fluid otorrhea
I. Inability to tolerate maxillomandibular fixation
J. Midface fractures
K. Severe displacement of condyle
L. Dislocation of the condylar head out of the fossa
M. Effusion
N. Hemarthrosis

II. Specific Therapeutic Goals for Mandibular Condyle Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Limited pain in the joint
C. Minimal mandibular growth disturbances in children

MANDIBULAR CONDYLE INJURIES (continued)

D. Minimal acute or chronic temporomandibular joint disorders (eg, internal derangement, osteoarthritis)
E. Adequate jaw mobility including opening and excursive movements

III. Specific Factors Affecting Risk for Mandibular Condyle Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Type and location of fracture (eg, greenstick, compound, comminuted, intracapsular, or extracapsular)
C. Absence of teeth
D. Extent of injury (eg, unilateral or bilateral)
E. Degree of displacement (eg, nondisplaced, fracture dislocation)
F. Presence of foreign body
G. History or presence of temporomandibular joint disorder, pathology, or infection
H. Presence of coexisting mandibular or maxillary injury
I. Age

IV. Indicated Therapeutic Parameters for Mandibular Condyle Injuries

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of mandibular condyle injuries are not listed in order of preference:

A. Observation and appropriate diet based on limited severity of fracture, displacement, and mobility
B. Closed reduction in cases of
    1. Nondisplaced or displaced fracture of a mandibular condyle where form and/or function can be restored and there are no medical contraindications to maxillomandibular fixations
    2. Fracture dislocations or comminuted fractures in the growing child where form and/or function can be restored
    3. Medical and/or anesthetic contraindications to open reduction
C. Open reduction (including endoscopically assisted, intraoperative computer navigated assisted, or intraoperative radiology) in cases of
    1. Fracture dislocation of a mandibular condyle
    2. Mechanical interference with mandibular function by the condyle or a foreign body
    3. Condylar fractures with loss of anterior-posterior and vertical dimension that cannot be managed by closed reduction (eg, edentulous patient, multiple facial fractures) including internal fixation if indicated
    4. Compound fracture
    5. Displacement of a mandibular condyle into middle cranial fossa
    6. Patient or surgeon preference for early or immediate mobilization or function
D. Antimicrobials as indicated
E. Control of pain
F. Drains for management of dead spaces or contaminated wounds when judgment dictates
G. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Mandibular Condyle Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
    2. Osseous union
    3. Restored joint anatomy and physiology
    4. Primary healing of incisions
    5. Normal speech, deglutition, and respiration
    6. Occlusion at premorbid status

MANDIBULAR CONDYLE INJURIES (continued)

7. Limited period of disability
8. Adequate mobilization including opening

B. Known risks and complications
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
2. Ankylosis
3. Nonunion
4. Post-treatment facial deformity
   a. Skeletal deformity or malunion
   b. Deformity of the facial soft tissue (eg, scarring)
   c. Abnormal mandibular growth in children
5. Abnormal oral and maxillofacial function (may be influenced by premorbid condition)
   a. Malocclusion and/or masticatory dysfunction
   b. Dysphagia and/or dysphonia
   c. Partial or complete respiratory obstruction

MANDIBULAR CONDYLE DISLOCATION

I. Indications for Therapy for Mandibular Condyle Dislocation

May include 1 or more of the following:

A. Physical evidence of condylar dislocation
B. Imaging evidence of condylar dislocation
C. Dental malocclusion
D. Mandibular dysfunction
E. Post-traumatic facial asymmetry
F. Pain

II. Specific Therapeutic Goals for Mandibular Condyle Dislocation

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Reduction of dislocation
C. Restoration of mandibular function

III. Specific Factors Affecting Risk for Mandibular Condyle Dislocation

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Presence of neuromuscular disorders
C. History of previous temporomandibular joint dislocation
D. Duration of temporomandibular joint dislocation
E. Presence of anatomical deformity of temporomandibular joint
F. History or presence of temporomandibular joint disorder, pathology, or infection

IV. Indicated Therapeutic Parameters for Mandibular Condyle Dislocation

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of mandibular condyle dislocation are not listed in order of preference:

MANDIBULAR CONDYLE DISLOCATION (continued)

A. Observation and appropriate diet based on limited severity of fracture, displacement, and mobility
B. Closed reduction with or without sedation or general anesthesia
   1. Reduction with maxillomandibular immobilization
   2. Reduction without maxillomandibular immobilization
C. Open reduction (including endoscopically assisted, intraoperative computer navigated assisted, or intraoperative radiology)
D. Resection of condylar head with repositioning and stabilization
E. Total joint replacement
F. Prophylactic antibiotic coverage for open reduction
G. Use of appropriate post-treatment imaging modalities to confirm condylar relocation
H. Antimicrobials as indicated
I. Management/control of pain and anxiety
J. Instructions for post-treatment care and follow-up (including physical therapy)

V. Outcome Assessment Indices for Mandibular Condyle Dislocation

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Absence of skeletal malrelation
   3. Absence of preauricular depression
   4. Normal speech and deglutition
   5. Occlusion at premorbid status
B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Post-treatment facial deformity
      a. Unfavorable skeletal relation
      b. Deformity of facial soft tissue (eg, surgical scar)
   3. Abnormal oral and maxillofacial function (may be influenced by premorbid condition)
      a. Malocclusion and/or masticatory dysfunction
      b. Dysphagia and/or dysphonia
   4. Chronic dislocation
   5. Condylar head resorption

MAXILLARY INJURIES

I. Indications for Therapy for Maxillary Injuries

May include 1 or more of the following:

A. Physical evidence of a fractured maxilla
B. Imaging evidence of a fractured maxilla
C. Malocclusion
D. Masticatory dysfunction
E. Deficits of sensory or motor nerves
F. Continuity defects
G. Presence of foreign bodies
H. Injuries to associated soft tissue
I. Cerebrospinal fluid rhinorrhea
J. Periorbital ecchymosis

MAXILLARY INJURIES (continued)

K. Subcutaneous emphysema
L. Subconjunctival hemorrhage
M. Ocular dysfunction and/or abnormalities
N. Nasolacrimal and/or nasofrontal apparatus dysfunction
O. Bleeding from nose (epistaxis) or mouth
P. Intercanthal widening
Q. Orbital entrapment
R. Significant orbital floor fracture as identified clinically or radiographically

II. Specific Therapeutic Goals for Maxillary Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restoration of occlusion, phonation, and cosmetics
C. Restoration of premorbid form and/or function of orbit and nose
D. Restoration of premorbid function of paranasal sinuses
E. Preservation of teeth and bone structure

III. Specific Factors Affecting Risk for Maxillary Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Degree and displacement of fracture
C. Presence of multiple fractured segments or fracture comminution
D. Presence of compound fracture
E. History or presence of temporomandibular joint disorder, pathology, or infection
F. Presence of abnormal dental occlusion or lack of occlusion
G. Presence of fractured teeth
H. Presence of teeth in line of fracture
I. Presence of infection or pathology associated with fracture
J. Presence of paranasal sinus or nasolacrimal apparatus infection or disease
K. Presence of congenital maxillofacial deformity (eg, cleft palate)
L. Presence of coexisting maxillofacial fractures

IV. Indicated Therapeutic Parameters for Maxillary Injuries

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of maxillary injuries are not listed in order of preference:

A. Observation and appropriate diet based on limited severity of fracture, displacement, and mobility
B. Closed reduction in cases of
    1. Uncomplicated fractures, displaced or nondisplaced
    2. Reduction and stabilization of fracture achievable with closed method and maxillomandibular fixation
    3. Comminuted fractures
    4. Medical and/or anesthetic contraindication to open reduction
C. Open reduction in cases of
    1. Inability to reduce fracture using closed methods
    2. Displaced fracture
    3. Unstable fracture
    4. Compound fracture
    5. Avulsion of bony or dento-osseous segments

MAXILLARY INJURIES (continued)

6. Patient or surgeon preference for early or immediate mobilization or function
7. Need for bone graft reconstruction
8. Injuries to associated soft tissue
9. Need for vascular or neurologic exploration or repair
10. Multiple facial fractures including mandibular fractures

D. Antimicrobials as indicated
E. Control of pain
F. Drains for management of dead spaces or contaminated wounds when judgment dictated
G. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Maxillary Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Primary healing of soft-tissue incisions
   3. Mucosal healing over and/or around bony and dento-osseous segments
   4. Osseous union
   5. Normal speech, deglutition, and respiration
   6. Restored premorbid occlusion
   7. Restored sinus function
   8. Restored ocular function
   9. Restored nasal function

B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Nonunion
   3. Postmanagement facial deformity
      a. Skeletal deformity or malunion
      b. Deformity of facial hard and/or soft tissue (eg, nasal and/or orbital deformity)
      c. Loss of bone and/or dento-osseous segment
   4. Abnormal oral and maxillofacial function (may be influenced by premorbid condition)
      a. Malocclusion and/or masticatory dysfunction
      b. Dysphonia
      c. Chronic oroantral or oronasal communication
      d. Altered ocular function including restriction of gaze
      e. Chronic sinus pathology
      f. Anosmia
      g. Partial or complete respiratory obstruction
      h. Blindness
      i. Enophthalmos
      j. Hypoglobus
      k. Dystopia
      l. Entropion
      m. Ectropion
      n. Epiphora
   5. Loss of tooth and/or teeth vitality
   6. Loss of tooth and/or teeth or bony structure

ZYGOMATIC INJURIES

I. Indications for Therapy for Zygomatic Injuries

May include 1 or more of the following:

A. Physical evidence of fracture
B. Imaging evidence of fracture
C. Sensory or motor nerve deficit
D. Mandibular dysfunction
E. Ocular dysfunction and/or abnormalities
F. Significant orbital floor or lateral wall fractures as identified clinically or radiographically
G. Facial deformity
H. Subcutaneous emphysema
I. Multiple facial fractures (panfacial fractures)
J. Severely displaced fractures
K. Severe comminution of zygomatic arch fractures

II. Specific Therapeutic Goals for Zygomatic Injuries

The goal of therapy is to restore form and/or function. However, risk factors and known complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restoration of premorbid ocular function
C. Correction or prevention of enophthalmos/exophthalmos
D. Restoration of premorbid antral function
E. Restoration of mandibular range of motion

III. Specific Factors Affecting Risk for Zygomatic Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Presence of compound or comminuted fracture
C. Degree of displacement
D. Presence of congenital maxillofacial deformity (eg, Crouzon syndrome)
E. Presence of paranasal sinus infection or disease
F. Presence of coexisting maxillofacial fractures

IV. Indicated Therapeutic Parameters for Zygomatic Injuries

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation, including consideration for ophthalmologic evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of zygomatic injuries are not listed in order of preference:

A. Observation based on limited severity of fracture, displacement, and mobility
B. Open reduction in cases of
    1. Fractured zygoma
    2. Fractured zygomatic arch
    3. Fractured orbital floor or lateral wall fractures
    4. Panfacial fractures may consider CT-guided navigation
C. Antimicrobials as indicated
D. Control of pain
E. Drains for management of dead spaces or contaminated wounds when judgment dictates
F. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Zygomatic Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

ZYGOMATIC INJURIES (continued)

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Osseous union
   3. Mandibular opening of at least 40 mm (less opening acceptable in children, commensurate with age and development)
   4. Mandibular excursions of at least 4 to 6 mm
   5. Normal ocular movements, globe position, and vision returned to premorbid state
   6. Normal speech, deglutition, and respiration
   7. Premorbid occlusion status

B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Nonunion
   3. Post-treatment facial deformity
      a. Skeletal deformity or malunion
      b. Deformity of facial soft tissue (eg, scarring, nasal asymmetry)
   4. Abnormal oral and maxillofacial function (may be influenced by premorbid condition)
      a. Mandibular opening of less than 35 mm (less opening acceptable in children, commensurate with age and development)
      b. Mandibular excursions of less than 4 to 6 mm
      c. Malocclusion and/or masticatory dysfunction
      d. Dysphagia and/or dysphonia
      e. Partial or complete respiratory obstruction
   5. Abnormal orbital form and eye function
   6. Chronic oroantral or oronasal communication

ORBITAL INJURIES

I. Indications for Therapy for Orbital Injuries

May include 1 or more of the following:

A. Physical evidence of orbital injury
B. Imaging evidence of orbital injury
C. Ocular dysfunction and/or abnormalities of the globe
D. Nasolacrimal dysfunction
E. Presence of foreign bodies
F. Subcutaneous emphysema
G. Motor and sensory nerve deficits
H. Presence of soft-tissue injuries
I. Entrapment of ocular muscles
J. Retrobulbar hematoma
K. Large defects
L. Enophthalmos
M. Hypoglobus
N. Dystopia

II. Specific Therapeutic Goals for Orbital Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

ORBITAL INJURIES (continued)

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Preservation of vision
C. Correction or prevention of enophthalmos/exophthalmos
D. Preservation of antral function
E. Correction or prevention of nasolacrimal duct dysfunction

III. Specific Factors Affecting Risk for Orbital Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Presence of globe injury
C. Presence of compound or comminuted fracture
D. Presence and degree of fracture displacement
E. Presence of congenital maxillofacial deformity (eg, Crouzon syndrome)
F. Presence of infection and/or pathology associated with fracture
G. Presence of paranasal sinus infection and/or disease
H. Presence of nasolacrimal apparatus infection and/or disease
I. Presence of coexisting middle and/or upper facial third fractures

IV. Indicated Therapeutic Parameters for Orbital Injuries

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation, including consideration for ophthalmologic evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of orbital injuries are not listed in order of preference:

A. Observation based on limited severity of fracture, displacement, and mobility
B. Open treatment (including endoscopically assisted and CT-guided navigation)
C. Orbital reconstruction
D. Medial and/or lateral canthopexy
E. Nasolacrimal reconstruction
F. Antimicrobials as indicated
G. Control of pain
H. Drains for management of dead spaces or contaminated wounds when judgment dictates
I. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Orbital Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
    2. Restored nasolacrimal function
    3. Restored ocular function (eg, vision, extraocular movements)
    4. Radiographic evaluation of placement/positioning of alloplastic and/or autogenous implants
B. Known risks and complications
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
    2. Postmanagement facial deformity
        a. Skeletal deformity or malunion
        b. Deformity of facial soft tissue (eg, scarring, nasal asymmetry)
    3. Abnormal orbital form
    4. Abnormal ocular function

ORBITAL INJURIES (continued)

5. Failure and/or extrusion of alloplastic implant
6. Asymmetric growth disturbances in children
7. Abnormal position of lower eyelid (eg, entropion, ectropion, scleral show)
8. Abnormal nasolacrimal apparatus function

NASAL BONE INJURIES

I. Indications for Therapy for Nasal Bone Injuries

May include 1 or more of the following:

A. Physical evidence of fractured nasal bones or septum as demonstrated by nasal speculum examination and/or endoscopy as indicated
B. Imaging evidence of fractured nasal bones or septum
C. Septal hematoma
D. Septal deviation
E. Nasal airway obstruction
F. Anosmia
G. Deficits of sensory and/or motor nerves
H. Presence of foreign bodies
I. Injuries to associated soft tissue
J. Periorbital ecchymosis
K. Subcutaneous emphysema
L. Nasolacrimal and/or nasofrontal apparatus dysfunction
M. Epistaxis

II. Specific Therapeutic Goals for Nasal Bone Injuries

The goal of therapy is to restore form and/or function. However, risk factors and known complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restoration of premorbid function of paranasal sinuses

III. Specific Factors Affecting Risk for Nasal Bone Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Epistaxis
C. Septal hematoma
D. Degree and displacement of fracture
E. Presence of multiple fractured segments or fracture comminution
F. Presence of a compound fracture
G. Soft-tissue stripping from cartilaginous or bony segments
H. Pre-existing paranasal infection or pathology
I. Damage to nasofrontal and/or nasolacrimal duct
J. Presence of cerebrospinal fluid leak
K. Presence of coexisting middle or upper-third facial bone fractures

IV. Indicated Therapeutic Parameters for Nasal Bone Injuries

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of nasal bone injuries are not listed in order of preference:

NASAL BONE INJURIES (continued)

A. Observation based on limited severity of fracture, displacement, and mobility
B. Closed reduction
   1. Displaced fractures
   2. Comminuted fractures
   3. Medical and/or anesthetic contraindication to open reduction
C. Open reduction
   1. Fractures that cannot be reduced by a closed method (eg, septal displacement, mechanical impaction of fragments)
   2. Avulsion of bony segment and/or overlying soft-tissue laceration
   3. Fractures requiring immediate bone grafting reconstruction
   4. Exposure to the nasal bones provided by surgical access to associated fractures
   5. Saddle nose deformity
   6. Airway obstruction
D. Antimicrobials as indicated
E. Control of pain
F. Drains for management of dead spaces or contaminated wounds when judgment dictates
G. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Nasal Bone Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Restored premorbid function of nose and paranasal sinuses
B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Nonunion
   3. Postmanagement facial deformity
      a. Skeletal deformity and/or malunion
      b. Deformity of facial soft and/or hard tissue (eg, nasal deformity, scarring, synechiae)
   4. Obstruction of nasal airway
   5. Paranasal sinus dysfunction

NASO-ORBITAL-ETHMOID COMPLEX INJURIES

I. Indications for Therapy for Naso-Orbital-Ethmoid Complex Injuries

May include 1 or more of the following:

A. Physical evidence of nasal, ethmoid, lacrimal, maxilla, and frontal sinus floor fractures
B. Imaging evidence of nasal, ethmoid, lacrimal, maxilla, and frontal sinus floor fractures
C. Epistaxis
D. Periorbital ecchymosis
E. Telecanthus
F. Cerebrospinal fluid rhinorrhea
G. Ocular dysfunction and/or abnormalities (eg, diplopia, dystopia, or enophthalmos)
H. Septal hematoma
I. Septal deviation
J. Nasal airway obstruction
K. Anosmia

NASO-ORBITAL-ETHMOID COMPLEX INJURIES (continued)

L. Deficits of sensory and/or motor nerves
M. Presence of foreign bodies
N. Injuries to associated soft tissue
O. Subcutaneous emphysema
P. Nasolacrimal and/or nasofrontal apparatus dysfunction
Q. Saddle nose deformity

II. Specific Therapeutic Goals for Naso-Orbital-Ethmoid Complex Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restoration of premorbid frontal sinus outflow tract function
C. Restoration of premorbid orbital form
D. Restoration of premorbid nasal airway
E. Restoration of premorbid extraocular function
F. Restoration of premorbid ocular function

III. Specific Factors Affecting Risk for Naso-Orbital-Ethmoid Complex Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Epistaxis
C. Ocular injury
D. Nasolacrimal duct injury
E. Frontal sinus outflow tract injury
F. Existing congenital craniofacial deformity (eg, hypertelorism)
G. Degree of telecanthus
H. Airway obstruction
I. Septal hematoma
J. Degree and displacement of fracture
K. Presence of multiple fractured segments or fracture comminution
L. Presence of a compound fracture
M. Soft-tissue stripping from cartilaginous or bony segments
N. Pre-existing paranasal infection or pathology
O. Presence of coexisting middle and upper-third facial fractures

IV Indicated Therapeutic Parameters for Naso-Orbital-Ethmoid Complex Injuries

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of naso-orbital-ethmoid complex injuries are not listed in order of preference:

A. Observation based on limited severity of fracture, displacement, and mobility
B. Closed reduction in cases of
    1. Displaced fractures
    2. Comminuted fractures
    3. Medical and/or anesthetic contraindication to open reduction
C. Open reduction in cases of
    1. Fractures that cannot be reduced by a closed method (eg, septal displacement, mechanical impaction of fragments)
    2. Avulsion of bony segment and/or overlying soft-tissue laceration

NASO-ORBITAL-ETHMOID COMPLEX INJURIES (continued)

3. Fractures requiring immediate bone grafting reconstruction
4. Exposure to the nasal, orbital, or ethmoid bones provided by surgical access to associated fractures
5. Telecanthus
6. Extraocular muscle entrapment
7. Altered orbital volume with ocular displacement

D. Canalicular repair of lacerations with stenting
E. Dacryocystotomy for avulsive canalicular injuries
F. Dacryocystorhinotomy for extensive soft and hard tissue disruption of the nasolacrimal apparatus
G. Reattachment or repair of disrupted canthal ligaments
H. Creation of a new frontal sinus outflow tract or drainage pathway in cases of grossly comminuted sinus floor injury
I. Antimicrobials as indicated
J. Control of pain
K. Drains for management of dead spaces or contaminated wounds when judgment dictates
L. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Naso-Orbital-Ethmoid Complex Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Restored premorbid nasal, ocular, extraocular, eyelid, nasolacrimal, and/or frontal sinus function
B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Nonunion
   3. Postmanagement facial deformity
      a. Skeletal deformity and/or malunion
      b. Deformity of facial soft and/or hard tissue (eg, nasal deformity, scarring, synechiae, persistent telecanthus, dystopia, enophthalmos, exophthalmos)
   4. Obstruction of nasal airway
   5. Paranasal sinus dysfunction and/or pathology
   6. Visual disturbances (eg, diplopia)
   7. Nasolacrimal dysfunction (eg, epiphora)
   8. Nasofrontal duct dysfunction
   9. Anosmia
   10. Epiphora

FRONTAL BONE AND FRONTAL SINUS INJURIES

I. Indications for Therapy for Frontal Bone and Frontal Sinus Injuries

May include 1 or more of the following:

A. Physical evidence of a supraorbital rim fracture
B. Physical evidence of a frontal sinus wall fracture
C. Physical evidence of a frontal bone fracture
D. Imaging evidence of a supraorbital rim fracture
E. Imaging evidence of a frontal sinus wall fracture
F. Imaging evidence of a frontal bone fracture
G. Deficits in sensation of the supraorbital nerve

FRONTAL BONE AND FRONTAL SINUS INJURIES (continued)

H. Proptosis, ptosis, or enophthalmos
I. Injuries to the overlying soft tissue
J. Presence of foreign bodies
K. Contour irregularities
L. Continuity defects
M. Cerebrospinal fluid rhinorrhea
N. Periorbital ecchymosis
O. Clinical or imaging evidence of associated fractures (eg, nasal, orbital, ethmoid)

II. Specific Therapeutic Goals for Frontal Bone and Frontal Sinus Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restoration of premorbid sinus physiologic function and/or prevention of frontal sinus pathology
C. Restoration of premorbid sensory function
D. Restoration of premorbid ocular function
E. Restoration of frontal sinus outflow tract function

III. Specific Factors Affecting Risk for Frontal Bone and Frontal Sinus Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Degree and displacement of fracture
C. Presence of multiple fractured segments or fracture comminution
D. Presence of a compound fracture
E. Pre-existing infection or pathology (eg, frontal sinusitis, mucocele)
F. Presence of coexisting or previous maxillofacial injury
G. Damage to frontal sinus outflow tract
H. Presence of cerebrospinal fluid leak
I. Presence of coexisting neurologic or ophthalmologic injury

IV. Indicated Therapeutic Parameters for Frontal Bone and Frontal Sinus Injuries

The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of frontal bone and frontal sinus injuries are not listed in order of preference:

A. Neurosurgical consultation in cases of
   1. Displaced frontal bone fractures
   2. Evidence of neurologic injury
   3. Displaced posterior table frontal sinus fractures
B. Observation in cases of
   1. Minimally or nondisplaced linear frontal bone fractures
   2. Minimally or nondisplaced supraorbital rim fractures
C. Observation, antibiotic therapy, and nasal decongestant in cases of minimally or nondisplaced anterior table frontal sinus fractures
D. Open reduction in cases of
   1. Displaced anterior table frontal sinus fractures
   2. Displaced anterior and posterior table frontal sinus fractures

FRONTAL BONE AND FRONTAL SINUS INJURIES (continued)

3. Fractures of the floor of the frontal sinus
4. Displaced supraorbital rim fractures

E. Open reduction with creation of a new nasofrontal duct in cases of
1. Grossly comminuted sinus floor injury
2. Grossly comminuted nasofrontal-ethmoidal injury

F. Sinus obliteration in cases of
1. Nasofrontal duct injuries that cannot be repaired
2. Minimally displaced posterior sinus wall injury with questionable nasofrontal duct function
3. Displaced or avulsed posterior sinus wall injury
4. Increased risk for sinusitis
5. Gross neurologic injury

G. Cranialization in cases of
1. Gross neurologic injury requiring decompression
2. Unrestorable (displaced) frontal sinus posterior table

H. Functional endoscopic sinus surgery in cases of
1. Isolated displaced frontal sinus outflow tract injury
2. Displaced frontal sinus outflow tract fracture with uncomplicated anterior/posterior wall injury
3. Minimally displaced posterior sinus wall injury with questionable nasofrontal duct function

I. Antimicrobials as indicated

J. Control of pain

K. Drains for management of dead spaces or contaminated wounds when judgment dictates

L. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Frontal Bone and Frontal Sinus Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
2. Restoration of sinus physiologic function and/or prevention of sinus pathology (eg, effective obliteration or cranialization)
3. Absence of mucocele or pyocele
4. Elimination of cerebrospinal fluid leak
5. Unchanged or improved vision

B. Known risks and complications
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
2. Neurologic injury (eg, concussion, coma, death)
3. Orbital injury (eg, diplopia, blindness)
4. Sensory deficit of the supraorbital nerve
5. Cerebrospinal fluid leak
6. Sinusitis, meningitis, cavernous sinus thrombosis, and osteomyelitis
7. Development of mucoceles and/or pyoceles
8. Headache
9. Contour deficits and irregularities
10. Deformity of the overlying facial soft tissue (eg, scarring)
11. Anosmia

ORAL/PERIORAL SOFT-TISSUE INJURIES

I. Indications for Therapy for Oral/Perioral Soft-Tissue Injuries

May include 1 or more of the following:

A. Physical evidence of abrasions, hematoma, lacerations, and/or avulsions
B. Penetrating wounds
C. Clinical and/or imaging evidence of foreign bodies
D. Vascular injuries
E. Compromised airway
F. Deficits of sensory and/or motor nerves
G. Injury to salivary glands
H. Burns (eg, thermal, chemical, and/or electrical)

II. Specific Therapeutic Goals for Oral/Perioral Soft-Tissue Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restoration of premorbid continuity of soft tissues
C. Restoration of premorbid soft-tissue quality (eg, pigmentation, texture, hair growth)
D. Minimal formation of scar tissue
E. Preservation and/or restoration of premorbid form and/or function of sensory and motor nerves
F. Preservation and/or restoration of premorbid form and/or function of salivary glands and ducts
G. Prevention of sialocele formation

III. Specific Factors Affecting Risk for Oral/Perioral Soft-Tissue Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Location, length, configuration, and direction of laceration
C. Presence of lacerations involving the salivary glands or ducts, cranial nerves and/or blood vessels, oral commissure, or vermilion border

IV. Indicated Therapeutic Parameters for Oral/Perioral Soft-Tissue Injuries

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of oral/perioral soft-tissue injuries are not listed in order of preference:

A. Management of airway obstruction
B. Control of hemorrhage
C. Debridement of soft tissue
D. Removal of foreign bodies
E. Management of vascular injuries
F. Nerve repair when appropriate (eg, facial nerve trunks proximal to vertical line from lateral canthus of the eye and when the age of patient is not a factor)
G. Repair of salivary gland and/or duct. Utilization of stents where indicated
H. Reconstruction of bony injuries to provide structural support of soft-tissue repairs
I. Reconstruction of avulsive wounds
J. Antimicrobials as indicated
K. Control of pain
L. Drains for management of dead spaces or contaminated wounds when judgment dictates
M. Instructions for post-treatment care and follow-up
N. Local, regional, and distant flaps when indicated

ORAL/PERIORAL SOFT-TISSUE INJURIES (continued)

V. Outcome Assessment Indices Oral/Perioral Soft-Tissue Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Restored soft-tissue pigmentation, texture, hair growth, speech, and deglutition
   3. Normal salivary gland

B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Wound breakdown
   3. Post-treatment deformity of facial soft tissue
   4. Poor soft-tissue quality (eg, pigmentation, texture, alopecia)
   5. Salivary gland dysfunction
   6. Hypertrophic scar or keloid formation

AURICLE INJURIES

I. Indications for Therapy for Auricle Injuries

May include 1 or more of the following:

A. Physical evidence of laceration
B. Physical evidence of hematoma
C. Physical evidence of partial or total avulsion
D. Physical evidence of abrasion
E. Deficits in sensory nerves
F. Presence of foreign bodies
G. Injuries to underlying cranial bones, external auditory canal, and/or tympanic membrane
H. Burns (eg, thermal, chemical, and/or electrical)

II. Specific Therapeutic Goals for Auricle Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Preservation of cartilage and skin
C. Control of hemorrhage
D. Limited hypertrophic scars
E. Limited scar contracture

III. Specific Factors Affecting Risk for Auricle Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Underlying cranial fractures
C. Location, length, configuration, and direction of laceration

AURICLE INJURIES (continued)

IV. Indicated Therapeutic Parameters for Auricle Injuries

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of traumatic injuries to the auricle are not listed in order of preference:

A. Wound cleansing, debridement, and control of hemorrhage in cases of abrasion
B. Wound cleansing, exploration, debridement, and repair in cases of simple lacerations
C. Hematoma evacuation
D. Split-thickness or full-thickness skin grafts in cases of skin avulsion with intact perichondrium
E. Wedge resection and primary closure in cases of minor (< 2.0 cm) partial avulsion of skin, perichondrium, and cartilage
F. Composite grafts or chondrocutaneous flaps in cases of major (> 2.0 cm) partial avulsion of skin, perichondrium, and cartilage
G. Pocket banking of tissue in cases of large avulsed segments
H. Microvascular reanastomosis of large or total avulsion of the auricle when available
I. Antimicrobials as indicated
J. Control of pain
K. Drains for management of dead spaces or contaminated wounds when judgment dictates
L. Instructions for post-treatment care and follow-up
M. Bolster support dressings when indicated
N. Stint the external ear canal when indicated

V. Outcome Assessment Indices for Auricle Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Preserved cartilage and cutaneous tissue
   3. Restored tissue pigmentation, texture, and contour
B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Necrosis of cartilage and skin
   3. Chondritis
   4. Hypertrophic scars (eg, children)
   5. Trap door deformities
   6. Scar contracture
   7. Subcutaneous atrophy
   8. Asymmetry
   9. Cauliflower ear

SCALP INJURIES

I. Indications for Therapy for Scalp Injuries

May include 1 or more of following:

A. Physical evidence of contusion and/or abrasion
B. Physical evidence of laceration and/or avulsion

SCALP INJURIES (continued)

C. Physical evidence of hemorrhage and/or hematoma
D. Deficits in sensory nerves
E. Presence of foreign bodies
F. Injuries to underlying cranial bones
G. Evidence of cranial contour deformities
H. Burns (eg, thermal, chemical, and/or electrical)

II. Specific Therapeutic Goals for Scalp Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Limited hypertrophic scars
C. Limited scar contracture
D. Limited alopecia

III. Specific Factors Affecting Risk for Scalp Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Underlying cranial fractures
C. Presence of closed head injury
D. Tissue that has been avulsed
E. Location, length, configuration, and direction of laceration

IV. Indicated Therapeutic Parameters for Scalp Injuries

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of scalp injuries are not listed in order of preference:

A. Wound cleansing, debridement, and control of hemorrhage in cases of abrasion
B. Wound cleansing, exploration, debridement, and suturing in cases of simple lacerations
C. Hematoma evacuation and pressure dressing or drain in cases of
    1. Hematomas
    2. Undermined soft tissues
D. Split-thickness skin grafts in cases of partial avulsion when periosteum remains
E. Potential use of dermal regeneration substitutes when exposed calvarium is present
F. Repair of partial or total avulsions with local or free tissue transfers
G. Antibiotic therapy in cases of contaminated wounds
H. Antimicrobials as indicated
I. Control of pain
J. Drains for management of dead spaces or contaminated wounds when judgment dictates
K. Instructions for post-treatment care and follow-up
L. Placement of tissue expander as indicated

V. Outcome Assessment Indices for Scalp Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
    2. Absence of hypertrophic or contracted scars

SCALP INJURIES (continued)

B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Necrosis of soft tissues
   3. Scar contracture
   4. Hypertrophic scars
   5. Alopecia
   6. Pigmentation changes
   7. Texture changes

PERIORBITAL SOFT-TISSUE INJURIES

I. Indications for Therapy for Periorbital Soft-Tissue Injuries

May include 1 or more of the following:

A. Physical evidence of abrasions, lacerations, and/or avulsions
B. Motor and/or sensory nerve deficits
C. Penetrating wounds (eg, interruption of tarsal plate)
D. Physical evidence of canthal ligament disruption
E. Burns (eg, thermal, chemical, and/or electrical)
F. Vascular injury
G. Injury to the lacrimal gland
H. Injury to the nasolacrimal apparatus
I. Clinical and/or imaging evidence of foreign bodies
J. Hematoma
K. Emphysema

II. Specific Therapeutic Goals for Periorbital Soft-Tissue Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restoration of continuity (eg, eyebrow, tarsal plate, orbital septum, canthal ligaments)
C. Restoration of premorbid soft-tissue quality (eg, pigmentation, texture, hair growth)
D. Minimal formation of scar tissue
E. Preservation and/or restoration of premorbid form and/or function of sensory and motor nerves
F. Preservation and/or restoration of premorbid form and/or function of lacrimal gland
G. Preservation and/or restoration of premorbid form and/or function of nasolacrimal apparatus

III. Specific Factors Affecting Risk for Periorbital Soft-Tissue Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Location, length, configuration, and direction of laceration
C. Presence of lacerations involving the lacrimal apparatus, globe, tarsal plates, canthal ligaments, cranial nerves, blood vessels, and/or muscles

IV. Indicated Therapeutic Parameters for Periorbital Soft-Tissue Injuries

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of periorbital soft-tissue injuries are not listed in order of preference:

PERIORBITAL SOFT-TISSUE INJURIES (continued)

A. Wound cleansing, debridement, and control of hemorrhage in cases of abrasion
B. Wound cleansing, exploration, debridement, and repair in cases of simple lacerations
C. Postseptal hematoma evacuation and control of active hemorrhage via lateral canthotomy
D. Split-thickness or full-thickness skin grafts in cases of skin avulsion with intact tarsal plates
E. Wedge resection and primary closure in cases of minor partial avulsion of lid
F. Reattachment, composite grafts, local or regional flaps, or free tissue transfer in cases of major partial or total avulsion of lid
G. Canalicular repair of lacerations with stenting
H. Dacryocystorhinostomy for avulsive canalicular injuries
I. Dacryocystorhinostomy for extensive soft and hard tissue disruption of the nasolacrimal apparatus
J. Reattachment or repair of disrupted canthal ligaments
K. Repair of eyebrow avulsion by free graft
L. Antimicrobials as indicated
M. Control of pain
N. Drains for management of dead spaces or contaminated wounds when judgment dictates
O. Instructions for post-treatment care and follow-up
P. Tarsorrhaphy or Frost Suture to prevent scar retraction when indicated

V. Outcome Assessment Indices for Periorbital Soft-Tissue Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Restored soft-tissue pigmentation, texture, and hair growth
   3. Normal lacrimal gland and nasolacrimal duct function
   4. Adequate function of eyelids
B. Known risks and complications
   1. Presence of a general known risk and/complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Wound breakdown
   3. Post-treatment deformity of facial soft tissue (eg, ptosis, ectropion, entropion, eyebrow malalignment, coloboma)
   4. Poor soft-tissue quality (eg, pigmentation, texture, alopecia)
   5. Ptosis
   6. Lacrimal gland dysfunction
   7. Nasolacrimal dysfunction (eg, epiphora)
   8. Chronic pain
   9. Hypertrophic scar or keloid formation

PERINASAL SOFT-TISSUE INJURIES

I. Indications for Therapy for Perinasal Soft-Tissue Injuries

May include 1 or more of the following:

A. Physical evidence of laceration
B. Physical evidence of hematoma
C. Physical evidence of partial or total avulsion
D. Physical evidence of abrasion
E. Deficits in sensory nerves
F. Presence of foreign bodies

PERINASAL SOFT-TISSUE INJURIES (continued)

G. Injuries to underlying nasal and other facial bones, nasal septum, and associated cartilaginous structures
H. Burns (eg, thermal, chemical, and/or electrical)

II. Specific Therapeutic Goals for Perinasal Soft-Tissue Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restoration of premorbid airway
C. Preservation of cartilage and skin
D. Limited hypertrophic scars
E. Limited scar contracture

III. Specific Factors Affecting Risk for Perinasal Soft-Tissue Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Underlying nasal, septal, and facial bone fractures
C. Location, length, configuration, and direction of laceration

IV. Indicated Therapeutic Parameters for Perinasal Soft-Tissue Injuries

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of perinasal soft-tissue injuries are not listed in order of preference.

A. Wound cleansing, debridement, and control of hemorrhage in cases of abrasion
B. Wound cleansing, exploration, debridement, and repair in cases of simple lacerations
C. Evacuation and application of a pressure dressing in cases of hematoma
D. Split-thickness or full-thickness skin grafts in cases of skin avulsion with intact perichondrium or mucosa
E. Local or composite grafts in cases of partial or total avulsion of skin, perichondrium, and cartilage
F. Pocket banking of cartilage in cases of large avulsed segments
G. Local and/or regional flaps when indicated
H. Microvascular tissue transfer of large or total avulsion of the nose when available
I. Antimicrobials as indicated
J. Control of pain
K. Drains for management of dead spaces or contaminated wounds when judgment dictates
L. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Perinasal Soft-Tissue Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
    2. Preserved cartilage and cutaneous tissue
    3. Restored tissue form and/or function (eg, pigmentation, texture, contour, and patent nasal airway)
B. Known risks and complications
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
    2. Necrosis of cartilage and skin (eg, nasal septal perforation)
    3. Chondritis
    4. Hypertrophic scars (eg, children)

PERINASAL SOFT-TISSUE INJURIES (continued)

5. Saddle nose deformities
6. Scar contracture
7. Synechiae
8. Subcutaneous atrophy
9. Asymmetry

FACIAL SOFT-TISSUE INJURIES

I. Indications for Therapy for Facial Soft-Tissue Injuries

May include 1 or more of the following:

A. Physical evidence of abrasions, lacerations, and/or avulsions
B. Motor and/or sensory nerve deficits
C. Penetrating wounds
D. Burns (eg, thermal, chemical, and/or electrical)
E. Compromised airway
F. Vascular injury
G. Injury to the salivary gland and/or duct
H. Clinical and/or imaging evidence of foreign bodies

II. Specific Therapeutic Goals for Facial Soft-Tissue Injuries

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restoration of premorbid soft-tissue quality (eg, pigmentation, texture, hair growth)
C. Minimal formation of scar tissue
D. Preservation and/or restoration of premorbid form and/or function of salivary glands and ducts
E. Preservation and/or restoration of premorbid form and/or function of nasolacrimal duct
F. Prevention of sialocele formation

III. Specific Factors Affecting Risk for Facial Soft-Tissue Injuries

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Location, length, configuration, and direction of laceration
C. Presence of coexisting or previous maxillofacial injuries
D. Presence of lacerations involving the salivary glands or ducts, cranial nerves, and/or blood vessels

IV. Indicated Therapeutic Parameters for Facial Soft-Tissue Injuries

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of facial soft-tissue injuries are not listed in order of preference:

A. Management of airway obstruction
B. Control of hemorrhage
C. Debridement of soft-tissue wounds
D. Removal of foreign bodies
E. Management of vascular injuries
F. Nerve repair when appropriate (eg, when facial nerve trunks are proximal to vertical line from lateral canthus of the eye and when patient age is not a factor)

FACIAL SOFT-TISSUE INJURIES (continued)

G. Repair of nasolacrimal apparatus
H. Repair of salivary gland apparatus
I. Surgical repair of soft tissue
J. Reconstruction of avulsive wounds, including use of local or regional flaps and/or free tissue transfer of tissue
K. Antimicrobials as indicated
L. Control of pain
M. Drains for management of dead spaces or contaminated wounds when judgment dictates
N. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices Facial Soft-Tissue Injuries

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Restored soft-tissue pigmentation, texture, and hair growth
   3. Normal salivary gland and nasolacrimal duct function
B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Wound breakdown
   3. Post-treatment deformity of facial soft tissue
   4. Poor soft-tissue quality (eg, pigmentation, texture, alopecia)
   5. Salivary gland dysfunction
   6. Nasolacrimal dysfunction
   7. Chronic pain
   8. History of hypertrophic scars or keloid formation

UPPER AIRWAY OBSTRUCTION

I. Indications for Therapy for Upper Airway Obstruction

May include 1 or more of the following:

A. Physical findings of airway obstruction or potential obstruction
B. Laryngeal fractures
C. Inability to handle secretions

II. Specific Therapeutic Goals for Upper Airway Obstruction

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Restored premorbid airway
C. Restored premorbid ventilation and tissue perfusion
D. Absence of foreign bodies

III. Specific Factors Affecting Risk for Upper Airway Obstruction

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Presence of laryngeal and/or bronchial injury

UPPER AIRWAY OBSTRUCTION (continued)

C. Presence of oral, nasal, or pharyngeal soft-tissue injuries
D. Presence of cervical spine injuries
E. Presence of coexisting or previous maxillofacial injuries
F. Comminuted panfacial fractures or flail mandibular fractures

IV. Indicated Therapeutic Parameters for Upper Airway Obstruction

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of upper airway obstruction are not listed in order of preference:

A. Emergency short-term airway management
   1. Suctioning
   2. Removal of foreign bodies
   3. Repositioning of jaw (eg, jaw thrust)
   4. Nasopharyngeal or oral airway
   5. Intubation
   6. Use of capnography when indicated
B. Surgical airway management
   1. Cricothyroidotomy
      a. Emergency surgical airway management
      b. Elective surgical airway management
   2. Tracheostomy
      a. Emergency surgical airway management
      b. Elective surgical airway management
C. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices Upper Airway Obstruction

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Adequate airway, ventilation, and tissue perfusion
   3. Absence of pulmonary complications (eg, pneumothorax, infection)
   4. Absence of neurologic deficit
   5. Stable airway
B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Inadequate airway, ventilation, or tissue perfusion
   3. Pulmonary complications (eg, pneumothorax, infection)
   4. Unstable airway
   5. Exsanguinating hemorrhage
   6. Vocal cord paralysis

ADVANCED IMAGING TECHNIQUES AND INTRAOPERATIVE COMPUTERIZED TECHNOLOGY

I. Indications for Therapy for Use of Advanced Imaging Techniques and Intraoperative Computerized Technology

May include 1 or more of the following and may be subject to regional and local availability:

ADVANCED IMAGING TECHNIQUES AND INTRAOPERATIVE COMPUTERIZED TECHNOLOGY (continued)

A. Availability of advanced imaging techniques and intraoperative computerized technology
B. Physical evidence of fracture
C. Imaging evidence of fracture
D. Mandibular dysfunction
E. Ocular dysfunction and/or abnormalities
F. Significant orbital floor or lateral wall fractures as identified clinically or radiographically
G. Facial deformity
H. Multiple facial fractures (panfacial fractures)
I. Severely displaced fractures
J. Severe comminution of fractures
K. Ballistic injury with hard and soft tissue displacement
L. High energy wound with hard and soft tissue displacement

II. Specific Therapeutic Goals for Use of Advanced Imaging Techniques and Intraoperative Computerized Technology

The goal of therapy is to restore form and/or function. However, risk factors and known complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Anatomic reconstruction of the craniomaxillofacial skeleton
C. Restoration of premorbid ocular function
D. Correction or prevention of enophthalmos/exophthalmos
E. Restoration of premorbid antral function
F. Restoration of mandibular range of motion
G. Restoration of facial width, height, and projection
H. Restoration of premorbid occlusal relationship

III. Specific Factors Affecting Risk for Use of Advanced Imaging Techniques and Intraoperative Computerized Technology

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Increased radiation exposure to patient and surgical staff

IV. Indicated Therapeutic Parameters Use of Advanced Imaging Techniques and Intraoperative Computerized Technology

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the use of advanced imaging and intraoperative computerized technology are not listed in order of preference:

A. Clinical observation based on severity of fracture displacement, comminution, and mobility
B. Intraoperative verification of anatomic reconstruction of craniomaxillofacial skeleton
C. Intraoperative verification of placement of surgical implants

V. Outcome Assessment Indices for Use of Advanced Imaging Techniques and Intraoperative Computerized Technology

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

ADVANCED IMAGING TECHNIQUES AND INTRAOPERATIVE COMPUTERIZED TECHNOLOGY (continued)

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Restoration of premorbid craniomaxillofacial width, height, and projection
   3. Mucosal healing over and/or around bony and dento-osseous segments
   4. Osseous union
   5. Normal speech, deglutition, and respiration
   6. Restored premorbid occlusion
   7. Restored sinus function
   8. Restored ocular function
   9. Restored nasal function
   10. Anatomic reconstruction of craniomaxillofacial skeleton
   11. Proper anatomic positioning of surgical implants (custom and/or stock)

B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Nonunion
   3. Postmanagement facial deformity
      a. Skeletal deformity or malunion
      b. Deformity of facial hard and/or soft tissue (eg, nasal and/or orbital deformity)
      c. Loss of bone and/or dento-osseous segment
   4. Abnormal oral and maxillofacial function (may be influenced by premorbid condition)
      a. Nonunion
      b. Post-traumatic facial deformity
         i. Skeletal deformity or malunion
      c. Malocclusion and/or masticatory dysfunction
      d. Mandibular opening less than 35 mm (less opening acceptable in children, commensurate with age and development)
      e. Mandibular exursions less than 4 to 6 mm
      f. Dysphagia and/or dysphonia
      g. Chronic oroantral or oronasal communication
      h. Abnormal orbital form and eye function
      i. Altered ocular function including restriction of gaze
      j. Chronic sinus pathology
      k. Anosmia
      l. Partial or complete respiratory obstruction
      m. Blindness
      n. Enophthalmos
      o. Hypoglobus
      p. Dystopia
      q. Entropion
      r. Ectropion
      s. Epiphora
      t. Cerebrospinal fluid otorrhea/rhinorrhea
   5. Loss of tooth and/or teeth vitality
   6. Loss of tooth and/or teeth or bony structure

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This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation of this document. Citation of the reference material is not meant to imply endorsement of any statement contained in the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

TEMPOROMANDIBULAR JOINT SURGERY

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023,* WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

Temporomandibular joint (TMJ) surgery is indicated for the treatment of a wide range of pathologic conditions, including developmental and acquired deformities, internal derangements, arthritis, functional abnormalities, ankylosis, and infection. Parameters of care related to management of tumors of the TMJ are in the *Diagnosis and Management of Pathological Conditions* chapter, and those for fractures of the mandibular condyle are in the *Trauma Surgery* chapter.

It is recognized that many patients undergoing TMJ surgeries have unique pain control requirements. As such, it may be appropriate to discuss a specific plan for postoperative pain control management. Such therapy might include the surgeon managing the patient's pain with opioid medications for a specified period, followed by referral to dedicated pain management.

The parameters for TMJ surgery are based on the descriptions of pathologic entities and modalities for their treatment that have appeared in peer-reviewed medical literature. This field has undergone a considerable evolution during the past 15 to 20 years. Basic and clinical research is continuing to increase the potential for successful surgical results.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR TMJ SURGERY

INFORMED CONSENT: All surgery must be preceded by the patient's or legal guardian's consent unless an emergent situation dictates otherwise. Emergent circumstances and the indications for treatment should be documented in the patient's record. Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the expected recovery period, alternative treatment options (including no treatment), and any patient or procedure specific factors that may affect the risk. The results of the informed consent process must be documented in the patient medical record. In general, an informed consent document is signed by the patient or guardian, but the OMS is well advised to document in the medical record that the informed consent process occurred, and that the patient/guardian provided both verbal and written consent that they understand and are willing to proceed with treatment.

PERIOPERATIVE ANTIBIOTIC THERAPY: The administration or prescribing of antibiotics may not be needed for otherwise healthy patient and thus the decision to employ prophylactic perioperative antibiotics is at the sole discretion of the treating surgeon and should be based on the patient's clinical condition as well as other comorbidities which may be present.

DEALING WITH NEUROLOGIC DEFICITS: Injuries to the terminal branches of the trigeminal nerve (eg, lingual, inferior alveolar, long buccal nerves), as well as the facial nerve, are known risks of oral and maxillofacial surgery. It should be noted that the presence of a pathologic craniomaxillofacial condition, dentoskeletal or craniofacial abnormality, or traumatic craniomaxillofacial injury may result in nerve injury prior to surgical management. In addition, the use of local anesthesia (eg, mandibular block) may increase the risk of nerve injury. Most nerve injuries resolve spontaneously, but some do not, and these may require consideration for nonsurgical and/or surgical intervention. Microneurosurgical repair should be considered when the disability is of concern to the patient, and there is clinical evidence of moderate, severe, or complete neurosensory impairment of various areas of the orofacial region (eg, lips, chin, tongue); paresis or paralysis of facial muscles; loss, decreased, or abnormal taste sensation; or neuropathic pain of peripheral origin or if the progression of spontaneous nerve recovery halts. Surgical repair should incorporate specialized microsurgical techniques (eg, operating magnification, nerve grafting) when indicated. Also see the *Reconstructive Surgery* chapter.

USE OF IMAGING MODALITIES: Imaging modalities may include panoramic radiograph, periapical and/or occlusal radiographs, maxillary and/or mandibular radiographs, computed tomography (CT), cone beam CT, positron emission tomography, positron emission tomography/ CT, radionucleotide imaging, and magnetic resonance imaging. In determining studies to be performed for imaging purposes, principles of as low as reasonably achievable (ALARA) should be followed.

USE OF ALLOPLASTIC MATERIALS: Partial or complete reconstruction of the TMJ may be accomplished using a wide variety of autogenous tissues, xenografts, or alloplastic implants. When alloplastic materials are used, they should be employed following the manufacturer's instructions and consistent with indications approved by the US Food and Drug Administration. When a treating surgeon elects to use an alloplastic material outside these approved indications, he/she should base the decision on applicable scientific principles and available medical knowledge and should document these considerations in the patient's record. Additionally, only the use of Food and Drug Administration approved devices is recommended.

DOCUMENTATION: *AAOMS ParCare 2023* includes documentation of objective findings, diagnoses, and patient management interventions. *The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon in light of the circumstances presented by each patient. Understandably, there may be sound clinical reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well advised to note in the patient's record the reason for the procedure followed. Moreover, it should be understood that adherence to the parameters does not guarantee a favorable outcome.*

GENERAL THERAPEUTIC GOALS FOR TMJ SURGERY:

A. Improve function and form
B. Limited period of disability
C. Improved range of jaw motion
D. Appropriate understanding by the patient (family) of the treatment options and acceptance of the treatment plan
E. Appropriate understanding and acceptance by the patient (family) of potential outcomes and known risks and complications
F. Reduction in pain
G. Improved quality of life

GENERAL FACTORS AFFECTING RELATIVE RISK DURING TMJ SURGERY:

A. Degree of patient and/or family understanding of the origin and natural course of the condition or disorder and therapeutic goals and acceptance of the proposed treatment
B. Presence of coexisting major systemic disease (eg, disease that increases a patient's American Society of Anesthesiologists classification to II, III, or IV as detailed in the *Patient Assessment* chapter)
C. Age of the patient
D. Presence of concomitant facial pain (eg, dental pain, earache, and headache)
E. Presence of parafunctional habits
F. Existing drug or alcohol dependence
G. Issues of secondary gain (eg, pending litigation)
H. Chronic pain disorders (eg, pain exceeding 3 months duration)
I. Presence of malocclusion
J. Presence of deformity or pathology of the TMJ
K. Presence of concomitant skeletal deformity
L. History of previous orthodontics, orthognathic surgery, or TMJ surgery
M. History of sensory or motor nerve abnormality (eg, temporary or permanent)
N. History of infection of surgical site
O. Presence of local or systemic conditions that may interfere with the normal healing process and subsequent tissue homeostasis (eg, previously irradiated tissue, diabetes mellitus, chronic renal disease, liver disease, blood disorder, pregnancy, steroid therapy, contraceptive medication, immunosuppression, malnutrition, Ehlers-Danlos syndrome, connective tissue disorders, and fibromyalgia)
P. Prolonged period of TMJ disuse (eg, ankylosis)
Q. History of maxillofacial trauma

GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR TMJ SURGERY:

A. Improved masticatory function and facial form
B. A level of pain that is of minimal or no concern to the patient and preferably measured objectively (eg, visual analog scale)
C. Improved mandibular function that is compatible with mastication, deglutition, speech, and oral hygiene
D. A stable occlusion
E. Limited period of disability
F. Limit further morbidity
G. Patient (family) acceptance of procedure and understanding of outcomes
H. Improved quality of life

GENERAL KNOWN RISKS AND COMPLICATIONS OF TMJ SURGERY:

A. Unplanned admission to intensive care unit after elective surgery
B. Unplanned intubation for longer than 12 hours after surgery

C. Reintubation or tracheostomy after surgery
D. Emergency tracheostomy (eg, ankylosis, trismus, and unable to maintain airway)
E. Use of parenteral drugs and/or fluids for longer than 72 hours after elective surgery
F. Failure to ambulate within 48 hours of elective surgery
G. Facial and/or trigeminal nerve dysfunction after surgery (eg, temporary or permanent facial muscle weakness resulting from surgery). The most common resulting problems are an inability to wrinkle the brow, raise the eyebrow, or gain tight closure of the eyelids and numbness (temporary or permanent) of certain areas of the skin in the region of the joint and sometimes in more remote areas of the face and scalp
H. Facial fracture during or after surgery
I. Need for unplanned exploratory procedures associated with surgery
J. Dental injury during surgery
K. Ocular injury during surgery and postoperative sequelae (eg, corneal abrasion, keratoconjunctivitis, and blindness)
L. Repeat oral and/or maxillofacial surgery
M. Core temperature of greater than 101 °F 72 hours after elective surgery
N. Postsurgical radiograph indicating presence of foreign body
O. Unplanned transfusion(s) of blood or blood components during or after surgery
P. Readmission for complications or incomplete management of problems on previous hospitalization
Q. Development of chronic pain disorder
R. Increased and/or persistent pain
S. Postoperative development of adhesions, heterotopic bone (reactive bone), or ankylosis within the joint space, which may cause continued jaw dysfunction, decreased range of jaw movement, difficulty chewing, and pain requiring further treatment
T. Development of TMJ internal derangement
U. New or worsened malocclusion
V. Imaging evidence of further degenerative joint changes and development of adhesions (scar tissue), joint arthritis (contralateral joint in unilateral cases), or osteomyelitis of the jaw (bone infection)
W. Significant joint noise with or without increased pain and/or dysfunction
X. Ear pain and/or dysfunction
Y. Development or worsening of a parafunctional habit
Z. Abnormal mandibular growth (eg, excessive and restricted)
AA. Prolonged period of disability
BB. Infection
CC. Development of complex regional pain syndrome
DD. Foreign body reaction or allergic reaction and rejection of the implant, wear, displacement, breakage, or loosening of alloplastic device components
EE. Ear problems, including inflammation of the canal, middle or inner ear infections, perforation of the ear drum, temporary or permanent hearing loss, ringing in the ears, or equilibrium problems
FF. Perforation of the middle cranial fossa resulting in extradural hematoma, subdural hematoma, cerebral injury, and the need for neurosurgical intervention
GG. Postoperative and/or future treatments are not limited to but may include the following: physical therapy, bite splint therapy, restorative or reconstructive dentistry, orthodontia, orthognathic surgery (jaw repositioning surgery), and further reconstructive TMJ surgery
HH. Respiratory and/or cardiac arrest
II. Death

SPECIAL CONSIDERATIONS FOR PEDIATRIC TMJ SURGERY

Orofacial pain due to TMJ conditions are less common in young children compared with teenagers and adults. Internal derangements are uncommon. TMJ conditions other than congenital deformities (eg, hemifacial microsomia) or acquired anatomical abnormalities (eg, fractures, bony ankylosis, and idiopathic condylar resorption) are also uncommon in children. When painful TMJ conditions occur, underlying psychopathologic factors are more frequent.

Informed consent issues specific to children as discussed in the *Patient Assessment* chapter are applicable for TMJ surgery.

Imaging is frequently required to assess and treat pediatric patients. Every effort to minimize the frequency and complexity of imaging studies should be employed to reduce radiation exposure. Whenever possible, contrast should

be avoided unless clinically indicated to further reduce risks associated with the use of contrast. Gadolinium is safe for nearly all populations, with a relatively rare risk of serious effects.

Masticatory muscle hyperactivity in children may present as nighttime grinding or bruxism, and this is common in the deciduous or mixed dentition stages of dental development. Children may complain of headaches, earaches, or jaw stiffness in the morning on awakening. Usually this can be managed with a night guard and/or biofeedback and appropriate medications, when indicated. Symptomatic clicking generally can be eliminated or diminished with midline hinge axis opening exercises to overcome an abnormal opening pattern. The origin of headache in the pediatric patient is primarily related to the sinus, eye, vascular system, or cervicalgia rather than TMJ.

Any operative procedure on the TMJ of a growing child must consider the ultimate effect of the treatment on growth and development of the mandible and face. Management of ankylosis, juvenile idiopathic arthritis (JIA), degenerative joint disease, infectious arthritis, mandibular dislocation, and condylar resorption is similar in children and adults. JIA is the most common joint disease in childhood and is currently classified according to the International League of Associations for Rheumatology. Involvement of the TMJ in JIA varies significantly in the literature and has been estimated to affect up to 87% depending on the JIA category investigated and the clinical measure and/or radiological method used to assess TMJ involvement JIA-TMJ can be present at diagnosis or may develop during the course of the disease. The TMJ may also be the first joint affected.

These children require frequent monitoring and occasional imaging (magnetic resonance imaging [MRI] with gadolinium contrast) to manage their disease. Medical management can include systemic medications such as nonsteroidal anti-inflammatory drugs (NSAIDs), disease-modifying anti-rheumatoid drugs (eg, methotrexate), or biologics (eg, adalimumab [Humira®]). Steroid injections may be required for treatment or for periodic management of exacerbations of disease activity to augment their medical management but they should be used with caution in growing patients. Occasionally surgery is required to debride or reconstruct joints destroyed by JIA. The goal of reconstructing the TMJ and ramus-condyle unit in children includes the restoration of normal functioning anatomy. This is true regardless of the underlying condition (eg, tumor, traumatic defect, and developmental defect). Therefore, autogenous reconstruction (eg, costochondral grafts) or alloplastic reconstruction (TMJ TJR) should be considered when the benefit of improving hypomobility outweighs the risk of asymmetric growth with the knowledge that additional surgical procedures may be necessary.

MASTICATORY MUSCLE DISORDERS

Masticatory muscle disorders can result in myofascial pain and/or muscle splinting. These disorders are the most common expression of temporomandibular disorders and may occur in combination with joint abnormalities or other pathologic conditions. Management of these disorders is nonsurgical, especially in children. When masticatory muscle disorders occur in combination with joint abnormalities or other pathologic conditions, the management of these disorders must be incorporated into the overall treatment plan. Pretreatment therapeutic goals are determined individually for each patient.

I. Indications for Therapy for Masticatory Muscle Disorders

May include 1 or more of the following:

A. Extra-articular pain related to muscles of the head and neck region
B. Earaches, headaches, masticatory, or facial myalgias
C. Restricted masticatory function
D. Restricted range of jaw motion
E. Associated TMJ abnormalities or pathology
F. Presence of sleep bruxism

II. Specific Therapeutic Goals For Masticatory Muscle Disorders

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
B. Improved jaw range of motion and/or function
C. Adequate control of pain in muscles of the head and neck region

III. Specific Factors Affecting Risk for Masticatory Muscle Disorders

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery

MASTICATORY MUSCLE DISORDERS (continued)

B. History of previous maxillofacial trauma
C. Developmental or acquired neuromuscular disorders

IV. Indicated Therapeutic Parameters For Masticatory Muscle Disorders

Some reduction in symptoms is expected within 3 months. If the symptoms persist or escalate during this period, further assessment of contributing etiologic and risk factors should be considered.

A. The pretreatment assessment includes, at a minimum:
   1. General history and physical examination, as detailed in the *Patient Assessment* chapter
   2. A focused history and physical examination of the TMJ region to determine if pathology is present
   3. An imaging examination, if indicated, based on the history and physical findings. The examination may include but is not limited to the following: screening panoramic radiography, cephalometric radiography, conventional tomography, CT, cone beam CT, radionuclide scanning, and MRI.

The following procedures for the management of masticatory muscle disorders are not listed in order of preference:

B. Nonsurgical Management
   1. Patient education (eg, stress reduction, dietary recommendations, jaw rest, and control of parafunctional jaw habits)
   2. Medication (eg, NSAIDs, analgesics, muscle relaxants, tricyclic antidepressants, and anticonvulsants)
   3. Physical medicine (eg, physical therapy, massage, heat, cold, ultrasonography, trigger point injections, neuromuscular blocking agents, dry needling, and low-level laser therapy)
   4. Botulinum toxin
   5. Behavioral modification (eg, stress reduction, work modification, counseling, biofeedback, and psychotherapy)
   6. Orthopedic appliances (eg, splints)
   7. Management of dental abnormalities
   8. Instructions for posttreatment care and follow-up
   9. Treatment of referred pain (eg, cervical pain)

V. Outcome Assessment Indices For Masticatory Muscle Disorders

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes

   General favorable therapeutic outcomes, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery

B. Known risks and complications associated with therapy

   Presence of a general known risk and/or complication, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery

INTRA-ARTICULAR PAIN AND DYSFUNCTION

Surgical intervention for intra-articular pain and dysfunction is indicated only when nonsurgical therapy has been ineffective and pain and/or dysfunction are moderate to severe. Surgery is not indicated for asymptomatic or minimally symptomatic patients. Surgery also is not indicated for preventive reasons in patients without pain and with satisfactory function. Pretreatment therapeutic goals are determined individually for each patient.

I. Indications For Therapy For Intra-Articular Pain And Dysfunction

May include 1 or more of the following:

A. Moderate-to-severe pain
   1. Temporomandibular pain
   2. Preauricular pain

INTRA-ARTICULAR PAIN AND DYSFUNCTION (continued)

3. Referred pain (eg, earaches)
4. Masticatory muscle pain (see masticatory muscle disorders section)

B. Dysfunction that is disabling and characterized by any of the following:
1. Restricted jaw range of motion (eg, locking of the joint: acute, chronic, intermittent, and persistent)
2. Excessive jaw range of motion (eg, hypermobility; chronic dislocation: acute, chronic, intermittent, and persistent)
3. Joint noises (eg, clicking, popping, and crepitation) associated with pain
4. Abnormal masticatory function (eg, painful chewing)

C. Imaging evidence of intra-articular pathology
D. Arthroscopic evidence of intra-articular pathology
E. Need for orthognathic surgery

II. Specific Therapeutic Goals For Intra-Articular Pain And Dysfunction

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
B. Improved function
C. Reduce pain in the joint
D. Elimination or reduction of noise in the joint

III. Specific Factors Affecting Risk For Intra-Articular Pain And Dysfunction

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for TMJ Surgery
B. Presence of a failed alloplastic or autograft
C. History of previous temporomandibular operative procedures
D. History of previous maxillofacial trauma
E. History of orthognathic surgery
F. Prior exposure to radiation in the TMJ area

IV. Indicated Therapeutic Parameters For Intra-Articular Pain And Dysfunction

A. The pretreatment assessment includes, at a minimum:
1. General history and physical examination, as detailed in the *Patient Assessment* chapter
2. A focused history and physical examination of the TMJ region to determine the presence of indications for care and to identify factors affecting risks
3. An imaging examination, if indicated, based on the history and physical findings. The examination may include but is not limited to the following: panoramic radiography, cephalometric radiography, conventional tomography, CT, cone beam CT, radionuclide scanning, and/or MRI

The following procedures for the management of intra-articular pain and dysfunction are not listed in order of preference:

B. Nonsurgical management
1. Patient education (eg, stress reduction, dietary recommendations, and jaw rest)
2. Medication (eg, NSAIDs, analgesics, and muscle relaxants)
3. Physical medicine (eg, physical therapy, massage, heat, cold, ultrasonography, and trigger point injections)
4. Intracapsular diagnostic and therapeutic injections
5. Behavioral modification (eg, stress reduction, work modification, counseling, biofeedback, and psychotherapy)
6. Orthopedic appliances (eg, splints)
7. Management of dental abnormalities
8. Diagnostic records to determine progression of the disease (eg, serial bite registration and models, and imaging studies in selected cases)

INTRA-ARTICULAR PAIN AND DYSFUNCTION (continued)

C. Surgical management
   1. Examination and observation under anesthesia
   2. Manipulation
   3. Arthrocentesis
   4. Arthroscopic surgery
   5. Arthrotomy or arthroplasty
      a. Disk repair procedures
      b. Diskectomy without replacement
      c. Diskectomy with replacement
   6. Alloplastic total joint replacement (prosthetic device)
   7. Autogenous reconstruction (eg, costochondral grafts)
   8. Modified condylotomy
   9. Orthognathic surgery as an adjunct to the management of TMJ disorders
   10. Correction of skeletal jaw deformities may be indicated before or after definitive joint treatment

D. Posttreatment management
   1. Wound care
   2. Physical therapy
   3. Pain management
   4. Diet and oral hygiene management
   5. Orthotic appliance
   6. Patient reassessment
   7. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices For Intra-Articular Pain And Dysfunction

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
   2. Improved mandibular function
   3. Acceptable clinical appearance (eg, absence of motor deficits, absence of hypertrophic scar formation, absence of facial asymmetry, or deformity)
   4. Improved quality of life
   5. A reduction in pain

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
   2. Removal of autograft or alloplastic implant
   3. Ankylosis
   4. Need for additional surgical intervention
   5. Development of neuropathic pain

INFLAMMATORY ARTHROPATHY

Inflammatory arthropathy encompasses several high inflammatory systemic autoimmune diseases that may affect the TMJ. In many cases, these conditions should be managed with the close cooperation of the patient's physician and/or rheumatologist.

It is important to distinguish whether the condylar resorption is active (progressive) or stable (nonprogressive). In its most severe form, inflammatory arthropathy may result in ankylosis and/or condylar destruction with resultant mandibular retrognathism, anterior skeletal open bite, and painful limitation of function.

Surgical intervention for arthritic conditions is indicated only when nonsurgical therapy has been ineffective and pain and/or dysfunction are moderate to severe. Surgery is not indicated for asymptomatic or minimally symptomatic patients

INFLAMMATORY ARTHROPATHY (continued)

except to correct a dentofacial deformity that requires TMJ reconstruction. Surgery also is not indicated for preventive reasons in patients without pain and with satisfactory function. Pretreatment therapeutic goals are determined individually for each patient.

I. Indications For Therapy For Inflammatory Arthropathy

May include 1 or more of the following:

A. Moderate-to-severe pain
   1. Temporomandibular pain
   2. Preauricular pain
   3. Referred pain (eg, earaches)
   4. Masticatory muscle pain (see masticatory muscle disorders section)

B. Dysfunction that is disabling and characterized by any of the following:
   1. Restricted jaw range of motion (eg, locking of the joint: acute, chronic, intermittent, and persistent)
   2. Excessive range of jaw motion (eg, hypermobility, chronic dislocation: acute, chronic, intermittent, and persistent)
   3. Joint noises (eg, clicking, popping, and crepitation)
   4. Abnormal masticatory function (eg, painful chewing and malocclusion)
   5. Joint swelling and/or effusion

C. Imaging evidence of arthritic process

D. Maxillofacial deformity

II. Specific Therapeutic Goals For Inflammatory Arthropathy

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery

B. Improved quality of life

C. Limited pain in the joint

D. Improved function

E. Corrected or improved associated maxillofacial relationship

F. Limited progression of the disease

III. Specific Factors Affecting Risk For Inflammatory Arthropathy

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery

B. Active process of resorption

C. Ankylosis

D. Presence of failed alloplast or autograft

E. Systemic disease affecting other joints

F. Prior exposure to radiation in the TMJ area

IV. Indicated Therapeutic Parameters For Inflammatory Arthropathy

A. The pretreatment assessment includes, at a minimum:
   1. General history and physical examination, as detailed in the *Patient Assessment* chapter
   2. Focused history and physical examination of the TMJ region to determine the presence of indications for care for inflammatory arthropathy and to identify factors affecting risks
   3. Appropriate laboratory studies to confirm the diagnosis(eg, antinuclear antibody, sedimentation rate, CRP, rheumatoid factor, anticyclic citrullinated peptide, SSA, SSB, DS-DNA etc.)
   4. An imaging examination, if indicated, based on the history and physical findings. The examination may include but is not limited to the following: panoramic radiography, cephalometric radiography, conventional tomography, CT, cone beam CT, radionuclide scanning, and/or MRI

INFLAMMATORY ARTHROPATHY (continued)

5. Appropriate diagnostic records to determine progression of the disease (eg, serial bite registration and models, imaging studies, and laboratory studies)

The following procedures for the management of inflammatory are not listed in order of preference:

B. Nonsurgical management
   1. Patient education (eg, stress reduction, dietary recommendations, and jaw rest)
   2. Medication (eg, NSAIDs, analgesics, muscle relaxants, and antiarthritics, steroids)
   3. Physical medicine (eg, physical therapy, massage, heat, cold, ultrasonography, and trigger point injections)
   4. Intracapsular diagnostic and therapeutic injections
   5. Behavioral modification (eg, stress reduction, work modification, counseling, biofeedback, and psychotherapy)
   6. Orthopedic appliances (eg, splints)
   7. Management of dental abnormalities
   8. Appropriate diagnostic records to determine progression of the disease (eg, serial bite registration and models, and imaging studies in selected cases)

C. Surgical management

The activity of the systemic disease must be considered prior to surgical management of the TMJ.

   1. Active (progressive) TMJ disease
      a. Examination and observation under anesthesia
      b. Manipulation
      c. Arthrocentesis
      d. Arthroscopic surgery
      e. Biopsy
      f. Arthroplasty
      g. Total alloplastic or autogenous graft joint replacement
      h. Modified condylotomy
   2. Stable (nonprogressive) TMJ disease
      a. Examination and observation under anesthesia
      b. Manipulation
      c. Arthrocentesis
      d. Arthroscopic surgery
      e. Biopsy
      f. Arthroplasty
      g. Total alloplastic or autogenous graft joint replacement
      h. Orthognathic surgery
      i. Modified condylotomy

D. Posttreatment management
   1. Wound care
   2. Pain management
   3. Diet and oral hygiene management
   4. Physical therapy
   5. Ongoing rheumatologic management
   6. Occlusal management
   7. Patient reassessment
   8. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices for Inflammatory Arthropathy

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery

INFLAMMATORY ARTHROPATHY (continued)

2. Acceptable clinical appearance (eg, absence of motor deficits, absence of hypertrophic scar formation, absence of facial asymmetry, or deformity)
3. Improved mandibular function (eg, maximum incisal opening, lateral, and protrusive excursions)

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
2. Removal of autograft or alloplast
3. Ankylosis

REACTIVE ARTHRITIS

The management of reactive arthritis depends on whether the condition is acute or chronic and primary or secondary. Treatment objectives are directed toward the elimination of causes.

Surgical intervention for reactive arthritis is indicated only when nonsurgical therapy has been ineffective and pain and/or dysfunction are moderate to severe. Pretreatment therapeutic goals are determined individually for each patient.

I. Indications For Therapy For Reactive Arthritis

May include 1 or more of the following:

A. Evidence of localized or systemic infection
B. Moderate-to-severe pain
1. Temporomandibular pain
2. Preauricular pain
3. Referred pain (eg, earaches)
4. Masticatory muscle pain (see masticatory muscle disorders section)

C. Dysfunction that is disabling and characterized by any of the following:
1. Restricted jaw range of motion (eg, hypomobility: acute, chronic, intermittent, and persistent)
2. Joint noises (eg, crepitation)
3. Abnormal masticatory function (eg, painful chewing and malocclusion)
4. Swelling, erythema, suppuration, and/or joint effusion

D. Imaging evidence of infectious process, failed prosthesis, or foreign body
E. Maxillofacial deformity

II. Specific Therapeutic Goals For Reactive Arthritis

The goal of therapy is to arrest the condition causing arthritis and restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
B. Elimination of infection
C. Removal of any foreign body
D. Alleviation or reduction in pain in the joint
E. Limited progression of disease
F. Corrected malocclusion
G. Corrected or improved associated maxillofacial deformity

III. Specific Factors Affecting Risk For Reactive Arthritis

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for TMJ Surgery
B. Virulence of microorganisms
C. Compromised host defenses
D. Presence of alloplast or autograft

REACTIVE ARTHRITIS (continued)

E. Extent of infection
F. Prior exposure to radiation in the TMJ area

IV. Indicated Therapeutic Parameters For Reactive Arthritis

The source of the infection (eg, extension of an otologic infection), systemic manifestations of the infection (eg, septicemia), presence of systemic disease (eg, diabetes mellitus), and host response (eg, human immunodeficiency virus infection and immunosuppression) must all be considered before surgical management of the infected TMJ.

A. The pretreatment assessment includes, at a minimum:
   1. General history and physical examination, as detailed in the *Patient Assessment* chapter
   2. Focused history and physical examination of the TMJ region to determine the presence of indications for care for infectious arthritis and to identify factors affecting risks
   3. Appropriate laboratory studies to confirm the diagnosis of infectious arthritis (eg, white blood cell count by serum or aspiration, Gram stain, bacterial culture, and sensitivity)
   4. An imaging examination, if indicated, based on the history and physical findings. The examination may include but is not limited to the following: panoramic radiography, cephalometric radiography, conventional tomography, CT, cone beam CT, radionuclide scanning, and/or MRI

The following procedures for the management of reactive arthritis are not listed in order of preference:

B. Nonsurgical management
   1. Patient education (eg, dietary recommendations and jaw rest)
   2. Antibiotic therapy
   3. Pain management
   4. Physical therapy
   5. Supportive therapy (eg, hydration and antipyretics)
C. Surgical management
   1. Acute infection
      a. Aspiration and/or arthrocentesis
      b. Incision and drainage with culture and sensitivity studies
      c. Identification and elimination of etiology
      d. Arthroscopic surgery
      e. Removal of implant or foreign body
   2. Chronic infection
      a. Aspiration and/or arthrocentesis
      b. Incision and drainage with culture and sensitivity studies
      c. Identification and elimination of etiology
      d. Arthroscopic surgery
      e. Biopsy
      f. Arthroplasty
      g. Alloplastic joint replacement (if culture negative and no signs of infection)
D. Posttreatment management
   1. Ongoing medical management of infection
   2. Wound care
   3. Pain management
   4. Diet and oral hygiene management
   5. Physical therapy
   6. Reassessment of infectious process
   7. Instructions for posttreatment care and follow-up
   8. Management of residual deformity after elimination of infectious process (eg, orthognathic surgery and joint reconstruction)

V. Outcome Assessment Indices For Reactive Arthritis

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

REACTIVE ARTHRITIS (continued)

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
   2. Elimination of infection
   3. Limited period of disability
   4. Acceptable clinical appearance (eg, absence of motor deficits, absence of hypertrophic scar formation, absence of facial asymmetry or deformity)
   5. Improved mandibular function (eg, maximum incisal opening, lateral and protrusive excursions)

B. Known risks and complications associated with surgery
   1. Presence of a general known risk and/or complication, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
   2. Need to remove an autograft or alloplast
   3. Ankylosis
   4. Progression of infection (eg, osteomyelitis, sepsis, deep space infection)
   5. Adherent unacceptable scar formation

MANDIBULAR DISLOCATION: RECURRENT OR PERSISTENT

Mandibular dislocation can be acute, recurrent, or persistent. All of these refer to the dislocation of the intact nonfractured condyle. Acute dislocation describes blockage of the condyle by the eminence that prevents its return to the glenoid fossa, thus causing inability to close the mouth. Recurrent dislocation describes multiple episodes of dislocation during a specific period. Persistent dislocation describes a long-term blockage of the condyle by the eminence and may be associated with irreversible intracapsular pathology. This section addresses the therapy for recurrent or persistent dislocation. Acute dislocation is addressed in the Trauma Surgery *chapter.*

I. Indications For Therapy For Mandibular Dislocation: Recurrent Or Persistent

May include 1 or more of the following:

A. Moderate-to-severe pain
   1. TMJ pain
   2. Preauricular pain
   3. Masticatory muscle pain (see masticatory muscle disorders section)

B. Dysfunction that is disabling and characterized by any of the following:
   1. Frequent, recurrent and/or persistent mandibular dislocation
   2. Restricted jaw range of motion
   3. Excessive jaw range of motion in patients who relocate after the dislocation
   4. Joint noises (eg, clicking, popping, and crepitation)
   5. Abnormal masticatory function (eg, painful chewing, malocclusion)
   6. Displaced autograft or alloplastic implant

C. Imaging evidence of dislocation and/or displaced autograft or alloplastic implant

II. Specific Therapeutic Goals For Mandibular Dislocation: Recurrent Or Persistent

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
B. Correction and prevention of dislocation
C. Reduce pain in the joint
D. Improved quality of life

III. Specific Factors Affecting Risk For Mandibular Dislocation: Recurrent Or Persistent

Severity factors that increase risk and the potential for known complications:

MANDIBULAR DISLOCATION: RECURRENT OR PERSISTENT (continued)

A. Presence of a general factor affecting risk, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
B. Status and/or degree of abnormal condylar and/or articular eminence growth and development
C. Presence of autograft and/or alloplastic implant
D. Presence of oromandibular dystonia, orofacial dystonia, or other jaw dyskinesia
E. Therapeutic use of medications causing extrapyramidal reactions
F. Systemic aggravating conditions including seizure disorders and neuromuscular disorders)
G. Prior exposure to radiation in the TMJ area

IV. Indicated Therapeutic Parameters For Mandibular Dislocation: Recurrent Or Persistent

A. The pretreatment assessment includes, at a minimum:
   1. General history and physical examination, as detailed in the *Patient Assessment* chapter
   2. Focused history and physical examination of the TMJ region to determine the presence of indications for care of mandibular dislocation and to identify factors affecting risks
   3. An imaging examination, based on the history and physical findings, may include but is not limited to the following: panoramic radiography, cephalometric radiography, conventional tomography, CT, cone beam CT, radionuclide scanning, and/or MRI

The following procedures for the management of mandibular dislocation are not listed in order of preference:

B. Nonsurgical management
   1. Patient education (eg, dietary recommendations, jaw rest, and decreased range of motion)
   2. Discontinuation of use of medications causing extrapyramidal reactions
   3. Medication (eg, drugs used to manage tremors, NSAIDs, analgesics, muscle relaxants, and steroids)
   4. Physical medicine (eg, physical therapy, massage, heat, cold, and ultrasonography)
   5. Intracapsular diagnostic and therapeutic injections (eg prolotherapy, autologous blood injections)
   6. Behavioral modification (eg, counseling, biofeedback, and psychotherapy)
   7. Botulinum toxin
C. Surgical management
   1. Manipulation and relocation of the condyle
   2. Application of maxillomandibular fixation
   3. Arthroscopic surgery
   4. Arthrotomy or arthroplasty
      a. Disk repair procedures
      b. Diskectomy without replacement
      c. Diskectomy with replacement
      d. Eminectomy
      e. Removal of displaced autograft or alloplastic implant
   5. Autogenous graft or eminence osteotomy to limit condylar movement
   6. Temporalis muscle scarification
   7. Inferomedial fracture of zygomatic arch
   8. Autogenous or alloplastic joint replacement
   9. Alloplastic buildup of eminence
D. Posttreatment management
   1. Wound care
   2. Pain management
   3. Diet and oral hygiene management
   4. Physical therapy
   5. Occlusal management
   6. Patient reassessment
   7. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices For Mandibular Dislocation: Recurrent Or Persistent

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

MANDIBULAR DISLOCATION: RECURRENT OR PERSISTENT (continued)

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
   2. Absence of recurrent or persistent mandibular dislocation
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
   2. Need to remove an autograft or alloplast
   3. Continued or recurrent dislocation

ANKYLOSIS AND RESTRICTED JAW MOTION

Intra-articular and extra-articular processes may restrict jaw motion severely. Ankylosis of the TMJ is an intra-articular process characterized by fibrous, fibro-osseous, or osseous obliteration of the joint space. Extracapsular causes of restricted jaw motion (pseudo ankylosis) include but are not limited to coronoid-zygomatic fusion, coronoid hypertrophy, and muscular fibrosis.

Surgical intervention for ankylosis is indicated only when nonsurgical therapy has been ineffective and pain and/or dysfunction are moderate to severe. Pretreatment therapeutic goals are determined individually for each patient.

I. Indications For Therapy For Ankylosis And Restricted Jaw Motion

May include 1 or more of the following:

A. Severely restricted jaw motion accompanied by 1 or more of the following:
   1. Inadequate masticatory function
   2. Abnormal speech (eg, constrained)
   3. Inability to undergo dental and/or medical care (eg, dental preventive and/or restorative, oral or pharyngeal surgery, and endoscopy)
   4. Compromised airway management (eg, intubation)
   5. Inhibited facial growth
   6. Imaging evidence of osseous or soft tissue abnormality
   7. Clinical and/or imaging evidence of restriction or obstruction unrelated to the TMJ (eg, coronoid-zygomatic fusion and coronoid hypertrophy)

II. Specific Therapeutic Goals For Ankylosis And Restricted Jaw Motion

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for TMJ Surgery
B. Release of ankylosis
C. Access for dental and/or medical care
D. Improved speech
E. Improved masticatory function
F. Relief or reduction of pain

III. Specific Factors Affecting Risk For Ankylosis And Restricted Jaw Motion

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
B. Type of ankylosis (eg, fibrous or bony)
C. Etiology of the ankylosis (eg, traumatic or inflammatory)
D. Extent and duration of ankylosis
E. Degree of pre-existing muscular atrophy
F. Ankylosis in a growing child

ANKYLOSIS AND RESTRICTED JAW MOTION (continued)

G. Number of prior TMJ surgeries
H. Prior exposure to radiation in the TMJ area
I. Previous placement of alloplastic joint

IV. Indicated Therapeutic Parameters For Ankylosis And Restricted Jaw Motion

A. The pretreatment assessment includes, at a minimum:
1. General history and physical examination, as detailed in the *Patient Assessment* chapter
2. Focused history and physical examination of the TMJ region to determine the presence of indications for care of ankylosis and restricted jaw motion and to identify factors affecting risks
3. An imaging examination, based on the history and physical findings. The examination may include but is not limited to the following: panoramic radiography, cephalometric radiography, conventional tomography, CT, cone beam CT, radionuclide scanning, and/or MRI

The following procedures for the management of ankylosis and restricted jaw motion are not listed in order of preference:

B. Nonsurgical management (usually not effective in bony ankylosis)
1. Medication (eg, NSAIDs, analgesics, muscle relaxants, antiarthritics, and steroids)
2. Physical therapy
3. Management of dental abnormalities

C. Surgical management
1. Brisement (forceful manipulation of jaw under general anesthesia)
2. Arthroplasty
3. Total Joint Replacement
4. Gap arthroplasty with insertion of interpositional material (eg, fat, muscle, dermis, silastic pullout)
5. Gap arthroplasty with autogenous reconstruction (eg, costochondral graft)
6. Coronoidectomy or coronoidotomy
7. Osteotomy of zygoma or zygomatic arch
8. Myotomy
9. Scar revision (eg, intraoral and/or extraoral)
10. Orthognathic surgery for residual maxillofacial deformity (see the *Surgical Correction of Maxillofacial Skeletal Deformities* chapter)
11. Excision of heterotopic bone or gap arthroplasty with reconstruction of the ramus-condyle unit by distraction osteogenesis

D. Posttreatment management
1. Wound care
2. Physical therapy
3. Pain management
4. Diet and oral hygiene management
5. Occlusal management
6. Appropriate diagnostic records to determine progression of the disease (eg, serial bite registration and models and imaging studies in select cases)
7. Patient reassessment
8. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices For Ankylosis And Restricted Jaw Motion

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
1. General favorable therapeutic outcomes, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
2. In a growing child, continued symmetric growth of the mandible in proper relationship to the midface
3. Acceptable clinical appearance (eg, absence of motor deficits, absence of hypertrophic scar formation, absence of facial asymmetry, or deformity)
4. Improved mandibular function (eg, maximum incisal opening, lateral, and protrusive excursions)

ANKYLOSIS AND RESTRICTED JAW MOTION (continued)

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
   2. Need to remove an autograft or alloplast
   3. Recurrence of ankylosis

CONDYLAR HYPERPLASIA OR HYPOPLASIA

Abnormal condylar size or configuration characterizes condylar hyperplasia or hypoplasia, which may be associated with abnormal mandibular and/or maxillary growth or changing skeletal relationships.

Surgical intervention for condylar hyperplasia or hypoplasia is indicated when nonsurgical therapy has been ineffective and/or considered inappropriate and pain, dysfunction, or deformity is moderate to severe. Pretreatment therapeutic goals are determined individually for each patient.

The clinical and imaging characteristics of the condylar abnormality may mimic those of a neoplasm or other pathologic process, necessitating further evaluation.

I. Indications For Therapy For Condylar Hyperplasia Or Hypoplasia

May include 1 or more of the following:

A. Moderate-to-severe pain
   1. Temporomandibular pain
   2. Preauricular pain
   3. Referred pain (eg, earache)
   4. Masticatory muscle pain (see masticatory muscle disorders section)

B. Dysfunction that is disabling and characterized by any of the following:
   1. Restricted jaw range of motion (eg, hypomobility: acute, chronic, intermittent, and persistent)
   2. Excessive jaw range of motion (eg, hypermobility: acute, chronic, intermittent, and persistent)
   3. Joint noises (eg, clicking, popping, and crepitation)
   4. Abnormal masticatory function (eg, painful chewing and malocclusion)

C. Imaging evidence of condylar hyperplasia or hypoplasia
D. Clinical evidence of progressive condylar hyperplasia or hypoplasia
E. Maxillofacial deformity
F. Continued abnormal growth

II. Specific Therapeutic Goals for Condylar Hyperplasia or Hypoplasia

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
B. Limited pain in the joint
C. Improved quality of life
D. Limited progression of the disease
E. Corrected malocclusion
F. Corrected or improved associated maxillofacial deformity

III. Specific Factors Affecting Risk For Condylar Hyperplasia Or Hypoplasia

Severity factors that increase risk and the potential for known complication:

A. Presence of a general factor affecting risk, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
B. Status and/or degree of abnormal condylar growth
C. Exposure to radiation in the TMJ area

CONDYLAR HYPERPLASIA OR HYPOPLASIA (continued)

IV. Indicated Therapeutic Parameters for condylar hyperplasia or hypoplasia
   A. The pretreatment assessment includes, at a minimum:
      1. General history and physical examination, as detailed in the *Patient Assessment* chapter
      2. Regional history and physical examination to determine the presence of indications for care for condylar hyperplasia or hypoplasia and to identify factors affecting risks
      3. An imaging examination, if indicated, based on the history and physical findings. The examination may include but is not limited to the following: panoramic radiography, cephalometric radiography, conventional tomography, CT, cone beam CT, radionuclide scanning, and/or MRI
      4. Appropriate diagnostic records to determine progression of the disease (eg, serial bite registration and models, imaging studies in selected cases)

      The following procedures for the management of condylar hyperplasia or hypoplasia are not listed in order of preference:
   B. Surgical management
      1. Incisional or excisional biopsy
      2. Arthroplasty with partial or total condylectomy
      3. Autogenous joint reconstruction (eg, costochondral graft)
      4. Total joint replacement
      5. Osseous reduction or augmentation
      6. Soft tissue reduction or augmentation
      7. Orthognathic surgery if stable and nonprogressing (see the *surgical correction of maxillofacial skeletal deformities* chapter)
   C. Posttreatment management
      1. Wound care
      2. Pain management
      3. Diet and oral hygiene management
      4. Physical therapy
      5. Occlusal management
      6. Patient reassessment
      7. Instructions for posttreatment care and follow-up
V. Outcome Assessment Indices For Condylar Hyperplasia Or Hypoplasia

   Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

   A. Favorable therapeutic outcomes
      1. General favorable therapeutic outcomes, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
      2. Acceptable clinical appearance
   B. Known risks and complications associated with therapy
      1. Presence of a general known risk and/or complication, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
      2. Removal of autograft or alloplast
      3. Infection
      4. Continued growth
      5. Continued asymmetry

GOUTY ARTHRITIS

Gouty arthritis (arthritis, hyperuricemia) is a metabolic disease that may affect the TMJ. The disease may be primary or secondary to another disease and/or medication that causes an increase in serum uric acid. In acute gouty arthritis, urate crystals can be precipitated in the synovial fluid of the TMJ, causing a severely painful inflammation. This condition should be treated with the close cooperation of the physician managing the overall systemic disease.

GOUTY ARTHRITIS (continued)

Gout occurs in less than 0.5% of the population and is more common in males than in females. The disease, when present, usually occurs in people older than 40 years. Although the large toe is the joint most commonly involved, the TMJ can also be affected. A synovial fluid analysis demonstrating urate crystals is necessary to confirm the diagnosis. Symptoms include severe TMJ pain, swelling, erythema, joint noise, and restricted mandibular mobility.

Surgical intervention for arthritic conditions is indicated only when nonsurgical therapy has been ineffective and pain and/or dysfunction are moderate to severe. Surgery is not indicated for asymptomatic or minimally symptomatic patients. Surgery also is not indicated for preventive reasons in patients without pain and with satisfactory function. Pretreatment therapeutic goals are determined individually for each patient.

I. Indications For Therapy For Gouty Arthritis

May include 1 or more of the following:

A. Moderate-to-severe pain
   1. TMJ pain
   2. Preauricular pain
   3. Referred pain (eg, earaches)
   4. Masticatory muscle pain (see masticatory muscle disorders section)

B. Dysfunction that is disabling and characterized by any of the following:
   1. Restricted jaw range of motion (eg, locking of the joint: acute, chronic, intermittent, and persistent)
   2. Joint noises (eg, clicking, popping, and crepitation)
   3. Abnormal masticatory function (eg, painful chewing and malocclusion)
   4. Joint swelling and/or effusion
   5. Erythema of skin over the TMJ region

C. Imaging evidence of arthritic process

D. Maxillofacial deformity

II. Specific Therapeutic Goals For Gouty Arthritis

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery

B. Limited pain in the joint gouty arthritis

C. Decreased systemic uric acid level

D. Improved function

E. Limited progression of the disease

F. Corrected or improved associated maxillofacial deformity

III. Specific Factors Affecting Risk For Gouty Arthritis

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery

B. Active process of condylar cortical erosions, bone spurs, and exostoses

C. Presence of alloplast or autograft

D. Gouty arthritis affecting other joints

IV. Indicated Therapeutic Parameters For Gouty Arthritis

A. The pretreatment assessment includes, at a minimum:
   1. General history and physical examination, as detailed in the *Patient Assessment* chapter
   2. Focused history and physical examination of the TMJ region to determine the presence of indications for care for gouty arthritis and to identify factors affecting risks
   3. Appropriate laboratory studies to confirm the diagnosis of gouty arthritis (eg, identification of uric acid crystals in the synovial fluid, serum uric acid level, and, in acute cases, leukocytosis, and an elevated sedimentation rate)

GOUTY ARTHRITIS (continued)

4. An imaging examination, if indicated, based on the history and physical findings. The examination may include but is not limited to the following: panoramic radiography, cephalometric radiography, conventional tomography, CT, cone beam CT, radionuclide scanning, and/or MRI
5. Appropriate diagnostic records to determine progression of the disease (eg, laboratory studies, synovial aspirate analysis, imaging studies in selected cases)

The following procedures for the management of gouty arthritis are not listed in order of preference:

B. Nonsurgical management
   1. Medication (eg, colchicine, indomethacin, NSAIDs, and analgesics)
   2. Physical medicine (eg, physical therapy, cold therapy)
   3. Intracapsular diagnostic synovial fluid aspiration and intra-articular injections
   4. Medical management (eg, steroids, reduce uric acid production, and/or increase excretion)
   5. Orthopedic appliances (eg, splints)

C. Surgical management
   1. Synovial fluid aspiration
   2. Arthrocentesis
   3. Arthroscopic surgery
   4. Biopsy
   5. Arthroplasty
   6. Total joint replacement

E. Posttreatment management
   1. Wound care
   2. Pain management
   3. Diet and oral hygiene management
   4. Physical therapy
   5. Laboratory studies
   6. Occlusal management
   7. Patient reassessment
   8. Instructions for posttreatment care and follow-up

V. Outcome Assessment Indices For Gouty Arthritis

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
   2. Acceptable clinical appearance (eg, absence of motor deficits, absence of hypertrophic scar formation, absence of facial asymmetry, or deformity)
   3. Improved mandibular function (eg, maximum incisal opening, lateral, and protrusive excursions)

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled general criteria, parameters, and considerations for TMJ surgery
   2. Removal of autograft or alloplast
   3. Ankylosis

SELECTED REFERENCES – TMJ SURGERY

This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation this document. Citation of the reference material is not meant to imply endorsement of any statement contained in the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

DIAGNOSIS AND MANAGEMENT OF PATHOLOGICAL CONDITIONS

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023,* WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

Diagnosis and Management of Pathological Conditions addresses the diagnosis and treatment of diseases of the oral and maxillofacial region, including diseases of bone, skin soft tissue, and salivary glands. Cysts, benign and malignant tumors, infections, and diseases of metabolism and function are discussed. Treatment of these diseases involves ablation, functional alteration, nonsurgical management, observation and supportive care. Odontogenic infections, including deep neck infections, are addressed in the *Dentoalveolar Surgery* chapter.

The parameters of care for pathological conditions have their foundation in knowledge that is continuing to expand and will probably do so from this time forward. Increased understanding of the nature of these diseases, their biologic behavior, and their response to therapy form the basis for practice parameters. Evidence-based medicine demonstrates that treatment decisions and their outcomes should be based on a definitive pathologic diagnosis obtained either by preoperative biopsy or post-treatment submission of surgical specimens. When reasonable, submission of specimens to oral and maxillofacial pathologists is encouraged because this increases the likelihood of diagnostic accuracy and, therefore, appropriate management. This document does not replace existing biomedical knowledge; it merely provides the basis definitive diagnosis formation for defining indications for therapy, parameters of therapy, goals of therapy, and the range of outcomes.

This section will refer only to diagnostic and therapeutic surgical procedures for the management of the lesions mentioned. Other areas of pathology, including temporomandibular disorders and congenital defects, are covered in other sections.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR DIAGNOSIS AND MANAGEMENT OF PATHOLOGICAL CONDITIONS

INFORMED CONSENT: All surgery must be preceded by the patient's or legal guardian's consent, unless an emergent situation dictates otherwise. Emergent circumstances and the indications for treatment should be documented in the patient's record. Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the expected recovery period, alternative treatment options (including no treatment), and any patient or procedure specific factors that may affect the risk. The results of the informed consent process must be documented in the patient medical record. In general, an informed consent document is signed by the patient or guardian, but the Oral and Maxillofacial Surgeon is well-advised to document in the medical record that the informed consent process occurred and that the patient/guardian provided both verbal and written consent that they understand and are willing to proceed with treatment.

PERIOPERATIVE ANTIBIOTIC THERAPY: The administration or prescribing of antibiotics may not be needed for otherwise healthy patient and thus the decision to employ prophylactic perioperative antibiotics is at the sole discretion of the treating surgeon and should be based on the patient's clinical condition as well as other comorbidities that may be present.

DEALING WITH NEUROLOGIC DEFICITS: Injuries to the terminal branches of the trigeminal nerve (eg, lingual, inferior alveolar, long buccal nerves), as well as the facial nerve, are known risks of oral and maxillofacial surgery. It should be noted that the presence of a pathologic craniomaxillofacial condition, dentoskeletal or craniofacial abnormality, or traumatic craniomaxillofacial injury may result in nerve injury prior to surgical management. In addition, the use of local anesthesia (eg, mandibular block) may increase the risk of nerve injury. Most nerve injuries resolve spontaneously, but some do not, and these may require consideration for nonsurgical and/or surgical intervention, for example, microneurosurgical repair should be considered when the disability is of concern to the patient, and there is clinical evidence of moderate, severe, or complete neurosensory impairment of various areas of the orofacial region (eg, lips, chin, tongue); paresis or paralysis of facial muscles; loss, decreased, or abnormal taste sensation; or neuropathic pain of peripheral origin or if the progression of spontaneous nerve recovery halts. Surgical repair should incorporate specialized microsurgical techniques (eg, operating magnification, nerve grafting), when indicated. Also see the *Reconstructive Surgery* chapter.

USE OF IMAGING MODALITIES: Imaging modalities may include panoramic radiograph, periapical and/or occlusal radiographs, maxillary and/or mandibular radiographs, computed tomography (CT), cone-beam computed tomography, positron emission tomography (PET), PET/CT, nuclear isotope bone scans, and magnetic resonance imaging (MRI). In determining studies to be performed for imaging purposes, principles of as low as reasonably achievable should be followed.

DOCUMENTATION: *AAOMS ParCare 2023* includes documentation of objective findings, diagnoses, and patient management interventions. *The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon considering the circumstances presented by each patient. Understandably, there may be specific*

clinical reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well-advised to note in the patient's record the reason for the procedure. Moreover, adherence to the parameters does not guarantee a favorable outcome.

GENERAL THERAPEUTIC GOALS FOR DIAGNOSIS AND MANAGEMENT OF PATHOLOGICAL CONDITIONS:

A. Provision of medical and/or surgical palliation or cure of the disease process
B. Restoration of function
C. Restoration of form
D. Preservation of vital structures
E. Prevention of recurrence
F. Limited period of disability
G. Appropriate understanding by patient (family) of treatment options and acceptance of treatment plan
H. Appropriate understanding and acceptance by patient (family) of favorable outcomes and known risks and complications
I. Palliation of patient's disease in the event of disseminated disease

GENERAL FACTORS AFFECTING RISK DURING DIAGNOSIS AND MANAGEMENT OF PATHOLOGICAL CONDITIONS:

A. Degree of patient's and/or family's understanding of the origin and natural course of the condition or disorder and therapeutic goals and acceptance of proposed treatment
B. Presence of coexisting major systemic disease (eg, disease that increases a patient's American Society of Anesthesiologists classification to II, III, or IV), as detailed in the *Patient Assessment* chapter
C. Age of patient
D. Presence of acute and/or pre-existing infection
E. Accuracy and quality of pathologic diagnosis
F. Presence of local or systemic conditions that may interfere with the normal healing process and subsequent tissue homeostasis (eg, previously irradiated tissue, diabetes mellitus, chronic renal disease, liver disease, blood disorder, steroid therapy, contraceptive medication, immunosuppression, malnutrition)
G. Presence of behavioral, psychological, neurologic, and/or psychiatric disorders, including habits (eg, substance abuse), seizure disorders, self-mutilation, or dementia that may affect surgery, healing, and/or response to therapy
H. Degree of patient's and/or family's cooperation and/or compliance
I. Regulatory and/or third-party decisions concerning access to care, indicated therapy, drugs, devices, and/or materials
J. Potential for risk to adjacent vital structures
K. Existing drug or alcohol intoxication

GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR DIAGNOSIS AND MANAGEMENT OF PATHOLOGICAL CONDITIONS:

A. Cure or palliation of disease
B. Restored form
C. Restored function
D. Presence of intact adjacent structures (eg, no unanticipated loss or damage)
E. Limited period of disability
F. Patient (family) acceptance of procedure and understanding of outcomes

GENERAL KNOWN RISKS AND COMPLICATIONS OF DIAGNOSIS AND MANAGEMENT OF PATHOLOGICAL CONDITIONS:

A. Unplanned admission to intensive care unit after elective surgery
B. Unplanned intubation for longer than 24 hours after surgery
C. Unplanned reintubation or tracheostomy after surgery
D. Use of parenteral drugs and/or fluids for longer than 72 hours after elective surgery
E. Failure to ambulate within an acceptable period (depending upon procedure) after surgery
F. Facial and/or trigeminal nerve dysfunction after surgery
G. Facial fracture during or after surgery (eg, pathologic fracture of mandible after marginal resection)
H. Unplanned Caldwell-Luc, bronchoscopy, or other exploratory procedures associated with surgery

I. Dental injury during surgery
J. Ocular injury during surgery (caused by surgery, anesthesia, or by the patient)
K. Repeat or unplanned oral and/or maxillofacial surgery (within 7 days following the initial procedure)
L. Postsurgical radiograph indicating presence of foreign body
M. Readmission of cancer patient for repeat ablative surgery within 12 months of primary surgery
N. Unplanned transfusion(s) of blood or blood components during or after surgery
O. Readmission for complications or incomplete management of problems on previous hospitalization
P. Respiratory and/or cardiac arrest
Q. Unanticipated residual functional deformity
R. Unanticipated residual structural deformity
S. Loss of or damage to adjacent vital structures (eg, neurosensory, dentition)
T. Local sequelae, with damage to or loss of vital structures
U. Loss of function
V. Loss of form
W. Death from tumor extension or because of tumor therapy
X. Death

SPECIAL CONSIDERATIONS FOR DIAGNOSIS AND MANAGEMENT OF PEDIATRIC PATHOLOGICAL CONDITIONS

The principles of management of pathological conditions in children and adults are similar. The differences are in the types of pathologic entities encountered and their frequencies. For example, the congenital epulis is a tumor found exclusively in neonates and newborns, and neuroectodermal tumors are found in infants and children. Lesions may also vary in rapidity of growth, aggressiveness, and predictability regarding biologic behavior when compared with those in adults. The biologic behavior of a lesion (eg, rapid growth, effacement of the dental crypts, root destruction) must be considered in deciding the therapeutic course. We assume for most pathologic entities and processes that the biologic behavior will mimic that seen in adult patients; however, this may not always be the case. Lesions that occur more frequently in adults, when found in children, may exhibit more aggressive behavior than seen in the adult equivalent. New therapies and management protocols are evolving for some lesions previously managed primarily with surgery. Examples are hemangiomas, which respond and involute under the influence of beta blocker therapy, and some mesenchymal tumors that respond to antiangiogenesis and other treatments. The example of central giant cell granulomas responding to interferon, or intralesional steroid injection, or calcitonin therapies, and even newer monoclonal antibody therapy (denosumab) are current topics. Very likely more such examples will arise as medical and targeted genetic treatments continue to be developed.

When managing tumors, the patient's developmental stage must be considered. Radiation therapy for head and neck malignant tumors may have devastating growth consequences. The potential for secondary tumors occurring years after the initial treatment is a concern. Although these and other concerns should be weighed in the management of young patients, they may not always alter the recommended therapy for life-threatening or aggressively destructive lesions. Anatomical variances from the adult, along with growth implications, present significant considerations to surgical management and reconstruction in the growing child in whom abnormalities of the face or jaws are to be removed. A condyle that is resected during surgical treatment, for example, should be replaced with a graft that is responsive to growth. Dental development must be considered when planning implant replacement for missing teeth.

A thorough physical evaluation, appropriate imaging studies, and vigilant monitoring of the clinical course are required for management of infections in children. Airway and hydration status are paramount in the management of severe pediatric infections because the margin of safety is less for the young patient. Also in children, it may be difficult to differentiate infection from a rapidly expanding neoplasm. Decisions regarding hospital admission must include consideration of the socioeconomic environment and the expected reliability of the child's support system.

CYSTS OF BONE

This section includes all odontogenic and nonodontogenic cysts, including those lesions not thought to be true cysts (eg, idiopathic bone cavity, traumatic bone cyst).

I. Indications for Therapy for Cysts of Bone

May include one or more of the following:

CYSTS OF BONE (continued)

A. Clinical indications
   1. Increasing pain
   2. Deformity (eg, swelling, expansion)
   3. Altered sensation
   4. Altered function
   5. Drainage
   6. Structures damaged or displaced from their normal position (eg, nerves, teeth, sinuses)
   7. Altered hue
   8. Crepitus
   9. Clinical evidence of fracture
   10. Secondary infection
   11. Bony structural stability is questionable

B. Imaging indications (based on clinical and plain film assessment)
   1. Change in bone density (eg, radiolucency)
   2. Displacement of adjacent anatomical structures
   3. Assessment of proximity to/invasion of adjacent structures
   4. Evidence of pathologic fracture X rays review to determine pathological fracture versus bone infection

C. Results of differential diagnosis

D. Results of additional studies, as indicated
   1. Aspiration (eg, straw-colored fluid)
   2. Fine-needle aspiration (eg, cytologic confirmation of cyst)
   3. Core needle biopsy (self-directed or in association with an imaging study, eg, CT)
   4. Biopsy: incisional or excisional, depending on lesion size, extent, character, and differential diagnosis (eg, microscopic confirmation of cyst)
   5. Enucleation and curettage
      a. Simple, mandible
      b. Complex, mandible
      c. Maxilla
   6. Decompression/marsupialization
      a. Mandible
      b. Maxilla
   7. Resection (eg, recurrent cyst)
      a. Mandible
      b. Maxilla

E. Additional presurgical studies may include:
   1. Imaging
      a. Office-based scans (panoramic and/or cone-beam computed tomography)
      b. Conventional plain films or CT (depending on size and character)
   2. Evaluation for nevoid basal cell carcinoma syndrome in patients with multiple keratocystic odontogenic tumors (eg, complete cutaneous examination, imaging studies as indicated)
   3. Explanation (stressing importance) to family on the need for 6 to 12 month clinical and radiographic evaluation.

II. Specific Therapeutic Goals for Cysts of Bone

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions

B. Eradication of cyst

III. Specific Factors Affecting Risk in the Treatment of Cysts of Bone

Severity factors that increase risk and the potential for known complications:

CYSTS OF BONE (continued)

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Associated teeth
C. Proximity to/invasion of adjacent structures
D. Type of cyst, recurrence-prone cysts (eg, keratocystic odontogenic tumor, botryoid odontogenic cyst, glandular odontogenic cyst)
E. Fracture or weakening of bone due to cyst expansion
F. Status post removal of prior cyst or tumor in same area of bone

IV. Indicated Therapeutic Parameters for Cysts of Bone

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of cysts of bone are not listed in order of preference:

A. Diagnosis by aspiration or biopsy
B. Primary treatment
   1. Observation, including clinical examination and serial radiographs (eg, presumptive diagnosis of idiopathic bone cavity, traumatic bone cyst, unicameral bone cavity, Stafne cyst, and periapical radiolucency in the endodontically treated tooth)
   2. Marsupialization and/or decompression for patients with large cysts or those unable to undergo enucleation or extirpation or for those in whom the potential for damage to adjacent vital structures is high
   3. Enucleation for lesions not prone to recurrence
   4. Enucleation and curettage for lesions in which complete removal by enucleation alone is known to be inadequate (curettage can be mechanical, physical, chemical, or a combination)
   5. Marginal or segmental resection for aggressive or recurrent cysts

   All specimens must be submitted for pathologic assessment.
C. Adjunctive treatment (Also see the *Reconstructive Surgery* chapter)
   1. Fixation to reduce the potential for fracture and/or preserve function (eg, maxillomandibular, bone plates)
   2. Management of bone defect for defects likely to persist or break down (eg, packing; autogenous, allogeneic, or alloplastic grafting)
   3. Secondary reconstruction for cases with potential for infection or recurrence, if primarily reconstructed, or those with systemic or local contraindications
D. Post-treatment follow-up
   1. Baseline imaging in the initial postoperative period
   2. Determination of restoration of form and function and absence of recurrence
      a. Clinical and imaging examination for nonrecurrence-prone cysts (dentigerous) until form and/or function are restored
      b. Clinical and imaging examination for recurrence-prone cysts (odontogenic keratocyst) for the patient's lifetime, annually for 5 years, then biannually if no recurrence
   3. Instructions to return if signs or symptoms recur before regularly scheduled follow-up appointment
E. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Cysts of Bone

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Patient remains free of disease
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Recurrence of cyst

MALIGNANT TUMORS OF BONE

This section includes primary and metastatic lesions.

I. Indications for Therapy for Malignant Tumors of Bone

May include one or more of the following:

A. Clinical indications
   1. Pain
   2. Deformity (eg, swelling, expansion)
   3. Altered sensation
   4. Altered function
   5. Drainage
   6. Structures damaged or displaced from their normal position (eg, nerves, teeth, sinuses)
   7. Altered hue
   8. Crepitus
   9. Clinical evidence of fracture
   10. Secondary infection
   11. Pulsation, bruit, or thrill
   12. Ulceration
   13. Hemorrhage
   14. Evidence of local tumor extension, regional lymphadenopathy, or metastasis
   15. Bony structural stability is questionable

B. Imaging indications (based on clinical and plain radiograph assessment)
   1. Change in bone architecture and/or density
   2. Displacement of adjacent anatomical structures
   3. Assessment of proximity to/invasion of adjacent structures
   4. Evidence of pathologic fracture
   5. Abnormal bone scan
   6. Altered vascularity
   7. PET or PET/CT scan demonstrating intense hypermetabolic focus or foci

C. Results of differential diagnosis

D. Results of additional studies, as indicated
   1. Aspiration to rule out vascular lesions
   2. Incisional biopsy
   3. Core needle biopsy
   4. Fine-needle aspiration biopsy (self-directed or in association with imaging, eg, CT)
   5. Microbiologic assessment (eg, culture and sensitivity for secondarily infected lesions)

E. Additional presurgical studies may include:
   1. Imaging
      a. Office-based scans (panoramic and/or cone-beam computed tomography)
      b. Conventional film imaging or CT (depending on size and character)
      c. MRI
      d. Nuclear medicine scan (bone scan, single photon emission computed tomography, PET or PET/CT scan)
      e. Plain radiographs, including chest radiograph and skeletal survey, as necessary
      f. Angiography including magnetic resonance angiography (MRA), computed tomography angiography (CTA) if indicated
   2. Laboratory studies (eg, complete blood cell count, liver function tests, serum electrophoresis)

II. Specific Therapeutic Goals for Malignant Tumors of Bone

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions

B. Eradication of tumor

MALIGNANT TUMORS OF BONE (continued)

III. Specific Factors Affecting Risk in the Treatment of Malignant Tumors of Bone

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Associated teeth
C. Proximity to/invasion of adjacent structures
D. Extent of primary tumor
E. Presence and extent of regional and/or distant metastasis
F. Fracture or weakening of mandible or maxilla due to presence of tumor
G. Compromised airway

IV. Indicated Therapeutic Parameters for Malignant Tumors of Bone

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of malignant tumors of bone are not listed in order of preference:

A. Diagnosis by aspiration or biopsy
B. Primary treatment
   1. Observation (eg, unresectable tumors, indolent lesions in compromised patients, patients or families unwilling to give consent informed or otherwise)
   2. Marginal resection when a margin of normal bone can be removed without creating a segmental defect
   3. Segmental resection of bone with adjacent structures
   4. Composite resection of bone, including surrounding soft tissues and regional lymph nodes for squamous cell carcinoma or similar malignant tumors
   5. Radiation therapy and/or neoadjuvant chemotherapy

   All specimens must be submitted for pathologic assessment.
C. Adjuvant therapy and reconstruction
   1. Radiation therapy and/or chemotherapy
   2. Reconstruction bone plates to bridge segmental defects or prevent pathologic fractures in extensive marginal resections
   3. Primary reconstruction to restore form and/or function for defects likely to persist, for weakened underlying structures with low potential for infection, or for recurrence in the absence of systemic or local contraindications
      a. Bone grafts
      b. Skin grafts and soft tissue flaps (eg, local, pedicled, free)
      c. Composite grafts
      d. Alloplasts (bone plates)
      e. Implant reconstruction (rarely primary in malignancies)
   4. Secondary reconstruction to restore form and/or function for cases with high potential for infection or recurrence or with systemic or local contraindications to primary reconstruction
      a. Bone grafts
      b. Skin grafts and soft tissue flaps (eg, local, pedicled, free)
      c. Composite grafts
      d. Alloplast (bone plates)
      e. Implant reconstruction
D. Post-treatment follow-up
   1. Baseline plain radiography in the initial postoperative period
   2. Plain film radiographs of the chest at regularly scheduled intervals
   3. Special imaging studies (CT, MRI, bone scans, PET or PET/CT, according to tumor type and location and the clinician's level of suspicion for recurrent and metastatic disease)
   4. Clinical and imaging examination for malignant tumors for the patient's lifetime, depending on tumor type, likely site of metastasis, and likely length of time to recurrence

MALIGNANT TUMORS OF BONE (continued)

5. Instructions to return if signs or symptoms recur before regularly scheduled follow-up appointment

E. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Malignant Tumors of Bone

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Patient remains free of disease

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Local recurrence of tumor or regional and/or distant metastasis
   3. Death from regional extension of tumor, metastasis, or as a result of therapy
   4. Excess morbidity from radiation and/or chemotherapy (eg, tissue necrosis, radiation caries)

BENIGN TUMORS OF BONE

I. Indications for Therapy for Benign Tumors of Bone

May include one or more of the following:

A. Clinical indications
   1. Pain
   2. Deformity (eg, swelling, expansion)
   3. Altered sensation
   4. Altered function
   5. Drainage
   6. Structures damaged or displaced from their normal position (eg, nerves, teeth, sinuses)
   7. Altered hue
   8. Crepitus
   9. Clinical evidence of fracture
   10. Secondary infection
   11. Pulsation, bruit, or thrill
   12. Ulceration
   13. Hemorrhage
   14. Incidence of local tumor extension
   15. Bony structural stability is questionable

B. Imaging indications (based on clinical and plain film radiograph assessment)
   1. Change in bone architecture and/or density
   2. Displacement of adjacent anatomical structures
   3. Assessment of proximity to/invasion of adjacent structures
   4. Evidence of pathologic or impending pathologic fracture
   5. Abnormal bone scan
   6. Altered vascularity

C. Results of differential diagnosis

D. Results of additional studies, as indicated
   1. Aspiration to rule out vascular lesions
   2. Biopsy (incisional or excisional, depending on lesion size, extent, character, and differential diagnosis)
   3. Fine-needle aspiration biopsy
   4. Core needle biopsy (self-directed or associated with imaging, eg, CT)

BENIGN TUMORS OF BONE (continued)

E. Additional presurgical studies may include
   1. Imaging
      a. Office-based scans (panoramic and/or cone-beam computed tomography)
      b. Conventional tomography or medical-grade CT (depending on size and character)
      c. MRI
      d. Nuclear medicine scan
      e. Angiography including CTA or MRA for presumptive arteriovenous malformation
      f. Plain radiographs of the jaws
   2. Laboratory studies (eg, complete blood cell count)

II. Specific Therapeutic Goals for Benign Tumors of Bone

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Eradication of tumor

III. Specific Factors Affecting Risk in the Treatment of Benign Tumors of Bone

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Associated teeth
C. Proximity to/invasion of adjacent structures
D. Extent of primary tumor
E. Fracture or weakening of mandible due to presence of tumor
F. Compromised airway
G. Histologic type and character of tumor

IV. Indicated Therapeutic Parameters for Benign Tumors of Bone

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, an imaging evaluation, and a histologic analysis (if indicated). Also see the Patient Assessment *chapter.*

The following procedures for the management of benign tumors of bone are not listed in order of preference:

A. Diagnosis by aspiration or biopsy
B. Primary treatment (management modified by local or systemic factors)
   1. Observation (eg, unresectable tumors, indolent lesions in compromised patients, patients or families unwilling to give consent informed or otherwise)
   2. Therapeutic injection or systemic therapy (eg, steroid injection, calcitonin, or interferon therapy for central giant cell lesions)
   3. Enucleation for well-demarcated lesion with low potential for recurrence (eg, adenomatoid odontogenic tumor, odontoma, ossifying fibroma)
   4. Enucleation and curettage for lesions in which complete removal by enucleation alone is known to be inadequate (curettage can be mechanical, physical, or chemical)
   5. Marginal resection for tumor with propensity for recurrence (eg, ameloblastoma) and when a margin of normal bone can be removed without creating segmental defect
   6. Segmental resection of bone with adjacent structures for benign tumors with propensity for involvement, extension to adjacent structures, or when size or location mitigates a marginal resection
   7. Embolization and/or vessel ligation for vascular lesions with the possibility of secondary surgical removal

   All specimens must be submitted for pathologic assessment.

C. Adjunctive treatment
   1. Reconstruction bone plates to bridge segmental defects or prevent pathologic fractures in extensive marginal resections

BENIGN TUMORS OF BONE (continued)

2. Adjunctive chemotherapy as with interferon or calcitonin for postenucleation/resection adjuvant treatment of aggressive giant cell lesions
3. Primary reconstruction to restore form and/or function for defects likely to persist, for weakened underlying structures with low potential for infection, or for recurrence in the absence of systemic or local contraindications
   a. Bone grafts
   b. Skin grafts and soft tissue flaps (eg, local, pedicled, free)
   c. Composite grafts
   d. Alloplast (bone plates)
   e. Implant reconstruction (primary or secondary)
4. Secondary reconstruction to restore form and/or function for cases with high potential for infection if primarily grafted, recurrence, or with systemic or local contraindications
   a. Bone grafts
   b. Skin grafts and soft tissue flaps (eg, local, pedicled, free)
   c. Composite grafts
   d. Alloplast (bone plates)
   e. Implant reconstruction

D. Post-treatment follow-up
1. Baseline imaging in the initial postoperative period
2. Clinical and imaging examination until form and/or function is restored for nonrecurrence-prone tumors
3. Clinical and imaging examination for recurrence-prone benign tumors for the patient's lifetime, annually for 5 years, then biennially (eg, ameloblastoma)
4. Instructions to return if signs or symptoms recur before regularly scheduled follow-up appointment

E. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Benign Tumors of Bone

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
2. Patient remains free of disease

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
2. Death from regional extension of tumor or because of therapy
3. Local recurrence of tumor

OSTEOMYELITIS

I. Indications for Therapy for Bacterial Osteomyelitis

May include one or more of the following:

A. Clinical indications
1. Pain
2. Swelling
3. Altered sensation
4. Altered function
5. Diaphoresis
6. Fever
7. Trismus
8. Chills

OSTEOMYELITIS (continued)

9. General malaise
10. Swelling
11. Erythema
12. Purulence
13. Exposed bone
14. Fetor oris
15. Soft tissue induration
16. Fluctuance
17. Sinus tract (fistula)
18. Malocclusion
19. Tooth mobility
20. Lymphadenitis
21. Sequestration
22. Evidence of fracture
23. Skin mottling
24. Granulation tissue formation
25. Lymphadenopathy
26. Bone mobility

B. Imaging indications (based on clinical and plain film radiograph assessment)
   1. Destruction of bone (radiolucency or other evidence of osteolytic process)
   2. Evidence of sequestrum and/or involucrum formation
   3. Reactive hyperplasia (sclerosis) of bone
   4. Abnormal bone scan
   5. Abnormal location and extent of radiopacity or radiolucency
   6. Antral or nasal wall destruction or thickening
   7. Evidence of pathologic fracture
   8. Evidence of bony expansion
   9. Mottled bone

C. Results of differential diagnosis

D. Results of additional studies, as indicated
   1. Surgical procedures
      a. Biopsy
      b. Incision and drainage with productive result
      c. Removal of bone sequestrum
      d. Lateral decortication
      e. Resection
   2. Laboratory evidence
      a. Gram stain
      b. Histopathology (special stains identifying organisms)
      c. Culture and sensitivities
      d. Complete blood cell count, differential count, sedimentation rate, and C-reactive protein if indicated

E. Additional presurgical studies may include:
   1. Imaging
      a. Nuclear scans (eg, technetium, gallium, indium)
      b. Office-based scans (panoramic and/or cone-beam computed tomography)
      c. CT
      d. MRI

II. Specific Therapeutic Goals for Osteomyelitis (All Types)

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions

OSTEOMYELITIS (continued)

B. Elimination of infection
C. Prevention or treatment of pathologic fractures
D. Eradication of systemic infection
E. Return of form and/or function

III. Specific Factors Affecting Risk in the Treatment of Osteomyelitis

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Associated nonvital teeth
C. Periodontal disease
D. Presence of impending airway obstruction
E. Extent of infection (eg, localized, diffuse)
F. Identification of organism (eg, known, classified)
G. Virulence of organism and/or responsiveness to antibiotics
H. Degree of vascularity in region (eg, prior injury or surgery)
I. Presence of associated fracture
J. Presence or absence of disseminated disease (eg, chronic recurrent multifocal osteomyelitis)

IV. Indicated Therapeutic Parameters for Bacterial Osteomyelitis

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of osteomyelitis are not listed in order of preference:

A. Diagnosis by imaging, biopsy, and culture (when indicated)
B. Nonsurgical treatment
   1. Antibiotic or antifungal therapy
   2. Nutritional support
   3. Hydration
   4. Irrigation
   5. Control of systemic disease
   6. Consideration for hyperbaric oxygen (HBO) therapy
   7. Culture of draining wound
C. Surgical treatment
   1. Incision and drainage
   2. Debridement and sequestrectomy
   3. Stabilization of fracture
   4. Removal of involved teeth
   5. Saucerization
   6. Lateral decortication of mandible
   7. Marginal resection of mandible
   8. Segmental resection of mandible
   9. Partial or complete maxillectomy

All specimens must be submitted for pathologic and microbiologic assessments.

CHRONIC DIFFUSE SCLEROSING OSTEOMYELITIS

Diffuse sclerosing osteomyelitis (DSO) is a rare, poorly understood destructive inflammatory disease of bone, primarily of the mandible that can be treated with various methods and usually occurs in younger patients.

A. Clinical indications
   1. Moderate-severe pain
   2. Swelling

CHRONIC DIFFUSE SCLEROSING OSTEOMYELITIS (continued)

3. Fever
4. General
5. Malaise
6. Swelling
7. Soft tissue changes
8. Trismus
9. Altered sensation
10. Altered imaging

B. Etiologic theories of DSO
1. Bacterial
2. Fungal
3. Autoimmune
4. Syndrome component (eg, synovitis, acne, pustulosis, hyperostosis, osteitis)
5. Chronic tendoperiostitis, etiology undiagnosed
6. Hyperocclusion of teeth
7. Malocclusion
8. Chronic hyperactivity/spasm of masticatory muscles

C. Treatment modalities
1. Medication:
   a. Antibiotics
   b. Anti-inflammatories
   c. Antiresorptive agents
   d. HBO therapy
   e. Surgery
      i. Decortication
      ii. Curettage
      iii. Saucerization
      iv. Excision
      v. Resection
      vi. Recontouring
      vii. Minimal resection

D. Additional imaging indications
1. Rare pathologic fractures
2. Cortical sclerosis
3. Medullary sclerosis
4. Subperiosteal bone formation
5. Condylar process deformation
6. Hypertrophy of masseter muscle
7. Edema of masticatory muscles
8. Rare sequestrum formation
9. Atypical bone scan
10. Atypical single photon emission computed tomography scan

E. Post-treatment follow-up
1. Baseline imaging in the initial postoperative period
2. Antibiotic/antifungal therapy
3. Post-treatment assessment (bone scan, eg, gallium, indium)
4. Determination of adequate restoration of form and/or function
5. Instructions to return if signs or symptoms recur before regularly scheduled follow-up appointment
6. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Osteomyelitis

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

CHRONIC DIFFUSE SCLEROSING OSTEOMYELITIS (continued)

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Complete absence of both local and systemic infection
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Persistent infection
   3. Pathologic fracture
   4. Airway impairment
   5. Draining fistula
   6. Antimicrobial complications
C. Patients must be advised that all types of osteomyelitis have the potential to recur—especially the DSO type—and that all treatments must be allied with continual vigilance on their part, and the part of the well-trained clinician.

NONODONTOGENIC SOFT TISSUE INFECTIONS OF THE HEAD AND NECK

I. Indications for Therapy for Nonodontogenic Soft Tissue Infections of the Head and Neck

May include one or more of the following:

A. Clinical or physical findings
   1. Pain
   2. Swelling
   3. Soft tissue induration
   4. Erythema
   5. Lymphadenitis
   6. Trismus
   7. Purulence
   8. Fistula
   9. Malaise
   10. Fever
   11. Chills
   12. Diaphoresis
   13. Dyspnea
   14. Dysphagia
   15. Altered function
   16. Altered sensation
   17. Soft tissue necrosis (eg, necrotizing fasciitis)
   18. Systemic sepsis
   19. Disseminated infection (eg, prosthetic cardiac valve)
   20. Skin ulceration
   21. Vesicular skin eruption
   22. Skin mottling
B. Diagnostic imaging findings
   1. Gas spaces in soft tissue
   2. Soft tissue mass (fat stranding, phlegmon, etc.), fluid loculation, and/or abscess cavity
C. Laboratory findings
   1. Abnormal complete blood cell count, differential count, C-reactive protein, sedimentation rate, serum electrolytes, glucose, arterial blood gas
   2. Positive microbiologic culture (eg, blood, purulence)

NONODONTOGENIC SOFT TISSUE INFECTIONS OF THE HEAD AND NECK (continued)

3. Positive Gram stain
4. Elevated temperature

II. Specific Therapeutic Goals for Nonodontogenic Soft Tissue Infections of the Head and Neck

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Prevention of recurrence

III. Specific Factors Affecting Outcomes from Nonodontogenic Soft Tissue Infections of the Head and Neck

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Extent of infection (eg, localized, diffuse)
C. Direction and/or rate of extension of infection
D. Presence of impending airway obstruction
E. Susceptibility of organism to antibiotics
F. Virulence of organism
G. Proximity to contiguous structures
H. Presence of foreign bodies or implanted materials

IV. Indicated Therapeutic Parameters for Nonodontogenic Soft Tissue Infections of the Head and Neck

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of nonodontogenic infections are not listed in order of preference:

A. Establishment of airway (intubation, emergency tracheostomy, cricothyroidotomy), if compromised
B. Elimination of infection source
C. Incision and drainage
D. Aspiration
E. Pain control
F. Irrigation and debridement
G. Fasciotomies (if indicated)
H. Identification of organism (eg, Gram stain, aerobic and anaerobic organism culture and sensitivity testing, culture acid-fast bacilli, methicillin-resistant *Staphylococcus aureus* and fungi, hold cultures for extended period to identify atypical organisms (eg, actinomyces) when indicated
I. Assessment and support of host defenses (eg, local measures, antipyretics, nutritional support, and hydration, HBO treatment)
J. Antimicrobial therapeutic management, if indicated (systemic or local therapy)
K. Assessment and management of systemic involvement (eg, sepsis)
L. Assessment and management of coexisting systemic disease (eg, diabetes mellitus)
M. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Nonodontogenic Soft Tissue Infections of the Head and Neck

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Absence of local or systemic signs and/or symptoms of infection
   3. Absence of unanticipated tissue loss

NONODONTOGENIC SOFT TISSUE INFECTIONS OF THE HEAD AND NECK (continued)

4. Restored form and function
5. Improved host defenses
6. Limited period of disability

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
2. Persistence or extension of infection (intracranial extension, eg, sinusitis, cavernous sinus thrombosis, osteomyelitis, mediastinitis)
3. Airway impairment
4. Tissue loss or damage to adjacent vital structures
5. Adverse systemic sequelae (eg, septicemia, endocarditis), which could lead to organ failure and death
6. Adverse drugs reactions or interaction with existing therapeutic drug regimens
7. Facial, neck scarring, or keloid formation with need for secondary revision surgery
8. Nerve injury secondary to the infection or the surgical intervention
9. Injury to organ systems approximate to areas of prior infection (eg, salivary duct) that need secondary revision surgery

OSTEORADIONECROSIS

I. Indications for Therapy for Osteoradionecrosis

May include one or more of the following:

A. Clinical indications
1. History of radiotherapy
2. Pain
3. Exposed bone
4. Sequestrum
5. Orocutaneous fistula
6. Oronasal fistula
7. Oroantral fistula
8. Tissue hypoxia (eg, thin skin, beard loss, oximetry evidence)
9. Soft tissue dehiscence
10. Evidence of pathologic fracture
11. Tooth mobility
12. Altered sensation
13. Swelling
14. Induration
15. Secondary infection
16. Fetor oris

B. Imaging indications (based on clinical and plain radiograph assessment)
1. Destruction of bone (radiolucency or other evidence of osteolytic process)
2. Sequestrum formation
3. Sclerosis of bone
4. Evidence of pathologic fracture
5. Altered uptake on bone scan

C. Results of differential diagnosis

D. Results of additional studies, as indicated
1. Surgical
a. Biopsy to rule out presence of tumor and confirm nonvital bone, as indicated
b. Microbiologic analysis of deep bony biopsy to assess superimposed infection, as indicated

OSTEORADIONECROSIS (continued)

E. Additional presurgical studies may include:
   1. Imaging
      a. Office-based scans (panoramic and/or cone-beam computed tomography)
      b. CT
      c. MRI
      d. Nuclear scans
   2. Transcutaneous oxygen concentration measurements (optional primary historic)

II. Specific Therapeutic Goals for Osteoradionecrosis

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Pain control
C. Provision of full mucosal coverage of remaining, viable bone
D. Preparation of the patient for bony reconstruction, as necessary
E. Reconstruction of quantitatively deficient soft tissue bed as necessary

III. Specific Factors Affecting of Risk in Treatment of Osteoradionecrosis

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Associated teeth
C. Associated nonvital teeth
D. Periodontal disease
E. Potential for risk to adjacent structures
F. Extent of osteoradionecrosis clinically present (staging per modified Notani criteria)
G. Dose, portals, fractionation, and tissue response of radiotherapy
H. Airway status

IV. Indicated Therapeutic Parameters for Osteoradionecrosis

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of osteoradionecrosis are not listed in order of preference:

A. Supportive, nonsurgical treatment
   1. Ruling out of recurrent tumor
   2. Local wound care
   3. Nutritional support
   4. Optimal therapy of concomitant systemic disease
   5. Antibiotic therapy for secondary infections
   6. HBO therapy before and after surgical treatment
   7. Vitamin E and Trental® (pentoxifylline)
B. Surgical treatment (with adjunctive HBO therapy when appropriate)
   1. Removal of affected bone
      a. Sequestrectomy
      b. Saucerization to bleeding bone
      c. Partial or complete maxillectomy
      d. Marginal resection of mandible
      e. Segmental resection of mandible
      f. Removal of all exposed radiated bone

OSTEORADIONECROSIS (continued)

2. Vascularized soft tissue flap with bone resection

All specimens must be submitted for pathologic assessment.

C. Primary or secondary bony reconstruction to restore form and/or function
D. Post-treatment follow-up
   1. Baseline imaging in the initial postoperative period
   2. Repeat biopsy, when indicated by clinical or radiographic changes
   3. Instructions to return if signs or symptoms recur before regularly scheduled follow-up appointment
E. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Osteoradionecrosis

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Elimination of clinically active osteoradionecrosis and associated signs and symptoms
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Clinically persistent osteoradionecrosis (eg, pain, fistula, exposed bone, pathologic fracture)
   3. Systemic sequelae (eg, septicemia, endocarditis)
   4. Masticatory or airway impairment
   5. Further bone loss causing facial deformity

MEDICATION-RELATED OSTEONECROSIS OF THE JAWS

I. Indications for Therapy for Medication-Related Osteonecrosis of the Jaws

May include one or more of the following:

A. Clinical indications
   1. History of exposure to antiresorptive or antiangiogenic medications
   2. Pain
   3. Exposed bone
   4. Sequestrum
   5. Orocutaneous fistula
   6. Oronasal fistula
   7. Oroantral fistula
   8. Soft tissue retraction
   9. Evidence of pathologic fracture
   10. Tooth mobility
   11. Altered sensation
   12. Swelling
   13. Induration
   14. Secondary infection
   15. Fetor oris
B. Imaging indications (based on clinical and plain radiograph assessment)
   1. Destruction of bone (radiolucency or other evidence of osteolytic process)
   2. Sequestrum formation
   3. Sclerosis of bone
   4. Evidence of pathologic fracture
   5. Altered uptake on bone scan

MEDICATION-RELATED OSTEONECROSIS OF THE JAWS (continued)

C. Results of differential diagnosis
D. Results of additional studies, as indicated
   1. Surgical
      a. Biopsy to rule out presence of tumor and confirm nonvital bone, as indicated
   2. Microbiologic assessment
E. Additional presurgical studies may include:
   1. Imaging
      a. Office-based scans (panoramic and/or cone-beam computed tomography)
      b. CT scan
      c. MRI
      d. Bone scans

II. Specific Therapeutic Goals for Medication-Related Osteonecrosis of the Jaws

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Limited pain
C. Provision of full mucosal coverage of remaining, viable bone

III. Specific Factors Affecting Risk in the Treatment of Medication-Related Osteonecrosis of the Jaws

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Associated teeth
C. Associated nonvital teeth
D. Periodontal disease
E. Potential for risk to adjacent structures
F. Extent of osteonecrosis clinically present (staging per *AAOMS* criteria)
G. Airway status
H. Overall health of patient (active malignancy, metastatic disease, immunosuppression)

IV. Indicated Therapeutic Parameters for Medication-Related Osteonecrosis of the Jaws

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of bisphosphonate-related osteonecrosis of the jaws are not listed in order of preference:

A. Supportive, nonsurgical treatment
   1. Local wound care
   2. Nutritional support
   3. Optimal therapy of concomitant systemic disease
   4. Antibiotic therapy for secondary infections
   5. Prescribing pentoxifylline and tocopherol
B. Surgical treatment
   1. Removal of affected bone
      a. Sequestrectomy
      b. Saucerization to bleeding bone
      c. Marginal resection of mandible
      d. Segmental resection of mandible
      e. Partial or complete maxillectomy

All specimens must be submitted for pathologic assessment.

MEDICATION-RELATED OSTEONECROSIS OF THE JAWS (continued)

C. Primary or secondary bony reconstruction to restore form and/or function
   1. Alloplast reconstruction (bone plates)
   2. Primary or secondary bony reconstruction to restore form and/or function
D. Post-treatment follow-up
   1. Baseline imaging in the initial postoperative period
   2. Repeat biopsy, when indicated by clinical or radiographic changes
   3. Instructions to return if signs or symptoms recur before regularly scheduled follow-up appointment
E. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Medication-Related Osteonecrosis of the Jaws

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Elimination of clinically active osteonecrosis of the jaws and associated signs and symptoms
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Clinically persistent osteonecrosis of the jaws (eg, pain, fistula, exposed bone, pathologic fracture)
   3. Systemic sequelae (eg, septicemia, endocarditis)
   4. Masticatory or airway impairment
   5. Further bone loss causing facial deformity

METABOLIC AND DYSTROPHIC DISEASES OF BONE

I. Indications for Therapy for Metabolic and Dystrophic Diseases of Bone

May include one or more of the following:

A. Clinical indications
   1. Pain
   2. Swelling
   3. Altered sensation
   4. Altered function
   5. Facial deformity (hard and/or soft tissue)
   6. Loss of bone
   7. Alteration of bone quality (eg, fibrous dysplasia)
   8. Deposition of bone
   9. Evidence of secondary infection
   10. Evidence of pathologic fracture
   11. Evidence of exposed bone
   12. Mobility or displacement of teeth
B. Imaging indications (based on clinical and plain film radiograph assessment)
   1. Mass effect
   2. Altered bone density (radiolucency and/or radiopacity)
   3. Displaced adjacent structures
   4. Expansion into adjacent structures and regions
   5. Evidence of fracture and/or infection
C. Results of differential diagnosis
D. Additional presurgical studies may include:

METABOLIC AND DYSTROPHIC DISEASES OF BONE (continued)

1. Surgical procedures
   a. Biopsy (with or without guidance imaging)
      i. Incisional
      ii. Excisional
      iii. Trephine
      iv. Core
2. Imaging
   a. Three-dimensional (eg, conventional tomography or CT, depending on size and character)
   b. Magnetic resonance
   c. Nuclear medicine scan
   d. Plain radiographs, including chest radiograph and skeletal survey

E. Laboratory evidence
   1. Abnormal laboratory values (eg, serum calcium, phosphorus, alkaline phosphatase, parathyroid hormone assay)

II. Specific Therapeutic Goals for Metabolic and Dystrophic Diseases of Bone

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Elimination of disease
C. Controlled disease progression

III. Specific Factors Affecting Risk in the Treatment of Metabolic and Dystrophic Diseases of Bone

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Associated teeth, vital and/or nonvital
C. Presence of acute and/or pre-existing infection
D. Proximity to/invasion of adjacent structures
E. Fracture or weakening of jaw and facial skeleton due to extension of disease
F. Compromised airway

IV. Indicated Therapeutic Parameters for Metabolic and Dystrophic Diseases of Bone

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of metabolic and dystrophic diseases of bone are not listed in order of preference:

A. Diagnosis by aspiration or biopsy
B. Supportive, nonsurgical treatment
   1. No immediate treatment but deferred periodic reassessment and possible treatment for conditions such as fibrous dysplasia, osteogenesis imperfecta
   2. Medical management (eg, calcium supplements for osteoporosis, chemotherapy for Paget disease)
   3. Therapeutic injection of lesion (eg, corticosteroids)
C. Surgical treatment
   1. Recontouring and correction of secondary deformities
   2. Enucleation and curettage
   3. Resection of involved bone

   All specimens must be submitted for pathologic assessment.
D. Reconstruction to restore form and/or function (Also see the *Reconstructive Surgery* chapter)
E. Post-treatment follow-up
   1. Periodic clinical, laboratory, and imaging evaluation, as indicated

METABOLIC AND DYSTROPHIC DISEASES OF BONE (continued)

2. Instructions to return if signs or symptoms recur before regularly scheduled follow-up appointment

F. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Metabolic and Dystrophic Diseases of Bone

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Control or elimination of disease
      a. Reduction in number and severity of symptoms
      b. Reversal of damage to anatomical structures
      c. None or minimal progression of disease

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Deterioration of clinical status
   3. Uncontrolled progression of disease

CYSTS OF SOFT TISSUE

This section excludes the management of salivary cysts.

I. Indications for Therapy for Cysts of Soft Tissue

May include one or more of the following:

A. Clinical indications
   1. Pain
   2. Deformity (eg, swelling, expansion)
   3. Altered sensation
   4. Altered function
   5. Drainage
   6. Erythema
   7. Movable discrete swelling
   8. Fistula

B. Results of differential diagnosis

C. Additional presurgical studies may include:
   1. Fine-needle aspiration or incisional biopsy for confirmation of cyst
   2. Microbiologic assessment for secondarily infected lesions
   3. Imaging
      a. CT, MRI, or ultrasonography for large lesions possibly impinging on vital structures
      b. Nuclear scans as dictated by clinical examination

II. Specific Therapeutic Goals for Cysts of Soft Tissue

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions

B. Eradication of cyst

III. Specific Factors Affecting Risk in the Treatment of Cysts of Soft Tissue

Severity factors that increase risk and the potential for known complications:

CYSTS OF SOFT TISSUE (continued)

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Presence of acute and/or pre-existing infection
C. Proximity to/invasion of adjacent structures

IV. Indicated Therapeutic Parameters for Cysts of Soft Tissue

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of cysts of soft tissue are not listed in order of preference:

A. Diagnosis by aspiration or biopsy
B. Primary treatment
   1. Enucleation of cyst
   2. Excision of adjacent skin/mucosa if indicated

   All specimens must be submitted for pathologic assessment.
C. Adjunctive treatment
   1. Primary repair
   2. Repair with adjacent soft tissue transfer
D. Post-treatment follow-up
   1. Clinical follow-up until form and/or function are restored
   2. Instructions to return if signs or symptoms recur before regularly scheduled follow-up appointment
E. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Cysts of Soft Tissue

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Patient remains free of disease
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Recurrence of cyst

BENIGN TUMORS OF SOFT TISSUE

I. Indications for Therapy for Benign Tumors of Soft Tissue

May include one or more of the following:

A. Clinical indications
   1. Pain
   2. Deformity (eg, swelling, expansion)
   3. Altered sensation
   4. Altered function
   5. Induration
   6. Elevated temperature
   7. Red, white, discolored, or pigmented lesions
   8. Ulceration
   9. Secondary infection

BENIGN TUMORS OF SOFT TISSUE (continued)

B. Imaging indications
C. Results of differential diagnosis
D. Results of additional studies, as indicated
   1. Biopsy (incisional or excisional, depending on lesion size, site, extent, character, and differential diagnosis)
   2. Fine-needle aspiration
   3. Microbiologic assessment for secondarily infected lesions

II. Specific Therapeutic Goals for Benign Tumors of Soft Tissue

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Eradication of tumor

III. Specific Factors Affecting Risk in the Treatment of Benign Tumors of Soft Tissue

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Presence of acute and/or pre-existing infection
C. Proximity to/invasion of adjacent structures
D. Extent of tumor or malformation (eg, limited to primary site, beyond primary site)
E. Degree of mobility of normally mobile organ/structure (eg, tongue, mandible)

IV. Indicated Therapeutic Parameters for Benign Tumors of Soft Tissue

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of benign tumors of soft tissue are not listed in order of preference:

A. Diagnosis by aspiration or biopsy
   1. Primary treatment
      a. Local surgical (including laser, cryotherapy, and radiofrequency ablation) or chemical excision

   All specimens must be submitted for pathologic assessment.
B. Adjunctive treatment
   1. Primary or secondary reconstruction
      a. Vascularized or nonvascularized bone grafts
      b. Soft tissue flaps (eg, local, pedicled, free)
      c. Skin grafting or acellular dermal matrices
      d. Alloplasts (bone plates)
   2. Access osteotomies
C. Post-treatment follow-up
   1. Clinical examination until form and/or function are restored
   2. Instructions to return if signs or symptoms recur before regularly scheduled follow-up appointment
D. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Benign Tumors of Soft Tissue

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. No evidence of disease
B. Known risks and complications associated with therapy

1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
2. Local recurrence of tumor

MALIGNANT TUMORS OF SOFT TISSUE

Malignant tumors are managed only in part by surgery. Management is frequently comprehensive and involves an interdisciplinary team that includes specialties of oral and maxillofacial surgery, radiation therapy, medical oncology, dentistry, and various support services.

I. Indications for Therapy for Malignant Tumors of Soft Tissue

May include one or more of the following:

A. Clinical indications
   1. Pain
   2. Deformity (eg, swelling, expansion)
   3. Altered sensation
   4. Altered function
   5. Induration
   6. Hemorrhage
   7. Elevated temperature
   8. Red, white, discolored, or pigmented lesions
   9. Ulceration
   10. Evidence of tumor and/or regional lymphadenopathy
   11. Secondary infection

B. Imaging indications
   1. Proximity to/invasion of adjacent bony or soft tissue structures

C. Results of differential diagnosis

D. Results of additional studies, as indicated
   1. Biopsy (incisional or excisional, depending on lesion size, site, extent, character, and differential diagnosis)
   2. Fine-needle aspiration
   3. Microbiologic assessment for lesions due to secondary infections

E. Presurgical studies for staging purposes:
   1. Imaging
      a. CT, MRI, or ultrasonography of primary site for extent of local disease, to evaluate for regional involvement and to evaluate for the presence of metastatic disease if appropriate
      b. Nuclear medicine scan for evaluation of possible distant metastatic sites (bone scan, PET scan, PET/CT scan)
      c. Conventional films as adjunct, including chest radiograph to complete tumor, node, metastasis staging and skeletal survey for presumptive metastatic lesion
   2. Laboratory assessment
      a. Culture and sensitivity for lesions due to secondary infections
      b. Blood tests for presumptive malignant lesions, including complete blood cell count and liver function tests for tumors that may metastasize to the liver as part of presurgical workup
   3. Surgical
      a. Evaluation for presence of synchronous tumors that may include evaluation under anesthesia and panendoscopy, if indicated
   4. Clinical staging

II. Specific Therapeutic Goals for Malignant Tumors of Soft Tissue

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions

B. Eradication of tumor

MALIGNANT TUMORS OF SOFT TISSUE (continued)

III. Specific Factors Affecting Risk in the Treatment of Malignant Tumors of Soft Tissue

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Presence of acute and/or pre-existing infection
C. Proximity to/invasion of adjacent structures
D. Extent of tumor (eg, limited to primary site, beyond primary site)
E. Presence and extent of regional and/or distant metastasis
F. Degree of mobility of normally mobile organ/structure (eg, tongue, mandible)

IV. Indicated Therapeutic Parameters for Malignant Tumors of Soft Tissue

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of malignant tumors of soft tissue are not listed in order of preference:

A. Diagnosis by either aspiration or biopsy
B. Primary treatment
   1. Local surgical or chemical excision for malignant tumors deemed to be local
   2. Excision of associated structures for invasive tumors as necessary in order to obtain clear anatomic margins
   3. Excision of associated structures in the region, including neck dissection when cervical lymph nodes are present (N+) or when high risk of occult neck disease exists in patients with malignant disease
   4. Adjuvant treatment with radiation therapy and/or chemotherapy when indicated

   All specimens must be submitted for pathologic assessment.
C. Adjunctive treatment (Also see the *Reconstructive Surgery* chapter)
   1. Adjunctive radiation therapy and/or chemotherapy
   2. Primary or secondary reconstruction
      a. Vascularized or nonvascularized bone grafts
      b. Soft tissue flaps (eg, local, pedicled, free)
      c. Skin grafting or acellular dermal matrices
      d. Alloplasts (bone plates)
   3. Access osteotomies
D. Post-treatment follow-up
   1. Baseline plain radiographic imaging in the initial postoperative period when bone evaluation is needed
   2. Plain radiographs of the chest at regularly scheduled intervals
   3. Special imaging studies (CT, MRI, bone scans, PET or PET/CT, according to tumor type and location and the clinician's level of suspicion for recurrent and metastatic disease)
   4. Clinical and imaging examination for malignant tumors for the patient's lifetime
   5. Instructions to return if signs or symptoms recur before regularly scheduled follow-up appointment
E. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Malignant Tumors of Soft Tissue

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. No evidence of disease
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Local recurrence of tumor or metastasis
   3. Residual functional deformity

4. Residual structural deformity
5. Damage to or loss of adjacent structures
6. Excess morbidity from radiation therapy or chemotherapy
7. Death from tumor metastasis, tumor extension, or as a result of tumor therapy

VASCULAR LESIONS

I. Indications for Therapy for Vascular Lesions

May include one or more of the following:

A. Clinical indications
   1. Pain
   2. Deformity (eg, swelling, expansion)
   3. Altered sensation
   4. Altered function
   5. Induration
   6. Thrill
   7. Bruit
   8. Hemorrhage
   9. Elevated temperature
   10. Red, white, discolored, or pigmented lesions
   11. Secondary infection

B. Imaging indications
   1. Infiltration of adjacent soft tissue and/or bony structures
   2. Assess possible source (feeding vessel)

C. Studies may include:
   1. Imaging
      a. Conventional angiography with possible therapeutic intervention and/or ultrasonographic examination for presumptive vascular malformation
      b. MRI or MRA for presumptive vascular malformations
      c. CTA
   2. Laboratory assessment when needed
      a. Culture and sensitivity for lesions due to secondary infections

D. Results of differential diagnosis

E. Results of additional studies, as indicated
   1. Fine-needle aspiration
   2. Biopsy (incisional or excisional, depending on lesion size, site, extent, character, and differential diagnosis

II. Specific Therapeutic Goals for Vascular Lesions

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions

B. Eradication of tumor or malformation

III. Specific Factors Affecting Risk in the Treatment of Vascular Lesions

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions

B. Presence of acute and/or pre-existing infection

C. Proximity to/invasion of adjacent structures

D. Extent of tumor or malformation (eg, limited to primary site, beyond primary site)

E. Degree of mobility of normally mobile organ/structure (eg, tongue, mandible)

F. Excessive bleeding

G. Pregnancy

VASCULAR LESIONS (continued)

IV. Indicated Therapeutic Parameters for Vascular Lesions

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of vascular lesions are not listed in order of preference:

A. Diagnosis by physical examination, imaging, aspiration, or biopsy
B. Primary treatment
    1. Embolization and/or vessel ligation for vascular lesions
    2. Excision or resection (possibly postembolization)

    All specimens must be submitted for pathologic assessment.
C. Adjunctive treatment
    1. Laser
    2. Sclerotherapy
    3. Primary or secondary reconstruction
        a. Bone grafts
        b. Skin grafting
        c. Soft tissue flaps (eg, local, pedicled, free)
        d. Alloplasts (bone plates)
    4. Access osteotomies
D. Post-treatment follow-up
    1. Clinical examination for vascular lesions until form and/or function are restored
    2. Instructions to return if signs or symptoms recur before the regularly scheduled follow-up appointment
    3. Repeat imaging study (based on symptoms and clinical findings)
        a. Conventional angiogram
        b. CT angiogram
        c. MRI angiogram
E. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Vascular Lesions

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
    2. Disease eliminated
B. Known risks and complications associated with therapy
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
    2. Local recurrence of tumor
    3. Cosmetic deformity and functional limitations
    4. Death from hemorrhage

MUCOSAL DISEASES

I. Indications for Therapy for Mucosal Diseases

May include one or more of the following:

A. Clinical indications
    1. Pain
    2. Altered function

MUCOSAL DISEASES (continued)

3. Altered appearance (eg, change in color or character)
4. Altered mucosal integrity (eg, ability to elevate or wipe off lesion by rubbing surface)

B. Results of differential diagnosis
C. Additional studies, as indicated, may include:
1. Exfoliative cytology
2. Microbiologic assessment
3. Diagnosis via biopsy for conventional staining, direct or indirect immunofluorescence
4. Brush biopsy

II. Specific Therapeutic Goals for Mucosal Diseases

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Elimination or control of disease
C. Elimination of symptoms

III. Specific Factors Affecting Risk in the Treatment of Mucosal Diseases

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Presence of acute and/or pre-existing infection

IV. Indicated Therapeutic Parameters for Mucosal Diseases

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of mucosal diseases are not listed in order of preference:

A. Diagnosis by physical examination and/or biopsy
B. Primary treatment
1. Observation and periodic follow-up (eg, lichen planus)
2. Elimination of etiologic factor (eg, change medication in cases of lichenoid drug reaction)
3. Medication (eg, antifungal, topical and/or systemic corticosteroid therapy, antineoplastic, other immune modulation therapy)
4. Surgical removal
5. Ophthalmologic consultation when indicated (eg, pemphigus)

All specimens must be submitted for pathologic assessment.

C. Adjunctive treatment
1. Ensuring oral hygiene
2. Evaluation of medications
3. Nutritional support

D. Post-treatment follow-up (dependent on nature of disease)
1. Consider repeat biopsy if change occurs in the clinical appearance of the lesion

E. Instructions to return if signs or symptoms recur before the regularly scheduled follow-up appointment
F. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Mucosal Diseases

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes

MUCOSAL DISEASES (continued)

1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
2. Elimination or amelioration of symptoms (pain)
3. Elimination or control of disease

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
2. Recurrence of symptoms
3. Recurrence of disease
4. Functional disability
5. Chronic pain

SALIVARY GLAND DISEASES: BENIGN AND MALIGNANT TUMORS AND MISCELLANEOUS LESIONS

I. Indications for Therapy for Salivary Gland Diseases: Benign and Malignant Tumors and Miscellaneous Lesions

May include one or more of the following:

A. Clinical indications
1. Pain
2. Mass effect (eg, swelling, expansion)
3. Ulceration
4. Altered neurologic function, dependent on anatomic location of gland
5. Reduced or absent salivary flow
6. Alteration in color of overlying tissue
7. Fluctuance
8. Secondary infection
9. Altered speech or masticatory function
10. Evidence of regional or distant metastasis
11. Auditory changes

B. Imaging indications
1. Displacement of adjacent anatomical structures
2. Proximity to/invasion of adjacent structures (eg, deep lobe of parotid gland, palatal bone)

C. Results of differential diagnosis

D. Results of additional studies, as indicated
1. Fine-needle aspiration
2. Incisional or excisional biopsy, depending on lesion location, extent, and character
3. Core needle biopsy with or without imaging guidance.

E. Additional presurgical studies may include:
1. MRI, CT or PET, PET/CT scanning, as indicated, for evaluation of primary site, neural involvement, and metastases
2. Plain radiographs, including panoramic radiograph, for intraosseous salivary gland tumors or other tumors with suspected bone involvement
3. Chest radiographs in cases of malignant lesions
4. Laboratory tests, including complete blood cell count and liver function tests in cases of malignant disease
5. Contrast-enhanced sialography
6. Quantitative and qualitative salivary flow studies

SALIVARY GLAND DISEASES: BENIGN AND MALIGNANT TUMORS AND MISCELLANEOUS LESIONS (continued)

II. Specific Therapeutic Goals for Salivary Gland Diseases: Benign and Malignant Tumors and Miscellaneous Lesions

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Eradication of cyst or tumor

III. Specific Factors Affecting Risk in the Treatment of Salivary Gland Diseases: Benign and Malignant Tumors and Miscellaneous Lesions

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Presence of acute and/or pre-existing infection
C. Proximity to/invasion of adjacent structures
D. Extent of cyst or primary tumor
E. Presence and extent of regional and/or distant metastases

IV. Indicated Therapeutic Parameters for Salivary Gland Diseases: Benign and Malignant Tumors and Miscellaneous Lesions

The presurgical assessment includes, at a minimum, a comprehensive history and a physical examination. An imaging evaluation may be indicated depending on the salivary lesion being evaluated. Also see the Patient Assessment *chapter.*

The following procedures for the management of salivary gland diseases are not listed in order of preference:

A. Diagnosis by aspiration or biopsy
B. Primary treatment
   1. Marsupialization (eg, ranula)
   2. Local excision of lesion (eg, canalicular adenoma)
   3. Local excision of lesion with adjacent tissue (eg, mucous retention phenomenon, pleomorphic adenoma)
   4. Sialoadenectomy (eg, sublingual gland for ranula, pleomorphic adenoma of major gland)
   5. Sialoadenectomy with excision of associated adjacent tissues (eg, malignant tumor of major gland)
   6. Simultaneous or delayed prophylactic or therapeutic lymph node dissection (eg, specific malignant tumors)
   7. Radiation therapy and/or chemotherapy for malignant tumors
   8. Sialoendoscopy for benign duct blockage
   9. Sialography for benign duct blockage and stenosis

   All specimens must be submitted for pathologic assessment.
C. Adjunctive treatment
   1. Radiation therapy and/or chemotherapy for malignant tumors, when indicated
   2. Reconstructive procedures (Also see the *Reconstructive Surgery* chapter)
      a. Bone, nerve, and soft tissue grafts, including local pedicled and microvascular free grafts
   3. Nutritional support
D. Post-treatment follow-up
   1. Clinical follow-up of cyst or benign tumors until form and/or function are restored
   2. Annual clinical follow-up of recurrence-prone tumor (eg, pleomorphic adenoma), with special reference to primary site
   3. Continual clinical examination for malignant tumors for the patient's lifetime, with type of examination and imaging depending on tumor type, likely site of metastasis, and likely length of time to appearance of recurrence or metastasis
   4. Instructions to return if signs or symptoms recur before the regularly scheduled follow-up appointment
E. Instructions for post-treatment care and follow-up

SALIVARY GLAND DISEASES: BENIGN AND MALIGNANT TUMORS AND MISCELLANEOUS LESIONS (continued)

V. Outcome Assessment Indices for Salivary Gland Diseases: Benign and Malignant Tumors and Miscellaneous Lesions

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Patient is free of cyst or tumor at primary, regional, or distant site

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Local recurrence of cyst or tumor
   3. Metastasis
   4. Death from tumor metastasis, extension, or therapy

SALIVARY GLAND INFECTIONS

I. Indications for Therapy for Salivary Gland Infections

May include one or more of the following:

A. Clinical indications
   1. Pain
   2. Swelling
   3. Erythema
   4. Altered neurologic function
   5. Drainage of pus or mucus
   6. Reduced salivary flow
   7. Sinus tracts (fistula)
   8. Fluctuance
   9. Induration
   10. Fever
   11. Dehydration
   12. Leukocytosis
   13. Elevation of sedimentation rate
   14. Evidence from culture

B. Results of differential diagnosis

C. Results of additional studies, as indicated
   1. Culture and sensitivity
   2. Gram stain
   3. Aspiration

D. Additional studies, as indicated, may include:
   1. Radiographs for sialolith (occlusal films)
   2. Office-based scans (panoramic and/or cone-beam computed tomography)
   3. CT
   4. MRI
   5. Sialography
   6. Complete blood cell count with differential count
   7. Sedimentation rate
   8. Evaluation for underlying disease process (eg, alcoholism, malnutrition, diabetes mellitus, immunosuppression, collagen vascular disease, etc.)
   9. Microbiologic assessment

SALIVARY GLAND INFECTIONS (continued)

II. Specific Therapeutic Goals for Salivary Gland Infections

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Eradication of infection

III. Specific Factors Affecting Risk in the Treatment of Salivary Gland Infections

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Presence of acute infection
C. Extent of infection (eg, localized, diffuse)
D. Identification of organism (eg, known, classified)
E. Virulence of organism and/or responsiveness to antibiotics
F. Potential for injury to adjacent structures
G. Degree of vascularity in region (eg, after radiation therapy, multiple operations)
H. Postsurgical state with intensive care unit admission
I. Presence of chronic infection
J. Presence of sialoliths

IV. Indicated Therapeutic Parameters for Salivary Gland Infections

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of salivary gland infections are not listed in order of preference:

A. Appropriate antibiotic therapy
B. Incision and drainage (if indicated)
C. Control of pain
D. Management of underlying medical condition when present
E. Maintenance of hydration and nutrition
F. Sialolithotomy
G. Sialodochotomy
H. Sialodochoplasty
I. Sialoadenectomy
J. Instructions for post-treatment care and follow-up

All specimens must be submitted for microbiologic assessment.

V. Outcome Assessment Indices for Salivary Gland Infections

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
    2. Absence of infection

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Persistent infection
   3. Systemic sequelae of the infection

SALIVARY GLAND DISEASES: OTHER LOCAL OR SYSTEMIC

This section includes but is not limited to Sjögren syndrome, sarcoidosis, and necrotizing sialometaplasia.

I. Indications for Therapy for Salivary Gland Diseases: Other Local or Systemic

May include one or more of the following:

A. Clinical indications
   1. Xerostomia
   2. Salivary gland enlargement
   3. Ulceration
   4. Hypersalivation
B. Results of differential diagnosis
C. Results of additional studies, as indicated
   1. Clinical
      a. Keratoconjunctivitis sicca
      b. Rheumatoid or other immune mediated arthritis
      c. Lacrimal gland enlargement
      d. Signs and symptoms of sarcoidosis (eg, hilar lymphadenopathy, Heerfordt syndrome, hypercalcemia, Löfgren syndrome)
   2. Imaging
      a. Sialography
      b. Nuclear medicine scan (bone scan)
      c. CT
      d. MRI
      e. Chest radiograph for sarcoidosis
   3. Laboratory
      a. Evidence of Sjögren syndrome (eg, SSA, SSB, antinuclear antibody, latex fixation test)
      b. Elevated sedimentation rate
      c. Serum angiotensin-converting enzyme (eg, sarcoidosis)
   4. Surgical
      a. Fine-needle aspiration
      b. Biopsy (lip vs parotid)
      c. Core needle biopsy
D. Additional presurgical studies may include:
   1. MRI or CT

II. Specific Therapeutic Goals for Salivary Gland Diseases: Other Local or Systemic

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Elimination or control of disease

III. Specific Factors Affecting Risk in the Treatment of Salivary Gland Diseases: Other Local or Systemic

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
B. Presence of acute and/or pre-existing infection
C. Potential for injury to adjacent structures

SALIVARY GLAND DISEASES: OTHER LOCAL OR SYSTEMIC (continued)

IV. Indicated Therapeutic Parameters for Salivary Gland Diseases: Other Local or Systemic

The presurgical assessment includes, at a minimum, a comprehensive history, a physical examination, and an imaging evaluation. Also see the Patient Assessment *chapter.*

The following procedures for the management of salivary gland diseases are not listed in order of preference:

A. Diagnosis by aspiration or biopsy
B. Medical treatment of underlying disorders
C. Palliative treatment of pain, dehydration, malnutrition
D. Sialoadenectomy in chronic and persistent disease
E. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Salivary Gland Diseases: Other Local or Systemic

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Patient is free of disease
   3. Reduction in number and severity of symptoms
   4. Reversal of damage to structures
   5. Controlled progression of disease
   6. Improved clinical status

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Diagnosis and Management of Pathological Conditions
   2. Deterioration of clinical status or progression of disease
   3. Malignant transformation
   4. Injury (temporary or permanent) to sensory or motor nerves

SELECTED REFERENCES – DIAGNOSIS AND MANAGEMENT OF PATHOLOGICAL CONDITIONS

This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation of this document. Citation of the reference material is not meant to imply endorsement of any statement contained in the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

RECONSTRUCTIVE SURGERY

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023,* WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE. TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

Reconstructive oral and maxillofacial surgery is defined as the surgical correction of soft and/or hard tissue defects of the jaws, face, and contiguous structures, including reduction, revision, augmentation, grafting, and implantation for the correction or replacement of defective structures to assist in restoring function to the compromised patient.

The general principles of reconstruction in the region of the face and jaws are similar to those for reconstruction of other anatomic sites. The concentration of essential functional and esthetic anatomy in the oral and maxillofacial region, however, mandates particular care and knowledge of the facial form, masticatory apparatus, and dentition.

The Oral and Maxillofacial Surgeon, therefore, must understand and observe diagnostic and technical principles specific to the restitution of normal function and appearance in this critical area. Because of rapid developments associated with both alloplastic and allogeneic materials and autogenous tissue transfers, variability in treatment approaches within the definitions of acceptable practice can be expected. Evolution of computer-assisted surgical planning and navigational surgery also introduces variability in treatment approaches within the definitions of acceptable practice. However, diagnostic or therapeutic measures employed in reconstructive surgery should be based on objective scientific data and where appropriate, clinical observation representative of a structured analysis of treatment. Treatment analysis should be based on an adequate sample, take into account inclusion and exclusion criteria, and involve a sufficient period of follow-up.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR RECONSTRUCTIVE SURGERY

INFORMED CONSENT: All surgery must be preceded by the patient's or legal guardian's consent, unless an emergent situation dictates otherwise. Emergent circumstances and the indications for treatment should be documented in the patient's record. Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the expected recovery period, alternative treatment options (including no treatment), and any patient or procedure-specific factors that may affect the risk. The results of the informed consent process must be documented in the patient medical record. In general, an informed consent document is signed by the patient or guardian, but the Oral and Maxillofacial Surgery is well advised to document in the medical record that the informed consent process occurred and that the patient/guardian provided both verbal and written consent that they understand and are willing to proceed with treatment.

PERIOPERATIVE ANTIBIOTIC THERAPY: The administration or prescribing of antibiotics may not be needed for otherwise healthy patient and thus the decision to employ prophylactic perioperative antibiotics is at the sole discretion of the treating surgeon and should be based on the patient's clinical condition as well as other comorbidities which may be present.

USE OF IMAGING MODALITIES: Imaging modalities may include panoramic radiograph, periapical and/or occlusal radiographs, maxillary and/or mandibular radiographs, computed tomography, cone beam computed tomography, positron emission tomography, positron emission tomography/computed tomography, and magnetic resonance imaging. In determining studies to be performed for imaging purposes, principles of ALARA (as low as reasonably achievable) should be followed.

DOCUMENTATION: *AAOMS ParCare 2023* includes documentation of objective findings, diagnoses, and patient management interventions. *The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon in light of the circumstances presented by each patient.*

Understandably, there may be good clinical reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well advised to note in the patient's record the reason for the procedure followed. Moreover, it should be understood that adherence to the parameters does not guarantee a favorable outcome.

GENERAL THERAPEUTIC GOALS FOR RECONSTRUCTIVE SURGERY

A. Restored absent or abnormal tissue and function
B. Restored or improved facial symmetry and appearance
C. Enhanced social and psychological well-being
D. Limited severity and period of disability
E. Replacement of missing or qualitatively deficient soft tissue and improved physiologic function
F. Maintenance of form and function over time (eg, maintenance of volume of grafted bone, acceptable growth of a costochondral graft in a child)

G. Appropriate understanding by patient (family) of treatment options and acceptance of treatment plan
H. Appropriate understanding and acceptance by patient (family) of favorable outcomes and known risks and complications

GENERAL FACTORS AFFECTING RISK DURING RECONSTRUCTIVE SURGERY

A. Degree of patient's and/or family's understanding of the origin and natural course of the condition or disorder and therapeutic goals and acceptance of proposed treatment
B. Presence of coexisting major systemic disease (eg, disease that increases a patient's American Society of Anesthesiologists classification to II, III, or IV), as detailed in the *Patient Assessment* chapter
C. Age of patient
D. Abnormal or inadequate osseous and/or soft tissue anatomy
E. Presence of disease in bone and/or soft tissue
F. Presence of infection
G. Unfavorable local or systemic response (eg, hypersensitivity, foreign body reaction, fibrosis) to materials used in reconstructive surgery
H. Use of unsuspected contaminated or diseased materials
I. Severity of the deformity
J. Inadequate vascularity of the area (eg, effect of previous surgery, radiation, trauma, chemical or burn injuries, cleft palate deformity, hypertrophic scar, keloid)
K. Inadequate healing secondary to previous trauma or surgery (eg, failure, nonunion)
L. Inadequate support systems
M. Presence of local or systemic conditions that may interfere with the normal healing process and subsequent tissue homeostasis (eg, previously irradiated tissue, diabetes mellitus, chronic renal disease, liver disease, anticoagulative blood disorders, steroid therapy, contraceptive medication, immunosuppression, malnutrition)
N. Presence of behavioral, psychological, neurologic, or psychiatric disorders, including habits (eg, substance abuse), seizure disorders, or self-mutilation that may affect surgery, healing, and/or response to therapy
O. Degree of patient's and/or family's cooperation and/or compliance
P. Regulatory and/or third-party decisions concerning access to care, indicated therapy, drugs, devices, and/or materials
Q. Abnormalities in the health or position of the remaining bone
R. Previous surgical history

GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR RECONSTRUCTIVE SURGERY

A. Improved physiologic function
B. Improved support for hard and soft tissue structures
C. Enhanced social and psychological well-being
D. Limited severity and/or period of disability
E. Improved appearance
F. Improved facial symmetry
G. Maintenance of form and function over time
H. Improved function
I. Improved physiologic function
J. Patient (family) acceptance of procedure and understanding of outcomes

GENERAL KNOWN RISKS AND COMPLICATIONS FOR RECONSTRUCTIVE SURGERY: Unexpected systemic postsurgical complications may occur in the oral and maxillofacial surgical patient, as with any other surgical patient (eg, deep venous thromboses, pulmonary emboli, myocardial infarctions, cerebrovascular accidents)

A. Unplanned admission to intensive care unit after elective surgery
B. Unplanned intubation for longer than 12 hours after surgery
C. Reintubation or tracheostomy after surgery
D. Use of parenteral drugs, intravenous fluids, catheters, feeding tubes, and other intensive support for an extended period after elective surgery
E. Unexpected failure to ambulate within a reasonable period after elective surgery
F. Facial and/or trigeminal nerve dysfunction after surgery
G. Facial fracture during or after surgery
H. Unplanned Caldwell-Luc, bronchoscopy, or other exploratory procedures associated with surgery

I. Dental injury during surgery
J. Ocular injury during surgery
K. Repeat oral and/or maxillofacial surgery
L. Core temperature of greater than 101 °F 72 hours after elective surgery
M. Postsurgical radiograph indicating the presence of foreign body
N. Readmission of cancer patient for repeat ablative surgery
O. Unplanned transfusion(s) of blood or blood components during or after surgery
P. Readmission for complications or incomplete management of problems on previous hospitalization
Q. Respiratory and/or cardiac arrest in the perioperative period
R. Recipient site(s) morbidity
S. Donor site(s) morbidity
T. Development of new systemic disease or condition (eg, human immunodeficiency virus infection, hepatitis, pulmonary embolism)
U. Exacerbation of existing systemic disease (eg, cerebrovascular, cardiac, pulmonary)
V. Worsened social and psychological well-being
W. Increased severity and/or extension of period of disability
X. Pain
Y. Death

SPECIAL CONSIDERATIONS FOR PEDIATRIC RECONSTRUCTIVE SURGERY

A primary concern for the Oral and Maxillofacial Surgeon performing pediatric craniomaxillofacial reconstruction is to provide a stable, functional skeletal framework that will respond to future unrestricted growth and development. Of particular concern are the nasal, orbital, and mandibular regions.

The orbital region is an area of rapid development in the infant to early childhood years. Post-traumatic or postablative conditions may require immediate orbital reconstruction with autogenous grafts that respond to globe development and function and later to sinus enlargement. Split calvarial or costal grafts have been used in orbital reconstruction for the pediatric patient in the past, however, with more sophisticated custom orbital implants, and the risks of donor site morbidity, this practice is less common.

Nasal development is progressive, with significant projection and nasal cavity enlargement. Costochondral grafts usually respond favorably to functional forces and intrinsic stimuli for growth. Also see the *Facial Cosmetic Surgery* chapter for septorhinoplasty for nasal obstruction.

The jaws, particularly the mandible, are key regions of development in pediatric patients. Because mandibular growth is both active (programmed) and passive (responsive), reconstruction during childhood must be staged chronologically. Optimal ramal/condylar growth necessitates both osseous and cartilaginous elements, which are provided by costochondral grafts. Mandibular body reconstruction in later childhood may be accomplished through osseous grafts from the calvaria (minor defects) or rib or iliac crest (major defects). Distraction osteogenesis and/or early orthognathic procedures may further facilitate facial development after condylar elements are in place and monitored for responsive or adaptive mechanisms.

Fibula free flap (FFF) can be a reasonable treatment in children with large mandibular defects. Indications for FFF are: 1) irradiated wound bed; 2) scarred periosteum; 3) skeletal defect larger than 5-6 cm; 4) large postablative operation requiring soft tissue reconstruction; and 5) failed previous bone grafts. When the occlusion is maintained and there is appropriate adaptation of fibula to craniofacial skeleton, FFF can be followed by implant placement. The rate of complications of FFF in the pediatric population is comparable to the rate in adults.

Also see the *Surgical Correction of Maxillofacial Skeletal Deformities* chapter.

DEFECTS OF THE MANDIBLE AND ASSOCIATED SOFT TISSUES

The Temporomandibular Joint Surgery *chapter also addresses reconstructive surgery involving the temporomandibular joint.*

I. Indications for Therapy for Defects of the Mandible and Associated Soft Tissues

May include one or more of the following:

DEFECTS OF THE MANDIBLE AND ASSOCIATED SOFT TISSUES (continued)

A. Impaired masticatory function, speech, and/or swallowing
B. Malocclusion
C. Inadequate digestion and nutritional deficiencies
D. Inadequate bone support for soft tissue oral and maxillofacial structures
E. Inadequate quantity and quality of bone and soft tissue for implant reconstruction
F. Obstructed airway
G. Facial asymmetries
H. Temporomandibular joint dysfunction
I. Impaired functional mobility (eg, scar contracture)
J. Provision of soft tissue coverage of vital structures
K. Salivary incontinence
L. Mucocutaneous pathology
M. Presence of foreign bodies
N. Quantitative or qualitative soft tissue deficiencies
O. Periodontal disease
P. Orocutaneous fistula

II. Specifics Therapeutic Goals for Defects of the Mandible and Associated Soft Tissues

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Improved functional mobility
C. Improved nutrition
D. Improved facial symmetry and appearance
E. Adequate coverage of vital structures
F. Closure of orocutaneous fistulae
G. Reduced salivary incontinence
H. Improved masticatory and/or prosthetic function
I. Improved jaw range of motion
J. Improved speech
K. Improved swallowing
L. Improved airway
M. Improved environment for maintenance of periodontal health
N. Diagnosis and control of mucocutaneous diseases and systemic pathology
O. Corrected or limited effects of abnormal growth

III. Specific Factors Affecting Risk for Defects of the Mandible and Associated Soft Tissues

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Abnormalities in the health and positioning of remaining teeth or bone
C. Functional deficiencies in mastication and/or swallowing
D. Presence and functional status of temporomandibular joint
E. Presence of muscular disorders
F. Airway compromise (eg, presence of obstructive sleep apnea (OSA), upper airway obstruction, tracheostomy, choanal atresia, nasal septal deviation and/or perforation, hypertrophied turbinates, allergic symptoms, hypertrophied tonsils, and adenoids, polyps, or tumors)

IV. Indicated Therapeutic Parameters for Defects of the Mandible and Associated Soft Tissues

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

DEFECTS OF THE MANDIBLE AND ASSOCIATED SOFT TISSUES (continued)

The following is a list of procedures for reconstruction of defects of the mandible and associated soft tissue. Defect characteristics, including volume, tissue condition, and anatomical site, should guide the selection of an appropriate reconstructive technique. The following procedures for the management of defects of the mandible and associated soft tissues are not listed in order of preference:

A. Timing of reconstruction should be considered during preoperative planning
   1. Immediate reconstruction
      a. When potential for successful hard tissue reconstruction is favorable (eg, adequate soft tissue and vascular supply)
      b. For tumor ablative surgery, when there is a high degree of confidence that the tumor has been completely removed
      c. When there is concern regarding deterioration of the psychological and/or psychiatric status of the patient and/or family
      d. Palliative reconstruction in cases of terminal disease when there is facial disfigurement
      e. In the presence of extensive soft tissue defect, to prevent infection, contracture, salivary incontinence, etc.
   2. Delayed reconstruction
      a. When the potential for successful immediate hard tissue reconstruction is unfavorable (eg, oral contamination, compromised vascular supply, infection)
      b. For tumor ablative surgery, when it is not certain that the tumor has been completely removed
      c. Palliative reconstruction in cases of terminal disease when there is facial disfigurement
B. Access for reconstruction
   1. Neck incisions
   2. Preauricular incisions
   3. Perioral and intraoral incisions
   4. Lip incisions
C. Modalities for reconstruction
   1. Hard tissue
      a. Autogenous bone (eg, particulate and/or block grafts)
         i. Free grafts
            aa. Ilium (eg, anterior and/or posterior)
            bb. Cranial, tibial, maxillofacial (eg, mandible, zygoma) for alveolar reconstruction before prosthetic and/or implant rehabilitation
            cc. Rib
            dd. Osteomyocutaneous pedicle flaps
            ee. Prepared reinserted autogenous bone (eg, irradiated, frozen)
         ii. Microvascular flaps
            aa. Fibula
            bb. Ilium
            cc. Scapula
            dd. Radius
            ee. Rib
      b. Alloplastic materials
         i. Metal plates, screws, and trays
         ii. Synthetic bone substitutes
         iii. Guided tissue regeneration materials
         iv. Polymeric materials (eg, resorbable and nonresorbable)
      c. Allogeneic bone (crushed cortical and/or cancellous, with or without autogenous bone)
         i. Rib
         ii. Ilium
         iii. Mandible
      d. Xenogeneic bone (eg, bovine bone)
      e. Bone morphogenetic protein
      f. Implant placement and/or prosthetic rehabilitation

DEFECTS OF THE MANDIBLE AND ASSOCIATED SOFT TISSUES (continued)

g. Adjunctive therapy
   i. Hyperbaric oxygen
   ii. Growth factors (eg, fibrin adhesive, autologous platelet-rich plasma)
h. Fixation and/or stabilization of skeletal devices
   i. Functional fixation with plates and screws (rigid or semirigid)
   ii. Intraosseous wires
   iii. External skeletal pin fixation, including distraction
   iv. Maxillomandibular fixation
   v. Intraoral splints
i. Transport distraction osteogenesis for segmental defect reconstruction (includes initial application of device and subsequent removal)
j. Implant placement (Also see the *Dental and Craniomaxillofacial Implant Surgery* chapter)

2. Soft tissue
   a. Local flaps
      i. Random pattern flaps
      ii. Axial pattern flaps
      iii. Regional flaps
   b. Microvascular flaps (eg, radial forearm flap, rectus abdominis flap, latissimus dorsi flap)
   c. Full- or split-thickness skin and mucosal grafts
   d. Adjunctive therapy (eg, hyperbaric oxygen, wound debridement)
   e. Tissue expanders

D. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Defects of the Mandible and Associated Soft Tissues

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
   2. Replaced missing hard tissue
   3. Improved mandibular function (eg, mastication, speech, swallowing, nutritional status, and/or airway)
   4. Improved functional mobility of mandible and soft tissues
   5. Adequate coverage of vital structure
   6. Closure of orocutaneous fistulae
   7. Reduced salivary incontinence
   8. Controlled mucocutaneous pathology
   9. Improved environment for maintenance of periodontal health
   10. Correction or limitation of abnormal growth and development

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
   2. Recipient site
      a. Malunion, nonunion, fibrous union
      b. Inadequate volume
      c. Infection
   3. Specific known risks and complications associated with selected more commonly used donor sites:
      a. Ilium
         i. Persistent gait disturbance
         ii. Hernia
         iii. Ileus
         iv. Peritonitis
         v. Retroperitoneal hematoma

DEFECTS OF THE MANDIBLE AND ASSOCIATED SOFT TISSUES (continued)

   b. Rib
      i. Pneumothorax and/or hemothorax
      ii. Chondritis
   c. Cranium
      i. Dural tears
      ii. Intracranial hemorrhage (eg, epidural, subdural hematoma)
4. Specific known risks and complications associated with recipient site
   a. Inability to wear prosthesis
   b. Inadequate quantity and quality of bone and soft tissue for placement for dental implants
   c. Neurologic deficit (eg, anesthesia, paresthesia, paralysis, dysgeusia)

DEFECTS OF THE MAXILLA AND ASSOCIATED SOFT TISSUES

I. Indications for Therapy for Defects of the Maxilla and Associated Soft Tissues

May include one or more of the following:

A. Impaired masticatory function, speech, and/or swallowing
B. Malocclusion
C. Nutritional deficiencies
D. Inadequate bone support for soft tissue, oral and maxillofacial structures, teeth, and prosthetic appliances
E. Obstructed airway
F. Oronasal, oroantral, and/or oral-orbital communication
G. Abnormal function of the paranasal sinuses
H. Quantitative or qualitative soft tissue deficiencies (eg, cheeks, lips, nose, eyelids)
I. Impaired functional mobility (eg, scar contracture)
J. Facial asymmetry and disfigurement
K. Ectropion and/or entropion
L. Epiphora
M. Drooling
N. Orocutaneous fistula
O. Nutritional deficiencies
P. Provision of soft tissue coverage of vital structures (eg, eyes, paranasal sinuses, bone)
Q. Facial asymmetry and disfigurement
R. Soft tissue dehiscence with exposure of bone plate or bone graft
S. Periodontal disease
T. Mucocutaneous and systemic pathology
U. Presence of foreign bodies

II. Specific Therapeutic Goals for Defects of the Maxilla and Associated Soft Tissues

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Improved functional mobility
C. Improved swallowing and prevention of aspiration and/or regurgitation
D. Improved facial symmetry
E. Adequate coverage of vital structures
F. Closure of orocutaneous fistulae
G. Control secretions
H. Improved appearance
I. Identification of occult or previously unrecognized disease during therapy
J. Corrected ectropion and/or entropion

DEFECTS OF THE MAXILLA AND ASSOCIATED SOFT TISSUES (continued)

K. Restored orbital drainage and/or corrected epiphora
L. Improved masticatory and/or prosthetic function
M. Improved speech
N. Improved nutrition
O. Improved airway
P. Closure of oronasal, oroantral, and/or cutaneous fistulae
Q. Improved function of the paranasal sinuses
R. Improved environment for maintenance of periodontal health
S. Diagnosis and control of mucocutaneous diseases and systemic disease
T. Corrected or limited effects of abnormal growth

III. Specific Factors Affecting Risk of Reconstruction for Defects of the Maxilla and Associated Soft Tissues

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Compromises in the health and positioning of remaining teeth or bone
C. Functional deficiencies in mastication and/or swallowing
D. Presence of muscular disorders
E. Airway compromise (eg, presence of OSA, upper airway obstruction, tracheostomy, choanal atresia, nasal septal deviation and/or perforation, hypertrophied turbinates, allergic symptoms, hypertrophied tonsils, and adenoids, polyps, or tumors)
F. Abnormal speech (eg, presence or absence of hypernasal or hyponasal speech, velopharyngeal incompetence, articulatory speech dysfunction, tongue volume, and immobility)
G. Compromised osseous and/or soft tissue anatomy

IV. Indicated Therapeutic Parameters for Defects of the Maxilla and Associated Soft Tissues

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following is a list of procedures for reconstruction of defects of the maxilla and associated soft tissue. Defect characteristics, including volume, tissue condition, and anatomical site, should guide the selection of an appropriate reconstructive technique. The following procedures for the management of defects of the maxilla and associated soft tissues are not listed in order of preference:

A. Timing of reconstruction should be considered during preoperative planning
    1. Immediate reconstruction
        a. When potential for successful hard tissue reconstruction is favorable (eg, adequate soft tissue, vascular supply)
        b. For tumor ablative surgery, when there is a high degree of confidence that the tumor has been completely removed
        c. When there is concern regarding deterioration of the psychological and/or psychiatric status of the patient and/or family
        d. Palliative reconstruction in cases of terminal disease when there is facial disfigurement
        e. In the presence of extensive soft tissue defect, to prevent infection, contracture, salivary incontinence, etc.
    2. Delayed reconstruction
        a. When the potential for successful immediate hard tissue reconstruction is unfavorable (eg, oral contamination, compromised vascular supply, infection)
        b. For tumor ablative surgery, when it is not certain that the tumor has been completely removed
        c. Palliative reconstruction in cases of terminal disease when there is facial disfigurement
B. Access for reconstruction
    1. Transoral
    2. Transcutaneous (eg, Weber-Ferguson incision)
    3. Coronal flap(s)

DEFECTS OF THE MAXILLA AND ASSOCIATED SOFT TISSUES (continued)

4. Facial degloving incision
5. Combinations of 1 through 4

C. Modalities for reconstruction
1. Hard tissue reconstruction
   a. Autogenous bone
      i. Free grafts
         aa. Ilium (eg, anterior and posterior)
         bb. Cranial, tibial, maxillofacial (eg, mandible, zygoma) for alveolar or maxillary sinus reconstruction before prosthetic and/or implant rehabilitation
         cc. Rib
         dd. Osteomyocutaneous pedicle flaps
      ii. Microvascular flaps
         aa. Ilium
         bb. Fibula
         cc. Scapula
         dd. Osteomyocutaneous
   b. Alloplastic materials
      i. Metallic plates, screws, and trays
      ii. Synthetic bone substitutes
      iii. Guided tissue regeneration materials
      iv. Polymeric materials
   c. Allogeneic bone
      i. Rib
      ii. Ilium
      iii. Mandible
   d. Xenogeneic bone (eg, bovine bone)
   e. Bone morphogenetic protein
   f. Implant placement and/or prosthetic reconstruction
   g. Adjunctive therapy
      i. Fixation and/or stabilization of skeletal segments
      ii. Hyperbaric oxygen
      iii. Growth factors (eg, fibrin adhesive, autologous platelet-rich plasma)
   h. Fixation and/or stabilization devices
      i. Rigid internal plates
      ii. Wire osteosynthesis
      iii. External skeletal pin fixation
      iv. Maxillomandibular fixation
      v. Intraoral splints
   i. Soft tissue reconstruction of maxillary bone defects
      i. Temporalis muscle and/or fascia flaps
      ii. Buccal fat pad flaps
      iii. Adjacent local soft tissue flaps
      iv. Microvascular flaps (eg, radial forearm)
   j. Implant placement (Also see the Dental and *Craniomaxillofacial Implant Surgery* chapter)
2. Soft tissue reconstruction
   a. Local flaps
      i. Random pattern flaps
      ii. Axial pattern flaps
      iii. Regional flaps
   b. Microvascular flaps (eg, radial forearm flap, rectus abdominis flap, latissimus dorsi flap)
   c. Full- or split-thickness skin and mucosal grafts

DEFECTS OF THE MAXILLA AND ASSOCIATED SOFT TISSUES (continued)

d. Adjunctive therapy (eg, hyperbaric oxygen, wound debridement)
e. Tissue expanders

D. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Defects of the Maxilla and Associated Soft Tissues

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
2. Replaced missing hard tissue
3. Improved maxillary function, mastication, speech, swallowing, nutritional status, and/or airway
4. Replaced missing or qualitatively deficient soft tissue
5. Improved functional mobility
6. Improved swallowing and prevention of aspiration and/or regurgitation
7. Adequate coverage of vital structures
8. Closure of orocutaneous fistulae
9. Control of secretions
10. Identification of occult or previously unrecognized disease during therapy
11. Corrected ectropion and/or entropion and lid position
12. Restored orbital drainage and/or corrected epiphora
13. Improved function of the paranasal sinuses
14. Improved environment for maintenance of periodontal health
15. Diagnosis and control of mucocutaneous diseases and systemic disease
16. Corrected or limited effects of abnormal growth and development

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
2. Recipient site
a. Oroantral and/or nasal communication
b. Inability to wear a prosthetic appliance
3. Specific known risks and complications for selected commonly used donor sites:
a. Ilium
i. Persistent gait disturbance
ii. Hernia
iii. Ileus
iv. Peritonitis
v. Retroperitoneal hematoma
b. Rib
i. Pneumothorax and/or hemothorax
ii. Chondritis
c. Cranium
i. Dural tears
ii. Intracranial hemorrhage (eg, epidural or subdural hematoma)
d. FFF
i. Persistent gait disturbance
ii. Knee and/or ankle instability
iii. Excessive scarring and/or donor site cosmetic defects
iv. Neurologic disturbance
v. Compartment syndrome
vi. Extremity ischemia

DEFECTS OF THE MAXILLA AND ASSOCIATED SOFT TISSUES (continued)

e. Radial forearm free flap
   i. Excessive scarring and/or donor site cosmetic defects
   ii. Fine motor disturbances
   iii. Neurologic disturbance
   iv. Compartment syndrome
   v. Extremity ischemia
f. Scapula free flap
   i. Excessive scarring and/or donor site cosmetic defects
   ii. Upper extremity range of motion disturbance

DEFECTS OF THE ZYGOMA AND ASSOCIATED SOFT TISSUES

I. Indications for Therapy for Defects of the Zygoma and Associated Soft Tissues

May include one or more of the following:

A. Inadequate support for soft tissues
B. Globe malposition
C. Ocular dysfunction
D. Globe vulnerability to infection and/or injury
E. Infraorbital pain, paresthesia, or anesthesia
F. Abnormal function and/or infection of the maxillary sinus
G. Presence of foreign bodies
H. Restricted jaw range of motion
I. Other evidence, when applicable, from clinical examination or imaging studies (eg, radiography, computed tomography, magnetic resonance imaging)
J. Temporal hollow, either from temporal wasting or lateral malposition of the zygoma or zygomatic arch
K. Quantitative or qualitative soft tissue deficiencies (eg, cheeks, eyelids)
L. Impaired functional mobility (eg, scar contracture)
M. Facial asymmetry and disfigurement
N. Ectropion and/or entropion
O. Epiphora
P. Orocutaneous fistula
Q. Nutritional deficiencies
R. Provision of soft tissue coverage of vital structures (eg, maxilla, nasal bones)
S. Soft tissue dehiscence with exposure of bone plate or bone graft

II. Specific Therapeutic Goals for Defects of the Zygoma and Associated Soft Tissues

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Improved jaw range of motion
C. Improved facial symmetry
D. Improved infraorbital neurosensory function
E. Improved support for hard tissue structures
F. Removal of indicated foreign bodies
G. Improved globe position and ocular function and protection
H. Improved function of the maxillary sinus and resolution of infection
I. Improved appearance
J. Improved functional mobility
K. Adequate coverage of vital structures

DEFECTS OF THE ZYGOMA AND ASSOCIATED SOFT TISSUES (continued)

L. Closure of orocutaneous fistulae
M. Identification of occult or previously unrecognized disease during therapy
N. Corrected ectropion and/or entropion
O. Restored orbital drainage and/or corrected epiphora

III. Specific Factors Affecting Risk for Defects of the Zygoma and Associated Soft Tissues

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Pathology or infection of sinuses (eg, presence of allergies, polyps, sinusitis, mucocele)
C. Severity of ocular or orbital impairment
D. Abnormal osseous and/or soft tissue anatomy
E. Compromised health of remaining teeth or bone
F. Compromised airway (eg, presence of OSA, upper airway obstruction, tracheostomy, choanal atresia, nasal septal deviation and/or perforation, hypertrophied turbinates, allergic symptoms, hypertrophied tonsils and adenoids, polyps, tumors)

IV. Indicated Therapeutic Parameters for Defects of the Zygoma and Associated Soft Tissues

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following is a list of procedures for the reconstruction of defects of the zygoma and associated soft tissue. Defect characteristics, including volume, tissue condition, and anatomic site, should guide the selection of an appropriate reconstructive technique. The following procedures for the management of defects of the zygoma and associated soft tissues are not listed in order of preference:

A. Timing of reconstruction should be considered during preoperative planning
    1. Immediate reconstruction
        a. When potential for successful hard tissue reconstruction is favorable (eg, adequate soft tissue, vascular supply)
        b. For tumor ablative surgery, when there is a high degree of confidence that the tumor has been completely removed
        c. When there is concern regarding deterioration of the psychologic and/or psychiatric status of the patient and/or family
        d. Palliative reconstruction in cases of terminal disease when there is facial disfigurement
        e. In the presence of extensive soft tissue defect, to prevent infection, contracture, salivary incontinence, etc.
    2. Delayed reconstruction
        a. When the potential for successful immediate hard tissue reconstruction is unfavorable (eg, oral contamination, compromised vascular supply, infection)
        b. For tumor ablative surgery, when it is not certain that the tumor has been completely removed
        c. Palliative reconstruction in cases of terminal disease when there is facial disfigurement
B. Access for reconstruction
    1. Intraoral incisions
    2. Lower eyelid—blepharoplasty or conjunctival incisions
    3. Coronal or hemicoronal flap
    4. Facial degloving
    5. Weber-Ferguson incision
    6. Upper eyelid—blepharoplasty or brow incisions
    7. Any pre-existing wounds or scars
C. Modalities for reconstruction
    1. Zygomatic malunion
        a. Zygomatic augmentation
            i. Alloplastic: preformed or patient specific (eg, Silastic, hydroxyapatite, porous polyethylene, acrylic)

DEFECTS OF THE ZYGOMA AND ASSOCIATED SOFT TISSUES (continued)

ii. Autogenous graft (eg, cranial bone, iliac crest)
iii. Allogeneic bone
b. Zygomatic osteotomy and repositioning with fixation (may require concomitant orbital reconstruction)
c. Distraction osteogenesis (includes application of device and subsequent incision/access and removal)

2. Missing bone from zygoma, zygomatic arch, or lateral or inferior orbital rim
a. Bone graft reconstruction
i. Cranial, rib, or iliac crest block grafts
ii. Iliac crest marrow in a custom fabricated mesh tray
iii. Microvascular free flap (especially in irradiated tissues and in composite bone or soft tissue defects)
b. Alloplastic replacement of missing bone (eg, titanium mesh, hydroxyapatite)

3. Soft tissue reconstruction
a. Local flaps
i. Random pattern flaps
ii. Axial pattern flaps
b. Regional flaps
i. Random pattern flaps
ii. Axial pattern flaps
c. Microvascular flaps (eg, radial forearm flap, rectus abdominis flap, latissimus dorsi flap)
d. Full- or split-thickness skin and mucosal grafts
e. Adjunctive therapy
f. Tissue expanders
g. Distraction osteogenesis (includes application of device and subsequent incision/access and removal)

4. Use of adjuvant planning tools such as virtual surgical planning (VSP), computer-assisted surgical simulation (CASS)
5. Navigational surgery

D. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Defects of the Zygoma and Associated Soft Tissues

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
2. Restored absent or displaced hard and/or soft tissues
3. Improved facial symmetry
4. Improved infraorbital neurosensory function
5. Improved support for hard tissue structures
6. Removal of indicated foreign bodies
7. Improved globe position and ocular function and protection
8. Improved function of the maxillary sinus and resolution of infection
9. Replaced missing or qualitatively deficient soft tissue
10. Improved functional mobility
11. Improved swallowing and prevention of aspiration
12. Adequate coverage of vital structures
13. Identification of occult or previously unrecognized disease during therapy
14. Corrected ectropion and/or entropion
15. Restored orbital drainage and/or corrected epiphora

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery

DEFECTS OF THE ZYGOMA AND ASSOCIATED SOFT TISSUES (continued)

2. Recipient site
   a. Globe malposition
   b. Globe functional problems (eg, diplopia, strabismus)
   c. Visual disturbance
   d. Temporal fossa depression and/or wasting
3. Specific risks and complications associated with selected commonly used donor sites:
   a. Ilium
      i. Persistent gait disturbance
      ii. Hernia
      iii. Ileus
      iv. Peritonitis
      v. Retroperitoneal hematoma
   b. Rib
      i. Pneumothorax and/or hemothorax
      ii. Chondritis
   c. Cranium
      i. Dural tears
      ii. Intracranial hemorrhage (eg, epidural, subdural hematoma)

ORBITAL DEFECTS

I. Indications for Therapy for Orbital Defects

May include one or more of the following:

A. Ocular dysfunction (eg, diplopia)
B. Globe malposition (eg, dystopia, hypertelorism, enophthalmos)
C. Globe vulnerability to infection and/or injury
D. Inadequate protection for central nervous system
E. Orbital-antral communication
F. Facial asymmetry
G. Nasolacrimal duct dysfunction (eg, epiphora)
H. Frontal sinus dysfunction and/or pathology

II. Specific Therapeutic Goals for Orbital Defects

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Improved ocular function
C. Improved globe position
D. Prevention of ocular injury
E. Identification of occult or previously unrecognized disease during therapy
F. Protection of central nervous system
G. Improved orbital-antral partition
H. Improved facial symmetry
I. Improved nasolacrimal function
J. Prevention and/or elimination of frontal sinus dysfunction and/or pathology

ORBITAL DEFECTS (continued)

III. Specific Factors Affecting Risk for Orbital Defects

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Presence of muscular disorder
C. Severity of ocular or orbital impairment
D. Abnormal osseous and/or soft tissue anatomy
E. Functional deficiencies

IV. Indicated Therapeutic Parameters for Orbital Defects

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of orbital defects are not listed in order of preference:

A. Surgical approaches
   1. Transorbital (transconjunctival)
   2. Transoral and/or antral
   3. Transcutaneous eyelid incisions (eg, subciliary, subtarsal, infraorbital, upper blepharoplasty incisions)
   4. Eyebrow incisions (eg, "Gull wing")
   5. Coronal flap(s)
   6. "Open sky" approach
   7. Pre-existing wounds or scars
   8. Caruncular approaches
B. Modalities for hard tissue reconstruction
   1. Autogenous bone (eg, particulate and/or block grafts)
      a. Free grafts
         i. Ilium (eg, anterior and posterior)
         ii. Cranial, tibial, maxillofacial (eg, mandible, zygoma)
         iii. Rib
      b. Osteomyocutaneous pedicle flaps
      c. Free microvascular (eg, ilium, fibula, scapula, osteomyocutaneous)
      d. Transport distraction osteogenesis (includes application of device and subsequent incision/access and removal)
   2. Alloplastic materials
      a. Metallic plates, screws, and trays (preformed or patient specific)
      b. Synthetic bone substitutes
      c. Guided tissue regeneration materials
      d. Polymeric materials
   3. Allogeneic bone (with or without autogenous bone)
      a. Rib
      b. Ilium
      c. Mandible
      d. Crushed cortical and cancellous
      e. Adjunctive materials and devices
         i. Metallic and/or synthetic plates, screws, and trays
         ii. Synthetic bone substitutes (eg, block hydroxyapatite)
         iii. Implants (also see the *Dental and Craniomaxillofacial Implant Surgery* chapter) (preformed or patient specific)
         iv. Fixation and/or stabilization devices
      f. Internal fixation plates
      g. Wire fixation
      h. External pin fixation

ORBITAL DEFECTS (continued)

i. Adjunctive therapy
i. Hyperbaric oxygen
j. Implant placement (Also see the *Dental and Craniomaxillofacial Implant Surgery* chapter)
4. Use of adjuvant planning tools such as VSP, CASS
5. Navigational surgery

C. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Orbital Defects

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
2. Replaced missing hard tissue
3. Improved ocular function
4. Improved globe position
5. Prevention of ocular injury
6. Identification of occult or previously unrecognized disease during therapy
7. Protection of central nervous system
8. Improved orbital-antral partition
9. Improved nasolacrimal function
10. Prevention of and/or elimination of frontal sinus dysfunction and/or pathology

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
2. Recipient site
a. Globe malposition
b. Globe functional problems (eg, diplopia, strabismus, enophthalmos)
c. Visual disturbance
d. Temporal fossa depression and/or wasting
3. Donor site(s)
a. Known risks and complications associated with iliac grafts
i. Persistent gait disturbance
ii. Hernia
iii. Ileus
iv. Peritonitis
v. Retroperitoneal hematoma
b. Known risks and complications associated with rib grafts
i. Pneumothorax and/or hemothorax
ii. Chondritis
c. Known risks and complications associated with cranial grafts
i. Dural tears
ii. Intracranial hemorrhage (eg, epidural, subdural hematoma)

NASAL DEFECTS

I. Indications for Therapy for Nasal Defects

May include one or more of the following:

A. Inadequate support for nasal soft tissues
B. Obstructed nasal airway

NASAL DEFECTS (continued)

C. Oronasal communication
D. Abnormal function of the paranasal sinuses
E. Facial asymmetry
F. External deformity (eg, saddle nose)
G. Presence of foreign bodies
H. Other evidence, when applicable, from clinical examination or imaging studies (eg, radiography, computed tomography, magnetic resonance imaging)
I. Hypernasal speech

II. Specific Therapeutic Goals for Nasal Defects

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Improved speech
C. Improved appearance
D. Improved facial symmetry
E. Improved support for nasal soft tissues
F. Improved airway
G. Closed oronasal fistulae
H. Removal of indicated foreign bodies
I. Improved drainage of orbital secretions
J. Improved function of the paranasal sinuses

III. Specific Factors Affecting Risk for Nasal Defects

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Abnormal or missing overlying soft tissues, bone, and nasal cartilages (septum, upper lateral cartilages, lower lateral cartilages)
C. Airway abnormalities (eg, presence of OSA; upper airway obstruction; tracheostomy; choanal atresia; nasal septal deviation and/or perforation; hypertrophied turbinates; allergic symptoms; hypertrophied tonsils; and adenoids, polyps, or tumors)
D. Condition of sinuses (eg, presence or absence of allergies, polyps, sinusitis, mucocele)
E. Poor quality of speech (eg, presence or absence of hypernasal or hyponasal speech, velopharyngeal incompetence, articulatory speech dysfunction, tongue volume, and immobility)

IV. Indicated Therapeutic Parameters for Nasal Defects

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *and* Dental and Craniomaxillofacial Implant Surgery *chapters.*

The following procedures for the management of nasal defects are not listed in order of preference:

A. Prosthetic replacement: indicated for complete loss of hard and soft nasal tissue as an alternative to hard and soft tissue reconstruction on a temporary or permanent basis. Implant placement for anchorage may be helpful
B. Access for tissue reconstruction
    1. Internal and external nasal incisions
    2. Closed rhinoplasty approach
    3. Open rhinoplasty approach
    4. Coronal flap approach
    5. "Open sky" approach
    6. Midface degloving approach

NASAL DEFECTS (continued)

C. Modalities for reconstruction
   1. Hard tissue
      a. Bone grafts (autogenous grafts)
         i. Cranial
         ii. Rib
         iii. Ilium
         iv. Maxillofacial (eg, mandible, zygoma)
      b. Cartilage grafts (autogenous grafts)
         i. Rib
         ii. Ear
         iii. Nasal
      c. Alloplastic materials
         i. Metallic and/or synthetic plates, screws, and trays
         ii. Synthetic bone substitutes
         iii. Polymeric materials
      d. Allogeneic materials

      Includes freeze-dried, demineralized freeze-dried, fresh-frozen, cryopreserved fresh-frozen materials; autolyzed antigenic extracted allogeneic bone

         i. Bone
            aa. Rib
            bb. Ilium
            cc. Mandible
            dd. Other (eg, maxilla, calvaria, zygoma)
            ee. Particulated bone (eg, crushed cortical and cancellous, wedges and strips)
         ii. Cartilage (eg, cryopreserved fresh-frozen, fresh-frozen, freeze-dried)
      e. Xenogeneic
      f. Implant placement (Also see the *Dental and Craniomaxillofacial Implant Surgery* chapter)
      g. Use of adjuvant planning tools such as VSP, CASS
      h. Navigational surgery
   2. Soft tissue
      a. Local flaps
         i. Random pattern flaps
         ii. Axial pattern flaps
         iii. Regional flaps
      b. Microvascular flaps (eg, radial forearm flap, rectus abdominis flap, latissimus dorsi flap)
      c. Full- or split-thickness skin and mucosal grafts
      d. Adjunctive therapy (eg, hyperbaric oxygen, wound debridement)
      e. Tissue expanders
D. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Nasal Defects

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
   2. Restored absent or displaced hard tissues
   3. Improved speech
   4. Improved support for nasal soft tissues
   5. Improved airway
   6. Closure of oronasal fistulae

NASAL DEFECTS (continued)

7. Removal of indicated foreign bodies
8. Improved drainage of orbital secretions
9. Improved function of paranasal sinuses

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
   2. Recipient site
      a. Nasolacrimal complications
      b. Septal defects
      c. Nasal projection loss
      d. Reduced nasal airway
      e. Displaced hard tissues
      f. Cosmetic defect/compromise
      g. Secondary infection
   3. Donor site(s)
      a. Known risks and complications associated with iliac grafts
         i. Persistent gait disturbance
         ii. Hernia
         iii. Ileus
         iv. Peritonitis
         v. Retroperitoneal hematoma
         vi. Infection
      b. Known risks and complications associated with rib grafts
         i. Pneumothorax and/or hemothorax
         ii. Chondritis
         iii. Infection
      c. Known risks and complications associated with cranial grafts
         i. Dural tears
         ii. Intracranial hemorrhage (eg, epidural subdural hematoma)
         iii. Infection

DEFECTS OF THE FRONTAL BONE AND ASSOCIATED SOFT TISSUES

I. Indications for Therapy for Defects of the Frontal Bone and Associated Soft Tissues

May include one or more of the following:

A. Inadequate protection for the central nervous system
B. Inadequate support for frontal soft tissues
C. Frontal pain, paresthesia, anesthesia, or paralysis
D. Abnormal function of the frontal sinus (eg, lack of appropriate drainage)
E. Frontal sinus infection, mucocele, or other pathology
F. Facial asymmetry
G. Cosmetic contour defect
H. Presence of foreign bodies
I. Other evidence, when applicable, from clinical examination or imaging studies (eg, radiography, computed tomography, magnetic resonance imaging)
J. Scar contracture (eyebrow, upper eyelid)
K. Cosmetic soft tissue deformity
L. Regional neurologic dysfunction (eg, pain, frontal paresthesia or anesthesia, paralysis of frontalis)
M. Ptosis of eyebrow or eyelid

DEFECTS OF THE FRONTAL BONE AND ASSOCIATED SOFT TISSUES (continued)

II. Specific Therapeutic Goals for Defects of the Frontal Bone and Associated Soft Tissues

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Improved facial symmetry
C. Improved pain, paresthesia, anesthesia, or paralysis of forehead and/or eyebrows
D. Improved support of forehead soft tissues
E. Improved protection of the central nervous system
F. Removal of indicated foreign bodies
G. Improved function of the frontal sinus
H. Resolution of frontal sinus infection, mucocele, or other pathology
I. Improved appearance
J. Replacement of missing soft tissue structures
K. Improved neurologic function or camouflage of dysfunction
L. Improved protection and/or lubrication of the eye
M. Improved scars and scar contractures

III. Specific Factors Affecting Risk for Defects of the Frontal Bone and Associated Soft Tissues

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Abnormal overlying frontal soft tissues
C. Presence of pathology in bone
D. Presence of infection
E. Extensive loss of bone and soft tissue

IV. Indicated Therapeutic Parameters for Defects of the Frontal Bone and Associated Soft Tissues

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. If brain exposure is anticipated, neurologic surgery consultation should be considered. Also see the Patient Assessment *chapter.*

The following is a list of procedures for reconstruction of defects of the frontal bone and associated soft tissue. Defect characteristics, including volume, tissue condition, and anatomical site, should guide the selection of an appropriate reconstructive technique. The following procedures for the management of defects of the frontal bone and associated soft tissues are not listed in order of preference:

A. Timing of reconstruction should be considered during preoperative planning
    1. Immediate reconstruction
        a. When potential for successful hard tissue reconstruction is favorable (eg, adequate soft tissue, vascular supply)
        b. For tumor ablative surgery, when there is a high degree of confidence that the tumor has been completely removed
        c. When there is concern regarding deterioration of the psychological and/or psychiatric status of the patient and/or family
        d. Palliative reconstruction in cases of terminal disease when there is facial disfigurement
        e. In the presence of extensive soft tissue defect, to prevent infection, contracture, salivary incontinence, etc.
    2. Delayed reconstruction
        a. When the potential for successful immediate hard tissue reconstruction is unfavorable (eg, oral contamination, compromised vascular supply, infection)

DEFECTS OF THE FRONTAL BONE AND ASSOCIATED SOFT TISSUES (continued)

b. For tumor ablative surgery, when it is not certain that the tumor has been completely removed
c. Palliative reconstruction in cases of terminal disease when there is facial disfigurement

B. Access for reconstruction
1. Coronal flap
2. "Open sky" incision
3. Brow incision
4. Through existing laceration

C. Modalities of reconstruction
1. Hard tissue
a. Frontal reconstruction (cranioplasty) with alloplastic materials
b. Frontal reconstruction with autogenous bone
c. Frontal osteotomy
d. Resection of frontal sinus mucosa and obliteration with bone, fat, or other materials
e. Frontal sinus cranialization
2. Soft tissue
a. Forehead reconstruction
i. Undermining with primary closure
ii. Healing by secondary intention
iii. Split- or full-thickness skin grafts
iv. Local flaps
aa. Advancement (eg, unilateral [U-plasty], bilateral [H-plasty], or Burow wedge advancement flaps)
bb. Rotational
cc. Transposition (eg, rhomboid flap)
v. Use of tissue expanders in conjunction with local flaps
b. Scalp reconstruction
i. Undermining with primary closure
ii. Healing by secondary intention
iii. Full- or split-thickness skin grafts
iv. Local flaps
aa. Transpositional flaps (eg, temporoparietal flaps, temporo-parietal-occipital flap, Juri flap)
bb. Rotation flaps
cc. Advancement flaps (eg, U-plasty, H-plasty)
v. Use of tissue expanders
vi. Microvascular flaps
3. Use of adjuvant planning tools such as VSP, CASS
4. Navigational surgery

D. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Defects of the Frontal Bone and Associated Soft Tissues

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
2. Restored absent or displaced hard tissues
3. Improved pain, paresthesia, anesthesia, or paralysis of forehead and/or eyebrows
4. Improved support of forehead soft tissues
5. Improved protection of the central nervous system
6. Removal of indicated foreign bodies
7. Improved function of the frontal sinus

DEFECTS OF THE FRONTAL BONE AND ASSOCIATED SOFT TISSUES (continued)

8. Resolution of frontal sinus infection, mucocele, or other pathology
9. Restoration or improvement of missing or compromised soft tissue structures
10. Improved neurologic function or camouflage of dysfunction
11. Improved protection and/or lubrication of the eye
12. Improved scars and scar contractures

B. Known risks and complications associated with therapy
1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
2. Recipient site
   a. Cosmetic defects
   b. Frontal sinus drainage complications
   c. Contour complications
   d. Insufficient hard and soft tissue
   e. Secondary infections
3. Specific known risks and complications associated with selected commonly used donor sites
   a. Ilium
      i. Persistent gait disturbance
      ii. Hernia
      iii. Ileus
      iv. Peritonitis
      v. Retroperitoneal hematoma
   b. Rib
      i. Pneumothorax and/or hemothorax
      ii. Chondritis
   c. Cranium
      i. Dural tears
      ii. Intracranial hemorrhage (eg, epidural, subdural hematoma)
   d. Rotational scalp flaps
      i. Alopecia and/or hair growth disturbance
      ii. Excessive scarring and/or cosmetic defects
      iii. Dehiscence
   e. Temporoparietal fascia flap
      i. Excessive scarring and/or cosmetic defects
      ii. Alopecia
   f. Rectus abdominis free flap
      i. Hernia
      ii. Excessive scarring and/or cosmetic defects
   g. Trapezius free flap
      i. Excessive scarring and/or cosmetic defects
      ii. Upper extremity range of motion disturbance

NEUROLOGIC DEFECTS

I. Indications for Therapy for Neurologic Defects

May include one or more of the following:

*Injuries to the terminal branches of the trigeminal nerve (*eg, *lingual, inferior alveolar, long buccal nerves) are known risks of oral and maxillofacial surgery, especially following dentoalveolar surgery. In addition, the use of local anesthesia (*eg, *mandibular block) may increase the risk of nerve injury. Most nerve injuries resolve spontaneously, but some do not resolve and require consideration for nonsurgical and/or surgical intervention.*

NEUROLOGIC DEFECTS (continued)

Microneurosurgical repair should be considered when the disability is of concern to the patient, and there is clinical evidence of moderate, severe, or complete neurosensory impairment; paresis or paralysis of facial muscles; loss, decreased, or abnormal taste sensation; or neuropathic pain of peripheral origin.

*Microneurosurgical repair should be considered when the disability is of concern to the patient, and there is clinical evidence of moderate, severe, or complete neurosensory impairment of various areas of the orofacial region (*eg, *lips, chin, tongue); paresis or paralysis of facial muscles; loss, decreased, or abnormal taste sensation; or neuropathic pain of peripheral origin or if the progression of spontaneous nerve recovery halts. Surgical repair should incorporate specialized microsurgical techniques (*eg, *operating magnification, nerve grafting), when indicated.*

A. Unobserved (closed) nerve injuries
    1. Most injuries to the lingual and inferior alveolar nerves are not recognized by the clinician at the time of injury, but manifest in the postoperative period with compromised spontaneous return of sensation
    2. Following recognition of the nerve injury documented by history and clinical examination, patients should be referred for neurologic assessment if there is a persistent lack of spontaneous improvement, and if the clinician does not have the skills to perform comprehensive neurosensory assessment and/or does not have the expertise to perform surgical repair, if indicated
    3. Nerve injuries may result in reduced sensation (eg, hypesthesia or anesthesia), and/or painful sensation (eg, hyperesthesia, allodynia, dysesthesia)
    4. Based upon clinical neurosensory testing, nerve injuries that demonstrate moderate, severe, or complete sensory impairment, that are non-resolving, may benefit from microneurosurgery
    5. Symptomatic unpleasant sensations (eg, neuropathic pain, dysesthesia, dysgeusia, ageusia, or hypogeusia, with or without a painful trigger zone) may benefit from nonsurgical management (eg, pharmacologic treatment, neurology consultation)
    6. Presence of sustained intolerable neuropathic pain (eg, allodynia, hyperalgesia, hyperpathia) unrelieved by medical and physical therapies may benefit from microneurosurgical intervention, especially if the symptoms are alleviated by a diagnostic local anesthetic nerve block
    7. Nonresolving or worsening functionally debilitating neurosensory deficits may benefit from microsurgical intervention
    8. Nonresolving facial nerve muscular paresis and deficient nerve conduction deficits (based upon EMG studies) may benefit from physical therapy, facial reanimation procedures, or microneurosurgical intervention
B. Observed (open) nerve injuries
    1. On occasion, a nerve injury may be seen at the time of injury. Management is based upon several factors:
        a. A transected nerve lying within soft tissue (eg, lingual nerve, facial nerve), may be amenable to immediate or delayed primary (21 days) repair, or secondary repair (following initial soft tissue healing and assessment of spontaneous recovery) depending upon the exact nature of the injury (eg, clean vs avulsive), the patient's physical status, the status of wound (eg, contaminated, infected), and the availability of microsurgical equipment and clinical skill
        b. A transected, well-aligned nerve lying within a bony canal (eg, inferior alveolar nerve within the inferior alveolar canal) may or may not require primary, delayed primary, or secondary repair, depending upon local factors and clinical judgment, since the bony canal may act as a physiologic conduit to guide spontaneous nerve regeneration
    2. Avulsive nerve injuries, whether lying within soft tissue or bony canals, more often require primary, delayed primary, or secondary surgical repair than clean transection nerve injuries
    3. Consideration should be given toward neural reconstruction following ablative jaw procedures that result in nerve continuity defects using interpositional autogenous or allogeneic nerve grafting

II. Specific Therapeutic Goals for Neurologic Defects

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery

NEUROLOGIC DEFECTS (continued)

B. Restoration of acceptable functional sensory, special sensory (eg, taste), and/or motor function
C. Alleviation or reduction in pain or discomfort

III. Specific Factors Affecting Risk for Neurologic Defects

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
B. Functional deficiencies in mastication and/or swallowing
C. Presence of neuromuscular disorders
D. Patient age
E. Patient gender
F. Type of injury
G. Presence of neuropathic pain
H. Time since injury
I. Location of injury
J. Associated soft tissue injuries
K. Other comorbidities (eg, immunocompromised status, use of tobacco)

IV. Indicated Therapeutic Parameters for Neurologic Defects

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, clinical neurosensory or motor nerve conduction tests when indicated, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

A. Nonsurgical treatment
   1. Nonsurgical treatment may be the primary indicated therapy in selected nerve injury patients. Such patients may include those with the following:
      a. Metabolic neuropathies
      b. Centrally induced pain
      c. Atypical pain not conforming to normal peripheral nerve distribution
      d. Chronic injuries when irreversible atrophy has occurred in the distal nerve (Wallerian degeneration)
      e. Pain not effectively relieved by peripheral diagnostic local nerve blocks
      f. Sympathetic-mediated pain or reflex-sympathetic dystrophy (complex regional pain syndrome)
      g. Poor ASA physical status in which surgical risks outweigh potential benefits
   2. Nonsurgical treatment includes several categories, any or all of which might be indicated for a given patient, whether or not surgical treatment is also indicated:
      a. Psychological—evaluation, counseling, support groups, meditation, yoga, stress management, psychotherapy
      b. Physiologic—biofeedback exercises, physical therapy, occupational therapy, transcutaneous electrical stimulation, acupuncture, low-level laser therapy
      c. Pharmacologic—therapeutic local anesthetic nerve blocks, systemic local anesthetics, antineuralgic-antiepileptic medications, antidepressants, nonsteroidal anti-inflammatory drugs, topically applied counterirritants, other medications, as indicated, and as directed by a neurologist

B. Surgical treatment

The following procedures, which are among those that may be required for the surgical management of neurologic defects, are not listed in order of preference:

1. Nerve decompression (external neurolysis)
2. Internal neurolysis
3. Excision of neuroma
4. Direct nerve repair (direct neurorrhaphy)
5. Indirect nerve repair (indirect neurorrhaphy)
   a. Autogenous (eg, sural) nerve grafts

NEUROLOGIC DEFECTS (continued)

b. Allogeneic (cadaveric) nerve grafts
c. Conduit repair (entubulation)

6. Nerve protection (nerve wrap)
7. Epineurial capping
8. Nerve sharing
9. Nerve transfer
10. Nerve transpositioning/lateralization
11. Nerve ablation techniques (eg, gamma knife therapy, radiofrequency, cryosurgery)

V. Outcome Assessment Indices for Neurologic Defects

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
   2. Restoration of acceptable functional sensory, special sensory (eg, taste), and/or motor function
   3. Alleviation or reduction in pain or discomfort

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Reconstructive Surgery
   2. Persistent sensory or special sensory (eg, taste) impairment or loss
   3. Persistent paresis or paralysis of facial muscles
   4. Persistent moderate, severe, or complete sensory impairment
   5. Persistent neuropathic pain
   6. Donor site neurosensory deficit, neuroma formation, skin scar (eg, autogenous nerve graft harvest)

SELECTED REFERENCES – RECONSTRUCTIVE SURGERY

This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation of this document. Citation of the reference material is not meant to imply endorsement of any statement contained in the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2023)

FACIAL COSMETIC SURGERY

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS PARCARE 2023,* WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

INTRODUCTION

Cosmetic maxillofacial surgery, or facial cosmetic surgery, encompasses procedures designed to enhance and improve the form and appearance of the maxillofacial region. Facial cosmetic surgery is utilized to correct the adverse effects of aging, adiposity, facial asymmetries, and congenital and acquired facial deformities. Facial cosmetic surgery may be performed on both hard and soft tissues of the chin, maxillofacial contour, eyelids, nasal structures, soft tissue of face and neck, skin surface contour, hair, and ear.

Perceptions of facial deformities, like all esthetics, are highly subjective. Therefore, this document has made no attempt to evaluate form and appearance objectively or to assess them quantitatively. Applicable treatment is selected after a comprehensive dialog between the facial cosmetic surgeon and the patient in which both subjective and objective evaluations are used to determine the necessity for treatment and to estimate and discuss a reasonable risk-benefit ratio.

Although many different procedures are available for the management of patients with esthetic concerns, this document may serve as a guide. It will be useful in identifying factors that affect risk and establishing parameters of therapy, indicators of favorable therapeutic outcomes, and known risks and complications associated with therapy for many maxillofacial cosmetic procedures.

Facial cosmetic surgery, as presented, is an integral and fundamental aspect of oral and maxillofacial surgery parameters and is best addressed as a separate section. It is recognized that cosmetic surgery principles may be applied in the performance of other types of oral and maxillofacial surgery. Fellows and members of the specialty are granted privileges to perform cosmetic maxillofacial surgery and, if indicated, associated autogenous graft harvest, based on individual training, experience, and demonstrated current competence.

GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR FACIAL COSMETIC SURGERY

INFORMED CONSENT: All surgery must be preceded by the patient's or legal guardian's consent, unless an emergent situation dictates otherwise. Emergent circumstances and the indications for treatment should be documented in the patient's record.

Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the expected recovery period, alternative treatment options (including no treatment), and any patient or procedure specific factors that may affect the risk. The results of the informed consent process must be documented in the patient medical record. In general, an informed consent document is signed by the patient or guardian, but the Oral and Maxillofacial Surgeon is well-advised to document in the medical record that the informed consent process occurred and that the patient/guardian provided both verbal and written consent that they understand and are willing to proceed with treatment.

PERIOPERATIVE ANTIBIOTIC THERAPY: The administration or prescribing of antibiotics may not be needed for otherwise healthy patient and thus the decision to employ prophylactic perioperative antibiotics is at the sole discretion of the treating surgeon and should be based on the patient's clinical condition as well as other comorbidities which may be present.

DEALING WITH NEUROLOGIC DEFICITS: Injuries to the terminal branches of the trigeminal nerve (eg, lingual, inferior alveolar, long buccal nerves, infraorbital, as well as the facial nerve, are known risks of oral and maxillofacial surgery. It should be noted that the presence of a pathologic craniomaxillofacial condition, dentoskeletal or craniofacial abnormality, or traumatic craniomaxillofacial injury may result in nerve injury prior to surgical management. In addition, the use of local anesthesia (eg, mandibular block) may increase the risk of nerve injury. Most nerve injuries resolve spontaneously, but some do not, and these may require consideration for nonsurgical and/or surgical intervention. Microneurosurgical repair should be considered when the disability is of concern to the patient, and there is clinical evidence of moderate, severe, or complete neurosensory impairment of various areas of the orofacial region (eg, lips, chin, tongue); paresis or paralysis of facial muscles; loss, decreased, or abnormal taste sensation; or neuropathic pain of peripheral origin or if the progression of spontaneous nerve recovery halts. Surgical repair should incorporate specialized microsurgical techniques (eg, operating magnification, nerve grafting), when indicated. Also see the *Reconstructive Surgery* chapter.

USE OF IMAGING MODALITIES: Imaging modalities may include panoramic radiograph, periapical and/or occlusal radiographs, maxillary and/or mandibular radiographs, computed tomography, cone-beam computed tomography, positron emission tomography, positron emission tomography/computed tomography, and magnetic resonance imaging. In determining studies to be performed for imaging purposes, principles of as low as reasonably achievable should be followed.

DOCUMENTATION: *AAOMS ParCare 2023* includes documentation of objective findings, diagnoses, and patient management interventions. *The ultimate judgment regarding the appropriateness of any specific procedure must be made by the individual surgeon in light of the circumstances presented by each patient. Understandably, there may be good reasons to deviate from these parameters. When a surgeon chooses to deviate from an applicable parameter based on the circumstances of a particular patient, the facial cosmetic surgeon is well-advised to note in the patient's record the reason for the procedure followed. Moreover, it should be understood that adherence to the parameters does not guarantee a favorable outcome.*

GENERAL THERAPEUTIC GOALS FOR FACIAL COSMETIC SURGERY:

A. Appropriate understanding by patient (family) of treatment options and acceptance of treatment plan
B. Appropriate understanding and acceptance by patient (family) of favorable outcomes and known risks and complications
C. Correction of functional deformities that affect appearance
D. Satisfaction of the patient's desire for improved facial contour
E. Enhancement of the patient's self-esteem and quality of life
F. Achievement of the desired change in maxillofacial bone and/or soft tissue facial contour, symmetry and/or form
G. Stable and predictable clinical results
H. Consistent with gender identification of the patient

GENERAL FACTORS AFFECTING RISK DURING FACIAL COSMETIC SURGERY:

A. Degree of patient and/or family understanding of the origin and natural course of the condition or disorder and therapeutic goals and acceptance of proposed treatment
B. Presence of coexisting major systemic disease (eg, disease that increases a patient's American Society of Anesthesiologists classification to II, III, or IV), as detailed in the Patient Assessment *chapter*
C. Age of patient
D. Presence of abnormal neural, vascular, or muscular anatomy
E. Presence of infection
F. History of previous surgery in the same anatomical region
G. Presence of local or systemic conditions that may interfere with the normal healing process and subsequent tissue homeostasis (eg, previously irradiated tissue, diabetes mellitus, chronic renal disease, liver disease, blood disorder, steroid therapy, contraceptive medication, immunosuppression, malnutrition, bisphosphonate therapy)
H. Presence of behavioral, psychological, neurologic, or psychiatric disorders, including habits (eg, tobacco usage, substance abuse), seizure disorders, body dysmorphic disorder, or self-mutilation that may affect surgery, healing, and/or response to therapy
I. Degree of patient's and/or family's cooperation and/or compliance
J. Regulatory and/or third-party decisions concerning access to care, indicated therapy, drugs, devices, and/or materials
K. History of exposure to harmful environmental influences (eg, radiation, sun)

GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR FACIAL COSMETIC SURGERY:

A. Patient's satisfaction with clinical outcome
B. Enhancement of patient's self-esteem and quality of life
C. Clinical evidence of healing
D. Imaging evidence of healing
E. Unchanged preoperative neurosensory and/or neuromotor function
F. Achievement of desired change in osseous and/or soft tissue contours
G. Imaging evidence of improvement in osseous and/or soft tissue contours
H. Patient (family) acceptance of procedure and understanding of outcomes

GENERAL KNOWN RISKS AND COMPLICATIONS FOR FACIAL COSMETIC SURGERY:

A. Unplanned admission after elective surgery
B. Unplanned intubation
C. Reintubation or tracheostomy after surgery
D. Use of parenteral drugs and/or fluids for longer than 72 hours after elective surgery
E. Failure to ambulate within a reasonable of time
F. Facial and/or trigeminal nerve dysfunction after surgery
G. Facial fracture during or after surgery

H. Unplanned Caldwell-Luc, bronchoscopy, or other exploratory procedures associated with surgery
I. Dental injury during surgery
J. Ocular injury during surgery
K. Repeat surgery within 6 months of original surgery
L. Revision surgery
M. Core temperature of greater than 101 °F 72 hours after elective surgery
N. Postsurgical radiograph indicating presence of foreign body
O. Unplanned transfusion(s) of blood or blood components during or after surgery
P. Readmission for complications or incomplete management of problems on previous hospitalization
Q. Respiratory and/or cardiac arrest
R. Expressions of patient dissatisfaction
S. Evidence of patient's diminished self-esteem and quality of life
T. Infection of bone and soft tissue
U. Soft tissue necrosis
V. Formation of hypertrophic scar or keloid
W. Hematoma
X. Death

SPECIAL CONSIDERATIONS FOR PEDIATRIC FACIAL COSMETIC SURGERY

Facial cosmetic surgery procedures were once thought to be reserved only for the adult patient, but recent reports from public polls, media, and cosmetic surgery literature demonstrate that more children (mostly adolescents) are seeking cosmetic procedures.These procedures may be associated with gender affirming surgeries and need to be planned based on state laws as well as patient (and parent if applicable) requests.

Generally, 4 areas of cosmetic surgical problems may present to the Oral and Maxillofacial Surgeon in a pediatric patient: skin health issues, septorhinoplasty, otoplasty, and the correction of congenital or acquired deformities of the craniomaxillofacial region.

Skin care and health have become a public health issue, even for the pediatric population. The sharp increase in skin malignant tumors due to long-term sun exposure has alarmed public health officials and practitioners nationwide. Skin cancer originates in early childhood, when the skin is most susceptible to damage. Parents should be instructed in skin protection (eg, coverage, sunscreens of sun protection factor 30 or higher with ultraviolet A and ultraviolet B protection, and vigilance) for their children. Children with Spitz nevi, large melanotic patches (hairy), multiple or variable nevi, or a family history of skin cancer should be referred for dermatologic surveillance.

Acne and acne scarring are also important issues in skin care for the adolescent patient. Chemical epidermal and dermal skin rejuvenation procedures are available, which intend to improve or control comedone formation, sebaceous inflammatory conditions, and some mild forms of cystic acne. Dermabrasion and soft tissue augmentation procedures with injection of materials for acne scarring should be reserved for late adolescence and early adulthood. Resurfacing procedures should be avoided in patients who are using isotretinoin medications for acne control.

Septorhinoplasty is usually delayed until adolescence. An obvious exception is the cleft patient for whom a nasal revision may be beneficial at any point with appropriate indications present. Nasal obstruction may be due to developmental factors, such as allergic rhinitis and other inflammatory conditions, trauma, and neoplastic disease. Inflammatory and allergic phenomena are common in children and are usually controlled through a combination of antihistamines, nasal topic steroids, decongestants, and antibiotics if sinusitis ensues. Corrective nasal surgery was previously deferred due to growth considerations but recent reports suggest that early reconstruction allows optimal nasal development, form, and function. Autogenous osseous, cartilaginous, and fascial grafts are generallyindicated. Complaints of nasal obstruction after septorhinoplasty in the young patient may be due to the nasal cycle (alternating nasal air inflow), which is more active in children, or to exacerbated allergic and inflammatory conditions.

Otoplasty in the pediatric patient population typically involves the surgical correction of ear underdevelopment and overdevelopment (eg, absent antihelical fold, protruding ears due to conchal cartilage hypertrophy, etc.) and asymmetries. Surgery may be performed when the cartilage has reached a near fully developed size, typically at 5 or 6 years of age. Surgical repair is ideally performed prior to the pediatric patient becoming school aged to minimize any psychosocial ramifications of peer ridicule from protruding ears and asymmetries.

Other functional problem areas may demand consideration of early cosmetic-like procedures. Eyelid function is important for the normal development and health of vision. Functional eyelid surgery and blepharoplasty techniques may be appropriately considered for the pediatric patient in these situations.

Elective augmentation or reduction procedures in pediatric patients should be performed after growth has slowed or ceased. Patients with craniofacial anomalies where serial fat graft augmentations might improve the long-term outcome are sometimes exceptions to awaiting completion of growth.

Oral and Maxillofacial Surgeons are well aware of the benefit of orthognathic procedures in achieving esthetic balance and appearance in the face. This is easily expanded to malar and chin procedures, where osteotomies and autogenous grafts or alloplastic materials may be safely used.

CHIN DEFORMITIES

I. Indications for Therapy for Chin Deformities

May include one or more of the following:

A. Patient's desire for change in chin contour and/or position
B. Clinical evidence of bone and/or soft tissue chin deformity
C. Imaging evidence of bone and/or soft tissue deformity

II. Specific Therapeutic Goals for Chin Deformities

The goal of therapy is to improve form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Satisfaction of the patient's desire for change in chin contour and/or position
C. Enhancement of the patient's self-esteem and quality of life
D. Achievement of the desired change in chin contour and/or position (bone and/or soft tissue)
E. Long-term fixation
F. Enhanced appearance resulting from surgical correction of functional deformities

III. Specific Factors Affecting Risk for Chin Deformities

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Presence of abnormal dental anatomy
C. Presence of bone pathology
D. Inferior alveolar nerve position

IV. Indicated Therapeutic Parameters for Chin Deformities

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

A. Mandibular osteotomy
B. Mandibular ostectomy
C. Mandibular osteoplasty
D. Autografts
E. Alloplasts
F. Combinations thereof
G. Instructions for post-treatment care and follow-up
H. Stabilization method (plates, screws, wires)

V. Outcome Assessment Indices for Chin Deformities

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery

CHIN DEFORMITIES (continued)

B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
   2. Failure to achieve desired change in chin contour and/or position
   3. Clinical and/or imaging evidence of malunion of osteotomy and/or ostectomy
   4. Clinical and/or imaging evidence of nonunion of osteotomy and/or ostectomy
   5. Infection of bone, soft tissue, and/or alloplast
   6. Hematoma formation
   7. Resorption of hard and/or soft tissues secondary to alloplast implant
   8. Injuries to dental structures
   9. Clinical failure of implant material (eg, autograft, allograft, alloplast)
   10. Anomalies associated with donor site
   11. Dysfunction (eg, lip incompetence)
   12. Disfigurement (eg, witches chin, pointed chin, asymmetric chin)
   13. Neurosensory damage to lip, chin, mandibular teeth, and gingiva
   14. Development or worsening of obstructive sleep apnea (level of the hypopharynx)

FACIAL CONTOUR DEFORMITIES

This section includes but is not limited to forehead deformities, supraorbital rim anomalies, malar and/or zygomatic arch hypo/hyperplasia, mandibular angular deformity, nasal dorsum, and nasal deformity.

I. Indications for Therapy for Facial Contour Deformities

May include one or more of the following:

A. Patient's desire for change in contour
B. Need to improve patient's self-esteem and quality of life
C. Clinical evidence of bone and/or soft tissue deformity
D. Imaging evidence of bone and/or soft tissue deformity
E. Correction of functional deformities that affect appearance

II. Specific Therapeutic Goals for Facial Contour Deformities

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery

III. Specific Factors Affecting Risk for Facial Contour Deformities

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Presence of local or regional pathology

IV. Indicated Therapeutic Parameters for Facial Contour Deformities

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of maxillofacial contour deformities are not listed in order of preference:

A. Autograft and/or alloplast augmentation
B. Soft tissue reduction or augmentation
C. Osseous tissue reduction or augmentation

FACIAL CONTOUR DEFORMITIES (continued)

D. Osteotomy and/or ostectomy and/or osteoplasty
E. Injectable autografts, allografts, and/or synthetics
F. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Facial Contour Deformities

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
   2. Failure to achieve desired change in facial contour
   3. Clinical and/or imaging evidence of malunion of osteotomy and/or ostectomy
   4. Clinical and/or imaging evidence of nonunion of osteotomy and/or ostectomy
   5. Infection of bone, soft tissue, and/or alloplast
   6. Resorption of hard and/or soft tissues secondary to alloplast implant
   7. Clinical failure of implant material (eg, autograft, allograft, alloplast)
   8. Anomalies associated with donor site
   9. Dysfunction (eg, ectropion, entropion, nasal airway dysfunction)
   10. Chronic sinusitis
   11. Neurosensory compromise in surgical area

EXTERNAL EAR DEFORMITIES

I. Indications for Therapy for External Ear Deformities

May include one or more of the following:

A. Patient's desire for change in contour and appearance
B. Need to improve patient's self-esteem and quality of life
C. Clinical evidence of cartilaginous or soft tissue deformity
D. Microtia, anotia
E. Imaging evidence of cartilaginous or soft tissue deformity
F. Correction of functional deformities that affect appearance

II. Specific Therapeutic Goals for External Ear Deformities

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Achievement of desired change in cartilaginous or soft tissue contour and appearance
C. Restored normal auricular anatomical relationships

III. Specific Factors Affecting Risk for External Ear Deformities

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Craniofacial growth status

EXTERNAL EAR DEFORMITIES (continued)

C. Presence of local or regional pathology
D. History of exposure to harmful environmental influences (eg, radiation, sun)
E. History of external or middle ear disease

IV. Indicated Therapeutic Parameters for External Ear Deformities

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

A. Otoplasty
B. Instructions for post-treatment care and follow-up
C. Ear replacement; osseous implants with prosthesis versus autogenous cartilage versus alloplastic materials (also see the *Dental and Craniomaxillofacial Implant Surgery* chapter)

V. Outcome Assessment Indices for External Ear Deformities

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
   2. Failure to achieve desired change in contour and appearance
   3. Infection of bone, cartilage, soft tissue, graft, and/or alloplastic materials
   4. Anomalies associated with donor site
   5. Resorption of hard and/or soft tissues
   6. Hypertrophic scar or keloid
   7. Dysfunction (eg, auditory canal stenosis)
   8. Failure of osseous implants

FACIAL LIPOMATOSIS

I. Indications for Therapy for Facial Lipomatosis

May include one or more of the following:

A. Patient's desire for change in contour
B. Need to enhance patient's self-esteem and quality of life
C. Clinical evidence of soft maxillofacial tissue deformity
D. Imaging evidence of soft tissue maxillofacial deformity
E. Correction of functional deformities that affect appearance

II. Specific Therapeutic Goals for Facial Lipomatosis

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery

III. Specific Factors Affecting Risk for Facial Lipomatosis

Severity factors that increase risk and the potential for known complications:

FACIAL LIPOMATOSIS (continued)

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Presence of local or regional pathology
C. History of exposure to harmful environmental influences (eg, radiation, sun)

IV. Indicated Therapeutic Parameters for Facial Lipomatosis

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of maxillofacial adiposity are not listed in order of preference:

A. Closed or open suction-assisted lipectomy
B. Excisional lipectomy
C. Cryolipolysis, thermolypolysis, chemolypolysis, radiofrequency, and ultrasound lypolysis
D. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Facial Lipomatosis

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
   2. Failure to achieve desired change in maxillofacial contour
   3. Formation of hypertrophic scar or keloid
   4. Contour defects
   5. Cutaneous burns
   6. Asymmetry
   7. Cervical band formation
   8. Facial nerve injury
   9. Neurosensory loss
   10. Infection
   11. Hematoma/seroma

EYELID DEFORMITIES

I. Indications for Therapy of Eyelid Deformities

May include one or more of the following:

A. Patients desire to enhance self-esteem by improving their periorbital appearance (ie, restoring or improving anatomic position of the periorbital)
B. Patients desire to enhance quality of life by improving periorbital function (ie, correcting peripheral visual impairment, decrease epiphora, or xerophthalmia)
C. Evidence of periorbital trauma or pathology (ie, lacrimal gland hypertrophy, tumor)
D. Clinical evidence of undesirable soft tissue contour/position (ie, upper or lower eyelid dermatochalasis, pseudoherniation of upper or lower orbital fat, lacrimal gland ptosis, eyelid ptosis, undesirable lateral canthal angle location, lower lid laxity, tear troughs, and attenuated inferior orbicularis oculi combined with overlying skin

EYELID DEFORMITIES (continued)

laxity causing a cascading fullness beyond the inferior orbital rim to the molar eminence which may contribute to malar edema, malar mounds, and festoons)

E. Correction of postsurgical complications/defects (ie, ectropion, blunted or malpositioned canthal angle, excessive hollowing of the tear trough due to overzealous resection of orbital fat)
F. Lower eyelid rhytid

II. Specific Therapeutic Goals for Eyelid Deformities

The goal of therapy is to restore or enhance form and function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Achievement of patient's desire for change in periorbital contour (eg, reduction of rhytids and/or fat herniation, tear trough elimination)
C. Improved peripheral vision
D. Elimination of ptosis
E. Elimination of ectropion
F. Correction of entropion

III. Specific Factors Affecting Risk for Eyelid Deformities

Factors that increase risk and the potential for complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Presence of local or regional pathology
C. History of exposure to harmful environmental influences (eg, radiation, sun)
D. Medication history (eg, steroids, isotretinoin)
E. Skin tone and texture (Fitzpatrick or Glogau classification)
F. History of previous periorbital surgery
G. Presence of preoperative xerophthalmia H.

IV. Indicated Therapeutic Parameters for Eyelid Deformities

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures are not listed in order of preference:

A. Blepharoplasty
B. Brow lift
C. Adjunctive procedures such as autologous periorbital fat grafting
D. Alteration of the periorbital osseous contour
E. Instructions for post-treatment care and follow-up
F. Laser resurfacing of rhytids (commonly used to treat lower eyelid dermatochalasis)

V. Outcome Assessment Indices for Eyelid Deformities

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

NASAL DEFORMITIES

I. Indications for Therapy for Nasal Deformities

May include one or more of the following:

A. Patients desire to enhance self-esteem by altering their nasal appearance
B. Patients desire to enhance quality of life by improving nasal function
C. Clinical evidence of nasal deformity (eg, bone, cartilage, and/or soft tissue)

NASAL DEFORMITIES (continued)

D. Imaging evidence of nasal deformity (eg, bone, cartilage, and/or soft tissue)
E. Correction of functional deformities

II. Specific Therapeutic Goals for Nasal Deformities

The goal of therapy is to restore or enhance form and function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Satisfaction of patient's desire for change in nasal contour
C. Achievement of desired change in nasal contour

III. Specific Factors Affecting Risk for Nasal Deformities

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Presence of abnormal bone, cartilage, and/or soft tissue (eg, deviated septum, turbinate, pre-existing septal or palatal perforations)
C. History of previous nasal trauma or surgery
D. Presence of pathology (eg, nasal polyps, sinus disease)
E. History of exposure to harmful environmental influences (eg, radiation, sun)
F. History of intranasal recreational drug use

IV. Indicated Therapeutic Parameters for Nasal Deformities

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of nasal deformities are not listed in order of preference:

A. Open rhinoplasty
B. Closed rhinoplasty
C. Septoplasty
D. Inferior turbinate surgery
E. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Nasal Deformities

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
    2. Uncompromised nasal airway function
B. Known risks and complications associated with therapy
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
    2. Failure to achieve desired change in nasal contour
    3. Malunion of osteotomy
    4. Nonunion of osteotomy
    5. Presence of neurosensory and/or neuromotor abnormality
    6. Excessive soft tissue scarring (eg, keloid)
    7. Infection involving bone, cartilage, soft tissue, and/or grafts
    8. Resorption of hard and/or soft tissues secondary to alloplast implant
    9. Need for secondary procedures
    10. Clinical failure of autograft, allograft, or alloplast material

11. Donor site complications
12. Dysfunction (eg, nasal dyspnea, synechia)
13. Postsurgical sinus disease

CERVICOFACIAL SOFT TISSUE REDUNDANCY

I. Indications for Therapy for Cervicofacial Soft Tissue Redundancy

May include one or more of the following:

A. Patient's desire for change in contour of face and/or neck
B. Need to enhance the patient's self-esteem and quality of life
C. Clinical evidence of soft tissue redundancy
D. Imaging evidence of soft tissue redundancy
E. Correction of functional deformities that affect appearance

II. Specific Therapeutic Goals for Cervicofacial Soft Tissue Redundancy

The goal of therapy is to restore or enhance form and function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Satisfaction of patient's desire for change in cervicofacial contour
C. Achievement of desired change in cervicofacial contour

III. Specific Factors Affecting Risk for Cervicofacial Soft Tissue Redundancy

Factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Presence of pathology
C. History of exposure to harmful environmental influences (eg, radiation, sun)
D. Presurgical obtuse cervicomental angle
E. Undiagnosed or untreated ptotic or hypertrophic submandibular glands
F. Anatomic aberrances (abnormal location or branching of facial nerve)
G. History of prior cervicofacial surgery or trauma

IV. Indicated Therapeutic Parameters for Cervicofacial Soft Tissue Redundancy

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

A. Rhytidectomy
B. Surgical approaches/technique can be organized by:
    1. Incision length and location (traditional vs short scar, S-lift, MACS, endoscopic)
    2. Flap length (short vs long flap, with long flap dissection extending closer to the oral commissure)
    3. Dissection depth including subcutaneous, superficial musculoaponeurotic system, deep plane, and composite (where no dissection is performed between the skin and superficial musculoaponeurotic system)
    4. Combinations thereof

V. Outcome Assessment Indices for Cervicofacial Soft Tissue Redundancy

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Known risks and complications associated with therapy
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
    2. Failure to achieve desired change in cervicofacial contour

CERVICOFACIAL SOFT TISSUE REDUNDANCY (continued)

3. Unfavorable scarring (formation of hypertrophic scar or keloid)
4. Alopecia
5. Loss/malposition of temporal hair tuft
6. Hematoma
7. Transient or permanent facial nerve paresis or palsy
8. Pixy ear deformity
9. Hairline alteration
10. Beard pattern changes
11. Skin necrosis
12. Transient or permanent neurosensory compromise
13. Neuroma
14. Seroma

FOREHEAD AND BROW DEFORMITIES

I. Indications for Therapy for Forehead and Brow Deformities

May include one or more of the following:

A. Patient's desire for change in appearance or position of brow and forehead
B. Need to enhance the patient's self-esteem and quality of life
C. Clinical evidence of forehead rhytids or brow ptosis
D. Imaging evidence of forehead rhytids or brow ptosis
E. Evidence of supraorbital rim hyper/hypoplasia
F. Correction of functional deformities that affect appearance
G. Patient's desire to decrease skin heaviness and redundancy in the glabella, forehead, and temple region

II. Specific Therapeutic Goals for Forehead and Brow Deformities

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Satisfaction of patient's desire for change in forehead rhytids and brow position
C. Achievement of desired change in forehead rhytids, skin redundancy, and brow position
D. Achievement of desired supraorbital rim contour

III. Specific Factors Affecting Risk for Forehead and Brow Deformities

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Presence of pathology
C. History of exposure to harmful environmental influences (eg, radiation, sun)
D. Position of hairline
E. Follicular density of brow hair
F. Patient's sex
G. Thickness and redundancy of forehead skin

IV. Indicated Therapeutic Parameters for Forehead and Brow Deformities

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of forehead and brow deformities are not listed in order of preference

A. Direct

FOREHEAD AND BROW DEFORMITIES (continued)

B. Internal browpexy/browplasty
C. Midforehead
D. Trichophyllic
E. Hairline
F. Coronal
G. Endoscopic
H. Subperiosteal, subgaleal, or subcutaneous
I. Transblepharoplasty browpexy
J. Botulinum toxin therapy
K. Hairline follicular grafting
L. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Forehead and Brow Deformities

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
   2. Achievement of desired change in forehead rhytids and brow position
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
   2. Failure to achieve desired change in forehead rhytids, skin redundancy, and brow position
   3. Alopecia
   4. Neurosensory and/or neuromotor compromise
   5. Anomalies associated with donor site
   6. Alteration in position of hairline
   7. Hypertrophic and keloid scarring

CUTANEOUS TISSUE DEFORMITIES

I. Indications for Therapy for Cutaneous Tissue Deformities

May include one or more of the following:

A. Patient's desire for change in surface texture, elasticity, contour, and/or pigmentation
B. A need to enhance patient's self-esteem and quality of life
C. Clinical evidence of surface deformity (eg, cicatrix, rhytids, elastosis, keloid, pigmentation)
D. Imaging evidence of surface deformity
E. Correction of functional deformity that affects appearance

II. Specific Therapeutic Goals for Cutaneous Tissue Deformities

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Satisfaction of patient's desire for improved surface texture, elasticity, contour, and/or pigmentation
C. Achievement of desired change in surface texture, elasticity, contour, and/or pigmentation

III. Specific Factors Affecting Risk for Cutaneous Tissue Deformities

Severity factors that increase risk and the potential for known complications:

CUTANEOUS TISSUE DEFORMITIES (continued)

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Skin tone and texture (eg, Fitzpatrick skin classification)
C. Genetic factors
D. History of abnormal scarring
E. Medications (eg, steroids, isotretinoin, oral contraceptives)
F. Presence of pigmentary disorder
G. History of herpes simplex type 1 infection

IV. Indicated Therapeutic Parameters for Cutaneous Tissue Deformities

The *presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the* Patient Assessment *chapter.*

The following procedures for the management of cutaneous tissue deformities are not listed in order of preference:

A. Dermabrasion
B. Chemical peel
C. Surgical excision of benign lesions (including scar revision)
D. Injectable materials
E. Topical retinoic acid
F. Topical lightening agents (eg, hydroquinone)
G. Topical exfoliants
H. Topical growth factors
I. IPL, BBL, LED light therapy
J. Ablative, sublative, and nonablative laser treatment
K. Cosmetic neuromuscular blocking agents
L. Radiofrequency skin tightening
M. Ultrasonic skin tightening
N. Microneedling, with or without plate rich plasma, radiofrequency energy
O. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Cutaneous Tissue Deformities

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
   2. Achievement of desired change in surface texture, elasticity, contour, and/or pigmentation
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
   2. Failure to achieve desired change in surface texture, elasticity, contour, and/or pigmentation
   3. Hypopigmentation or hyperpigmentation
   4. Clinical failure of injectable materials
   5. Prolonged erythema secondary to skin treatment procedures
   6. Allergic reaction to filler material
   7. Hypertrophic or keloid scarring
   8. Infection

FACIAL GENDER AFFIRMATION

This type of surgery includes, but is not limited to forehead contour, orbital contour, malar and/or zygomatic arch hypo/hyperplasia, mandibular angle contour, chin contour and position, nasal dorsum, nasal deformity, hairline contour, brow position, eyelid dermatochalasis and fat prolapse, lip length and projection, facial soft tissue laxity, and Adam's apple contour. In all, this includes correction of any area of hard or soft tissue that is anatomically and/or esthetically incongruent with the patient's gender identity.

HAIR PATTERN DEFORMITIES

I. Indications for Therapy for Hair Pattern Deformities

May include one or more of the following:

A. Patient's desire to restore lost hair
B. Need to enhance patient's self-esteem and quality of life
C. Androgenic alopecia
D. Post-traumatic hair pattern deformity (eg, traction, laceration, avulsion, burn)
E. Male pattern facial hair deformity associated with a congenital deformity (eg, cleft lip)
F. Congenital alopecia
G. Alopecia of unknown origin
H. Postsurgical alopecia and/or scarring
I. Premature aging evidenced by premature hair loss

II. Specific Therapeutic Goals for Hair Pattern Deformities

The goal of therapy is to restore form and/or function. However, risk factors and potential complications may preclude complete restoration of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Satisfaction of patient's desire to improve hair pattern
C. Achievement of desired change in hair pattern
D. Restoration of youthful appearance and facial balance by restoring hairlines to within acceptable guidelines

III. Specific Factors Affecting Risk for Hair Pattern Deformities

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Quality and quantity of donor site
C. Density of hair at donor site
D. Classification of male pattern baldness for scalp deformities
E. Magnitude and location of other facial hair loss (eg, eyebrow, lip)
F. Individual facial characteristics
G. Medications (eg, steroids)
H. Alopecia of inflammatory or autoimmune origin resulting in scarring and destruction of the hair follicle (eg, alopecia areata, cicatrical alopecia, lichen planopilaris, frontal fibrosing alopecia)
I. Unrealistic patient expectations
J. History of abnormal scarring
K. History of herpes simplex type 1 infection

IV. Indicated Therapeutic Parameters for Hair Pattern Deformities

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the management of hair pattern deformities are not listed in order of preference:

A. Micrografts
B. Minigrafts
C. Cylinder grafts or punched grafts

HAIR PATTERN DEFORMITIES (continued)

D. Free tissue grafts (eg, donor strips)
E. Rotational flaps
F. Follicular unit extraction
G. Robotic hair restoration

V. Outcome Assessment Indices for Hair Pattern Deformities

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
   2. Achievement of desired change in hair pattern deformity
B. Known risks and complications associated with therapy
   1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
   2. Alopecia of inflammatory or autoimmune origin resulting in scarring and destruction of the hair follicle (eg, alopecia areata, cicatrical alopecia, lichen planopilaris, frontal fibrosing alopecia)
   3. Hemorrhage
   4. Edema
   5. Infection
   6. Surface contour irregularities
   7. Hypertrophic scars
   8. Loss of grafts
   9. Continued hair loss

SPECIFIC SURGICAL CONSIDERATIONS FOR FACIAL GENDER AFFIRMATION SURGERY

Current population studies estimate that 0.4 to 1.6% of adults identify as transgender. Transgender and nonbinary patients seek consult for facial feminization and masculinization surgery. The World Professional Association for Transgender Health (WPATH) is an international, multidisciplinary, professional association. WPATH issues a set of evidence and expert opinions based standard of care for the treatment of the transgender patient. This standard of care, WPATH SOC (Standard of Care) Version 8, is available to the public, and sets for the prevailing clinical guidelines worldwide for treatment of transgender patient, including guidelines for surgical intervention.

Patients seeking surgical intervention for gender dysphoria with facial gender affirmation surgery should meet the guidelines set forth by the WPATH Standards of Care.

I. Indications for Therapy for Facial Gender Affirmation surgery

May include one or more of the following:

A. Treatment of gender dysphoria
B. Patient's desire for changes in facial appearance to more anatomical and esthetic gender appropriate normatives.
C. Need to improve patient's self-esteem and quality of life
D. Clinical evidence of bone and/or soft tissue contours incongruent with patient's gender identity
E. Imaging evidence of bone and/or soft tissue deformity incongruent with patient's gender identity
F. Correction of functional deformities that affect appearance specifically related to patient's gender identity

II. Specific Therapeutic Goals for Facial Gender Affirmation

The goal of therapy is to correct the hard and soft tissues such that they are congruent with the patient's gender identity. However, risk factors and potential complications may preclude complete correction to gender based normative of form and/or function.

A. Presence of a general therapeutic goal, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery

SPECIFIC SURGICAL CONSIDERATIONS FOR FACIAL GENDER AFFIRMATION SURGERY (continued)

B. Long-term result in facial gender correction as perceived by the patient and public (ie, cessation of public "misgendering")
C. Decreased symptoms of gender dysphoria

III. Specific Factors Affecting Risk for Facial Gender Affirmation

Severity factors that increase risk and the potential for known complications:

A. Presence of a general factor affecting risk, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Presence of local or regional pathology or anatomical aberrances (ie, abnormal position of nerve branches)
C. Presence of undiagnosed or untreated psychiatric condition
D. Medications (hormone blockers, exogenous steroids, spironolactone)
E. Inconsistency with hormone therapy for treatment of gender dysphoria
F. Hypercoagulability secondary to exogenous hormone use
G. Thickness of skull bones and position/size of frontal sinus

IV. Indicated Therapeutic Parameters for Facial Gender affirmation

The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and imaging evaluation if indicated by clinical presentation. Also see the Patient Assessment *chapter.*

The following procedures for the purposes of facial gender affirmation are not listed in order of preference:

A. Autograft and/or alloplast augmentation
B. Soft tissue reduction or augmentation (ie, lipectomy and fat transfer, skin excision procedures with or without deeper soft tissue layers)
C. Osseous tissue reduction or augmentation (including rhinoplasty with or without septoplasty)
D. Osteotomy and/or ostectomy and/or osteoplasty
E. Injectable autografts, allografts, and/or synthetics
F. All specific factors and therapeutic parameters listed under *Cutaneous Tissue Deformities* chapter
G. All specific factors and therapeutic parameters listed under *Hair Pattern Deformities* chapter
H. Combinations thereof
I. Stabilization methods (plates, screws, resorbable mechanisms)
J. Instructions for post-treatment care and follow-up

V. Outcome Assessment Indices for Facial Gender Affirmation

Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through clinical evaluation and may include an imaging evaluation.

A. Favorable therapeutic outcomes
    1. General favorable therapeutic outcomes, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
B. Known risks and complications associated with therapy
    1. Presence of a general known risk and/or complication, as listed in the section titled General Criteria, Parameters, and Considerations for Facial Cosmetic Surgery
    2. Failure to achieve desired change in gender appearance
    3. Clinical and/or imaging evidence of malunion of osteotomy and/or ostectomy
    4. Clinical and/or imaging evidence of nonunion of osteotomy and/or ostectomy
    5. Infection of bone, soft tissue, and/or alloplast
    6. Chronic sinusitis
    7. Resorption of hard and/or soft tissues secondary to alloplast implant
    8. Clinical failure of implant material (eg, autograft, allograft, alloplast)
    9. Anomalies associated with donor site
    10. Dysfunction (eg, ectropion, entropion, nasal airway dysfunction, lip incompetence)
    11. Neurosensory compromise in surgical area

SPECIFIC SURGICAL CONSIDERATIONS FOR FACIAL GENDER AFFIRMATION SURGERY (continued)

12. Development of postoperative malocclusion or injury to dental structures
13. Hematoma or seroma formation including postseptal hematoma
14. Disfigurement (asymmetry, lid droop, nasal deformity, hypertrophic scarring or skin necrosis, alopecia, excess soft tissue laxity)
15. Development or worsening of obstructive sleep apnea
16. Changes in vocal pitch

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This list of selected references is intended only to acknowledge some of the sources of information drawn on in the preparation of this document. Citation of the reference material is not meant to imply endorsement of any statement contained in the reference material. The list is not an exhaustive compilation of information on the topic. Readers should consult other sources to obtain a complete bibliography.

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