Parameters of Care:
Clinical Practice Guidelines
for Oral and Maxillofacial Surgery
(AAOMS ParCare 2017)

TRAUMA 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 posttraumatic functional and cosmetic defects associated with facial trauma. The following section on trauma management presents guidelines 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. 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.

DEALING WITH NEUROLOGIC DEFECTS: 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 non-surgical 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 possibly with angiography, 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 2017 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, and/or psychiatric disorders, including habits (eg, substance abuse, including tobacco and alcohol), seizure disorders, and 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. Evidenced 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 post-operative 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 preexisting 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
   2. Absence of neurologic dysfunction (sensory or motor)

F. Absence of skeletal deformity

G. Absence of soft tissue deformity

H. 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 longer than 12 hours after surgery

I. Unplanned tracheostomy

J. Reintubation or tracheostomy after surgery

K. Use of parenteral drugs and/or fluids for longer than 72 hours after surgery

L. Failure to ambulate within 48 hours of elective surgery

M. Facial fracture during or following surgery

N. Unplanned Caldwell-Luc, bronchoscopy, or other exploratory procedures associated with surgery
O. Dental injury during surgery
P. Ocular injury during surgery
Q. Repeat oral and/or maxillofacial surgery
R. Core temperature of greater than 101°F 72 hours after surgery
S. Postsurgical radiograph indicating presence of foreign body
T. Unplanned transfusion(s) of blood or blood components during or after surgery
U. Readmission for complications or incomplete management of problems on previous hospitalization
V. Respiratory and/or cardiac arrest
W. Chronic neurologic abnormality (e.g., motor and/or sensory dysfunction)
X. Malunion and/or nonunion
Y. Cerebrospinal fluid leak
Z. 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 younger 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 posttraumatic 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 younger 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 replanting 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 younger 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 younger 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 (including permanent teeth) should almost always be replanted, even if the prognosis is apparently poor. 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 one 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
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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Preservation of tooth structures
C. Preservation of alveolar architecture
D. Restoration of occlusion, function, and aesthetics

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 entitled 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. Preexisting periodontal disease
G. Preexisting caries
H. Preexisting endodontic therapy
I. Preexisting 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 posttreatment 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Preserved teeth and tooth structures
   3. Restored occlusion, function, and aesthetics

B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section entitled 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 one 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
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 entitled 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 aesthetics

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 entitled 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. Preexisting periodontal disease
G. Preexisting caries
H. Preexisting endodontic therapy
I. Preexisting 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 posttreatment 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Preserved teeth and tooth structures
   3. Restored occlusion, aesthetics, phonation

B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section entitled 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 one or more of the following:

A. Physical evidence of fracture
B. Imaging evidence of fracture
C. Malocclusion
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 entitled 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 aesthetics

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 entitled 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 posttreatment 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.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Osseous union
   3. Restored pretrauma arch form, function, and occlusion
   4. Restored aesthetics
   5. Normal speech, deglutition, respiration
B. Known risks and complications
   1. Presence of a general known risk and/or complication, as listed in the section entitled 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. Posttreatment 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 one 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 entitled 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

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 entitled 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 (e.g., 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 posttreatment reduction for comminuted mandibular fractures and/or mandibular fractures with concomitant panfacial fractures

F. Use of medical modelling, 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 posttreatment 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Primary healing of soft tissue incisions
   3. Osseous union
   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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Nonunion
   3. Post management 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 one 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Limited pain in the joint
C. Minimal mandibular growth disturbances in children
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 entitled 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) 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)
   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 posttreatment 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 entitled 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
   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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Ankylosis
   3. Nonunion
   4. Posttreatment 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 one 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
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 entitled 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 entitled 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:

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)
D. Resection of condylar head with repositioning and stabilization
E. Total joint replacement
F. Prophylactic antibiotic coverage for open reduction
G. Use of appropriate posttreatment imaging modalities to confirm condylar relocation
H. Antimicrobials as indicated
I. Management/control of pain and anxiety
J. Instructions for posttreatment 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 entitled 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery

2. Posttreatment facial deformity
   a. Unfavorable skeletal relation
   b. Deformity of facial soft tissue (e.g., 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 one 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
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 entitled 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 entitled 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 non-displaced
   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
   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 entitled 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery

2. Nonunion

3. Post-management 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 one 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 entitled 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 entitled 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 computed tomography (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.

A. Favorable therapeutic outcomes
   1. General favorable therapeutic outcomes, as listed in the section entitled 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 entitled 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

5. Abnormal orbital form and eye function

6. Chronic oroantral or oronasal communication

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.

A. Presence of a general therapeutic goal, as listed in the section entitled 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 entitled 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 computed tomography (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 entitled 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Post management 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
   5. Failure and/or extrusion of alloplastic implant
   6. Asymmetric growth disturbances in children
   7. Abnormal position of lower eyelid (entropion, ectropion, scleral show)
   8. Abnormal nasolacrimal apparatus function

NASAL BONE INJURIES

I. Indications for Therapy for Nasal Bone Injuries

May include one 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 entitled 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 entitled 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. Preexisting 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:

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 posttreatment 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 entitled 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Nonunion
   3. Post management facial deformity
      a. Skeletal deformity and/or malunion
      b. Deformity of facial soft and/or hard tissue (e.g., 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 one 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 (e.g., diplopia, dystopia or enophthalmos)
   H. Septal hematoma
   I. Septal deviation
   J. Nasal airway obstruction
   K. Anosmia
   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 entitled 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 entitled 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. Preexisting 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
   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 canaliculare 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 entitled 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Nonunion
   3. Post-management 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 one 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
   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 entitled 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 entitled 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. Preexisting 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
   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. Unreconstructable (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
I. Antimicrobials as indicated
J. Control of pain
K. Drains for management of dead spaces or contaminated wounds when judgment dictates
L. Instructions for posttreatment 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 entitled 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 entitled 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, 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 one 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 entitled 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
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 entitled 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 tissues 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

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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
2. Restored soft tissue pigmentation, texture, hair growth, speech, 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 entitled 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 one 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 entitled 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Underlying cranial fractures
C. Location, length, configuration, and direction of laceration

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- 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 posttreatment care and follow-up
M. Bolster support dressings 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 entitled 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Necrosis of cartilage and skin
   3. Chondritis
   4. Hypertrophic scars (e.g., 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 one or more of following:

A. Physical evidence of contusion and/or abrasion
B. Physical evidence of laceration and/or avulsion
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 (e.g., 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 entitled 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 entitled 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery  
   2. Absence of hypertrophic or contracted scars  
B. Known risks and complications  
   1. Presence of a general known risk and/or complication, as listed in the section entitled 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 one 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)
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 entitled 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 entitled 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:

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- 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 posttreatment 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Restored soft tissue pigmentation, texture, 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Wound breakdown
   3. Posttreatment 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 one 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 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 entitled 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 entitled 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- 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 entitled 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 entitled 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)  
  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 one 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 entitled 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 entitled 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)
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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
   2. Restored soft tissue pigmentation, texture, 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 entitled 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 one 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 entitled 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 entitled General Criteria, Parameters, and Considerations for Trauma Surgery
B. Presence of laryngeal and/or bronchial injury
C. Presence of oral, nasal, or oropharyngeal 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 posttreatment 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 entitled 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 entitled 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

SELECTED REFERENCES – TRAUMA 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.

SPECIAL CONSIDERATIONS FOR PEDIATRIC TRAUMA SURGERY


FRACTURED TEETH


LUXATED AND/OR AVULSED TEETH

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ALVEOLAR PROCESS INJURIES


**MANDIBULAR ANGLE, BODY, RAMUS, AND SYMPHYSIS INJURIES**

MANDIBULAR CONDYLE INJURIES


MANDIBULAR CONDYLE DISLOCATION


MAXILLARY INJURIES


**ZYGOMATIC INJURIES**


ORBITAL INJURIES

NASAL BONE INJURIES


NASO-ORBITAL-ETHMOID COMPLEX INJURIES


FRONTAL BONE AND FRONTAL SINUS INJURIES


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ORAL/PERIORAL SOFT TISSUE INJURIES


AURICLE INJURIES


SCALP INJURIES


PERIORBITAL SOFT TISSUE INJURIES


FACIAL SOFT TISSUE INJURIES


UPPER AIRWAY OBSTRUCTION


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