FACIAL INJURIES IN SPORTS

Background
1. Sports related facial injuries account for 6-8% of all facial soft tissue injuries\(^1\)
   - 11-40% of all sports injuries involve the face
   - There are several general categories for facial trauma
     - Soft tissue injuries—contusions, abrasions, lacerations, punctures, hematomas
     - Facial-orbital, nasal, zygomaticomaxillary, mandibular bones
     - Dental injuries-tooth fractures, displacement, and avulsions
2. General Information
   - Male to female ratio is approximately 10-14:1\(^2\)
   - Peak incidence 16-20 years of age
   - Vast majority of injuries occur from direct contact with a ball or head to head contact
   - Nasal fractures account for ~60% of facial fractures
   - Other facial fractures:
     - Zygomaticomaxillary 10-20%
     - Mandibular 10-15%
     - Orbital 3-5%

Pathophysiology
1. Anatomy of face
   - Soft tissues—extremely vascular
     - Blood supply derived from internal and external carotid arteries
     - Sensation
       - 3 branches of trigeminal nerve
     - Motor function
       - 5 branches of facial nerve and motor division of trigeminal nerve.
     - Infections are uncommon
     - Elasticity of skin aids in healing
   - Facial bones—divided into thirds
     - Upper third:
       - Frontal bone-ends at level of supraorbital ridge
       - Fractures in this area usually involve frontal sinus
     - Middle third
       - Most prominent and complex
       - Extends from below supraorbital rims to incisal edges of upper teeth
       - Consists of orbits, nasal bones, zygoma, maxillary bones
       - Orbital space-cone shaped and consists of 7 bones
         - Zygoma, sphenoid, lacrimal, maxillary, palatine, ethmoid, nasal
       - Periorbital rim
         - Serves as attachment for suspensory ligaments of eye
Protective framework for globe, optic nerve

- Zygoma/maxilla—provide malar protection of mid-face anteriorly
  - Articulates laterally to form zygomatic arch
- Nose—projects from mid-face, composed of cartilage/bone
  - Experiences highest incidence of fracture due to projection from face
    - Lower third—mandible/teeth
      - Condylar processes considered a part of lower third even though they articulate with temporal bone to form temperomandibular joint

2. Incidence/Prevalence—most common in direct body contact sports
   - Highest risk in soccer (38.1%)
   - Baseball (16.1%)
   - Basketball (12.7%)
     - Nasal fractures account for more than 50% of all sports-related maxillofacial fractures
     - 15% of those fractures are recurrent

3. Risk Factors
   - Participation in direct body sports
   - Most who sustain facial bone fractures should not return to game
     - Second impact increases risk of converting simple non-operative fracture to complex disfiguring surgical fracture

4. Morbidity / Mortality
   - Poorly managed nasal fractures lead to chronic nasal deformities and breathing difficulties
   - Misdiagnosed maxillary fractures have been associated with:
     - Respiratory distress due to structural deformity
     - Intraoral bleeding and edema
   - Important to identify quickly

Diagnostics

1. History
   - Mechanism of injury
   - Location of pain
   - Swelling
   - History of past injury
   - Associated symptoms (numbness, tingling, lost of senses)

2. Initial evaluation—basic principles of trauma evaluation
   - Assessment of airway, breathing, circulation, disability
The airway must be protected from compromise:

- Bleeding
- Tooth fragments
- Dental appliances
- Severe mandibular fractures

All unconscious patients must be considered to have a head or neck injury and require appropriate neurologic evaluation and neck stabilization.

Once life threatening injuries are ruled out, further exam for soft tissue injuries and facial fractures:

- Extensive bleeding may occur from facial wounds
- Direct pressure usually sufficient for hemostasis
- Injury to soft tissue between bone and overlying skin result in varying degrees of swelling, tenderness, ecchymosis
- Lacerations most commonly occur over bony prominences in linear or stellate patterns.

3. Physical Examination

Upper third of face-check:

- Facial nerve (frontal branch)
  - Raise eyebrows
- Trigeminal nerve (ophthalmic branch)
  - Light touch intact on forehead
- Supraorbital rims
  - Palpation of supraorbital rims

Middle third-check eyes, nose, zygoma, maxilla, facial nerve (zygomatic and buccal branches), trigeminal nerve (maxillary branch)

- Examine eyes for vision changes, extra-ocular muscle function, globe integrity
- Check for widening of mid face, pain with palpation or step off points in this region
- Facial Nerve (zygomatic and buccal branches)
  - Close eyes, smile, purse lips, puff out cheeks
- Trigeminal Nerve (maxillary branch)
  - Light touch intact on cheeks
- Palpate nose, intranasal examination important for thorough nasal injury exam

Lower third- check lips, tongue, cheeks, all teeth, mandible, facial nerve (mandibular and cervical), trigeminal nerve (mandibular branch).

- Observe for any lacerations especially involving the vermillion board of the lip
  - Requires careful re-approximation
- Sublingual ecchymosis is a sign of mandibular fracture
- Evaluate the temperomandibular joint for dislocation
- Examination of the ear for hematoma, hearing deficiencies, or presence of fluid in auditory canal or behind tympanic membrane
  - May be indicative of underlying skull base fracture
- Facial nerve (mandibular and cervical)
• Purse lips and grimace (activates platysma)
  ▪ Trigeminal nerve (mandibular branch both sensory and motor)
  ▪ Light touch intact on mandible
  ▪ Open/close mouth, clench teeth (muscles of mastication)
  ○ Dental Injuries-Dental Trauma in Athletes

4. Diagnostic Testing
  ○ Imaging
    ▪ Consider CT scan for all suspected facial fractures, especially maxillary, zygomatic.
    ▪ X-ray for maxillary sinus injuries
    ▪ 3 view Water’s, Cauldwell, lateral
    ▪ Panoramic views for maxilla and mandible injuries

Differential Diagnosis
1. Key Differential Diagnoses
  ○ Upper Third:
    ▪ Fracture of orbital rims
  ○ Middle Third:
    ▪ Fracture of nose
    ▪ Septal hematoma
    ▪ Zygoma
    ▪ Maxilla
  ○ Lower Third:
    ▪ Fracture of skull base
    ▪ Fracture of mandible
    ▪ Dental trauma
    ▪ TMJ dislocation

2. Extensive Differential Diagnoses—lacerations, abrasions, contusions to all regions of face

Therapeutics
1. Acute treatment—evaluate for severe head and neck injuries with all facial injuries
  ○ If evaluation reveals need for airway protection or cervical stabilization perform immediate treatment and transport immediately to ED
    ▪ Facial fractures—no return to practice or contest
      ▪ Orbital fractures
      ▪ Nasal fractures
      ▪ Septal hematoma
      ▪ Epistaxis
      ▪ Maxillary fracture:
        ○ Classified as LeFort I, II, or II
        ○ LeFort I—maxilla separated from nasal-septal structures, entire maxilla moves as one unit
        ○ LeFort II—maxilla and nasal complex separated from the orbital-zygomatic structures, maxilla and nose move as one unit
- LeFort III separate the maxillary, zygomatic, nasal, orbital structures from cranial base
- All cases are surgical open reduction internal fixation (ORIF)

**Zygomatic fracture—“tripod fracture”**
- Zygoma fractures at attachment points on temporal, frontal, and maxillary bones
- Palpation reveals “step-off” sign at any attachment point of zygoma
  - 75% displaced inferiorly, medially, and posteriorly
  - 70% of pts with fracture have pain on palpation
- Referral to specialist for evaluation within 1-2 days

- Soft diet for several days to weeks
- AVOID blowing nose for several weeks to prevent further fracture displacement, subcutaneous emphysema (especially around orbit, which could lead to vision loss).

**Mandibular fracture—subcondylar regions are most frequently fractured areas**
- Obvious when ≥2 teeth move as a unit
- Emergency management of airway
- Check for intraoral debris
- Assessment of cervical spine
- Assess for concussion.
- Mandible should be supported by a Barton bandage or a soft cervical collar
- Transport for open reduction and internal fixation

- Contusions, abrasions, burst lacerations, hematomas
  - Keep head elevated
  - Apply ice for 15-20 minutes every 2 hours
  - Expect resolution in several weeks

**Mandible dislocation**
- Jaw usually deviates to contralateral side from fracture
- Needs to be treated quickly to avoid resistance from muscle spasm and edema
- Condylar fracture must be ruled out
- With patient seated, place hands on either side of mandible
- Use a steady downward and backward force to allow condyle to slip into glenoid fossa
- Sedation or muscle relaxant may be required if muscle spasm has occurred

**Epistaxis**
- Most commonly involves anterior chamber of nose, Kiesselbach’s plexus
- Can usually be controlled with:
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- Direct pressure by pinching nares together
- And/or application of vasoconstrictive spray (oxymetazoline hydrochloride, phenylephrine hydrochloride)\(^ {10} \)
- Brisk bleeding, caused by disruption of sphenopalatine artery or posterior epistaxis requires nasal packing and referral to emergency department for further treatment
- Return to play immediately in absence of active bleeding or other associated traumatic findings-obvious deformity, neurological deficit\(^ {11} \)
- Fracture reduction on sidelines with gentle external and septal (soft probe) manipulation

### Lacerations
- Apply pressure to achieve hemostasis
- Re-examine, cleanse with saline or tap water.
- Re-approximate wound with adhesive bandages, skin adhesive
  - For deeper and/or jagged lacerations may consult plastic surgery for best aesthetic outcome
- Intraoral lesions are treated same way
- May be re-approximated with absorbable suture material
  - Cheek (through and through) lacerations-carefully re-approximate with two-layer closure of skin and muscle to prevent intraoral pocket formation
  - Mucosal surface lacerations
    - Let heal by secondary intention to reduce chance of infection
- Consider antibiotic therapy for contaminated wounds
- Determine tetanus status

2. Further Management (24 hrs)
   - Abrasions with partial-thickness skin loss
     - Cleanse with antiseptic and apply twice-daily antibiotic ointment
   - Lacerations-after cleansing/repair dressings may include plain petroleum dressing, a synthetic adhesive covering, triple antibiotic ointment
   - Nasal trauma
     - Non-emergent-ice, elevation, topical decongestants
     - Re-examination in 1-2 days
     - Otolaryngology referral in 5-10 days when swelling as improved.
     - Closed nasal fracture reduction yields acceptable function and cosmetic results in >70-80\% of patients
   - Contusion-ice until swelling has stabilized, then heat to increase local blood flow and hasten healing.
     - Pain can be controlled with NSAIDS for 2-5 days
     - Complete resolution in 2 weeks if there is no additional injury
   - Auricular and septal hematoma-require special attention due to potential for peri-chondral injury leading to necrosis
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- Septal hematoma—purple, grapelike swelling of nasal septum
  - Requires incision and drainage and anterior nasal packing by otolaryngologist
  - Necessary to prevent necrosis causing “saddle nose deformity”
- Auricular hematoma—ecchymotic fluid collection in helical portion of the ear
  - Requires incision and drainage, closure, and compressive dressing for 3 days Error! Bookmark not defined.

3. Long-Term Care
- Abrasions—no healed in 14 days or full-thickness injuries, refer to plastic surgeon for further evaluation
- Auricular hematoma
  - After placement of compressive dressing, usually silicone splint, re-examine in 7 days Error! Bookmark not defined.
  - Treat for 14 days total
- All fractures return to play based on severity and requirement for surgery Error! Bookmark not defined.
  - Usually earliest is 6 weeks
  - Usually requires protective equipment for return to play (varies based on availability and specialist preference)

Prevention
1. Primary Prevention
   - See NCAA Sports Medicine Handbook for sports specific recommendations
2. Secondary Prevention
   - Based on specialist recommendations otherwise as noted above for specific injuries, or for athletes comfort
   - Once fracture has healed, return to primary prevention equipment recommended for specific sports.

References
2. Outcome Analysis of Sports-Related Multiple Facial Fractures. Hwang, Kun MD, PhD; You, Sun Hye MD; Lee, Hong Sik MD Journal of Craniofacial Surgery May 2009 - Volume 20 - Issue 3 - pp 825-829


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