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

TRAUMA SURGERY

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J Oral Maxillofac Surg

THIS SECTION IS 1 OF 11 CLINICAL SECTIONS INCLUDED IN AAOMS
PARCARE 2017, WHICH IS VIEWED AS A LIVING DOCUMENT APPLICABLE
TO THE PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY. IT WILL BE UPDATED
AT DESIGNATED INTERVALS TO REFLECT NEW INFORMATION CONCERNING THE
PRACTICE OF ORAL AND MAXILLOFACIAL SURGERY.

55

56 **INTRODUCTION**

57

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

63 Treatment of these patients often requires hospitalization and the skills of professionals trained in trauma
64 management. The emergent management of the patient should follow the guidelines established by the American
65 College of Surgeons Subcommittee on Trauma, as outlined in the *Advanced Trauma Life Support for Doctors*.
66 Maxillofacial injuries may result in life-threatening complications and significant cosmetic or functional
67 problems, such as abnormalities in mastication, swallowing, breathing, smelling, and vision. The patient may
68 have chronic pain, and those with extensive residual defects frequently develop psychosocial disorders.

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

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

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

83

84

85 **GENERAL CRITERIA, PARAMETERS, AND CONSIDERATIONS FOR** 86 **TRAUMA SURGERY**

87

88 **INFORMED CONSENT:** All surgery must be preceded by the patient's or legal guardian's consent, unless an
89 emergent situation dictates otherwise. These circumstances should be documented in the patient's record.
90 Informed consent is obtained after the patient or the legal guardian has been informed of the indications for the
91 procedure(s), the goals of treatment, the known benefits and risks of the procedure(s), the factors that may affect
92 the risk, the treatment options, and the favorable outcomes.

93

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

98

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

108 abnormal taste sensation; or neuropathic pain of peripheral origin. Surgical repair should incorporate specialized
109 microsurgical techniques (eg, operating magnification, nerve grafting), when indicated. Also see the
110 *Reconstructive Surgery* chapter.

111
112 **USE OF IMAGING MODALITIES:** Imaging modalities may include panoramic radiograph, periapical and/or
113 occlusal radiographs, maxillary and/or mandibular radiographs, computed tomography possibly with angiography,
114 cone beam computed tomography, positron emission tomography, positron emission tomography/computed
115 tomography, and magnetic resonance imaging. In determining studies to be performed for imaging purposes,
116 principles of ALARA (as low as reasonably achievable) should be followed.

117
118 **DOCUMENTATION:** The *AAOMS ParCare 2017* includes documentation of objective findings, diagnoses, and
119 patient management interventions. *The ultimate judgment regarding the appropriateness of any specific*
120 *procedure must be made by the individual surgeon in light of the circumstances presented by each patient.*
121 *Understandably, there may be good clinical reasons to deviate from these parameters. When a surgeon chooses*
122 *to deviate from an applicable parameter based on the circumstances of a particular patient, he/she is well advised*
123 *to note in the patient's record the reason for the procedure followed. Moreover, it should be understood that*
124 *adherence to the parameters does not guarantee a favorable outcome.*

125
126 **GENERAL THERAPEUTIC GOALS OF TRAUMA SURGERY:**

- 127
128 A. Protection and/or establishment of an adequate airway
129 B. Control of hemorrhage
130 C. Restoration of premorbid form and function
131 D. Preservation of tissue
132 E. Limited period of disability
133 F. Limited psychological morbidity
134 G. Limited pain
135 H. Uncomplicated healing
136 I. Avoidance of infection
137 J. Appropriate understanding by patient (family) of treatment options and acceptance of treatment plan
138 K. Appropriate understanding and acceptance by patient (family) of favorable outcomes and known risks and
139 complications
140 L. Avoidance of secondary deformities
141 M. Optimized esthetic result

142
143 **GENERAL FACTORS AFFECTING RISK DURING TRAUMA SURGERY:**

144
145 Effects of the host and environment, care available, and understanding by the patient and caregiver may affect
146 both risk factors and potential complications associated with trauma surgery.

- 147
148 A. Presence of airway impairment
149 B. Presence of hemorrhage
150 C. Degree of patient and/or family understanding of the origin and natural course of the condition or disorder
151 and therapeutic goals and acceptance of proposed treatment
152 D. Presence of coexisting major systemic disease (eg, disease that increases a patient's American Society of
153 Anesthesiologists classification to II, III, or IV), as detailed in the *Patient Assessment* chapter
154 E. Inability to complete the preoperative evaluation due to the urgency of the patient's clinical condition
155 F. Age of the patient
156 G. Crush, thermal, chemical, and/or electrical injury
157 H. Presence of underlying fracture
158 I. Presence of tissue loss (eg, avulsive injuries)
159 J. Adequacy of blood supply to affected tissues
160 K. Presence of infection and/or pathology associated with injury
161 L. Availability of instruments or equipment

- 162 M. Presence of concomitant medical or surgical problems that may delay management (eg, severe intracranial
- 163 injury, cervical spine injury, pulmonary injury, and cardiac injury)
- 164 N. Presence of local or systemic conditions that may interfere with the normal healing process and subsequent
- 165 tissue homeostasis (eg, previously irradiated tissue, diabetes mellitus, chronic renal disease, liver disease,
- 166 blood disorder, steroid therapy, contraceptive medication, immunosuppression, and malnutrition)
- 167 O. Presence of behavioral, psychological, neurologic, and/or psychiatric disorders, including habits (eg,
- 168 substance abuse, including tobacco and alcohol), seizure disorders, and self-mutilation, that may affect
- 169 surgery, healing, and/or response to therapy
- 170 P. Degree of patient's and/or family's cooperation and/or compliance
- 171 Q. Regulatory and/or third-party decisions concerning access to care, indicated therapy, drugs, devices, and/or
- 172 materials
- 173 R. Time elapsed since injury. Evidenced based medicine has not documented that a significant delay (up to 5
- 174 days from the time of injury) in the repair of uncomplicated maxillofacial fractures increases the risk of
- 175 post-operative complications.
- 176 S. History or presence of keloid or hypertrophic scar formation
- 177 T. Patient's stage of skeletal and/or dental development (eg, growing child; deciduous, mixed, or permanent
- 178 dentition)
- 179 U. Presence of coexisting or previous maxillofacial injury
- 180 V. Presence of coexisting or previous neurologic abnormalities (eg, sensory or motor disturbance)
- 181 W. Presence of a preexisting dentofacial abnormality
- 182 X. Cause of injury and degree of contamination

183
184 **GENERAL FAVORABLE THERAPEUTIC OUTCOMES FOR TRAUMA SURGERY:**

- 185
- 186 A. Healed soft and hard tissues
- 187 1. Osseous union
- 188 2. Primary soft tissue healing of incisions or lacerations
- 189 3. Retention of premorbid tissue
- 190 B. Restored facial form (maybe influenced by premorbid condition)
- 191 C. Restored physiologic function
- 192 D. Limited period of disability
- 193 E. Limited pain
- 194 1. Absence of infection
- 195 F. Absence of neurologic dysfunction (sensory or motor)
- 196 G. Absence of skeletal deformity
- 197 H. Absence of soft tissue deformity
- 198 I. Absence of growth disturbance in children
- 199 J. Patient (family) acceptance of procedure and understanding of outcomes

200
201 **GENERAL KNOWN RISKS AND COMPLICATIONS OF TRAUMA SURGERY:**

- 202
- 203 A. Infection
- 204 B. Scarring (eg, from incisions and/or injury)
- 205 C. Chronic pain
- 206 D. Prolonged or chronic disability
- 207 E. Psychological impairment
- 208 F. Wound breakdown
- 209 G. Unplanned admission to intensive care unit after surgery
- 210 H. Unplanned intubation for longer than 12 hours after surgery
- 211 I. Unplanned tracheostomy
- 212 J. Reintubation or tracheostomy after surgery
- 213 K. Use of parenteral drugs and/or fluids for longer than 72 hours after surgery
- 214 L. Failure to ambulate within 48 hours of elective surgery
- 215 M. Facial fracture during or following surgery
- 216 N. Unplanned Caldwell-Luc, bronchoscopy, or other exploratory procedures associated with surgery

- 217 O. Dental injury during surgery
- 218 P. Ocular injury during surgery
- 219 Q. Repeat oral and/or maxillofacial surgery
- 220 R. Core temperature of greater than 101°F 72 hours after surgery
- 221 S. Postsurgical radiograph indicating presence of foreign body
- 222 T. Unplanned transfusion(s) of blood or blood components during or after surgery
- 223 U. Readmission for complications or incomplete management of problems on previous hospitalization
- 224 V. Respiratory and/or cardiac arrest
- 225 W. Chronic neurologic abnormality (eg, motor and/or sensory dysfunction)
- 226 X. Malunion and/or nonunion
- 227 Y. Cerebrospinal fluid leak
- 228 Z. Death

229

230

231 ***SPECIAL CONSIDERATIONS FOR PEDIATRIC TRAUMA SURGERY***

232

233 Although maxillofacial traumatic injuries in children are less common than in adults, they are associated with
234 considerable morbidity in the pediatric age group. Children younger than 5 years represent less than 1% of
235 patients with maxillofacial injuries reported from general hospitals, and those between the ages of 5 and 12 years
236 represent approximately 4% to 6% of the total. The most common causes are falls and motor vehicle accidents.

237 Treatment principles for children sustaining maxillofacial injury are similar to those for adults and have been
238 described and outlined in this document. However, special considerations are based on the child's anatomy, size,
239 and stages of dental and psychological development. Complications unique to children include growth
240 abnormalities, and psychosocial problems related to posttraumatic facial deformity.

241 Treatment goals in the pediatric population are the same as those described for adults, with the addition of
242 limiting growth abnormalities and ensuring that both the patient and parents obtain adequate counseling to deal
243 with any functional or anatomical deficits resulting from the injury.

244 Psychosocial factors must be considered in the pediatric patient group. Parents often feel guilty about the
245 circumstances surrounding the injury, and counseling may be required to help them understand and deal with
246 potential problems. Age-appropriate counseling may also be required to help the child deal with functional
247 disability or anatomical deformity. The specter of child abuse must be entertained, and where suspicion is
248 aroused, it must be investigated appropriately according to ethical and local legal requirements.

249 The major additional risks to the patient are related to the stage of growth. For example, between the ages of 4
250 and 7 years and 11 and 13 years, condylar fractures present the risk of abnormal growth of the mandible, with
251 resultant malocclusion and asymmetric or symmetric dentofacial deformity. Midface injuries in those younger
252 than 10 years present the risk of decreased growth, resulting in midface hypoplasia and class III malocclusion.
253 Finally, injuries during the deciduous and mixed dentition stages present the risk of direct or treatment-related
254 iatrogenic damage to the permanent teeth, with subsequent late eruption, failure of eruption, or abnormal tooth
255 structure. Consideration should be given for not reimplanting and stabilizing teeth that have been avulsed for
256 more than 1 hour (unless kept in physiologic solution or milk) due to the known risk for root resorption and/or
257 ankylosis.

258 Specific treatment of fractures in children is similar to that in adults, with some exceptions due to age-related
259 anatomic and physiologic variables. When planning open reduction and internal fixation of fractures in children,
260 care must be taken to be aware of and avoid unerupted teeth that may be in the path of plates and screws.
261 Furthermore, in children who have deciduous and mixed dentition, the bone may be soft, and it may be difficult to
262 find adequate bone stock to hold screws. In the mixed stages of dental development, the process of active tooth
263 eruption may compensate for minor misalignments of alveolar fracture reductions.

264 Treatment of condylar fractures warrants special mention. The goals should be to achieve preinjury occlusion
265 and normal motion. Special care should be taken to avoid maxillomandibular fixation for more than 7 to 10 days
266 in children with condylar fractures because this significantly increases the incidence of hypomobility and
267 ankylosis. Significantly displaced condylar fractures in children younger than 5 years are often associated with
268 condylar remodeling or regeneration.

269 Midface injuries in children are treated similarly to adults. Plates and screws placed in the calvaria of children
270 younger than 2 years may migrate toward the dura as the skull grows and probably should be removed.

271 Alternatively, bioresorbable materials may be used in both maxillary and mandibular fractures in this age group.
272 Nasal fractures should be reduced, and treatment is rarely associated with growth disturbance. On the other hand,
273 severely comminuted nasal fractures, with loss of nasal septal cartilage, are often associated with midfacial
274 growth disturbance. The diagnosis of nasal fractures in children may be improved with the use of ultrasound
275 imaging techniques.

276 Soft tissue injuries are managed similarly to that described for adults. In the case of avulsive injuries, tissue
277 (including permanent teeth) should almost always be replanted, even if the prognosis is apparently poor. Children
278 heal well but often experience excessive scarring. For this reason, most sutures should be placed subdermally and
279 long-term skin dressing support implemented. Tissue glues are easily applied for the approximation of tension-
280 free lacerations.

281

282

283 ***FRACTURED TEETH***

284

285 **I. Indications for Therapy for Fractured Teeth**

286

287 *May include one or more of the following:*

288

- 289 A. Physical evidence of a crown fracture and/or root fracture
- 290 B. Imaging evidence of a crown fracture and/or root fracture
- 291 C. Physical evidence of a malocclusion
- 292 D. Physical evidence of tooth mobility
- 293 E. Tooth sensitivity to percussion, manipulation, or mastication
- 294 F. Sensitivity to thermal stimuli
- 295 G. Physical evidence of injury to the adjacent gingiva, alveolar process, or basal bone
- 296 H. Imaging evidence of associated alveolar process or basal bone fracture
- 297 I. Pain in the absence of noxious stimuli

298 **II. Specific Therapeutic Goals for Fractured Teeth**

299

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

302

- 303 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
- 304 Considerations for Trauma Surgery
- 305 B. Preservation of tooth structures
- 306 C. Preservation of alveolar architecture
- 307 D. Restoration of occlusion, function, and aesthetics

308 **III. Specific Factors Affecting Risk for Fractured Teeth**

309

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

311

- 312 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
- 313 and Considerations for Trauma Surgery
- 314 B. Amount of protrusion of the upper incisors
- 315 C. Malocclusion
- 316 D. Labial competence
- 317 E. Vector of impact
- 318 F. Preexisting periodontal disease
- 319 G. Preexisting caries
- 320 H. Preexisting endodontic therapy
- 321 I. Preexisting dental restorations (eg, crown and bridge)
- 322 J. Extent of root development
- 323 K. Size of pulp chamber and root canal
- 324 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

- 379 J. Imaging evidence of an alveolar process fracture
- 380 K. Imaging evidence of widened periodontal ligament
- 381 L. Imaging evidence of a displaced or missing tooth

382 **II. Specific Therapeutic Goals for Luxated and/or Avulsed Teeth**

383

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

386

- 387 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
- 388 Considerations for Trauma Surgery
- 389 B. Preservation of teeth and tooth structures
- 390 C. Preservation of alveolar architecture
- 391 D. Restoration of occlusion, function, and aesthetics

392 **III. Specific Factors Affecting Risk for Luxated and/or Avulsed Teeth**

393

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

395

- 396 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
- 397 and Considerations for Trauma Surgery
- 398 B. Amount of protrusion of the upper incisor
- 399 C. Malocclusion
- 400 D. Labial competence
- 401 E. Vector of impact
- 402 F. Preexisting periodontal disease
- 403 G. Preexisting caries
- 404 H. Preexisting endodontic therapy
- 405 I. Preexisting dental restorations (eg, crown and bridge)
- 406 J. Extent of root development
- 407 K. Size of pulp chamber and root canal
- 408 L. Associated tooth fracture
- 409 M. Postinjury transportation media
- 410 N. Time elapsed since injury and/or reimplantation
- 411 O. Alveolar ridge resorption

412 **IV. Indicated Therapeutic Parameters for Luxated and/or Avulsed Teeth**

413

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

416

417 *The following procedures for the management of luxated and/or avulsed teeth are not listed in order of*
418 *preference:*

419

- 420 A. Reimplantation of adult avulsed teeth
- 421 B. Irrigation of tooth socket
- 422 C. Repositioning of luxated or extruded teeth
- 423 D. Stabilization of mobile teeth or avulsed adult teeth
- 424 E. Observation for the eruption of intruded teeth
- 425 F. Consideration for endodontic therapy
- 426 G. Management of associated alveolar process, mandible, or maxillary fractures
- 427 H. Extraction (or no reimplantation) in cases of nonsalvageable teeth
- 428 I. Antimicrobials as indicated
- 429 J. Control of pain
- 430 K. Instructions for posttreatment care and follow-up

431 **V. Outcome Assessment Indices for Luxated and/or Avulsed Teeth**

432

433 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
434 *clinical evaluation and may include an imaging evaluation.*
435

- 436 A. Favorable therapeutic outcomes
437 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
438 and Considerations for Trauma Surgery
439 2. Preserved teeth and tooth structures
440 3. Restored occlusion, aesthetics, phonation
441 B. Known risks and complications
442 1. Presence of a general known risk and/or complication, as listed in the section entitled General
443 Criteria, Parameters, and Considerations for Trauma Surgery
444 2. Ankylosis
445 3. Root resorption (internal/external)
446 4. Discoloration
447 5. Malocclusion
448 6. Loss of tooth or teeth
449 7. Periodontal defects
450 8. Pulpal disease
451

452 453 ***ALVEOLAR PROCESS INJURIES***

454 455 **I. Indications for Therapy for Alveolar Process Injuries**

456
457 *May include one or more of the following:*
458

- 459 A. Physical evidence of fracture
460 B. Imaging evidence of fracture
461 C. Malocclusion
462 D. Masticatory dysfunction
463 E. Injuries to associated soft tissue
464 F. Sensory nerve deficits
465 G. Fractures or mobility of the dentition

466 **II. Specific Therapeutic Goals for Alveolar Process Injuries**

467
468 *The goal of therapy is to restore form and/or function. However, risk factors and potential complications may*
469 *preclude complete restoration of form and/or function.*
470

- 471 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
472 Considerations for Trauma Surgery
473 B. Preservation of teeth and alveolar bone
474 C. Restoration of premorbid sensory nerve function
475 D. Restoration of occlusion, function, and aesthetics

476 **III. Specific Factors Affecting Risk for Alveolar Process Injuries**

477
478 *Severity factors that increase risk and the potential for known complications:*
479

- 480 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
481 and Considerations for Trauma Surgery
482 B. Presence of abnormal dental occlusion or lack of occlusion (eg, partial edentulism)
483 C. Presence of fractured teeth
484 D. Presence of teeth in line of fracture
485 E. Presence of periodontal disease, infection, or pathology associated with teeth fracture
486 F. Degree of displacement of fracture

- 487 G. Presence of multiple fractured segments or fracture comminution
- 488 H. Presence of compound fracture
- 489 I. Inadequacy of blood supply to fracture segment(s) and/or overlying soft tissue

490 **IV. Indicated Therapeutic Parameters for Alveolar Process Injuries**

491

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

494

495 *The following procedures for the management of alveolar process injuries are not listed in order of*
496 *preference:*

497

- 498 A. Observation and appropriate diet based on limited severity of fracture, displacement, and mobility
- 499 B. Closed reduction in cases of:
 - 500 1. Compound fractures
 - 501 2. Complex fractures
 - 502 3. Medical and/or anesthetic contraindication to open reduction
- 503 C. Open reduction alveolus - stabilization of teeth open reduction splinting
 - 504 1. Unstable fractures
 - 505 2. Patient or surgeon preference for early or immediate function
 - 506 3. Inability to perform closed reduction
 - 507 4. Injuries associated with soft or other bony tissue
 - 508 5. Inadequate dentition (inability to apply dental splinting)
- 509 D. Removal of teeth
- 510 E. Antimicrobials as indicated
- 511 F. Control of pain
- 512 G. Drains for management of dead spaces or contaminated wounds when judgment dictates
- 513 H. Instructions for posttreatment care and follow-up

514

514 **V. Outcome Assessment Indices for Alveolar Process Injuries**

515

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

518

- 519 A. Favorable therapeutic outcomes
 - 520 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
 - 521 and Considerations for Trauma Surgery
 - 522 2. Osseous union
 - 523 3. Restored pretrauma arch form, function, and occlusion
 - 524 4. Restored aesthetics
 - 525 5. Normal speech, deglutition, respiration
- 526 B. Known risks and complications
 - 527 1. Presence of a general known risk and/or complication, as listed in the section entitled General
 - 528 Criteria, Parameters, and Considerations for Trauma Surgery
 - 529 2. Loss of teeth and/or supporting structures
 - 530 3. Periodontal defects
 - 531 4. Devitalized teeth
 - 532 5. Nonunion
 - 533 6. Posttreatment facial deformity
 - 534 a. Skeletal deformity or malunion
 - 535 b. Facial soft tissue deformity (eg, scarring)
 - 536 7. Abnormal oral and maxillofacial function
 - 537 a. Malocclusion and/or masticatory dysfunction
 - 538 b. Dysphonia
 - 539 8. Alveolar ridge resorption

540

541

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 (eg, edentulism)
- F. Presence of fractured teeth
- G. Presence of teeth in line of fracture
- H. Presence of infection or pathology associated with a fracture or associated teeth
- I. History or presence of temporomandibular joint disorder, pathology, or infection
- J. Presence of coexisting alveolar process or maxillary injury

IV. Indicated Therapeutic Parameters for Mandibular Injuries (Angle, Body, Ramus and Symphysis)

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

The following procedures for the management of mandibular angle, body, ramus, and symphysis injuries are not listed in order of preference:

- A. Observation and appropriate diet based on limited severity of fracture, displacement, and mobility
- B. Closed reduction in cases of:
 - 1. Stable fracture

- 596 2. Reduction and stabilization of fracture achievable with closed method and maxillomandibular fixation
597 and/or external fixation
598 3. Medical and/or anesthetic contraindication to open reduction
599 C. Open reduction in cases of:
600 1. Unstable fractures
601 2. Continuity defects
602 3. Patient or surgeon preference for early or immediate mobilization or function
603 4. Injuries to associated soft or other bony tissue
604 5. Need for vascular or neurologic exploration or repair
605 6. Associated midface fractures (LeFort level fractures)
606 D. Antimicrobials as indicated
607 E. Use of advanced imaging, when appropriate, to evaluate the posttreatment reduction for comminuted
608 mandibular fractures and/or mandibular fractures with concomitant panfacial fractures
609 F. Use of medical modelling, when appropriate, to facilitate the anatomic reduction of fractures involving
610 large continuity defects or severely comminuted fractures with concomitant panfacial fractures
611 G. Control of pain
612 H. Drains for management of dead spaces or contaminated wounds when judgment dictates
613 I. Instructions for posttreatment care and follow-up
614 **V. Outcome Assessment Indices for Mandibular Injuries (Angle, Body, Ramus, and Symphysis)**
615

616 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
617 *clinical evaluation and may include an imaging evaluation.*
618

- 619 A. Favorable therapeutic outcomes
620 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
621 and Considerations for Trauma Surgery
622 2. Primary healing of soft tissue incisions
623 3. Osseous union
624 4. Normal speech, deglutition, and respiration
625 5. Occlusion at premorbid status
626 6. Adequate jaw mobility including opening and excursive movements
627 B. Known risks and complications
628 1. Presence of a general known risk and/or complication, as listed in the section entitled General
629 Criteria, Parameters, and Considerations for Trauma Surgery
630 2. Nonunion
631 3. Post management facial deformity
632 a. Skeletal deformity and/or malunion
633 b. Deformity of facial soft tissue
634 c. Abnormal oral and mandibular function (may be influenced by premorbid condition)
635 4. Malocclusion and/or masticatory dysfunction
636 a. Dysphonia and/or dysphagia
637 b. Partial or complete respiratory obstruction
638 5. Loss of tooth or teeth vitality
639 6. Loss of tooth or teeth
640 7. Loss of bony structures
641 8. Damage caused by plate and screw fixation
642 9. Damage to motor and sensory nerves
643 10. Facial widening for symphyseal fractures
644
645

646 **MANDIBULAR CONDYLE INJURIES**

647

648 **I. Indications for Therapy for Mandibular Condyle Injuries**

649

650 *May include one or more of the following:*

- 651
- 652 A. Physical evidence of fracture
- 653 B. Imaging evidence of fracture
- 654 C. Malocclusion
- 655 D. Mandibular dysfunction
- 656 E. Presence of foreign bodies
- 657 F. Lacerations and/or hemorrhage in external auditory canal
- 658 G. Hemotympanum
- 659 H. Cerebrospinal fluid otorrhea
- 660 I. Inability to tolerate maxillomandibular fixation
- 661 J. Midface fractures
- 662 K. Severe displacement of condyle
- 663 L. Dislocation of the condylar head out of the fossa
- 664 M. Effusion
- 665 N. Hemarthrosis

666 **II. Specific Therapeutic Goals for Mandibular Condyle Injuries**

667
668 *The goal of therapy is to restore form and/or function. However, risk factors and potential complications may*
669 *preclude complete restoration of form and/or function.*

- 670
- 671 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
- 672 Considerations for Trauma Surgery
- 673 B. Limited pain in the joint
- 674 C. Minimal mandibular growth disturbances in children
- 675 D. Minimal acute or chronic temporomandibular joint disorders (eg, internal derangement, osteoarthritis)
- 676 E. Adequate jaw mobility including opening and excursive movements

677 **III. Specific Factors Affecting Risk for Mandibular Condyle Injuries**

678
679 *Severity factors that increase risk and the potential for known complications:*

- 680
- 681 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
- 682 and Considerations for Trauma Surgery
- 683 B. Type and location of fracture (eg, greenstick, compound, comminuted, intracapsular or extracapsular)
- 684 C. Absence of teeth
- 685 D. Extent of injury (eg, unilateral or bilateral)
- 686 E. Degree of displacement (eg, nondisplaced, fracture dislocation)
- 687 F. Presence of foreign body
- 688 G. History or presence of temporomandibular joint disorder, pathology, or infection
- 689 H. Presence of coexisting mandibular or maxillary injury
- 690 I. Age

691 **IV. Indicated Therapeutic Parameters for Mandibular Condyle Injuries**

692
693 *The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation.*
694 *Also see the Patient Assessment chapter.*

695
696 *The following procedures for the management of mandibular condyle injuries are not listed in order of*
697 *preference:*

- 698
- 699 A. Observation and appropriate diet based on limited severity of fracture, displacement, and mobility
- 700 B. Closed reduction in cases of:
 - 701 1. Nondisplaced or displaced fracture of a mandibular condyle where form and/or function can be
 - 702 restored and there are no medical contraindications to maxillomandibular fixations
 - 703 2. Fracture dislocations or comminuted fractures in the growing child where form and/or function can be
 - 704 restored

-
- 705 3. Medical and/or anesthetic contraindications to open reduction
706 C. Open reduction (including endoscopically assisted) in cases of:
707 1. Fracture dislocation of a mandibular condyle
708 2. Mechanical interference with mandibular function by the condyle or a foreign body
709 3. Condylar fractures with loss of anterior-posterior and vertical dimension that cannot be managed by
710 closed reduction (eg, edentulous patient, multiple facial fractures)
711 4. Compound fracture
712 5. Displacement of a mandibular condyle into middle cranial fossa
713 6. Patient or surgeon preference for early or immediate mobilization or function
714 D. Antimicrobials as indicated
715 E. Control of pain
716 F. Drains for management of dead spaces or contaminated wounds when judgment dictates
717 G. Instructions for posttreatment care and follow-up

718 V. Outcome Assessment Indices for Mandibular Condyle Injuries

719
720 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
721 *clinical evaluation and may include an imaging evaluation.*
722

- 723 A. Favorable therapeutic outcomes
724 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
725 and Considerations for Trauma Surgery
726 2. Osseous union
727 3. Restored joint anatomy and physiology
728 4. Primary healing of incisions
729 5. Normal speech, deglutition, and respiration
730 6. Occlusion at premorbid status
731 7. Limited period of disability
732 8. Adequate mobilization including opening
733 B. Known risks and complications
734 1. Presence of a general known risk and/or complication, as listed in the section entitled General
735 Criteria, Parameters, and Considerations for Trauma Surgery
736 2. Ankylosis
737 3. Nonunion
738 4. Posttreatment facial deformity
739 a. Skeletal deformity or malunion
740 b. Deformity of the facial soft tissue (eg, scarring)
741 c. Abnormal mandibular growth in children
742 5. Abnormal oral and maxillofacial function (may be influenced by premorbid condition)
743 a. Malocclusion and/or masticatory dysfunction
744 b. Dysphagia and/or dysphonia
745 c. Partial or complete respiratory obstruction
746
747

748 **MANDIBULAR CONDYLE DISLOCATION**

749 I. Indications for Therapy for Mandibular Condyle Dislocation

750
751
752 *May include one or more of the following:*
753

- 754 A. Physical evidence of condylar dislocation
755 B. Imaging evidence of condylar dislocation
756 C. Dental malocclusion
757 D. Mandibular dysfunction
758 E. Post traumatic facial asymmetry

759 F. Pain

760 **II. Specific Therapeutic Goals for Mandibular Condyle Dislocation**

761

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

764

765 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
766 Considerations for Trauma Surgery

767 B. Reduction of dislocation

768 C. Restoration of mandibular function

769 **III. Specific Factors Affecting Risk for Mandibular Condyle Dislocation**

770

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

772

773 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
774 and Considerations for Trauma Surgery

775 B. Presence of neuromuscular disorders

776 C. History of previous temporomandibular joint dislocation

777 D. Duration of temporomandibular joint dislocation

778 E. Presence of anatomical deformity of temporomandibular joint

779 F. History or presence of temporomandibular joint disorder, pathology, or infection

780 **IV. Indicated Therapeutic Parameters for Mandibular Condyle Dislocation**

781

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

784

785 *The following procedures for the management of mandibular condyle dislocation are not listed in order of*
786 *preference:*

787

788 A. Observation and appropriate diet based on limited severity of fracture, displacement, and mobility

789 B. Closed reduction with or without sedation or general anesthesia

790 1. Reduction with maxillomandibular immobilization

791 2. Reduction without maxillomandibular immobilization

792 C. Open reduction (including endoscopically assisted)

793 D. Resection of condylar head with repositioning and stabilization

794 E. Total joint replacement

795 F. Prophylactic antibiotic coverage for open reduction

796 G. Use of appropriate posttreatment imaging modalities to confirm condylar relocation

797 H. Antimicrobials as indicated

798 I. Management/control of pain and anxiety

799 J. Instructions for posttreatment care and follow-up (including physical therapy)

800 **V. Outcome Assessment Indices for Mandibular Condyle Dislocation**

801

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

804

805 A. Favorable therapeutic outcomes

806 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
807 and Considerations for Trauma Surgery

808 2. Absence of skeletal malrelation

809 3. Absence of preauricular depression

810 4. Normal speech and deglutition

811 5. Occlusion at premorbid status

812 B. Known risks and complications

- 813 1. Presence of a general known risk and/or complication, as listed in the section entitled General
814 Criteria, Parameters, and Considerations for Trauma Surgery
815 2. Posttreatment facial deformity
816 a. Unfavorable skeletal relation
817 b. Deformity of facial soft tissue (eg, surgical scar)
818 3. Abnormal oral and maxillofacial function (may be influenced by premorbid condition)
819 a. Malocclusion and/or masticatory dysfunction
820 b. Dysphagia and/or dysphonia
821 4. Chronic dislocation
822 5. Condylar head resorption

823

824

825 **MAXILLARY INJURIES**

826

827 **I. Indications for Therapy for Maxillary Injuries**

828

829 *May include one or more of the following:*

830

831 A. Physical evidence of a fractured maxilla

832 B. Imaging evidence of a fractured maxilla

833 C. Malocclusion

834 D. Masticatory dysfunction

835 E. Deficits of sensory or motor nerves

836 F. Continuity defects

837 G. Presence of foreign bodies

838 H. Injuries to associated soft tissue

839 I. Cerebrospinal fluid rhinorrhea

840 J. Periorbital ecchymosis

841 K. Subcutaneous emphysema

842 L. Subconjunctival hemorrhage

843 M. Ocular dysfunction and/or abnormalities

844 N. Nasolacrimal and/or nasofrontal apparatus dysfunction

845 O. Bleeding from nose (epistaxis) or mouth

846 P. Intercanthal widening

847 Q. Orbital entrapment

848 R. Significant orbital floor fracture as identified clinically or radiographically

849 **II. Specific Therapeutic Goals for Maxillary Injuries**

850

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

853

854 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
855 Considerations for Trauma Surgery

856 B. Restoration of occlusion, phonation, and cosmetics

857 C. Restoration of premorbid form and/or function of orbit and nose

858 D. Restoration of premorbid function of paranasal sinuses

859 E. Preservation of teeth and bone structure

860 **III. Specific Factors Affecting Risk for Maxillary Injuries**

861

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

863

864 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
865 and Considerations for Trauma Surgery

866 B. Degree and displacement of fracture

- 867 C. Presence of multiple fractured segments or fracture comminution
- 868 D. Presence of compound fracture
- 869 E. History or presence of temporomandibular joint disorder, pathology, or infection
- 870 F. Presence of abnormal dental occlusion or lack of occlusion
- 871 G. Presence of fractured teeth
- 872 H. Presence of teeth in line of fracture
- 873 I. Presence of infection or pathology associated with fracture
- 874 J. Presence of paranasal sinus or nasolacrimal apparatus infection or disease
- 875 K. Presence of congenital maxillofacial deformity (eg, cleft palate)
- 876 L. Presence of coexisting maxillofacial fractures

877 **IV. Indicated Therapeutic Parameters for Maxillary Injuries**

878
879 *The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation.*
880 *Also see the Patient Assessment chapter.*

881
882 *The following procedures for the management of maxillary injuries are not listed in order of preference:*

- 883
- 884 A. Observation and appropriate diet based on limited severity of fracture, displacement, and mobility
- 885 B. Closed reduction in cases of:
 - 886 1. Uncomplicated fractures, displaced or non-displaced
 - 887 2. Reduction and stabilization of fracture achievable with closed method and maxillomandibular fixation
 - 888 3. Comminuted fractures
 - 889 4. Medical and/or anesthetic contraindication to open reduction
- 890 C. Open reduction in cases of:
 - 891 1. Inability to reduce fracture using closed methods
 - 892 2. Displaced fracture
 - 893 3. Unstable fracture
 - 894 4. Compound fracture
 - 895 5. Avulsion of bony or dento-osseous segments
 - 896 6. Patient or surgeon preference for early or immediate mobilization or function
 - 897 7. Need for bone graft reconstruction
 - 898 8. Injuries to associated soft tissue
 - 899 9. Need for vascular or neurologic exploration or repair
 - 900 10. Multiple facial fractures including mandibular fractures
- 901 D. Antimicrobials as indicated
- 902 E. Control of pain
- 903 F. Drains for management of dead spaces or contaminated wounds when judgment dictated
- 904 G. Instructions for post-treatment care and follow-up

905 **V. Outcome Assessment Indices for Maxillary Injuries**

906
907 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
908 *clinical evaluation and may include an imaging evaluation.*

- 909
- 910 A. Favorable therapeutic outcomes
 - 911 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
 - 912 and Considerations for Trauma Surgery
 - 913 2. Primary healing of soft tissue incisions
 - 914 3. Mucosal healing over and/or around bony and dento-osseous segments
 - 915 4. Osseous union
 - 916 5. Normal speech, deglutition, and respiration
 - 917 6. Restored premorbid occlusion
 - 918 7. Restored sinus function
 - 919 8. Restored ocular function
 - 920 9. Restored nasal function
- 921 B. Known risks and complications

-
- 922 1. Presence of a general known risk and/or complication, as listed in the section entitled General
923 Criteria, Parameters, and Considerations for Trauma Surgery
924 2. Nonunion
925 3. Post-management facial deformity
926 a. Skeletal deformity or malunion
927 b. Deformity of facial hard and/or soft tissue (eg, nasal and/or orbital deformity)
928 c. Loss of bone and/or dento-osseous segment
929 4. Abnormal oral and maxillofacial function (may be influenced by premorbid condition)
930 a. Malocclusion and/or masticatory dysfunction
931 b. Dysphonia
932 c. Chronic oronasal or oronasal communication
933 d. Altered ocular function including restriction of gaze
934 e. Chronic sinus pathology
935 f. Anosmia
936 g. Partial or complete respiratory obstruction
937 h. Blindness
938 i. Enophthalmos
939 j. Hypoglobus
940 k. Dystopia
941 l. Entropion
942 m. Ectropion
943 n. Epiphora
944 5. Loss of tooth and/or teeth vitality
945 6. Loss of tooth and/or teeth or bony structure
946
947

948 **ZYGOMATIC INJURIES**

949 **I. Indications for Therapy for Zygomatic Injuries**

950 *May include one or more of the following:*
951

- 952
953
954 A. Physical evidence of fracture
955 B. Imaging evidence of fracture
956 C. Sensory or motor nerve deficit
957 D. Mandibular dysfunction
958 E. Ocular dysfunction and/or abnormalities
959 F. Significant orbital floor or lateral wall fractures as identified clinically or radiographically
960 G. Facial deformity
961 H. Subcutaneous emphysema
962 I. Multiple facial fractures (panfacial fractures)
963 J. Severely displaced fractures
964 K. Severe comminution of zygomatic arch fractures

965 **II. Specific Therapeutic Goals for Zygomatic Injuries**

966
967 *The goal of therapy is to restore form and/or function. However, risk factors and known complications may*
968 *preclude complete restoration of form and/or function.*
969

- 970 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
971 Considerations for Trauma Surgery
972 B. Restoration of premorbid ocular function
973 C. Correction or prevention of enophthalmos/exophthalmos
974 D. Restoration of premorbid antral function
975 E. Restoration of mandibular range of motion

976 **III. Specific Factors Affecting Risk for Zygomatic Injuries**

977
978 *Severity factors that increase risk and the potential for known complications:*

- 979
- 980 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
 - 981 and Considerations for Trauma Surgery
 - 982 B. Presence of compound or comminuted fracture
 - 983 C. Degree of displacement
 - 984 D. Presence of congenital maxillofacial deformity (eg, Crouzon syndrome)
 - 985 E. Presence of paranasal sinus infection or disease
 - 986 F. Presence of coexisting maxillofacial fractures

987 **IV. Indicated Therapeutic Parameters for Zygomatic Injuries**

988
989 *The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation,*

990 *including consideration for ophthalmologic evaluation. Also see the Patient Assessment chapter.*

991
992 *The following procedures for the management of zygomatic injuries are not listed in order of preference:*

- 993
- 994 A. Observation based on limited severity of fracture, displacement, and mobility
 - 995 B. Open reduction in cases of:
 - 996 1. Fractured zygoma
 - 997 2. Fractured zygomatic arch
 - 998 3. Fractured orbital floor or lateral wall fractures
 - 999 4. Panfacial fractures, may consider computed tomography (CT) guided navigation)
 - 1000 C. Antimicrobials as indicated
 - 1001 D. Control of pain
 - 1002 E. Drains for management of dead spaces or contaminated wounds when judgment dictates
 - 1003 F. Instructions for post-treatment care and follow-up

1004 **V. Outcome Assessment Indices for Zygomatic Injuries**

1005
1006 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*

- 1007 *clinical evaluation and may include an imaging evaluation.*
- 1008
- 1009 A. Favorable therapeutic outcomes
 - 1010 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
 - 1011 and Considerations for Trauma Surgery
 - 1012 2. Osseous union
 - 1013 3. Mandibular opening of at least 40 mm (less opening acceptable in children, commensurate with age
 - 1014 and development)
 - 1015 4. Mandibular excursions of at least 4 to 6 mm
 - 1016 5. Normal ocular movements, globe position and vision returned to premonitory state
 - 1017 6. Normal speech, deglutition, and respiration
 - 1018 7. Premorbid occlusion status
 - 1019 B. Known risks and complications
 - 1020 1. Presence of a general known risk and/or complication, as listed in the section entitled General
 - 1021 Criteria, Parameters, and Considerations for Trauma Surgery
 - 1022 2. Nonunion
 - 1023 3. Post-treatment facial deformity
 - 1024 a. Skeletal deformity or malunion
 - 1025 b. Deformity of facial soft tissue (eg, scarring, nasal asymmetry)
 - 1026 4. Abnormal oral and maxillofacial function (may be influenced by premonitory condition)
 - 1027 a. Mandibular opening of less than 35 mm (less opening acceptable in children, commensurate with
 - 1028 age and development)
 - 1029 b. Mandibular excursions of less than 4 to 6 mm
 - 1030 c. Malocclusion and/or masticatory dysfunction

- 1031 d. Dysphagia and/or dysphonia
1032 e. Partial or complete respiratory obstruction
1033 5. Abnormal orbital form and eye function
1034 6. Chronic oroantral or oronasal communication
1035
1036

1037 **ORBITAL INJURIES**

1038 **I. Indications for Therapy for Orbital Injuries**

1039 *May include one or more of the following:*

- 1040
1041
1042
1043 A. Physical evidence of orbital injury
1044 B. Imaging evidence of orbital injury
1045 C. Ocular dysfunction and/or abnormalities of the globe
1046 D. Nasolacrimal dysfunction
1047 E. Presence of foreign bodies
1048 F. Subcutaneous emphysema
1049 G. Motor and sensory nerve deficits
1050 H. Presence of soft tissue injuries
1051 I. Entrapment of ocular muscles
1052 J. Retrobulbar hematoma
1053 K. Large defects
1054 L. Enophthalmos
1055 M. Hypoglobus
1056 N. Dystopia

1057 **II. Specific Therapeutic Goals for Orbital Injuries**

1058
1059 *The goal of therapy is to restore form and/or function. However, risk factors and potential complications may*
1060 *preclude complete restoration of form and/or function.*

- 1061
1062 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
1063 Considerations for Trauma Surgery
1064 B. Preservation of vision
1065 C. Correction or prevention of enophthalmos/exophthalmos
1066 D. Preservation of antral function
1067 E. Correction or prevention of nasolacrimal duct dysfunction

1068 **III. Specific Factors Affecting Risk for Orbital Injuries**

1069 *Severity factors that increase risk and the potential for known complications:*

- 1070
1071
1072 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
1073 and Considerations for Trauma Surgery
1074 B. Presence of globe injury
1075 C. Presence of compound or comminuted fracture
1076 D. Presence and degree of fracture displacement
1077 E. Presence of congenital maxillofacial deformity (eg, Crouzon syndrome)
1078 F. Presence of infection and/or pathology associated with fracture
1079 G. Presence of paranasal sinus infection and/or disease
1080 H. Presence of nasolacrimal apparatus infection and/or disease
1081 I. Presence of coexisting middle and/or upper facial third fractures

1082 **IV. Indicated Therapeutic Parameters for Orbital Injuries**

1083

1084 *The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation,*
1085 *including consideration for ophthalmologic evaluation. Also see the Patient Assessment chapter.*

1086
1087 *The following procedures for the management of orbital injuries are not listed in order of preference:*

- 1088
1089 A. Observation based on limited severity of fracture, displacement, and mobility
1090 B. Open treatment (including endoscopically assisted and computed tomography (CT) guided navigation)
1091 C. Orbital reconstruction
1092 D. Medial and/or lateral canthopexy
1093 E. Nasolacrimal reconstruction
1094 F. Antimicrobials as indicated
1095 G. Control of pain
1096 H. Drains for management of dead spaces or contaminated wounds when judgment dictates
1097 I. Instructions for post-treatment care and follow-up

1098 **V. Outcome Assessment Indices for Orbital Injuries**

1099
1100 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
1101 *clinical evaluation and may include an imaging evaluation.*

- 1102
1103 A. Favorable therapeutic outcomes
1104 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
1105 and Considerations for Trauma Surgery
1106 2. Restored nasolacrimal function
1107 3. Restored ocular function (eg, vision, extraocular movements)
1108 4. Radiographic evaluation of placement/positioning of alloplastic and/or autogenous implants
1109 B. Known risks and complications
1110 1. Presence of a general known risk and/or complication, as listed in the section entitled General
1111 Criteria, Parameters, and Considerations for Trauma Surgery
1112 2. Post management facial deformity
1113 a. Skeletal deformity or malunion
1114 b. Deformity of facial soft tissue (eg, scarring, nasal asymmetry)
1115 3. Abnormal orbital form
1116 4. Abnormal ocular function
1117 5. Failure and/or extrusion of alloplastic implant
1118 6. Asymmetric growth disturbances in children
1119 7. Abnormal position of lower eyelid (entropion, ectropion, scleral show)
1120 8. Abnormal nasolacrimal apparatus function

1121
1122
1123 ***NASAL BONE INJURIES***

1124
1125 **I. Indications for Therapy for Nasal Bone Injuries**

1126
1127 *May include one or more of the following:*

- 1128
1129 A. Physical evidence of fractured nasal bones or septum as demonstrated by nasal speculum examination
1130 and/or endoscopy as indicated
1131 B. Imaging evidence of fractured nasal bones or septum
1132 C. Septal hematoma
1133 D. Septal deviation
1134 E. Nasal airway obstruction
1135 F. Anosmia
1136 G. Deficits of sensory and/or motor nerves
1137 H. Presence of foreign bodies

- 1138 I. Injuries to associated soft tissue
- 1139 J. Periorbital ecchymosis
- 1140 K. Subcutaneous emphysema
- 1141 L. Nasolacrimal and/or nasofrontal apparatus dysfunction
- 1142 M. Epistaxis

1143 **II. Specific Therapeutic Goals for Nasal Bone Injuries**

1144
1145 *The goal of therapy is to restore form and/or function. However, risk factors and known complications may*
1146 *preclude complete restoration of form and/or function.*

- 1147
- 1148 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
- 1149 Considerations for Trauma Surgery
- 1150 B. Restoration of premorbid function of paranasal sinuses

1151 **III. Specific Factors Affecting Risk for Nasal Bone Injuries**

1152
1153 *Severity factors that increase risk and the potential for known complications:*

- 1154
- 1155 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
- 1156 and Considerations for Trauma Surgery
- 1157 B. Epistaxis
- 1158 C. Septal hematoma
- 1159 D. Degree and displacement of fracture
- 1160 E. Presence of multiple fractured segments or fracture comminution
- 1161 F. Presence of a compound fracture
- 1162 G. Soft tissue stripping from cartilaginous or bony segments
- 1163 H. Preexisting paranasal infection or pathology
- 1164 I. Damage to nasofrontal and/or nasolacrimal duct
- 1165 J. Presence of cerebrospinal fluid leak
- 1166 K. Presence of coexisting middle or upper-third facial bone fractures

1167 **IV. Indicated Therapeutic Parameters for Nasal Bone Injuries**

1168
1169 *The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation.*
1170 *Also see the Patient Assessment chapter.*

1171
1172 *The following procedures for the management of nasal bone injuries are not listed in order of preference:*

- 1173
- 1174 A. Observation based on limited severity of fracture, displacement, and mobility
- 1175 B. Closed reduction
 - 1176 1. Displaced fractures
 - 1177 2. Comminuted fractures
 - 1178 3. Medical and/or anesthetic contraindication to open reduction
- 1179 C. Open reduction
 - 1180 1. Fractures that cannot be reduced by a closed method (eg, septal displacement, mechanical impaction
 - 1181 of fragments)
 - 1182 2. Avulsion of bony segment and/or overlying soft tissue laceration
 - 1183 3. Fractures requiring immediate bone grafting reconstruction
 - 1184 4. Exposure to the nasal bones provided by surgical access to associated fractures
 - 1185 5. Saddle nose deformity
 - 1186 6. Airway obstruction
- 1187 D. Antimicrobials as indicated
- 1188 E. Control of pain
- 1189 F. Drains for management of dead spaces or contaminated wounds when judgment dictates
- 1190 G. Instructions for posttreatment care and follow-up

1191 **V. Outcome Assessment Indices for Nasal Bone Injuries**

1192

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

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- 1194
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- 1196 A. Favorable therapeutic outcomes
- 1197 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
- 1198 and Considerations for Trauma Surgery
- 1199 2. Restored premorbid function of nose and paranasal sinuses
- 1200 B. Known risks and complications
- 1201 1. Presence of a general known risk and/or complication, as listed in the section entitled General
- 1202 Criteria, Parameters, and Considerations for Trauma Surgery
- 1203 2. Nonunion
- 1204 3. Post management facial deformity
- 1205 a. Skeletal deformity and/or malunion
- 1206 b. Deformity of facial soft and/or hard tissue (eg, nasal deformity, scarring, synechiae)
- 1207 4. Obstruction of nasal airway
- 1208 5. Paranasal sinus dysfunction
- 1209

NASO-ORBITAL-ETHMOID COMPLEX INJURIES

I. Indications for Therapy for Naso-Orbital-Ethmoid Complex Injuries

May include one or more of the following:

- 1216
- 1217 A. Physical evidence of nasal, ethmoid, lacrimal, maxilla, and frontal sinus floor fractures
- 1218 B. Imaging evidence of nasal, ethmoid, lacrimal, maxilla, and frontal sinus floor fractures
- 1219 C. Epistaxis
- 1220 D. Periorbital ecchymosis
- 1221 E. Telecanthus
- 1222 F. Cerebrospinal fluid rhinorrhea
- 1223 G. Ocular dysfunction and/or abnormalities (eg, diplopia, dystopia or enophthalmos)
- 1224 H. Septal hematoma
- 1225 I. Septal deviation
- 1226 J. Nasal airway obstruction
- 1227 K. Anosmia
- 1228 L. Deficits of sensory and/or motor nerves
- 1229 M. Presence of foreign bodies
- 1230 N. Injuries to associated soft tissue
- 1231 O. Subcutaneous emphysema
- 1232 P. Nasolacrimal and/or nasofrontal apparatus dysfunction
- 1233 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.

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- 1239 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
- 1240 Considerations for Trauma Surgery
- 1241 B. Restoration of premorbid frontal sinus outflow tract function
- 1242 C. Restoration of premorbid orbital form
- 1243 D. Restoration of premorbid nasal airway
- 1244 E. Restoration of premorbid extraocular function
- 1245 F. Restoration of premorbid ocular function

III. Specific Factors Affecting Risk for Naso-Orbital-Ethmoid Complex Injuries

1247
1248 *Severity factors that increase risk and the potential for known complications:*
1249

- 1250 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
1251 and Considerations for Trauma Surgery
- 1252 B. Epistaxis
- 1253 C. Ocular injury
- 1254 D. Nasolacrimal duct injury
- 1255 E. Frontal sinus outflow tract injury
- 1256 F. Existing congenital craniofacial deformity (eg, hypertelorism)
- 1257 G. Degree of telecanthus
- 1258 H. Airway obstruction
- 1259 I. Septal hematoma
- 1260 J. Degree and displacement of fracture
- 1261 K. Presence of multiple fractured segments or fracture comminution
- 1262 L. Presence of a compound fracture
- 1263 M. Soft tissue stripping from cartilaginous or bony segments
- 1264 N. Preexisting paranasal infection or pathology
- 1265 O. Presence of coexisting middle and upper-third facial fractures

1266 **IV. Indicated Therapeutic Parameters for Naso-Orbital-Ethmoid Complex Injuries**
1267

1268 *The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation.*
1269 *Also see the Patient Assessment chapter.*
1270

1271 *The following procedures for the management of naso-orbital-ethmoid complex injuries are not listed in*
1272 *order of preference:*
1273

- 1274 A. Observation based on limited severity of fracture, displacement, and mobility
- 1275 B. Closed reduction in cases of:
 - 1276 1. Displaced fractures
 - 1277 2. Comminuted fractures
 - 1278 3. Medical and/or anesthetic contraindication to open reduction
- 1279 C. Open reduction in cases of:
 - 1280 1. Fractures that cannot be reduced by a closed method (eg, septal displacement, mechanical impaction
1281 of fragments)
 - 1282 2. Avulsion of bony segment and/or overlying soft tissue laceration
 - 1283 3. Fractures requiring immediate bone grafting reconstruction
 - 1284 4. Exposure to the nasal, orbital, or ethmoid bones provided by surgical access to associated fractures
 - 1285 5. Telecanthus
 - 1286 6. Extraocular muscle entrapment
 - 1287 7. Altered orbital volume with ocular displacement
- 1288 D. Canalicular repair of lacerations with stenting
- 1289 E. Dacryocystotomy for avulsive canalicular injuries
- 1290 F. Dacryocystorhinotomy for extensive soft and hard tissue disruption of the nasolacrimal apparatus
- 1291 G. Reattachment or repair of disrupted canthal ligaments
- 1292 H. Creation of a new frontal sinus outflow tract or drainage pathway in cases of grossly comminuted sinus
1293 floor injury
- 1294 I. Antimicrobials as indicated
- 1295 J. Control of pain
- 1296 K. Drains for management of dead spaces or contaminated wounds when judgment dictates
- 1297 L. Instructions for post-treatment care and follow-up

1298 **V. Outcome Assessment Indices for Naso-Orbital-Ethmoid Complex Injuries**
1299

1300 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
1301 *clinical evaluation and may include an imaging evaluation.*

- 1302
1303 A. Favorable therapeutic outcomes
1304 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
1305 and Considerations for Trauma Surgery
1306 2. Restored premorbid nasal, ocular, extraocular, eyelid, nasolacrimal, and/or frontal sinus function
1307 B. Known risks and complications
1308 1. Presence of a general known risk and/or complication, as listed in the section entitled General
1309 Criteria, Parameters, and Considerations for Trauma Surgery
1310 2. Nonunion
1311 3. Post-management facial deformity
1312 a. Skeletal deformity and/or malunion
1313 b. Deformity of facial soft and/or hard tissue (eg, nasal deformity, scarring, synechiae, persistent
1314 telecanthus, dystopia, enophthalmos, exophthalmos)
1315 4. Obstruction of nasal airway
1316 5. Paranasal sinus dysfunction and/or pathology
1317 6. Visual disturbances (eg, diplopia)
1318 7. Nasolacrimal dysfunction (eg, epiphora)
1319 8. Nasofrontal duct dysfunction
1320 9. Anosmia
1321 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:

- 1330 A. Physical evidence of a supraorbital rim fracture
1331 B. Physical evidence of a frontal sinus wall fracture
1332 C. Physical evidence of a frontal bone fracture
1333 D. Imaging evidence of a supraorbital rim fracture
1334 E. Imaging evidence of a frontal sinus wall fracture
1335 F. Imaging evidence of a frontal bone fracture
1336 G. Deficits in sensation of the supraorbital nerve
1337 H. Proptosis, ptosis, or enophthalmos
1338 I. Injuries to the overlying soft tissue
1339 J. Presence of foreign bodies
1340 K. Contour irregularities
1341 L. Continuity defects
1342 M. Cerebrospinal fluid rhinorrhea
1343 N. Periorbital ecchymosis
1344 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.

- 1350 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
1351 Considerations for Trauma Surgery
1352 B. Restoration of premorbid sinus physiologic function and/or prevention of frontal sinus pathology
1353 C. Restoration of premorbid sensory function
1354 D. Restoration of premorbid ocular function
1355 E. Restoration of frontal sinus outflow tract function

1356 III. Specific Factors Affecting Risk for Frontal Bone and Frontal Sinus Injuries

1357 *Severity factors that increase risk and the potential for known complications:*

- 1358 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
- 1359 and Considerations for Trauma Surgery
- 1360 B. Degree and displacement of fracture
- 1361 C. Presence of multiple fractured segments or fracture comminution
- 1362 D. Presence of a compound fracture
- 1363 E. Preexisting infection or pathology (eg, frontal sinusitis, mucocele)
- 1364 F. Presence of coexisting or previous maxillofacial injury
- 1365 G. Damage to frontal sinus outflow tract
- 1366 H. Presence of cerebrospinal fluid leak
- 1367 I. Presence of coexisting neurologic or ophthalmologic injury

1370 IV. Indicated Therapeutic Parameters for Frontal Bone and Frontal Sinus Injuries

1371 *The presurgical assessment includes, at a minimum, a history and both a clinical and an imaging evaluation.*

1372 *Also see the Patient Assessment chapter.*

1373 *The following procedures for the management of frontal bone and frontal sinus injuries are not listed in order*

1374 *of preference:*

- 1375 A. Neurosurgical consultation in cases of:
- 1376 1. Displaced frontal bone fractures
- 1377 2. Evidence of neurologic injury
- 1378 3. Displaced posterior table frontal sinus fractures
- 1379 B. Observation in cases of:
- 1380 1. Minimally or nondisplaced linear frontal bone fractures
- 1381 2. Minimally or nondisplaced supraorbital rim fractures
- 1382 C. Observation, antibiotic therapy, and nasal decongestant in cases of minimally or nondisplaced anterior
- 1383 table frontal sinus fractures
- 1384 D. Open reduction in cases of:
- 1385 1. Displaced anterior table frontal sinus fractures
- 1386 2. Displaced anterior and posterior table frontal sinus fractures
- 1387 3. Fractures of the floor of the frontal sinus
- 1388 4. Displaced supraorbital rim fractures
- 1389 E. Open reduction with creation of a new nasofrontal duct in cases of:
- 1390 1. Grossly comminuted sinus floor injury
- 1391 2. Grossly comminuted nasofrontal-ethmoidal injury
- 1392 F. Sinus obliteration in cases of:
- 1393 1. Nasofrontal duct injuries that cannot be repaired
- 1394 2. Minimally displaced posterior sinus wall injury with questionable nasofrontal duct function
- 1395 3. Displaced or avulsed posterior sinus wall injury
- 1396 4. Increased risk for sinusitis
- 1397 5. Gross neurologic injury
- 1400 G. Cranialization in cases of:
- 1401 1. Gross neurologic injury requiring decompression
- 1402 2. Unrestorable (displaced) frontal sinus posterior table
- 1403 H. Functional endoscopic sinus surgery in cases of:
- 1404 1. Isolated displaced frontal sinus outflow tract injury
- 1405 2. Displaced frontal sinus outflow tract fracture with uncomplicated anterior/posterior wall injury
- 1406 I. Antimicrobials as indicated
- 1407 J. Control of pain
- 1408 K. Drains for management of dead spaces or contaminated wounds when judgment dictates
- 1409 L. Instructions for posttreatment care and follow-up
- 1410

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

1465 G. Prevention of sialocele formation

1466 **III. Specific Factors Affecting Risk for Oral/Perioral Soft Tissue Injuries**

1467 *Severity factors that increase risk and the potential for known complications:*

- 1470 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
1471 and Considerations for Trauma Surgery
- 1472 B. Location, length, configuration, and direction of laceration
- 1473 C. Presence of lacerations involving the salivary glands or ducts, cranial nerves and/or blood vessels, oral
1474 commissure, or vermilion border

1475 **IV. Indicated Therapeutic Parameters for Oral/Perioral Soft Tissue Injuries**

1476

1477 *The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging*
1478 *evaluation if indicated by clinical presentation. Also see the Patient Assessment chapter.*

1479

1480 *The following procedures for the management of oral/perioral soft tissues injuries are not listed in order of*
1481 *preference:*

- 1482
- 1483 A. Management of airway obstruction
- 1484 B. Control of hemorrhage
- 1485 C. Debridement of soft tissue
- 1486 D. Removal of foreign bodies
- 1487 E. Management of vascular injuries
- 1488 F. Nerve repair when appropriate (eg, facial nerve trunks proximal to vertical line from lateral canthus of the
1489 eye and when the age of patient is not a factor)
- 1490 G. Repair of salivary gland and/or duct. Utilization of stents where indicated
- 1491 H. Reconstruction of bony injuries to provide structural support of soft tissue repairs
- 1492 I. Reconstruction of avulsive wounds
- 1493 J. Antimicrobials as indicated
- 1494 K. Control of pain
- 1495 L. Drains for management of dead spaces or contaminated wounds when judgment dictates
- 1496 M. Instructions for post-treatment care and follow-up
- 1497 N. Local, regional, and distant flaps when indicated

1498 **V. Outcome Assessment Indices Oral/Perioral Soft Tissue Injuries**

1499

1500 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
1501 *clinical evaluation and may include an imaging evaluation.*

- 1502
- 1503 A. Favorable therapeutic outcomes
- 1504 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
1505 and Considerations for Trauma Surgery
- 1506 2. Restored soft tissue pigmentation, texture, hair growth, speech, deglutition
- 1507 3. Normal salivary gland
- 1508 B. Known risks and complications
- 1509 1. Presence of a general known risk and/or complication, as listed in the section entitled General
1510 Criteria, Parameters, and Considerations for Trauma Surgery
- 1511 2. Wound breakdown
- 1512 3. Post-treatment deformity of facial soft tissue
- 1513 4. Poor soft tissue quality (eg, pigmentation, texture, alopecia)
- 1514 5. Salivary gland dysfunction
- 1515 6. Hypertrophic scar or keloid formation

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1518 **AURICLE INJURIES**

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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

N. Stint the external ear canal when indicated

V. Outcome Assessment Indices for Auricle Injuries

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

A. Favorable therapeutic outcomes

1. General favorable therapeutic outcomes, as listed in the section 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 (eg, children)
5. Trap door deformities
6. Scar contracture
7. Subcutaneous atrophy
8. Asymmetry
9. Cauliflower ear

SCALP INJURIES

I. Indications for Therapy for Scalp Injuries

May include 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 (eg, thermal, chemical, and/or electrical)

II. Specific Therapeutic Goals for Scalp Injuries

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

- A. Presence of a general therapeutic goal, as listed in the section 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

- 1628 B. Underlying cranial fractures
- 1629 C. Presence of closed head injury
- 1630 D. Tissue that has been avulsed
- 1631 E. Location, length, configuration, and direction of laceration

1632 **IV. Indicated Therapeutic Parameters for Scalp Injuries**

1633
1634 *The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging*
1635 *evaluation if indicated by clinical presentation. Also see the Patient Assessment chapter.*

1636
1637 *The following procedures for the management of scalp injuries are not listed in order of preference:*

- 1638
- 1639 A. Wound cleansing, debridement, and control of hemorrhage in cases of abrasion
- 1640 B. Wound cleansing, exploration, debridement, and suturing in cases of simple lacerations
- 1641 C. Hematoma evacuation and pressure dressing or drain in cases of:
 - 1642 1. Hematomas
 - 1643 2. Undermined soft tissues
- 1644 D. Split-thickness skin grafts in cases of partial avulsion when periosteum remains
- 1645 E. Potential use of dermal regeneration substitutes when exposed calvarium is present
- 1646 F. Repair of partial or total avulsions with local or free tissue transfers
- 1647 G. Antibiotic therapy in cases of contaminated wounds
- 1648 H. Antimicrobials as indicated
- 1649 I. Control of pain
- 1650 J. Drains for management of dead spaces or contaminated wounds when judgment dictates
- 1651 K. Instructions for post-treatment care and follow-up
- 1652 L. Placement of tissue expander as indicated

1653 **V. Outcome Assessment Indices for Scalp Injuries**

1654
1655 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
1656 *clinical evaluation and may include an imaging evaluation.*

- 1657
- 1658 A. Favorable therapeutic outcomes
 - 1659 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
 - 1660 and Considerations for Trauma Surgery
 - 1661 2. Absence of hypertrophic or contracted scars
- 1662 B. Known risks and complications
 - 1663 1. Presence of a general known risk and/or complication, as listed in the section entitled General
 - 1664 Criteria, Parameters, and Considerations for Trauma Surgery
 - 1665 2. Necrosis of soft tissues
 - 1666 3. Scar contracture
 - 1667 4. Hypertrophic scars
 - 1668 5. Alopecia
 - 1669 6. Pigmentation changes
 - 1670 7. Texture changes

1673 ***PERIORBITAL SOFT TISSUE INJURIES***

1674 **I. Indications for Therapy for Periorbital Soft Tissue Injuries**

1675
1676 *May include one or more of the following:*

- 1677
- 1678
- 1679 A. Physical evidence of abrasions, lacerations, and/or avulsions
- 1680 B. Motor and/or sensory nerve deficits
- 1681 C. Penetrating wounds (eg, interruption of tarsal plate)

- 1682 D. Physical evidence of canthal ligament disruption
- 1683 E. Burns (eg, thermal, chemical, and/or electrical)
- 1684 F. Vascular injury
- 1685 G. Injury to the lacrimal gland
- 1686 H. Injury to the nasolacrimal apparatus
- 1687 I. Clinical and/or imaging evidence of foreign bodies
- 1688 J. Hematoma
- 1689 K. Emphysema

1690 **II. Specific Therapeutic Goals for Periorbital Soft Tissue Injuries**

1691
1692 *The goal of therapy is to restore form and/or function. However, risk factors and potential complications may*
1693 *preclude complete restoration of form and/or function.*
1694

- 1695 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
- 1696 Considerations for Trauma Surgery
- 1697 B. Restoration of continuity (eg, eyebrow, tarsal plate, orbital septum, canthal ligaments)
- 1698 C. Restoration of premorbid soft tissue quality (eg, pigmentation, texture, hair growth)
- 1699 D. Minimal formation of scar tissue
- 1700 E. Preservation and/or restoration of premorbid form and/or function of sensory and motor nerves
- 1701 F. Preservation and/or restoration of premorbid form and/or function of lacrimal gland
- 1702 G. Preservation and/or restoration of premorbid form and/or function of nasolacrimal apparatus

1703 **III. Specific Factors Affecting Risk for Periorbital Soft Tissue Injuries**

1704
1705 *Severity factors that increase risk and the potential for known complications:*
1706

- 1707 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
- 1708 and Considerations for Trauma Surgery
- 1709 B. Location, length, configuration, and direction of laceration
- 1710 C. Presence of lacerations involving the lacrimal apparatus, globe, tarsal plates, canthal ligaments, cranial
- 1711 nerves, blood vessels, and/or muscles

1712 **IV. Indicated Therapeutic Parameters for Periorbital Soft Tissue Injuries**

1713
1714 *The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging*
1715 *evaluation if indicated by clinical presentation. Also see the Patient Assessment chapter.*
1716

1717 *The following procedures for the management of periorbital soft tissue injuries are not listed in order of*
1718 *preference:*
1719

- 1720 A. Wound cleansing, debridement, and control of hemorrhage in cases of abrasion
- 1721 B. Wound cleansing, exploration, debridement, and repair in cases of simple lacerations
- 1722 C. Postseptal hematoma evacuation and control of active hemorrhage via lateral canthotomy
- 1723 D. Split- or full-thickness skin grafts in cases of skin avulsion with intact tarsal plates
- 1724 E. Wedge resection and primary closure in cases of minor partial avulsion of lid
- 1725 F. Reattachment, composite grafts, local or regional flaps, or free tissue transfer in cases of major partial or
- 1726 total avulsion of lid
- 1727 G. Canalicular repair of lacerations with stenting
- 1728 H. Dacryocystorhinostomy for avulsive canalicular injuries
- 1729 I. Dacryocystorhinostomy for extensive soft and hard tissue disruption of the nasolacrimal apparatus
- 1730 J. Reattachment or repair of disrupted canthal ligaments
- 1731 K. Repair of eyebrow avulsion by free graft
- 1732 L. Antimicrobials as indicated
- 1733 M. Control of pain
- 1734 N. Drains for management of dead spaces or contaminated wounds when judgment dictates
- 1735 O. Instructions for posttreatment care and follow-up
- 1736 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:

- 1791 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
1792 and Considerations for Trauma Surgery
1793 B. Underlying nasal, septal, and facial bone fractures
1794 C. Location, length, configuration, and direction of laceration

1795 **IV. Indicated Therapeutic Parameters for Perinasal Soft Tissue Injuries**

1796
1797 *The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging*
1798 *evaluation if indicated by clinical presentation. Also see the Patient Assessment chapter.*
1799

1800 *The following procedures for the management of perinasal soft tissue injuries are not listed in order of*
1801 *preference:*
1802

- 1803 A. Wound cleansing, debridement, and control of hemorrhage in cases of abrasion
1804 B. Wound cleansing, exploration, debridement, and repair in cases of simple lacerations
1805 C. Evacuation and application of a pressure dressing in cases of hematoma
1806 D. Split- or full-thickness skin grafts in cases of skin avulsion with intact perichondrium or mucosa
1807 E. Local or composite grafts in cases of partial or total avulsion of skin, perichondrium, and cartilage
1808 F. Pocket banking of cartilage in cases of large avulsed segments
1809 G. Local and/or regional flaps when indicated
1810 H. Microvascular tissue transfer of large or total avulsion of the nose when available
1811 I. Antimicrobials as indicated
1812 J. Control of pain
1813 K. Drains for management of dead spaces or contaminated wounds when judgment dictates
1814 L. Instructions for post-treatment care and follow-up

1815 **V. Outcome Assessment Indices for Perinasal Soft Tissue Injuries**

1816
1817 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
1818 *clinical evaluation and may include an imaging evaluation.*
1819

- 1820 A. Favorable therapeutic outcomes
1821 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
1822 and Considerations for Trauma Surgery
1823 2. Preserved cartilage and cutaneous tissue
1824 3. Restored tissue form and/or function (eg, pigmentation, texture, contour, and patent nasal airway)
1825 B. Known risks and complications
1826 1. Presence of a general known risk and/or complication, as listed in the section entitled General
1827 Criteria, Parameters, and Considerations for Trauma Surgery
1828 2. Necrosis of cartilage and skin (eg, nasal septal perforation)
1829 3. Chondritis
1830 4. Hypertrophic scars (eg, children)
1831 5. Saddle nose deformities
1832 6. Scar contracture
1833 7. Synechiae
1834 8. Subcutaneous atrophy
1835 9. Asymmetry

1836 1837 1838 ***FACIAL SOFT TISSUE INJURIES***

1839 1840 **I. Indications for Therapy for Facial Soft Tissue Injuries**

1841
1842 *May include one or more of the following:*
1843

- 1844 A. Physical evidence of abrasions, lacerations, and/or avulsions

- 1845 B. Motor and/or sensory nerve deficits
- 1846 C. Penetrating wounds
- 1847 D. Burns (eg, thermal, chemical, and/or electrical)
- 1848 E. Compromised airway
- 1849 F. Vascular injury
- 1850 G. Injury to the salivary gland and/or duct
- 1851 H. Clinical and/or imaging evidence of foreign bodies

1852 **II. Specific Therapeutic Goals for Facial Soft Tissue Injuries**

1853

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.

1856

- 1857 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and Considerations for Trauma Surgery
- 1858
- 1859 B. Restoration of premorbid soft tissue quality (eg, pigmentation, texture, hair growth)
- 1860 C. Minimal formation of scar tissue
- 1861 D. Preservation and/or restoration of premorbid form and/or function of salivary glands and ducts
- 1862 E. Preservation and/or restoration of premorbid form and/or function of nasolacrimal duct
- 1863 F. Prevention of sialocele formation

1864 **III. Specific Factors Affecting Risk for Facial Soft Tissue Injuries**

1865

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

1866

- 1868 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters, and Considerations for Trauma Surgery
- 1869
- 1870 B. Location, length, configuration, and direction of laceration
- 1871 C. Presence of coexisting or previous maxillofacial injuries
- 1872 D. Presence of lacerations involving the salivary glands or ducts, cranial nerves, and/or blood vessels

1873 **IV. Indicated Therapeutic Parameters for Facial Soft Tissue Injuries**

1874

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.

1877

The following procedures for the management of facial soft tissue injuries are not listed in order of preference:

1880

- 1881 A. Management of airway obstruction
- 1882 B. Control of hemorrhage
- 1883 C. Debridement of soft tissue wounds
- 1884 D. Removal of foreign bodies
- 1885 E. Management of vascular injuries
- 1886 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)
- 1887
- 1888 G. Repair of nasolacrimal apparatus
- 1889 H. Repair of salivary gland apparatus
- 1890 I. Surgical repair of soft tissue
- 1891 J. Reconstruction of avulsive wounds, including use of local or regional flaps and/or free tissue transfer of
- 1892 tissue
- 1893 K. Antimicrobials as indicated
- 1894 L. Control of pain
- 1895 M. Drains for management of dead spaces or contaminated wounds when judgment dictates
- 1896 N. Instructions for post-treatment care and follow-up

1897 **V. Outcome Assessment Indices Facial Soft Tissue Injuries**

1898

1899 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
1900 *clinical evaluation and may include an imaging evaluation.*

- 1901
- 1902 A. Favorable therapeutic outcomes
- 1903 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
- 1904 and Considerations for Trauma Surgery
- 1905 2. Restored soft tissue pigmentation, texture, hair growth
- 1906 3. Normal salivary gland and nasolacrimal duct function
- 1907 B. Known risks and complications
- 1908 1. Presence of a general known risk and/or complication, as listed in the section entitled General
- 1909 Criteria, Parameters, and Considerations for Trauma Surgery
- 1910 2. Wound breakdown
- 1911 3. Post-treatment deformity of facial soft tissue
- 1912 4. Poor soft tissue quality (eg, pigmentation, texture, alopecia)
- 1913 5. Salivary gland dysfunction
- 1914 6. Nasolacrimal dysfunction
- 1915 7. Chronic pain
- 1916 8. History of hypertrophic scars or keloid formation

1917

1918

1919 **UPPER AIRWAY OBSTRUCTION**

1920

1921 **I. Indications for Therapy for Upper Airway Obstruction**

1922 *May include one or more of the following:*

- 1923
- 1924
- 1925 A. Physical findings of airway obstruction or potential obstruction
- 1926 B. Laryngeal fractures
- 1927 C. Inability to handle secretions

1928 **II. Specific Therapeutic Goals for Upper Airway Obstruction**

1929

1930 *The goal of therapy is to restore form and/or function. However, risk factors and potential complications may*
1931 *preclude complete restoration of form and/or function.*

- 1932
- 1933 A. Presence of a general therapeutic goal, as listed in the section entitled General Criteria, Parameters, and
- 1934 Considerations for Trauma Surgery
- 1935 B. Restored premorbid airway
- 1936 C. Restored premorbid ventilation and tissue perfusion
- 1937 D. Absence of foreign bodies

1938 **III. Specific Factors Affecting Risk for Upper Airway Obstruction**

1939 *Severity factors that increase risk and the potential for known complications:*

- 1940
- 1941
- 1942 A. Presence of a general factor affecting risk, as listed in the section entitled General Criteria, Parameters,
- 1943 and Considerations for Trauma Surgery
- 1944 B. Presence of laryngeal and/or bronchial injury
- 1945 C. Presence of oral, nasal, or pharyngeal soft tissue injuries
- 1946 D. Presence of cervical spine injuries
- 1947 E. Presence of coexisting or previous maxillofacial injuries
- 1948 F. Comminuted panfacial fractures or flail mandibular fractures

1949 **IV. Indicated Therapeutic Parameters for Upper Airway Obstruction**

1950

1951 *The presurgical assessment includes, at a minimum, a history, a clinical evaluation, and an imaging*
1952 *evaluation if indicated by clinical presentation. Also see the Patient Assessment chapter.*

1953
1954 *The following procedures for the management of upper airway obstruction are not listed in order of*
1955 *preference:*

- 1956
1957 A. Emergency short-term airway management
1958 1. Suctioning
1959 2. Removal of foreign bodies
1960 3. Repositioning of jaw (eg, jaw thrust)
1961 4. Nasopharyngeal or oral airway
1962 5. Intubation
1963 6. Use of capnography when indicated
1964 B. Surgical airway management
1965 1. Cricothyroidotomy
1966 a. Emergency surgical airway management
1967 b. Elective surgical airway management
1968 2. Tracheostomy
1969 a. Emergency surgical airway management
1970 b. Elective surgical airway management
1971 C. Instructions for posttreatment care and follow-up

1972 **V. Outcome Assessment Indices Upper Airway Obstruction**

1973
1974 *Indices are used by the specialty to assess aggregate outcomes of care. Outcomes are assessed through*
1975 *clinical evaluation and may include an imaging evaluation.*

- 1976
1977 A. Favorable therapeutic outcomes
1978 1. General favorable therapeutic outcomes, as listed in the section entitled General Criteria, Parameters,
1979 and Considerations for Trauma Surgery
1980 2. Adequate airway, ventilation, and tissue perfusion
1981 3. Absence of pulmonary complications (eg, pneumothorax, infection)
1982 4. Absence of neurologic deficit
1983 5. Stable airway
1984 B. Known risks and complications
1985 1. Presence of a general known risk and/or complication, as listed in the section entitled General
1986 Criteria, Parameters, and Considerations for Trauma Surgery
1987 2. Inadequate airway, ventilation, or tissue perfusion
1988 3. Pulmonary complications (eg, pneumothorax, infection)
1989 4. Unstable airway
1990 5. Exsanguinating hemorrhage
1991 6. Vocal cord paralysis

1992
1993
1994 ***SELECTED REFERENCES – TRAUMA SURGERY***

1995
1996 This list of selected references is intended only to acknowledge some of the sources of information drawn on in
1997 the preparation of this document. Citation of the reference material is not meant to imply endorsement of any
1998 statement contained in the reference material. The list is not an exhaustive compilation of information on the
1999 topic. Readers should consult other sources to obtain a complete bibliography.

2000
2001
2002 **SPECIAL CONSIDERATIONS FOR PEDIATRIC TRAUMA SURGERY**

- 2003
2004 1. Aizenbud D, Hazan-Molina H, Emodi O, et al: The management of mandibular body fractures in young
2005 children. Dent Traumatol 25:565, 2009

- 2006 2. American Academy of Pediatric Dentistry. Council on Clinical Affairs: Guideline on management of acute
2007 dental trauma. *Pediatr Dent* 30:175, 2008-2009 Available at:
2008 http://www.aapd.org/media/policies_guidelines/g_trauma.pdf Accessed April 18, 2016
- 2009 3. American Academy of Pediatric Dentistry. Council on Clinical Affairs: Policy on prevention of sports-
2010 related orofacial injuries. *Pediatr Dent* 30 (7 Suppl):58, 2008-2009 Available at:
2011 http://www.aapd.org/media/policies_guidelines/p_sports.pdf Accessed April 18, 2016.
- 2012 4. Anderson PJ: Fractures of the facial skeleton in children. *Injury* 26:47, 1995
- 2013 5. Australian Resuscitation Council. Paediatric advanced life support: Australian Resuscitation Council
2014 Guidelines 2006. *Emerg Med Australas* 18:357, 2006
- 2015 6. Brogan TV, Bratton SL, Dowd MD, et al: Severe dog bites in children. *Pediatrics* 96:947, 1995
- 2016 7. Chapman VM, Fenton LZ, Gao D, et al: Facial fractures in children: unique patterns of injury observed by
2017 computed tomography. *J Comput Assist Tomogr* 33:70, 2009
- 2018 8. Chrcanovic BR: Open versus closed reduction: mandibular condylar fractures in children. *Oral Maxillofac*
2019 *Surg* 16:245, 2012
- 2020 9. Clauser L, Dallera V, Sarti E, et al: Frontobasilar fractures in children. *Childs Nerv Syst* 20:168, 2004
- 2021 10. Eppley BL: Use of resorbable plates and screws in pediatric facial fractures. *J Oral Maxillofac Surg* 63:385,
2022 2005
- 2023 11. Gallagher TO, Setlur J, Maturo S, et al: Percutaneous transtracheal needle insufflation: A useful emergency
2024 airway adjunct simply constructed from common items found on your anesthesia cart. *Laryngoscope*
2025 122:1178, 2012
- 2026 12. Giroto JA, Gruss J: Primary post-traumatic mandibular reconstruction in infancy: a 10-year follow-up. *J*
2027 *Craniofac Surg* 15:255, 2004
- 2028 13. Hong HS, Cha JG, Paik SH, et al: High-resolution sonography for nasal fracture in children. *AJR Am J*
2029 *Roentgenol* 188:W86, 2007
- 2030 14. Iatrou I, Theologie-Lygidakis N, Tzerbos F: Surgical protocols and outcome for the treatment of
2031 maxillofacial fractures in children: 9 years' experience. *J Craniomaxillofac Surg* 38:511, 2010
- 2032 15. Iizuka T, Thoren H, Annino DJ, et al: Midfacial fractures in pediatric patients. Frequency, characteristics,
2033 and causes. *Arch Otolaryngol Head Neck Surg* 121:1366, 1995
- 2034 16. Jatana KR, Ryoo C, Skomorowski M, et al: Minimally invasive repair of an isolated posterior table frontal
2035 sinus fracture in a pediatric patient. *Otolaryngol Head Neck Surg* 138:809, 2008
- 2036 17. Jatla KK, Enzenauer RW: Orbital fractures: a review of current literature. *Curr Surg* 61:25, 2004
- 2037 18. Kaban LB: Diagnosis and treatment of fractures of the facial bones in children. *J Oral Maxillofac Surg*
2038 51:722, 1993
- 2039 19. Koltai PJ, Amjad I, Meyer D, et al: Orbital fractures in children. *Arch Otolaryngol Head Neck Surg*
2040 121:1375, 1995
- 2041 20. Koltai PJ, Rabkin D: Management of facial trauma in children. *Pediatr Clin North Am* 43:1253, 1996
- 2042 21. Kountakis SE, Rafie JJ, Ghorayeb B, et al: Pediatric gunshot wounds to the head and neck. *Otolaryngol*
2043 *Head Neck Surg* 114:756, 1996
- 2044 22. Leuin SC, Frydendall E, Gao D, et al: Temporomandibular joint dysfunction after mandibular fracture in
2045 children: a 10-year review. *Arch Otolaryngol Head Neck Surg* 137:10, 2011
- 2046 23. Liu T, Dong J, Wang J, et al: Microsurgical replantation for child total scalp avulsion. *J Craniofac Surg*
2047 20:81, 2009
- 2048 24. McGrath CJ, Egbert MA, Tong DC, et al: Unusual presentations of injuries associated with the mandibular
2049 condyle in children. *Br J Oral Maxillofac Surg* 34:311, 1996
- 2050 25. McIntyre JD, Lee JY, Trope M, et al: Permanent tooth replantation following avulsion: using a decision tree
2051 to achieve the best outcome. *Pediatr Dent* 31:137, 2009
- 2052 26. Mohindra S, Mukherjee KK, Chhabra R, et al: Orbital roof growing fractures: a report of four cases and
2053 literature review. *Br J Neurosurg* 20:420, 2006
- 2054 27. Montazem AH, Anastassov G: Management of condylar fractures. *Atlas Oral Maxillofac Surg Clin North*
2055 *Am* 17:55, 2009
- 2056 28. Morales JL, Skowronski PP, Thaller SR: Management of pediatric maxillary fractures. *J Craniofac Surg*
2057 21:1226, 2010
- 2058 29. Myall RW: Management of mandibular fractures in children. *Oral Maxillofac Surg Clin North Am* 21:197,
2059 2009

- 2060 30. Nishioka GJ, Larrabee WF, Murakami CS, et al: Suspended circummandibular wire fixation for mixed-
2061 dentition pediatric mandible fractures. *Arch Otolaryngol Head Neck Surg* 123:753, 1997
2062 31. Pohl Y, Filippi A, Kirschner H: Results after replantation of avulsed permanent teeth. I. Endodontic
2063 considerations. *Dent Traumatol* 21:80, 2005
2064 32. Pohl Y, Filippi A, Kirschner H: Results after replantation of avulsed permanent teeth. II. Periodontal
2065 healing and the role of physiologic storage and antiresorptive-regenerative therapy. *Dent Traumatol* 21:93,
2066 2005
2067 33. Pohl Y, Wahl G, Filippi A, et al: Results after replantation of avulsed permanent teeth. III. Tooth loss and
2068 survival analysis. *Dent Traumatol* 21:102, 2005
2069 34. Posnick JC: Craniomaxillofacial fractures in children. *Oral Maxillofac Surg Clin North Am* 6:169, 1994
2070 35. Posnick JC: Management of facial fractures in children and adolescents. *Ann Plast Surg* 33:442, 1994
2071 36. Posnick JC, Wells M, Pron GE: Pediatric facial fractures: evolving patterns of treatment. *J Oral Maxillofac*
2072 *Surg* 51:836, 1993
2073 37. Precious DS, Delaire J, Hoffman CD: The effects of nasomaxillary injury of future facial growth. *Oral Surg*
2074 *Oral Med Oral Pathol* 66:525, 1988
2075 38. Revuelta R, Sandor GK: Degloving injury of the mandibular mucosa following an extreme sport accident: a
2076 case report. *J Dent Child (Chic)* 72:104, 2005
2077 39. Roh WJ, Kang SG, Kim SJ: Multidisciplinary approach for a patient with dentinogenesis imperfecta and
2078 anterior trauma. *Am J Orthod Dentofacial Orthop* 183:352, 2010
2079 40. Shah RK, Patel A, Lander L, et al: Management of foreign bodies obstructing the airway in children. *Arch*
2080 *Otolaryngol Head Neck Surg* 136:373, 2010
2081 41. Shen XQ, Wang C, Xu JH, et al: Successful microsurgical replantation of a child's completely amputated
2082 ear. *J Plast Reconstr Aesthet Surg* 61:e19, 2008
2083 42. Stewart C, Dawson M, Phillips J, et al: A study of the management of 55 traumatically intruded permanent
2084 incisor teeth in children. *Eur Arch Paediatr Dent* 10:25, 2009
2085 43. Thaller SR, Huang V: Midfacial fractures in the pediatric population. *Ann Plast Surg* 29:348, 1992
2086 44. Tiwana PS, Kushner GM, Alpert B: Cranio-maxillofacial injuries in children. In: Fonseca R, Marciani RD,
2087 Turvey TA eds: *Oral and Maxillofacial Surgery* (ed 2). St. Louis, MO, Saunders, 2009
2088 45. Turbin RE, Maxwell DN, Langer PD, et al: Patterns of transorbital intracranial injury: a review and
2089 comparison of occult and non-occult cases. *Surv Ophthalmol* 51:449, 2006
2090 46. Wagle E, Allred EN, Needleman HL: Time delays in treating dental trauma at a children's hospital and
2091 private pediatric dental practice. *Pediatr Dent* 36:216, 2014
2092 47. Whatley WS, Allison DW, Chandra RD, et al: Frontal sinus fractures in children. *Laryngoscope* 115:1741,
2093 2005
2094 48. Wolfswinkel EM, Weathers WM, Wirthlin JO, et al: Management of pediatric mandible fractures.
2095 *Otolaryngol Clin North Am* 46:791, 2013
2096 49. Wriedt S, Martin M, Al-Nawas B, et al: Long-term effects of traumatic injuries to incisors and periodontal
2097 tissues during childhood: a retrospective study. *J Orofac Orthop* 71:318, 2010
2098 50. Zimmermann CE, Troulis MJ, Kaban LB: Pediatric facial fractures: recent advances in prevention,
2099 diagnosis and management. *Int J Oral Maxillofac Surg* 35:2, 2006
2100
2101

FRACTURED TEETH

- 2104 51. Abubaker AO, Papadopoulos H, Giglio JA: Diagnosis and management of dentoalveolar injuries. In:
2105 Fonseca R, Marciani RD, Turvey TA, eds: *Oral and Maxillofacial Surgery* (ed 2). St. Louis, MO, Saunders,
2106 2009
2107 52. American Academy of Pediatric Dentistry Council on Clinical Affairs: Guideline on management of acute
2108 dental trauma. *Pediatr Dent* 30(7 Suppl):175, 2008-2009. Available at:
2109 <http://www.aapd.org/media/policies.asp>. Accessed April 2011
2110 53. Andreasen JO, Andreasen FM, Andersson L, eds: *Textbook and Color Atlas of Traumatic Injuries to the*
2111 *Teeth* (ed 4). Oxford, Wiley, Blackwell, 2007
2112 54. Andreasen JO, Lauridsen E, Andreasen FM: Contradictions in the treatment of traumatic dental injuries and
2113 ways to proceed in dental trauma research. *Dent Traumatol* 26:16, 2010
2114 55. Bakland LK, Boyne PJ: Trauma to the oral cavity. *Clin Sports Med* 8:25, 1989

- 2115 56. Bonner P: Treating the emergency dental trauma patient. *Dent Today* 10:66, 1991
- 2116 57. Bringhurst C, Herr RD, Aldous JA: Oral trauma in the emergency department. *Am J Emerg Med* 11:486,
2117 1993
- 2118 58. Corner RW, Fitchie JG: Oral trauma: emergency care of lacerations, fractures, and burns. *Postgrad Med*
2119 85:2, 1989
- 2120 59. Crow RW: Diagnosis and management of sports-related injuries to the face. *Dent Clin North Am* 35:719,
2121 1991
- 2122 60. Diangelis AJ, Bakland LK: Traumatic dental injuries: current treatment concepts. *J Am Dent Assoc*
2123 10:1401, 1998
- 2124 61. Dierks EJ: Management of associated dental injuries in maxillofacial trauma. *Otolaryngol Clin North Am*
2125 24:1, 1991
- 2126 62. Elkhadem A, Mickan S, Richards D: Adverse events of surgical extrusion in treatment for crown-root and
2127 cervical root fractures: a systematic review of case series/reports. *Dent Traumatol* 30:1, 2014
- 2128 63. Fayad MI, Ashkenaz PJ, Johnson BR: Different representations of vertical root fractures detected by cone-
2129 beam volumetric tomography: a case series report. *J Endod* 38:1435, 2012
- 2130 64. Floratos SG, Kratchman SI: Surgical management of vertical root fractures for posterior teeth: report of
2131 four cases. *J Endod* 38:550, 2012
- 2132 65. Garcia-Godoy F, Pulver F: Treatment of trauma to the primary and young permanent dentitions. *Dent Clin*
2133 *North Am* 44:597, 2000
- 2134 66. Harrington MS, Eberhart AB, Knapp JF: Dentofacial trauma in children. *ASDC J Dent Child* 55:334, 1988
- 2135 67. Hill CM, Crosher RF, Mason DA: Dental and facial injuries following sports accidents: a study of 130
2136 patients. *Br J Oral Maxillofac Surg* 23:268, 1985
- 2137 68. Kabashima H, Mizobe K, Sakai T, et al: The usefulness of three-dimensional imaging for prognostication in
2138 cases of intentional tooth replantation. *J Oral Sci* 54:355, 2012
- 2139 69. Kenny DJ, Barrett EJ: Recent developments in dental traumatology. *Pediatr Dent* 23:464, 2001
- 2140 70. Kim DS, Shin DR, Choi GW, et al: Management of complicated crown-root fractures using intentional
2141 replantation: two case reports. *Dent Traumatol* 29:334, 2013
- 2142 71. Naqvi A, Ogidan O: Classification for traumatic injuries to teeth for epidemiological purposes.
2143 *Odontostomatol Trop* 13:115, 1990
- 2144 72. Noelken R, Kunkel M, Wagner W: Immediate implant placement and provisionalization after long axis root
2145 fracture and complete loss of the facial bony lamella. *Int J Periodontics Restorative Dent* 31:175, 2011
- 2146 73. Robinson FG, Cunningham LL: Oral rehabilitation of severe dentoalveolar trauma: a clinical report. *J Oral*
2147 *Implantol* 38:757, 2012
- 2148 74. Tan PM, Zweig BE: Clinical management of dentoalveolar trauma: a discussion of current philosophy and
2149 methodology and a review of a case. *Military Med* 154:518, 1989
- 2150 75. Wigler R, Steinbock N, Berg T: Oral cutaneous sinus tract, vertical root fracture, and bisphosphonate-
2151 related osteonecrosis: a case report. *J Endod* 39:1088, 2013
- 2152
- 2153

LUXATED AND/OR AVULSED TEETH

- 2154
- 2155
- 2156 76. Alani A, Austin R, Djemal S: Contemporary management of tooth replacement in the traumatized dentition.
2157 *Dent Traumatol* 28:183, 2012
- 2158 77. American Association of Endodontists: Recommended Guidelines of the American Association of
2159 Endodontists for the Treatment of Traumatic Dental Injuries. Chicago, IL, The Association, 2004. Available
2160 at:
2161 http://aae.org/uploadedFiles/Publications_and_Research/Guidelines_and_Position_Statements/2004Trauma
2162 [Guidelines.pdf](http://aae.org/uploadedFiles/Publications_and_Research/Guidelines_and_Position_Statements/2004Trauma). Accessed April 18, 2016
- 2163 78. Andersson L, Andreasen JO, Day P, et al: International Association of Dental Traumatology guidelines for
2164 the management of traumatic dental injuries: 2. Avulsion of permanent teeth. *Dent Traumatol* 28:88, 2012
- 2165 79. Andreasen JO, Andreasen FM, Andersson L, eds: Textbook and Color Atlas of Traumatic Injuries to the
2166 Teeth (ed 4). Oxford, Wiley, Blackwell, 2007
- 2167 80. Andreasen JO, Bakland LK, Matras RC, et al: Traumatic intrusion of permanent teeth. Part 1. An
2168 epidemiological study of 216 intruded permanent teeth. *Dent Traumatol* 22:83, 2006
- 2169 81. Bakland LK, Boyne PJ: Trauma to the oral cavity. *Clin Sports Med* 8:25, 1989

- 2170 82. Bonner P: Treating the emergency dental trauma patient. *Dent Today* 10:66, 1991
2171 83. Bringham C, Herr RD, Aldous JA: Oral trauma in the emergency department. *Am J Emerg Med* 11:486,
2172 1993
2173 84. Corner RW, Fitchie JG: Oral trauma: emergency care of lacerations, fractures, and burns. *Postgrad Med*
2174 85:2, 34, 1989
2175 85. Crow RW: Diagnosis and management of sports-related injuries to the face. *Dent Clin North Am* 35:719,
2176 1991
2177 86. Dehen M, Mrzilek M, Paling T: Modified acrylic cap splint for dento-alveolar fractures. *Int J Oral*
2178 *Maxillofac Surg* 18:856, 1989
2179 87. Diangelis AJ, Bakland LK: Traumatic dental injuries: current treatment concepts. *J Am Dent Assoc*
2180 10:1401, 1998
2181 88. Dierks EJ: Management of associated dental injuries in maxillofacial trauma. *Otolaryngol Clin North Am*
2182 24:165, 1991
2183 89. Flanders RA: Mouthguards and sports injuries. *Ill Dent J* 62:13, 1993
2184 90. Harrington MS, Eberhart AB, Knapp JF: Dentofacial trauma in children. *ASDC J Dent Child* 55:334, 1988
2185 91. Hill CM, Crosher RF, Mason DA: Dental and facial injuries following sports accidents: a study of 130
2186 patients. *Br J Oral Maxillofac Surg* 23:268, 1985
2187 92. Lauridsen E, Hermann NV, Gerds TA, et al: Combination injuries 2. The risk of pulp necrosis in permanent
2188 teeth with subluxation injuries and concomitant crown fractures. *Dent Traumatol* 28:371, 2012
2189 93. Lauridsen E, Hermann NV, Gerds TA, et al: Combination injuries 3. The risk of pulp necrosis in permanent
2190 teeth with extrusion or lateral luxation and concomitant crown fractures without pulp exposure. *Dent*
2191 *Traumatol* 28:379, 2012
2192 94. Macway-Gomez S, Lallier TE: Pedialyte promotes periodontal ligament cell survival and motility. *J Endod*
2193 39:202, 2013
2194 95. Marchiori EC, Santos SE, Asprino L, et al: Occurrence of dental avulsion and associated injuries in patients
2195 with facial trauma over a 9-year period. *Oral Maxillofac Surg* 17:119, 2013
2196 96. Naqvi A, Ogidan O: Classification for traumatic injuries to teeth for epidemiological purposes.
2197 *Odontostomatol Trop* 13:115, 1990
2198 97. Perez R, Berkowitz R, McIiveen L: Dental trauma in children: a survey. *Endod Dent Traumatol* 7:212, 1991
2199 98. Tan PM, Zweig BE: Clinical management of dentoalveolar trauma: a discussion of current philosophy and
2200 methodology and a review of a case. *Military Med* 154:518, 1989
2201
2202

ALVEOLAR PROCESS INJURIES

- 2203
2204
2205 99. Abubaker AO, Papadopoulos H, Giglio JA: Diagnosis and management of dentoalveolar injuries. In:
2206 Fonseca R, Marciani RD, Turvey TA, eds: *Oral and Maxillofacial Surgery* (ed 2). St. Louis, MO, Saunders,
2207 2009
2208 100. Andreasen JO, Andreasen FM, Andersson L, eds: *Textbook and Color Atlas of Traumatic Injuries to the*
2209 *Teeth* (ed 4). Oxford, Wiley, Blackwell, 2007
2210 101. Andreasen JO, Lauridsen E: Alveolar process fractures in the permanent dentition. Part 1. Etiology and
2211 clinical characteristics. A retrospective analysis of 299 cases involving 815 teeth. *Dent Traumatol* 31:442,
2212 2015
2213 102. Bakland LK, Boyne PJ: Trauma to the oral cavity. *Clin Sports Med* 8:25, 1989
2214 103. Bonner P: Treating the emergency dental trauma patient. *Dent Today* 10:66, 1991
2215 104. Bringham C, Herr RD, Aldous JA: Oral trauma in the emergency department. *Am J Emerg Med* 11:486,
2216 1993
2217 105. Corner RW, Fitchie JG: Oral trauma: emergency care of lacerations, fractures, and burns. *Postgrad Med*
2218 85:2, 1989
2219 106. Crow RW: Diagnosis and management of sports-related injuries to the face. *Dent Clin North Am.* 35:719,
2220 1991
2221 107. Cvek M, Mejare I, Andreasen JO: Healing and prognosis of teeth with intra-alveolar fractures involving the
2222 cervical part of the root. *Dent Traumatol* 18:57, 2002
2223 108. Dehen M, Mrzilek M, Paling T: Modified acrylic cap splint for dento-alveolar fractures. *Int J Oral*
2224 *Maxillofac Surg* 18:85, 1989

- 2225 109. Dierks EJ: Management of associated dental injuries in maxillofacial trauma. *Otolaryngol Clin North Am*
2226 24:165, 1991
2227 110. Flanders RA: Mouthguards and sports injuries. *Ill Dent J* 62:13, 1993
2228 111. Harrington MS, Eberhart AB, Knapp JF: Dentofacial trauma in children. *ASDC J Dent Child* 55:334, 1988
2229 112. Lauridsen E, Gerds T, Andreasen JO: Alveolar process fractures in the permanent dentition. Part 2. The risk
2230 of healing complications in teeth involved in an alveolar process fracture. *Dent Traumatol* 32:128, 2016
2231 113. Leathers RD, Gowans RE: Office-based management of dental alveolar trauma. *Atlas Oral Maxillofac Surg*
2232 *Clin North Am* 21:185, 2013
2233 114. Li Z, Hu TO, Li ZB: Open reduction by vestibular approach in the treatment of segmental alveolar fracture.
2234 *Dent Traumatol* 28:470, 2012
2235 115. Tan PM, Zweig BE: Clinical management of dentoalveolar trauma: a discussion of current philosophy and
2236 methodology and a review of a case. *Military Med* 154:518, 1989
2237
2238

MANDIBULAR ANGLE, BODY, RAMUS, AND SYMPHYSIS INJURIES

- 2239
2240
2241 116. Al-Moraissi EA, Ellis E: Surgical management of anterior mandibular fractures: a systematic review and
2242 meta-analysis. *J Oral Maxillofac Surg* 72:2507, 2014
2243 117. Al-Moraissi EA, Ellis E 3rd: What method for management of unilateral mandibular angle fractures has the
2244 lowest rate of postoperative complications? A systematic review and meta-analysis. *J Oral Maxillofac Surg*
2245 72:2197, 2014
2246 118. Bobrowski AN, Sonogo CL, Chagas Junior OL: Postoperative infection associated with mandibular angle
2247 fracture treatment in the presence of teeth on the fracture line: a systematic review and meta-analysis. *Int J*
2248 *Oral Maxillofac Surg* 42:1041, 2013
2249 119. Braasch DC, Abubaker AO: Management of mandibular angle fracture. *Oral Maxillofac Surg Clin North*
2250 *Am* 25:591, 2013
2251 120. Chrcanovic BR: Fixation of mandibular angle fractures: clinical studies. *Oral Maxillofac Surg* 18:123, 2014
2252 121. Chrcanovic BR: Locking versus non-locking plate fixation in the management of mandibular fractures: a
2253 meta-analysis. *Int J Oral Maxillofac Surg* 43:1243, 2014
2254 122. Creasman CN, Markowitz BL, Kawamoto HK Jr: Computed tomography versus standard radiography in
2255 the assessment of fractures of the mandible. *Ann Plast Surg* 29:109, 1992
2256 123. Dodson TB, Perrott DH, Kaban LB: Fixation of mandibular fractures: a comparative analysis of rigid
2257 internal fixation and standard fixation techniques. *J Oral Maxillofac Surg* 48:3626, 1990
2258 124. Ellis E 3rd: Treatment of mandibular angle fractures using the AO reconstruction plate. *J Oral Maxillofac*
2259 *Surg* 51:250, 1993
2260 125. Ellis E 3rd, Ghali GE: Lag screw fixation of anterior mandible fracture. *J Oral Maxillofac Surg* 49:13, 1991
2261 126. Ellis E 3rd, Ghali GE: Lag screw fixation of mandibular angle fractures. *J Oral Maxillofac Surg* 49:234,
2262 1991
2263 127. Ellis E 3rd, Karas N: Treatment of mandibular angle fractures using two minidynamic compression plates. *J*
2264 *Oral Maxillofac Surg* 50:958, 1992
2265 128. Ellis E 3rd, Sinn DP: Treatment of mandibular angle fractures using two 2.4-dynamic compression plates. *J*
2266 *Oral Maxillofac Surg* 51:969, 1993
2267 129. Ellis E 3rd, Walker L: Treatment of mandibular angle fractures using one non-compression miniplate. *J Oral*
2268 *Maxillofac Surg* 54:864, 1996
2269 130. Ellis E 3rd, Walker L: Treatment of mandibular angle fractures using two non-compression miniplates. *J*
2270 *Oral Maxillofac Surg* 52:1032, 1994
2271 131. Goodday RH: Management of fractures of the mandibular body and symphysis. *Oral Maxillofac Surg Clin*
2272 *North Am* 25:601, 2013
2273 132. Haug RH: Management of low-caliber, low-velocity gunshot wounds of the maxillofacial region. *J Oral*
2274 *Maxillofac Surg* 47:1192, 1989
2275 133. Haug RH, Barber JE, Reifeis R: A comparison of mandibular angle fracture plating techniques. *Oral Surg*
2276 *Oral Med Oral Pathol* 82:257, 1996
2277 134. Haug RH, Prather J, Indresano AT: An epidemiologic survey of facial fractures and concomitant injuries. *J*
2278 *Oral Maxillofac Surg* 48:926, 1990

- 2279 135. Haug RH, Schwimmer A: Fibrous union of the mandible: a review of 27 patients. *J Oral Maxillofac Surg* 52:832, 1994
2280
2281 136. Hindawi YH, Oakley GM, Kinsella CR Jr, et al: Antibiotic duration and postoperative infection rates in
2282 mandibular fractures. *J Craniofac Surg* 22:1375, 2011
2283 137. Iizuka T, Lindqvist C: Sensory disturbances associated with rigid internal fixation of mandibular fractures. *J*
2284 *Oral Maxillofac Surg* 49:1264, 1991
2285 138. Leach J, Truelson J: Traditional methods vs rigid internal fixation of mandible fractures. *Arch Otolaryngol*
2286 *Head Neck Surg* 121:750, 1995
2287 139. Luhr HG, Reidick T, Merten HA: Results of treatment of fractures of the atrophic edentulous mandible by
2288 compression plating: a retrospective evaluation of 84 consecutive cases. *J Oral Maxillofac Surg* 54:250,
2289 1996
2290 140. Madsen MJ, Haug RH: A biomechanical comparison of 2 techniques for reconstructing atrophic edentulous
2291 mandible fractures. *J Oral Maxillofac Surg* 64:457, 2006
2292 141. Melo AR, de Aguiar Soares Carneiro SC, Leal JL, et al: Fracture of the atrophic mandible: case series and
2293 critical review. *J Oral Maxillofac Surg* 69:1430, 2011
2294 142. Miles BA, Potter JK, Ellis E 3rd: The efficacy of postoperative antibiotic regimens in the open treatment of
2295 mandibular fractures: a prospective randomized trial. *J Oral Maxillofac Surg* 64:576, 2006
2296 143. Moritz M, Niederdelmann H, Dammer R: Solitary lag screw fixation in the treatment of angle fractures:
2297 state of the art. *Acta Stomatol Belg* 91:29, 1994
2298 144. Passieri L, Ellis E 3rd, Sinn DP: Complication of non-rigid fixation mandibular angle fractures. *J Oral*
2299 *Maxillofac Surg* 51:382, 1993
2300 145. Posnick JC, Wells M, Pron GE: Pediatric facial fractures: evolving patterns of treatment. *J Oral Maxillofac*
2301 *Surg* 51:836, 1993
2302 146. Renton TF, Wiesenfeld D: Mandibular fracture osteosynthesis: a comparison of three techniques. *Br J Oral*
2303 *Maxillofac Surg* 34:166, 1996
2304 147. Schaefer EH 4th, Cateson EJ: Antibiotic selection for open reduction internal fixation of mandible
2305 fractures. *J Craniofac Surg* 24:85, 2013
2306 148. Schaller B, Soong PL, Zix J, et al: The role of postoperative prophylactic antibiotics in the treatment of
2307 facial fractures: a randomized, double-blind, placebo-controlled pilot clinical study. Part 2: Mandibular
2308 fractures in 59 patients. *Br J Oral Maxillofac Surg* 51:803, 2013
2309 149. Schierely HP, Schmelzeisen R, Rahn B, et al: One- or two-plate fixation of mandibular angle fractures? *J*
2310 *Craniofac Surg* 25:162, 1997
2311 150. Singh RP, Carter LM, Whitfield PH: Antimicrobial prophylaxis in open reduction and internal fixation of
2312 compound mandibular fractures: a collaborative regional audit of outcome. *Br J Oral Maxillofac Surg*
2313 51:444, 2013
2314 151. Stone IE, Dodson TB, Bays RA: Risk factors for infection following operative treatment of mandibular
2315 fractures: a multivariate analysis. *Plast Reconstr Surg* 91:64, 1993
2316 152. Tuovinen V: A retrospective analysis of treatment of 279 patients with isolated mandibular fractures with
2317 titanium miniplates. *Oral Surg Oral Diagn* 4:45, 1993
2318 153. Valentino J, Marentette LJ: Supplemental maxillomandibular fixation with miniplate osteosynthesis.
2319 *Otolaryngol Head Neck Surg* 112:215, 1995
2320 154. Van Sickels JE: A review and update of new methods for immobilization of the mandible. *Oral Surg Oral*
2321 *Med Oral Pathol Oral Radiol Endod* 100:S11, 2005
2322
2323

MANDIBULAR CONDYLE INJURIES

- 2324
2325
2326 155. Abdel-Galil K, Loukota R: Fractures of the mandibular condyle: evidence base and current concepts of
2327 management. *Br J Oral Maxillofac Surg* 48:520, 2010
2328 156. Al-Moraissi EA, Ellis E 3rd: Surgical treatment of adult mandibular condylar fractures provides better
2329 outcomes than closed treatment: a systematic review and meta-analysis. *J Oral Maxillofac Surg* 73:482,
2330 2015
2331 157. Avrahami E, Rabin A, Mejdan M: Unilateral medial dislocation of the temporomandibular joint.
2332 *Neuroradiol* 39:602, 1997

- 2333 158. Bast B: Injuries to the mandibular condyle and subcondylar region. In: Fonseca R, Marciani RD, Turvey
2334 TA, eds: Oral and Maxillofacial Surgery (ed 2). St. Louis, MO, Saunders, 2009
- 2335 159. Beekler DM, Walker RV: Condyle fractures. *J Oral Surg* 27:563, 1969
- 2336 160. Boutros SG: Closed reduction and fluoroscopically assisted percutaneous stabilization of displaced
2337 subcondylar mandible fractures. *Plast Reconstr Surg* 116:971, 2005
- 2338 161. Chrcanovic BR: Surgical versus non-surgical treatment of mandibular condylar fractures: a meta-analysis.
2339 *Int J Oral Maxillofac Surg* 44:158, 2015
- 2340 162. Eckelt U, Schneider M, Erasmus F, et al: Open versus closed treatment of fractures of the mandibular
2341 condylar process—a prospective randomized multi-centre study. *J Craniomaxillofac Surg* 34:306, 2006
- 2342 163. Ellis E 3rd: Complications of mandibular condyle fractures. *Int J Oral Maxillofac Surg* 27:255, 1998
- 2343 164. Ellis E 3rd, Dean J: Rigid fixation of mandibular condyle fractures. *Oral Surg Oral Med Oral Pathol* 76:6,
2344 1993
- 2345 165. Feifel H, Albert-Deumlich J, Riediger D: Long-term follow-up of subcondylar fractures in children by
2346 electronic computer-assisted recording of condylar movements. *Int J Oral Maxillofac Surg* 21:70, 1992
- 2347 166. Goss AN, Bosanquet AG: The arthroscopic appearance of acute temporomandibular joint trauma. *J Oral*
2348 *Maxillofac Surg* 48:780, 1990
- 2349 167. Hackenberg B, Lee C, Caterson EJ: Management of subcondylar mandible fractures in the adult patient. *J*
2350 *Craniofac Surg* 25:166, 2014
- 2351 168. Hall MB: Condylar fractures. Surgical management. *J Oral Maxillofac Surg* 52:1189, 1994
- 2352 169. Hayward JR, Scott RF: Fractures of the mandibular condyle. *J Oral Maxillofac Surg* 51:57, 1993
- 2353 170. Hidding J, Wolf R, Pingel D: Surgical versus non-surgical treatment of fractures of the articular process of
2354 the mandible. *J Craniomaxillofac Surg* 20:345, 1992
- 2355 171. Hillerup S: Internal fixation of severely displaced mandibular condylar neck fracture with the aid of ramus
2356 osteotomy. A revised technique. *Int J Oral Maxillofac Surg* 26:272, 1997
- 2357 172. Ihnalainen V, Tasanen A: Central dislocation of the mandibular condyle into the middle cranial fossa: a
2358 case report and review of the literature. *Int J Oral Maxillofac Surg* 12:39, 1983
- 2359 173. Jones JK, Van Sickels JE: A preliminary report of arthroscopic findings following acute condylar trauma. *J*
2360 *Oral Maxillofac Surg* 49:55, 1991
- 2361 174. Kermer CH, Undt G, Rasse M: Surgical reduction and fixation of intracapsular condylar fractures. A follow
2362 up study. *Int J Oral Maxillofac Surg* 27:191, 1998
- 2363 175. Kommers SC, van den Bergh B, Forouzanfar T: Quality of life after open versus closed treatment for
2364 mandibular condyle fractures: a review of literature. *J Craniomaxillofac Surg* 41:e221, 2013
- 2365 176. Kragstrup TW, Christensen J, Fejerskov K, et al: Frey syndrome—an underreported complication to closed
2366 treatment of mandibular condyle fracture? Case report and literature review. *J Oral Maxillofac Surg*
2367 69:2211, 2011
- 2368 177. Kyzas PA, Saeed A, Tabbenor O: The treatment of mandibular condyle fractures: a meta-analysis. *J*
2369 *Craniofac Surg* 40:e438, 2012
- 2370 178. Landes CA, Lipphardt R: Prospective evaluation of a pragmatic treatment rationale: open reduction and
2371 internal fixation of displaced and dislocated condyle and condylar head fractures and closed reduction of
2372 non-displaced, non-dislocated fractures. Part II: high condylar and condylar head fractures. *Int J Oral*
2373 *Maxillofac Surg* 35:115, 2006
- 2374 179. Mitchell DA: A multicentre audit of unilateral fractures of the mandibular condyle. *Br J Oral Maxillofac*
2375 *Surg* 35:230, 1997
- 2376 180. Neff A, Chossegros C, Blanc JL, et al: Position paper from the IBRA Symposium on Surgery of the Head—
2377 the 2nd International Symposium for Condylar Fracture Osteosynthesis, Marseille, France 2012. *J*
2378 *Craniofac Surg* 42:1234, 2014
- 2379 181. Oikarinen KS, Raustia AM, Lahti J: Signs and symptoms of TMJ dysfunction in patients with mandibular
2380 condyle fractures. *Cranio* 9:58, 1991
- 2381 182. Palmieri C, Ellis E 3rd, Throckmorton G: Mandibular motion after closed and open treatment of unilateral
2382 mandibular condylar process fractures. *J Oral Maxillofac Surg* 57:764, 1999
- 2383 183. Pilling E, Schneider M, Mai R, et al: Minimally invasive fracture treatment with cannulated lag screws in
2384 intracapsular fractures of the condyle. *J Oral Maxillofac Surg* 64:868, 2006
- 2385 184. Raveh J, Vuillemin T, Ladrach K: Open reduction of the dislocated, fractured condylar process: indications
2386 and surgical procedures. *J Oral Maxillofac Surg* 47:120, 1989

- 2387 185. Silvennoinen U, Iizuka T, Lindqvist C: Different patterns of condylar fractures: an analysis of 382 patients
2388 in a 3-year period. *J Oral Maxillofac Surg* 50:1032, 1992
2389 186. Silvennoinen U, Iizuka T, Oikarinen K, et al: Analysis of possible factors leading to problems after
2390 nonsurgical treatment of condylar fractures. *J Oral Maxillofac Surg* 52:793, 1994
2391 187. Troulis MJ, Kaban LB: Endoscopic approach to the ramus/condyle unit: clinical applications. *J Oral*
2392 *Maxillofac Surg* 59:503, 2001
2393 188. Trup JC, Stoll P, Schlotthauer U, et al: Computerized axiographic evaluation of condylar movements in
2394 cases with fractures of the condylar process: a follow up over 19 years. *J Craniomaxillofac Surg* 24:46,
2395 1996
2396 189. Walker RV: Condylar fractures. Nonsurgical management. *J Oral Maxillofac Surg* 52:1185, 1994
2397 190. Widmark G, Bagenholm T, Kahnberg KE, et al: Open reduction of subcondylar fractures. A study of
2398 functional rehabilitation. *Int J Oral Maxillofac Surg* 25:101, 1996
2399 191. Worsaae N, Thorn JJ: Surgical versus nonsurgical treatment of unilateral dislocated low subcondylar
2400 fractures: a clinical study of 52 cases. *J Oral Maxillofac Surg* 52:353, 1994
2401 192. Yao S, Zhou J, Li Z: Contrast analysis of open reduction and internal fixation and non-surgical treatment of
2402 condylar fracture: a meta-analysis. *J Craniofac Surg* 25:2077, 2014
2403 193. Zide MF: Open reduction of mandibular condyle fractures: indications and technique. *Clin Plast Surg*
2404 16:69, 1989
2405
2406

MANDIBULAR CONDYLE DISLOCATION

- 2407
2408
2409 194. Levandoski RR: Mandibular whiplash. Part II: an extension flexion injury of the temporomandibular joints.
2410 *Funct Orthod* 10:45, 1993
2411 195. Lieberman J: Treating acute mandibular dislocations. *Postgrad Med* 85:136, 1989
2412 196. Luyk NH, Larsen PE: The diagnosis and treatment of the dislocated mandible. *Am J Emerg Med* 7:329,
2413 1989
2414 197. Oshiro N, Yoshida H, Uemura M, et al: Analysis of MRI findings in minimum invasive treatment for
2415 habitual temporomandibular joint dislocation by autologous blood injection around the temporomandibular
2416 joint capsule. *J Craniomaxillofac Surg* 42:1486, 2014
2417 198. Wolford LM, Pitta MC, Mehra P: Mitek anchors for treatment of chronic mandibular dislocation. *Oral Surg*
2418 *Oral Med Oral Pathol Oral Radiol Endod* 92:495, 2001
2419
2420

MAXILLARY INJURIES

- 2421
2422
2423 199. Dutton GN, al-Qurainy I, Stassen LF: Ophthalmic consequences of mid-facial trauma. *Eye* 6:86, 1992
2424 200. Gruss JS: Complex nasoethmoid-orbital and midfacial fractures: role of craniofacial surgical techniques and
2425 immediate bone grafting. *Ann Plast Surg* 1:377, 1986
2426 201. Haug RH: Management of low-caliber, low-velocity gunshot wounds of the maxillofacial region. *J Oral*
2427 *Maxillofac Surg* 47:1192, 1989
2428 202. Haug RH, Adams JM, Jordan RB: Comparison of the morbidity associated with maxillary fractures treated
2429 by maxillomandibular and rigid internal fixation. *Oral Surg Oral Med Oral Pathol* 80:629, 1995
2430 203. Haug RH, Prather J, Indresano AT: An epidemiologic survey of facial fractures and concomitant injuries. *J*
2431 *Oral Maxillofac Surg* 48:926, 1990
2432 204. Kelly KJ, Manson PN, Vander S: Sequencing LeFort fracture treatment (organization of treatment for a
2433 panfacial fracture). *J Craniofac Surg* 1:168, 1990
2434 205. Manson PN, Clark N, Robertson B, et al: Comprehensive management of pan-facial fractures. *J*
2435 *Craniomaxillofac Trauma* 1:43, 1995
2436 206. Marciani RD: Management of midface fractures: fifty years later. *J Oral Maxillofac Surg* 51:960, 1993
2437 207. Precious DS, Delaire J, Hoffman CD: The effects of nasomaxillary injury on future facial growth. *Oral Surg*
2438 *Oral Med Oral Pathol* 66:525, 1988
2439 208. Soong PL, Schaller B, Zix J, et al: The role of postoperative prophylactic antibiotics in the treatment of
2440 facial fractures: a randomised, double-blind, placebo-controlled pilot clinical study. Part 3: Le Fort and
2441 zygomatic fractures in 94 patients. *Br J Oral Maxillofac Surg* 52:329, 2014

2442 209. Thaller SR, Huang V: Midfacial fractures in the pediatric population. *Ann Plast Surg* 29:348, 1992

2443

2444

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ZYGOMATIC INJURIES

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2486

2487

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2493

2494

2495

2496

210. Ardekian L, Kaffe I, Taicher S: Comparative evaluation of different radiographic projections of zygomatic complex fractures. *J Craniomaxillofac Surg* 21:120, 1993
211. Carr RM, Mathog RH: Early and delayed repair of orbitozygomatic complex fractures. *J Oral Maxillofac Surg* 55:253, 1997
212. Crighton LA, Koppel DA: The value of postoperative radiographs in the management of zygomatic fractures: prospective study. *Br J Oral Maxillofac Surg* 45:51, 2007
213. D'Addario M, Cunningham LL Jr: Management of zygomatic fractures. In: Fonseca R, Marciani RD, Turvey TA, eds: *Oral and Maxillofacial Surgery* (ed 2). St. Louis, MO, Saunders, 2009
214. Dutton GN, al-Qurainy I, Stassen LF: Ophthalmic consequences of mid-facial trauma. *Eye* 6:86, 1992
215. Ellis E 3rd, Kittidumkerng W: Analysis of treatment for isolated zygomaticomaxillary complex fractures. *J Oral Maxillofac Surg* 54:386, 1996
216. Gilhooly MG, Falconer DT, Wood GA: Orbital subperiosteal abscess and blindness complicating a minimally displaced zygomatic complex fracture. *Br J Oral Maxillofac Surg* 33:185, 1995
217. Haug RH, Prather J, Indresano AT: An epidemiologic survey of facial fractures and concomitant injuries. *J Oral Maxillofac Surg* 48:926, 1990
218. Jungell P, Lindqvist C: Paraesthesia of the infraorbital nerve following fracture of the zygomatic complex. *Int J Oral Maxillofac Surg* 16:363, 1987
219. Kobienia BJ, Sultz JR, Migliori MR, et al: Portable fluoroscopy in the management of zygomatic arch fractures. *Ann Plast Surg* 40:260, 1998
220. Li J, Li P, Lu H, et al: Digital design and individually fabricated titanium implants for the reconstruction of traumatic zygomatico-orbital defects. *J Craniofac Surg* 24:363, 2013
221. Marciani RD: Management of midface fractures: fifty years later. *J Oral Maxillofac Surg* 51:960, 1993
222. Marinho RO, Freire-Maia B: Management of fractures of the zygomaticomaxillary complex. *Oral Maxillofac Surg Clin North Am* 25:617, 2013
223. Ord RA: Post-operative retrobulbar hemorrhage and blindness complicating trauma surgery. *Br J Oral Surg* 19:202, 1981
224. Reher P, Duarte GC: Miniplates in the frontozygomatic region. An anatomic study. *Int J Oral Maxillofac Surg* 23:273, 1994
225. Shumrick KA, Campbell AC: Management of the orbital rim and floor in zygoma and midface fractures: criteria for selective exploration. *Facial Plast Surg* 14:77, 1998
226. Shumrick KA, Kersten RC, Kulwin DR, et al: Criteria for selective management of the orbital rim and floor in zygomatic complex and midface fractures. *Arch Otolaryngol Head Neck Surg* 123:378, 1997
227. Soong PL, Schaller B, Zix J, et al: The role of postoperative prophylactic antibiotics in the treatment of facial fractures: a randomised, double-blind, placebo-controlled pilot clinical study. Part 3: Le Fort and zygomatic fractures in 94 patients. *Br J Oral Maxillofac Surg* 52:329, 2014
228. Thaller SR, Huang V: Midfacial fractures in the pediatric population. *Ann Plast Surg* 29:348, 1992
229. Vriens JP, Moos KF: Morbidity of the infraorbital nerve following orbitozygomatic complex fractures. *J Craniomaxillofac Surg* 23:363, 1995
230. Vriens JP, van der Glas HW, Bosman F, et al: Information on infraorbital nerve damage from multi-testing of sensory function. *Int J Oral Maxillofac Surg* 27:20, 1998
231. Weisberger EC, Eppley BL: Resorbable fixation plates in head and neck surgery. *Laryngoscope* 107:716, 1997
232. Wittwer G, Adeyemo WL, Voracek M, et al: An evaluation of the clinical application of three different biodegradable osteosynthesis materials for the fixation of zygomatic fractures. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 100:656, 2005
233. Zhang S, Gui H, Lin Y, et al: Navigation-guided correction of midfacial post-traumatic deformities (Shanghai experience with 40 cases). *J Oral Maxillofac Surg* 70:1426, 2012
234. Zingg M, Laedrach K, Chen J: Classification and treatment of zygomatic fractures: a review of 1,025 cases. *J Oral Maxillofac Surg* 50:778, 1992

ORBITAL INJURIES

- 2497
2498
2499
2500 235. Chang EL, Bernardino CR: Update on orbital trauma. *Curr Opin Ophthalmol* 15:411, 2004
2501 236. Colvin J, Langford S, Emonson D, et al: Initial management and transport of patients with perforating eye
2502 injuries. *Aust Fam Physician* 24:1017, 1995
2503 237. Dutton GN, al-Qurainy I, Stassen LF: Ophthalmic consequences of mid-facial trauma. *Eye* 6:86, 1992
2504 238. Dutton JJ, Manson PN, Iliff N, et al: Management of blow-out fractures of the orbital floor. *Surv*
2505 *Ophthalmol* 35:279, 1991
2506 239. Esmaeli B, Elner SG, Schork MA, et al: Visual outcomes and ocular survival after penetrating trauma. A
2507 clinicopathologic study. *Ophthalmology* 102:393, 1995
2508 240. Fong LP: Secondary hemorrhage in traumatic hyphema. Predictive factors for selective prophylaxis.
2509 *Ophthalmology* 101:1583, 1994
2510 241. Hinohira Y, Yumoto E, Shimamura I: Endoscopic endonasal reduction of blowout fractures of the orbital
2511 floor. *Otolaryngol Head Neck Surg* 133:741, 2005
2512 242. Holt GR, Holt JE: Incidence of eye injuries in facial fractures. An analysis of 727 cases. *Otolaryngol Head*
2513 *Neck Surg* 91:276, 1983
2514 243. Jackson IT: Classification and treatment of orbitozygomatic and orbitoethmoid fractures: the place of bone
2515 grafting and plate fixation. *Clin Plast Surg* 16:77, 1989
2516 244. Kakibuchi M, Fukazawa K, Fukuda K, et al: Combination of transconjunctival and endonasal-transantral
2517 approach in the repair of blowout fractures involving the orbital floor. *Br J Plast Surg* 57:37, 2004
2518 245. Kallela I, Hyrkas T, Paukku P, et al: Blindness after maxillofacial blunt trauma. Evaluation of candidates
2519 for optic nerve decompression surgery. *J Craniomaxillofac Surg* 22:220, 1994
2520 246. Li KK, Meara JG, Joseph MP: Reversal of blindness after facial fracture repair by prompt optic nerve
2521 decompression. *J Oral Maxillofac Surg* 55:648, 1997
2522 247. Markiewicz MR, Dierks EJ, Potter BE, et al: Reliability of intraoperative navigation in restoring normal
2523 orbital dimensions. *J Oral Maxillofac Surg* 69:2833, 2011
2524 248. Martello JY, Vasconez HC: Supraorbital roof fractures: a formidable entity with which to contend. *Ann*
2525 *Plast Surg* 38:223, 1997
2526 249. Ochs MW, Johns FR, Marciani RD: Orbital trauma. In: Fonseca R, Marciani RD, Turvey TA, eds: *Oral and*
2527 *Maxillofacial Surgery* (ed 2). St. Louis, MO, Saunders, 2009
2528 250. Ord RA: Post-operative retrobulbar hemorrhage and blindness complicating trauma surgery. *Br J Oral Surg*
2529 19:202, 1981
2530 251. Posnick JC, Wells M, Pron GE: Pediatric facial fractures: evolving patterns of treatment. *J Oral Maxillofac*
2531 *Surg* 51:836, 1993
2532 252. Rubin PA, Shore JW, Yaremchuk MJ: Complex orbital fracture repair using rigid fixation of the internal
2533 orbital skeleton. *Ophthalmology* 99:553, 1992
2534 253. Schendel SA: Orbital trauma. *Oral Maxillofac Surg Clin North Am* 5:409, 1993
2535 254. Schon R, Gellrich NC, Schmelzeisen R: Frontiers in maxillofacial endoscopic surgery. *Atlas Oral*
2536 *Maxillofac Surg Clin North Am* 11:209, 2003
2537 255. Shingleton BJ: Eye injuries. *N Engl J Med* 325:408, 1991
2538 256. Shumrick KA, Campbell AC: Management of the orbital rim and floor in zygoma and midface fractures:
2539 criteria for selective exploration. *Facial Plast Surg* 14:77, 1998
2540 257. Stanley RB, Sires BS, Funk GF, et al: Management of displaced lateral orbital wall fractures associated
2541 with visual and ocular motility disturbances. *Plast Reconstr Surg* 102:972, 1998
2542 258. Strong EB: Endoscopic repair of orbital blow-out fractures. *Facial Plast Surg* 20:223, 2004
2543 259. Vriens JP, van der Glas HW, Bosman F, et al: Information on infraorbital nerve damage from multitesting
2544 of sensory function. *Int J Oral Maxillofac Surg* 27:20, 1998
2545 260. Wallace TD, Moore CC, Bromwich MA, et al: Endoscopic repair of orbital floor fractures: computed
2546 tomographic analysis using a cadaveric model. *J Otolaryngol* 35:1, 2006
2547 261. Werther JR: Cutaneous approaches to the lower lid and orbit. *J Oral Maxillofac Surg* 56:60, 1998
2548 262. Yaremchuk MJ, Del Vecchio DA, Fiala TG, et al: Microfixation of acute orbital fractures. *Ann Plast Surg*
2549 30:385, 1993

- 2550 263. Zix J, Schaller B, Iizuka T, et al: The role of postoperative prophylactic antibiotics in the treatment of facial
2551 fractures: a randomised, double-blind, placebo-controlled pilot clinical study. Part 1: orbital fractures in 62
2552 patients. *Br J Oral Maxillofac Surg* 51:332, 2013
2553
2554

NASAL BONE INJURIES

- 2555
2556
2557 264. Al-Moraissi EA, Ellis E 3rd: Local versus general anesthesia for the management of nasal bone fractures: a
2558 systematic review and meta-analysis. *J Oral Maxillofac Surg* 73:606, 2015
2559 265. Frodel JL: Primary and secondary nasal bone grafting after major facial trauma. *Facial Plast Surg* 8:194,
2560 1992
2561 266. Frodel JL Jr: Management of the nasal dorsum in central facial injuries. Indications for calvarial bone
2562 grafting. *Arch Otolaryngol Head Neck Surg* 121:307, 1995
2563 267. Haug RH, Prather J: The closed reduction of nasal fractures. An evaluation of two techniques. *J Oral*
2564 *Maxillofac Surg* 49:1288, 1991
2565 268. Hegtvedt AK, Larsen PE: Isolated nasal fractures. *Atlas Oral Maxillofac Surg Clin North Am* 2:1, 1994
2566 269. Hwang K, You SH, Kim SG, et al: Analysis of nasal bone fractures: a six-year study of 503 patients. *J*
2567 *Craniofac Surg* 17:261, 2006
2568 270. Mondin V, Rinaldo A, Ferlito A: Management of nasal bone fractures. *Am J Otolaryngol* 26:18, 2005
2569 271. Reddy LV, Elhadi HM: Nasal fractures. In: Fonseca R, Marciani RD, Turvey TA, eds: *Oral and*
2570 *Maxillofacial Surgery* (ed 2). St. Louis, MO, Saunders, 2009
2571 272. Stranc MF, Robertson GA: A classification of injuries of the nasal skeleton. *Ann Plastic Surg* 2:468, 1978
2572 273. Thaller SR, Huang V: Midfacial fractures in the pediatric population. *Ann Plast Surg* 29:348, 1992
2573
2574

NASO-ORBITAL-ETHMOID COMPLEX INJURIES

- 2575
2576
2577 274. Ellis E 3rd: Sequencing treatment for naso-orbito-ethmoid fractures. *J Oral Maxillofac Surg* 51:543, 1993
2578 275. Evans GR, Clark N, Manson PN: Identification and management of minimally displaced nasoethmoidal
2579 orbital fractures. *Ann Plast Surg* 35:469, 1995
2580 276. Gruss JS: Complex nasoethmoid-orbital and midfacial fractures: role of craniofacial surgical techniques and
2581 immediate bone grafting. *Ann Plast Surg* 1:377, 1986
2582 277. Herford AS, Ying T, Brown B: Outcomes of severely comminuted (type III) naso-orbitoethmoid fractures. *J*
2583 *Oral Maxillofac Surg* 63:1266, 2005
2584 278. Jackson IT: Classification and treatment of orbitozygomatic and orbitoethmoid fractures: the place of bone
2585 grafting and plate fixation. *Clin Plast Surg* 16:77, 1989
2586 279. Johnson JV, Taylor TD: Treatment of nasal-orbital-ethmoid fractures. *Atlas Oral Maxillofac Surg Clin*
2587 *North Am* 2:35, 1997
2588 280. Marciani RD, Gonty AA: Principles of management of complex craniofacial trauma. *J Oral Maxillofac*
2589 *Surg* 51:535, 1993
2590 281. Markowitz BL, Manson PN, Sargent L, et al: Management of the medial canthal tendon in nasoethmoid
2591 orbital fractures: the importance of the central fragment in classification and treatment. *Plast Reconstr Surg*
2592 87:843, 1991
2593 282. Mehta N, Butala P, Bernstein MP: The imaging of maxillofacial trauma and its pertinence to surgical
2594 intervention. *Radiol Clin North Am* 50:43, 2012
2595 283. Merckx MA, Freihofer HP, Borstlap WA, et al: Effectiveness of primary correction of traumatic telecanthus.
2596 *Int J Oral Maxillofac Surg* 24:344, 1995
2597 284. Pawar SS, Rhee JS: Frontal sinus and naso-orbital-ethmoid fractures. *JAMA Facial Plast Surg* 16:284, 2014
2598 285. Precious DS, Delaire J, Hoffman CD: The effects of nasomaxillary injury of future facial growth. *Oral Surg*
2599 *Oral Med Oral Pathol* 66:525, 1988
2600 286. Sargent LA, Rogers GF: Nasoethmoid orbital fractures: diagnosis and management. *J Craniomaxillofac*
2601 *Trauma* 5:19, 1999
2602 287. Thaller SR, Huang V: Midfacial fractures in the pediatric population. *Ann Plast Surg* 29:348, 1992
2603 288. Wolff J, Sandor GK, Pyysalo M, et al: Late reconstruction of orbital and naso-orbital deformities. *Oral*
2604 *Maxillofac Surg Clin North Am* 25:683, 2013

2605
2606
2607
2608
2609
2610
2611
2612
2613
2614
2615
2616
2617
2618
2619
2620
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2649
2650
2651
2652
2653
2654
2655
2656
2657
2658

FRONTAL BONE AND FRONTAL SINUS INJURIES

289. Egemen O, Özkaya Ö, Aksan T, et al: Endoscopic repair of isolated anterior table frontal sinus fractures without fixation. *J Craniofac Surg* 24:1357, 2013
290. Kellman R, Goyal P: Managing the frontal sinus in the endoscopic age: has the endoscope changed the algorithm. *Craniofac Trauma Reconstr* 7:203, 2014
291. Donald PJ: Frontobasal approach for trauma and tumor. *Minim Invasive Neurosurg* 37:37, 1994
292. El Khatib K, Danino A, Malka G: The frontal sinus: a culprit or a victim? A review of 40 cases. *J Craniofac Surg* 32:314, 2004
293. Fattahi T: Management of frontal sinus. In: Fonseca R, Marciani RD, Turvey TA, eds: *Oral and Maxillofacial Surgery* (ed 2). St. Louis, MO, Saunders, 2009
294. Fattahi T, Johnson C, Steinberg B: Comparison of 2 preferred methods used for frontal sinus obliteration. *J Oral Maxillofac Surg* 63:487, 2005
295. Gelesko S, Markiewicz MR, Bell RB: Responsible and prudent imaging in the diagnosis and management of facial fractures. *Oral Maxillofac Surg Clin North Am* 25:545, 2013
296. Gonty AA, Marciani RD, Adornato DC: Management of front sinus fractures: a view of 33 cases. *J Oral Maxillofac Surg* 57:372, 1999
297. Haug RH, Likavec MJ: Frontal sinus reconstruction. *Atlas Oral Maxillofac Surg Clin North Am* 2:65, 1994
298. Helmy ES, Koh ML, Bays RA: Management of frontal sinus fractures. Review of the literature and clinical update. *Oral Surg Oral Med Oral Pathol* 69:137, 1990
299. Lee TT, Ratzker PA, Galarza M, et al: Early combined management of frontal sinus and orbital and facial fractures. *J Trauma* 44:665, 1998
300. Martello JY, Vasconez HC: Supraorbital roof fractures: a formidable entity with which to contend. *Ann Plast Surg* 38:223, 1997
301. Metzinger SE, Guerra AB, Garcia RE: Frontal sinus fractures: management guidelines. *Facial Plast Surg* 21:199, 2005
302. Powers DB, Rodriguez ER: Reconstruction of avulsive defects of the maxillofacial complex (Chapter 31). In: Fonseca RJ, Walker RV, Barber HD, et al, eds: *Oral and Maxillofacial Trauma* (ed 4). St. Louis, MO, Elsevier, 2012, p. 763

ORAL/PERIORAL SOFT TISSUE INJURIES

303. Bakland LK, Boyne PJ: Trauma to the oral cavity. *Clin Sports Med* 8:25, 1989
304. Bringham C, Herr RD, Aldous JA: Oral trauma in the emergency department. *Am J Emerg Med* 11:486, 1993
305. Corner RW, Fitchie JG: Oral trauma: emergency care of lacerations, fractures, and burns. *Postgrad Med* 85:34, 1989
306. Curtin JW: Basic plastic surgical techniques in repair of facial lacerations. *Surg Clin North Am* 53:33, 1973
307. Dierks EJ: Management of associated dental injuries in maxillofacial trauma. *Otolaryngol Clin North Am* 24:165, 1991
308. Herford A: Soft tissue injuries. In: Fonseca R, Marciani RD, Turvey TA, eds: *Oral and Maxillofacial Surgery* (ed 2). St. Louis, MO, Saunders, 2009
309. Holt GR: Concepts of soft-tissue trauma repair. *Otolaryngol Clin North Am* 23:1019, 1990
310. Hudson JW: Special soft tissue injuries. In: Fonseca R, Marciani RD, Turvey TA, eds: *Oral and Maxillofacial Surgery* (ed 2). St. Louis, MO, Saunders, 2009
311. Key SJ, Thomas DW, Shepherd JP: The management of soft tissue facial wounds. *Br J Oral Maxillofac Surg* 33:76, 1995
312. Lawson W: Management of soft tissue injuries of the face. *Otolaryngol Clin North Am* 15:35, 1982
313. Leach J: Proper handling of soft tissue in the acute phase. *Facial Plast Surg* 17:227, 2001
314. Morgan JP, Haug RH, Murphy MT: Management of maxillofacial dog bite injuries. *J Oral Maxillofac Surg* 53:435, 1995

- 2659 315. Schaefer D, Bennett J: Associated soft tissue injuries. *Atlas Oral Maxillofac Surg Clin North Am* 2:47,
2660 1994
2661 316. Spira M: Management of soft tissue injuries. *Ann Plast Surg* 17:408, 1986
2662 317. Stewart GM, Quan L, Horton MA: Laceration management. *Pediatr Emerg Care* 9:247, 1993
2663 318. Ziccardi VB, Goldfarb IW, Braun IW: Oral and maxillofacial surgical considerations in the management of
2664 burn victims. *J Oral Maxillofac Surg* 52:607, 1994
2665
2666

AURICLE INJURIES

- 2667
2668
2669 319. El-Khatib HA, Al-Basti HB, Al-Ghoul A, et al: Subtotal reconstruction of the burned auricle. *Burns* 31:230,
2670 2005
2671 320. Holt GR: Concepts of soft-tissue trauma repair. *Otolaryngol Clin North Am* 23:1019, 1990
2672 321. Morgan JP, Haug RH, Murphy MT: Management of maxillofacial dog bite injuries. *J Oral Maxillofac Surg*
2673 53:435, 1995
2674 322. Spira M: Management of soft tissue injuries. *Ann Plast Surg* 17:408, 1986
2675 323. Stewart GM, Quan L, Horton MA: Laceration management. *Pediatr Emerg Care* 9:247, 1993
2676 324. Yeong EK, Chen MT, Mann R, et al: Facial mutilation after an assault with chemicals. 15 cases and
2677 literature review. *J Burn Care Rehabil* 18:234, 1997
2678 325. Ziccardi VB, Goldfarb IW, Braun TW: Oral and maxillofacial surgical considerations in the management of
2679 burn victims. *J Oral Maxillofac Surg* 52:607, 1994
2680

SCALP INJURIES

- 2681
2682
2683
2684 326. Richardson MA, Lange JP, Jordan JR: Reconstruction of full-thickness scalp defects using a dermal
2685 regeneration template. *JAMA Facial Plast Surg* 18:62, 2016
2686 327. Hoffmann JF: Tissue expansion in the head and neck. *Facial Plast Surg Clin North Am* 13:315, 2005
2687 328. Huggler J, Singer AJ: Irrigation in facial and scalp lacerations: does it alter outcome? *Ann Emerg Med*
2688 31:73, 1998
2689 329. Morgan JP, Haug RH, Murphy MT: Management of maxillofacial dog bite injuries. *J Oral Maxillofac Surg*
2690 53:435, 1995
2691 330. Newman MI, Hanasono MM, Disa JJ, et al: Scalp reconstruction: a 15-year experience. *Ann Plast Surg*
2692 52:501, 2004
2693 331. Welch TB, Boyne PJ: The management of traumatic scalp injuries: report of cases. *J Oral Maxillofac Surg*
2694 49:1007, 1991
2695 332. Ziccardi VB, Goldfarb IW, Braun IW: Oral and maxillofacial surgical considerations in the management of
2696 burn victims. *J Oral Maxillofac Surg* 52:607, 1994
2697

PERIORBITAL SOFT TISSUE INJURIES

- 2698
2699
2700
2701 333. Birrer RB, Robinson T, Papachristos P: Orbital emphysema: how common, how significant? *Ann Emerg*
2702 *Med* 24:1115, 1994
2703 334. Curtin JW: Basic plastic surgical techniques in repair of facial lacerations. *Surg Clin North Am* 53:33, 1973
2704 335. Duma SM, Kress TA, Porta DJ, et al: Airbag-induced eye injuries: a report of 25 cases. *J Trauma* 41:114,
2705 1996
2706 336. Dutton GN, al-Qurainy I, Stassen LF: Ophthalmic consequences of mid-facial trauma. *Eye* 6:86, 1992
2707 337. Esmaeli B, Elner SG, Schork MA, et al: Visual outcomes and ocular survival after penetrating trauma. A
2708 clinicopathologic study. *Ophthalmology* 102:393, 1995
2709 338. Herman DC, Bartley GB: The treatment of animal bite injuries of the eye and ocular adnexa. *Ophthal Plast*
2710 *Reconstr Surg* 3:237, 1987
2711 339. Holt GR: Concepts of soft-tissue trauma repair. *Otolaryngol Clin North Am* 23:1019, 1990
2712 340. Jones NP: Eye injury in sport: incidence, biomechanics, clinical effects and prevention. *J R Coll Surg Edinb*
2713 38:127, 1993

- 2714 341. Joseph E, Zak R, Smith S: Predictors of blinding or serious eye injury in blunt trauma. *J Trauma* 33:19,
2715 1992
- 2716 342. Kennedy RH, May J, Dailey J: Canalicular laceration: an 11-year epidemiologic and clinical study. *Ophthal*
2717 *Plast Reconstr Surg* 6:46, 1990
- 2718 343. Key SJ, Thomas DW, Shepherd JP: The management of soft tissue facial wounds. *Br J Oral Maxillofac*
2719 *Surg* 33:76, 1995
- 2720 344. Klein BE, Karlson TA, Rose J: An anatomic index for the severity of ocular injuries. *Eur J Ophthalmol*
2721 3:57, 1993
- 2722 345. Lawson W: Management of soft tissue injuries of the face. *Otolaryngol Clin North Am* 15:35, 1982
- 2723 346. Leach J: Proper handling of soft tissue in the acute phase. *Facial Plast Surg* 17:227, 2001
- 2724 347. MacGillivray RF, Stevens MR: Primary surgical repair of traumatic lacerations of the lacrimal canaliculi.
2725 *Oral Surg Oral Med Oral Pathol* 81:157, 1996
- 2726 348. Melton NR, Maino JH, Thomas RK: Management of corneal abrasions. *Optom Clin* 1:119, 1991
- 2727 349. Micovic V, Mitrovic M, Vukovic D: Successfully treated sympathetic ophthalmia with typical histological
2728 confirmation. *Ger J Ophthalmol* 2:133, 1993
- 2729 350. Nelson CC: Management of eyelid trauma. *Aust N Z J Ophthalmol* 19:357, 1991
- 2730 351. Powers DB, Rodriguez ER: Reconstruction of avulsive defects of the maxillofacial complex (Chapter 31).
2731 In: Fonseca RJ, Walker RV, Barber HD, et al, eds: *Oral and Maxillofacial Trauma* (ed 4). St. Louis, MO,
2732 Elsevier, 2012, p. 763
- 2733 352. Reifler DM: Management of canalicular laceration. *Surv Ophthalmol* 36:113, 1991
- 2734 353. Schaefer D, Bennett J: Associated soft tissue injuries. *Atlas Oral Maxillofac Surg Clin North Am* 2:47,
2735 1994
- 2736 354. Shingleton BJ: Eye injuries. *N Engl J Med* 325:408, 1991
- 2737 355. Silverman H, Nunez L, Feller DB: Treatment of common eye emergencies. *Am Fam Physician* 45:2279,
2738 1992
- 2739 356. Spira M: Management of soft tissue injuries. *Ann Plast Surg* 17:408, 1986
- 2740 357. Stewart GM, Quan L, Horton MA: Laceration management. *Pediatr Emerg Care* 9:247, 1993
- 2741 358. Yeong EK, Chen MT, Mann R, et al: Facial mutilation after an assault with chemicals. 15 cases and
2742 literature review. *J Burn Care Rehabil* 18:234, 1997
- 2743 359. Ziccardi VB, Goldfarb IW, Braun IW: Oral and maxillofacial surgical considerations in the management of
2744 burn victims. *J Oral Maxillofac Surg* 52:607, 1994
- 2745
2746
2747

PERINASAL SOFT TISSUE INJURIES

- 2748
2749 360. Holt GR: Concepts of soft-tissue trauma repair. *Otolaryngol Clin North Am* 23:1019, 1990
- 2750 361. Key SJ, Thomas DW, Shepherd JP: The management of soft tissue facial wounds. *Br J Oral Maxillofac*
2751 *Surg* 33:76, 1995
- 2752 362. Lawson W: Management of soft tissue injuries of the face. *Otolaryngol Clin North Am* 15:35, 1982
- 2753 363. Leach J: Proper handling of soft tissue in the acute phase. *Facial Plast Surg* 17:227, 2001
- 2754 364. Morgan JP, Haug RH, Murphy MT: Management of maxillofacial dog bite injuries. *J Oral Maxillofac Surg*
2755 53:435, 1995
- 2756 365. Powers DB, Rodriguez ER: Reconstruction of avulsive defects of the maxillofacial complex (Chapter 31).
2757 In: Fonseca RJ, Walker RV, Barber HD, et al, eds: *Oral and Maxillofacial Trauma* (ed 4). St. Louis, MO,
2758 Elsevier, 2012, p. 763
- 2759 366. Rose GK, Mason JD, Varma SK: Effect of facial burns on the nasal mucosa. *Burns* 22:631, 1996
- 2760 367. Schaefer D, Bennett J: Associated soft tissue injuries. *Atlas Oral Maxillofac Surg Clin North Am* 2:47,
2761 1994
- 2762 368. Spira M: Management of soft tissue injuries. *Ann Plast Surg* 17:408, 1986
- 2763 369. Stewart GM, Quan L, Horton MA: Laceration management. *Pediatr Emerg Care* 9:247, 1993
- 2764 370. Yeong EK, Chen MT, Mann R, et al: Facial mutilation after an assault with chemicals. 15 cases and
2765 literature review. *J Burn Care Rehabil* 18:234, 1997
- 2766 371. Ziccardi VB, Goldfarb IW, Braun IW: Oral and maxillofacial surgical considerations in the management of
2767 burn victims. *J Oral Maxillofac Surg* 52:607, 1994
- 2768

FACIAL SOFT TISSUE INJURIES

- 2769
2770
2771
2772 372. Cummings P: Antibiotics to prevent infection in patients with dog bite wounds: a meta-analysis of
2773 randomized trials. *Ann Emerg Med* 23:535, 1994
2774 373. Curtin JW: Basic plastic surgical techniques in repair of facial lacerations. *Surg Clin North Am* 53:33, 1973
2775 374. Dire DJ, Hogan DE, Riggs MW: A prospective evaluation of risk factors for infections from dog-bite
2776 wounds. *Acad Emerg Med* 1:258, 1994
2777 375. Donkor P, Bankas DO: A study of primary closure of human bite injuries to the face. *J Oral Maxillofac*
2778 *Surg* 55:479, 1997
2779 376. Griego RD, Rosen T, Orengo IF, et al: Dog, cat, and human bites: a review. *J Am Acad Dermatol* 33:1019,
2780 1995
2781 377. Gruss JS, Antonyshyn O, Phillips JH: Early definitive bone and soft-tissue reconstruction of major gunshot
2782 wounds of the face. *Plast Reconstr Surg* 87:436, 1991
2783 378. Haug RH: Management of low-caliber, low-velocity gunshot wounds of the maxillofacial region. *J Oral*
2784 *Maxillofac Surg* 47:1192, 1989
2785 379. Holt GR: Concepts of soft-tissue trauma repair. *Otolaryngol Clin North Am* 23:1019, 1990
2786 380. Huggler J, Singer AJ: Irrigation in facial and scalp lacerations: does it alter outcome? *Ann Emerg Med*
2787 31:73, 1998
2788 381. Key SJ, Thomas DW, Shepherd JP: The management of soft tissue facial wounds. *Br J Oral Maxillofac*
2789 *Surg* 33:76, 1995
2790 382. Lawson W: Management of soft tissue injuries of the face. *Otolaryngol Clin North Am* 15:35, 1982
2791 383. Leach J: Proper handling of soft tissue in the acute phase. *Facial Plast Surg* 17:227, 2001
2792 384. Lindsey WH, Davis PT: Facial keloids. A 15-year experience. *Arch Otolaryngol Head Neck Surg* 123:397,
2793 1997
2794 385. Morgan JP, Haug RH, Murphy MT: Management of maxillofacial dog bite injuries. *J Oral Maxillofac Surg*
2795 53:435, 1995
2796 386. Omovie EE, Shepherd JP: Assessment of repair of facial lacerations. *Br J Oral Maxillofac Surg* 35:237,
2797 1997
2798 387. Fonseca RJ, Bertz JA, Powers MP, et al: Management of soft tissue injuries (Chapter 21). In: Fonseca RJ,
2799 Walker RV, Barber HD, et al, eds: *Oral and Maxillofacial Trauma* (ed 4). St. Louis, MO, Elsevier, 2012, p.
2800 506
2801 388. Schaefer D, Bennett J: Associated soft tissue injuries. *Atlas Oral Maxillofac Surg Clin North Am* 2:47,
2802 1994
2803 389. Spira M: Management of soft tissue injuries. *Ann Plast Surg* 17:408, 1986
2804 390. Stewart GM, Quan L, Horton MA: Laceration management. *Pediatr Emerg Care* 9:247, 1993
2805 391. Thomas DW, Hopkinson I, Harding KG, et al: The pathogenesis of hypertrophic/keloid scarring. *Int J Oral*
2806 *Maxillofac Surg* 23:232, 1994
2807 392. Yeong EK, Chen MT, Mann R, et al: Facial mutilation after an assault with chemicals. 15 cases and
2808 literature review. *J Burn Care Rehabil* 18:234, 1997
2809 393. Powers DB, Delo RI: Maxillofacial ballistic and missile injuries. (Chapter 27). In: Fonseca RJ, Walker RV,
2810 Barber HD, et al, eds: *Oral and Maxillofacial Trauma* (ed 4). St. Louis, MO, Elsevier, 2012, p. 696
2811 394. Powers DB, Delo RI: Characteristics of ballistic and blast injuries. *Atlas Oral Maxillofac Surg Clin North*
2812 *Am* 21:15, 2013
2813 395. Powers DB, Will MJ, Bourgeois SL, et al: Maxillofacial trauma treatment protocol. *Oral Maxillofac Surg*
2814 *Clin North Am* 17:341, 2005
2815 396. Ziccardi VB, Goldfarb IW, Braun IW: Oral and maxillofacial surgical considerations in the management of
2816 burn victims. *J Oral Maxillofac Surg* 52:607, 1994
2817
2818

UPPER AIRWAY OBSTRUCTION

- 2819
2820
2821 397. Airway and ventilatory management. In: *ATLS: Advanced Trauma Life Support for Doctors – Student*
2822 *Course Manual* (ed 8). Chicago, IL, American College of Surgeons, 2008

-
- 2823 398. Aziz M: Use of video-assisted intubation devices in the management of patients with trauma. *Anesthesiol*
2824 *Clin* 31:157, 2013
- 2825 399. Bisase B, Vadukul J, Lavery K: Facial trauma: a case of potentially life-threatening distracting injuries. *Br J*
2826 *Oral Maxillofac Surg* 49:e79, 2011
- 2827 400. Blostein PA, Koestner AJ, Hoak S: Failed rapid sequence intubation in trauma patients: esophageal tracheal
2828 combitube is a useful adjunct. *J Trauma* 44:534, 1998
- 2829 401. Chen AY, Stewart MG, Raup G: Penetrating injuries of the face. *Otolaryngol Head Neck Surg* 115:464,
2830 1996
- 2831 402. Clancy M, Nolan J: Airway management in the emergency department. *Emerg Med J* 19:2, 2002
- 2832 403. Cook TM, Silsby J, Simpson TP: Airway rescue in acute upper airway obstruction using a ProSeal
2833 Laryngeal mask airway and an Aintree catheter: a review of the ProSeal Laryngeal mask airway in the
2834 management of the difficult airway. *Anaesthesia* 60:1129, 2005
- 2835 404. Criswell JC, Parr MJ, Nolan JP: Emergency airway management in patients with cervical spine injuries.
2836 *Anaesthesia* 49:900, 1994
- 2837 405. Fischer S, Wallins JS, Bueno EM, et al: Airway recovery after face transplantation. *Plast Reconstr Surg*
2838 134:946e, 2014
- 2839 406. Jacobson LE, Gomez GA, Sobieray RJ, et al: Surgical cricothyroidotomy in trauma patients: analysis of its
2840 use by paramedics in the field. *J Trauma* 41:15, 1996
- 2841 407. Marlow TJ, Goltra DD, Schabel SI: Intracranial placement of a nasotracheal tube after facial fracture: a rare
2842 complication. *J Emerg Med* 15:187, 1997
- 2843 408. Rosen CL, Wolfe RE, Chew SE, et al: Blind nasotracheal intubation in the presence of facial trauma. *J*
2844 *Emerg Med* 15:141, 1997
- 2845 409. Moreno A, Calaei JG, Powers MP: Emergency airway management in the traumatized patient (Chapter 5).
2846 In: Fonseca RJ, Walker RV, Barber HD, et al, eds: *Oral and Maxillofacial Trauma* (ed 4). St. Louis, MO,
2847 Elsevier, 2012, p. 77
- 2848 410. Sly PD, Collins RA: Physiological basis of respiratory signs and symptoms. *Paediatr Respir Rev* 7:84, 2006
- 2849 411. Spaite DW, Joseph M: Prehospital cricothyrotomy: an investigation of indications, technique,
2850 complications, and patient outcome. *Ann Emerg Med* 19:279, 1990
- 2851 412. Taicher S, Givol N, Peleg M, et al: Changing indications for tracheostomy in maxillofacial trauma. *J Oral*
2852 *Maxillofac Surg* 54:292, 1996
- 2853 413. Walls RM: Blind nasotracheal intubation in the presence of facial trauma--is it safe? *J Emerg Med* 15:243,
2854 1997
- 2855 414. Walls RM: Management of the difficult airway in the trauma patient. *Emerg Med Clin North Am* 16:45,
2856 1998