

*Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2012)*

DENTOALVEOLAR SURGERY

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THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN *AAOMS
PARCARE 2012*, 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: 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. 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.

PERIOPERATIVE ANTIBIOTIC THERAPY: In certain circumstances, the use of antimicrobial rinses and systemic antibiotics may be indicated to prevent 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 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: The *AAOMS ParCare 2012* 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. 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, bisphosphonate therapy, or radiation to the jaws)
- L. Prophylactic treatment when access to care is expected to be limited in the future (eg, military service, service in third world country)

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, blood disorder, steroid therapy, immunosuppression, malnutrition, bisphosphonate therapy)
- 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, including tobacco and alcohol), seizure disorders, 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, bisphosphonate therapy, 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/or 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

- Comment and Exception: Planned admission should be documented in the patient's record before surgery.
- J. Unplanned intubation during the perioperative period
 - Comment and Exception: Planned intubation should be documented in the patient's record before surgery.
- 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
 - Comment and Exception: Procedures where long-term parenteral drugs and/or fluids are anticipated as part of the original treatment plan should be documented in the patient's record before surgery.
- M. Failure to meet proscribed discharge criteria within 6 hours of elective surgery
 - Comment and Exception: Anticipated delays in discharge should be documented preoperatively.
- N. Facial and/or trigeminal nerve dysfunction after surgery (eg, anesthesia, paresthesia of the lips, teeth, chin, or tongue)
 - Comment and Exception: When postoperative nerve dysfunction is a known risk, anticipated deficits should be documented in the patient's record before surgery (eg, trigeminal nerve dysfunction after removal of a third molar documented to be close to nerves).
- O. Maxillary or mandibular fracture during or after surgery
 - Comment and Exception: A fractured bone that may be a sequela to surgery should be documented in the patient's record before 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
 - Comment and Exception: When the likelihood of dental injury is possible, it should be documented in the patient's record before surgery.
- R. Ocular injury during surgery
- S. Unanticipated tissue loss or damage to adjacent vital structures
- T. Repeat Oral and/or Maxillofacial Surgery
 - Comment and Exception: Staged procedures that are part of the original treatment plan should be documented before the initial procedure.
- U. Core temperature of greater than 101°F during the first 72 hours
- V. Presence of foreign body after surgery
 - Comment and Exception: Implanted materials that are anticipated as a normal course of the surgical procedures should be documented in the patient record.
- 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
 - Comment and Exception: Admissions for terminal care must be documented.

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 developmental-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. This is absolutely mandatory in the case of separated parents.

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 are not uncommon and are frequently indicated for removal 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 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. Lingual frenectomy, when indicated, is considered early for optimizing speech development. It is important to recognize that recurrent ranulae 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. Hemangiomas may undergo a rapid growth phase in the first year of life but then regress spontaneously. 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 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. Nonvital pulp of tooth
 10. Carious tooth
 11. Fractured tooth
 12. Tooth mobility
 13. Feter
 14. Malaise
 15. Fever
 16. Chills
 17. Diaphoresis

ODONTOGENIC INFECTIONS (continued)

18. Dyspnea
 19. Dysphagia
 20. Altered function
 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/or 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 entitled 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 entitled 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:

ODONTOGENIC INFECTIONS (continued)

- A. Establishment of airway (intubation, emergency tracheostomy, cricothyroidotomy), if compromised
- B. Elimination of source (removal of tooth, endodontic treatment, periodontal therapy, etc)
- 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 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 entitled 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 entitled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
 - 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. 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 one 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. Split tooth

ERUPTED TEETH (continued)

6. Tooth mobility
 7. Internal or external resorption of tooth
 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), which 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 entitled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
- B. Prevention of pathology
- C. Improved aesthetics
- 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 entitled 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

ERUPTED TEETH (continued)

- L. Approximation of tooth or teeth to inferior alveolar nerve, lingual nerve, mental nerve, maxillary sinus, or other significant structures
- 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 entitled General Criteria, Parameters and Considerations for Dentoalveolar Surgery and Special Considerations for Dentoalveolar Surgery
 - 2. Maintenance of previously diseased teeth
 - 3. Improved aesthetics
 - 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 entitled 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 bisphosphonate therapy
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 one 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 entitled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
- B. Prevention or elimination of pathology
- C. Optimization of prosthetic rehabilitation
- D. Optimization of management and/or healing of jaw fractures
- E. Optimization of orthodontic results
- 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:

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

- A. Presence of a general factor affecting risk, as listed in the section entitled 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 bisphosphonate therapy

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. See also 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
- 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 entitled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery
 - 2. Absence of infection
 - 3. Elimination of associated pathology (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 entitled General Criteria, Parameters, and Considerations for Dentoalveolar Surgery

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

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/or 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. Bisphosphonate-related 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, which may then indicate its removal.

I. Indications for Therapy for Third Molars

May include one 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 (malposition, supraeruption, traumatic occlusion)
 7. Abnormalities of tooth size or shape precluding normal function
 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

THIRD MOLARS (continued)

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 nonsurgical treatment options
 18. Anatomical position causing potential damage to adjacent teeth
- B. Partially erupted third molar tooth: a "partially erupted tooth" that is so positioned 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 nonsurgical 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
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 (odontogenic cysts, neoplasms)

THIRD MOLARS (continued)

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 entitled 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 entitled 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)
- 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 one 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

THIRD MOLARS (continued)

of pathology, advancing decay, 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. See also 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 entitled 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 entitled 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 one 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

DEFORMITIES AND DEFECTS OF THE DENTOALVEOLAR COMPLEX

(continued)

- 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 entitled 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 entitled 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. Bisphosphonate 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. See also 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
 - 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

DEFORMITIES AND DEFECTS OF THE DENTOALVEOLAR COMPLEX*(continued)*

9. Lowering of floor of mouth with or without skin or mucosal grafting
 10. Alveoplasty 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 entitled 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 entitled 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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