Injuries to the Face and Jaw

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Assessment and Management
Introduction

- Isolated maxillofacial trauma is rarely life-threatening or an immediate cause of death unless associated with airway compromise
- Approximately 20% of patients will have associated injury to additional body systems
- MVA
Introduction

• Facial injuries still result in devastating permanent defects and appearance

• Advanced CMF techniques are steadily improving outcomes

• In the past 40 years, techniques in CMF surgery have evolved significantly

• Coordinated, multidisciplinary treatment strategy achieves better outcomes
Initial Evaluation

• Maxillofacial injuries result from energy transfer that is usually blunt or penetrating
• Maintaining an AIRWAY is the PRIMARY consideration in facial trauma
• Sign that significant force has been sustained – cervical spine and airway should be evaluated and monitored
Initial Evaluation

- Must maintain a high index of suspicion
- Significant facial trauma can lead to airway compromise as edema progresses
- It is better to intubate early then wait
- TTT = TRACH
Initial Survey

- Airway
- Hemorrhage
- Vision
- Bony trauma
- Soft tissue injuries
Airway Assessment
Airway Management

• Facial trauma can result in **IMMEDIATE** or **DELAYED** airway compromise

• Airway caliber can decrease subsequent to displacement of facial bones, expanding edema or hematoma, loose detention and debris, FB or laryngeal injuries

• If patient cannot maintain their own airway – intubate
Choice

- With midface and skull base fx, an airway is more safely established by orotracheal intubation or cricothyrotomy
  - minimize the likelihood of inadvertent submucosal or intracranial tube placement
- Nasotracheal intubation is not absolutely contraindicated – fiberoptic
- 10% of patients with facial trauma will have a cervical spine injury
Maxillofacial Hemorrhage
Initial Management

- Firm compression is an effective way to stop most arterial and venous facial bleeding
- Definitive ligation or cautery of a single bleeding point is sometimes necessary
- Blind clamping and suture ligation in deep wounds should be avoided in areas where the facial nerve may be injured
Initial Management

- Blood loss from scalp lacerations can be severe → hypovolemic shock
- Continuous hemorrhage often occurs from arteries just superficial to the galea, where they are surrounded by dense ct, which prevents them from retracting after injury
  - single-layer suture closure or Raney clips can minimize blood loss until definitive repair is possible
Nasal Hemorrhage

- Direct pressure with anterior nasal packing
- Packing both the anterior and posterior nasal cavity is sometimes required to provide sufficient direct pressure
- Foley catheters can be helpful
- If packing is ineffective – embolization is usually required
• Early transarterial embolization is the most effective treatment for significant persistent facial hemorrhage that does not respond to direct pressure or other methods.
• Reduction and fixation of bony injuries are often not effective at controlling significant bleeding.
• Ligation of ECA is unreliable because of the rich collateral vascular supply to head and face.
In unstable patients with ongoing significant facial hemorrhage that cannot be controlled by packing, EMBOLIZATION should be considered ASAP.
Comprehensive Survey
**Inspection**

- Facial swelling or asymmetry is a sign of underlying bony injury
- Face can swell quickly and dramatically with even minimal skeletal injury
- If the bite feels abnormal to the patient, a mandibular or midface fx is likely
- Periorbital ecchymoses are associated with zygomatic, orbital or skull base fx
Inspection

• Battle sign

• Facial nerve injuries are identified by asking the patient to lift the eyebrows, close the eyes and purse the lips

• Gross hearing

• If lacerations exist around the eye, closely inspect the lid margin and nasolacrimal duct for injury
Visual

• EOM – can be decreased with orbital fx
• True inferior rectus muscle entrapment – prevents any movement in superior gaze
• Ocular pain, decreased vision and appearance of spots
  – highly suggestive of globe damage
• Gross visual acuity and presence of diplopia
  – assessed for each eye separately and both eyes together
Visual

- Vertical or AP changes in globe position relative to the other eye are a sign of orbital fx
- Check pupils for symmetry, hyphema and subconjunctival ecchymoses
- If globe disruption is suspected, never press on or around the eye and always protect it from further disruption
**Palpation**

- Diminished sensation around the lips and cheeks from the trigeminal nerve is a sign of fracture
- Bimanual palpation works best for examining the rest of the craniofacial skeleton
- Assess for tenderness, asymmetries, step-offs or crepitus
- Simultaneously palpating both sides allows comparison and makes detection of injury more likely
Imaging

• CT is the gold standard imaging modality for maxillofacial trauma

• Allows volumetric rendering of the entire skull and mandible – can be used for patient-specific treatment planning
Treatment of Soft Tissue Injuries
Basic Concepts

- Maxillofacial soft tissue injuries are very common
- All wounds should be inspected for presence of FB or broken teeth prior to irrigation, cleansing and debridement
- Failure to remove all loose fragments and foreign material can result in persistent local inflammation and residual cosmetic deformities
Management

- Because of rich facial blood flow, even dusky tissues on small pedicles will often survive and may prove to be useful later on.

- Conservative debridement of injured facial soft tissues is usually recommended.
Antibiotics

- Routine Abx use for simple non-bite facial soft tissue injuries is not indicated

- In more complex and grossly contaminated wounds, Abx coverage should be considered
Facial Nerve

- Injuries to the proximal facial nerve result in obvious and serious functional disabilities.
- When evaluating soft tissue injuries around the facial nerve, its function must be assessed and documented prior to any local treatment.
- Evaluate all branches carefully.
Parotid Duct Injuries

- Extends anteriorly 2 to 3 cm from the anterior parotid gland and drains saliva into the mouth through an orifice found on the buccal mucosa just opposite the maxillary molars.

- Deep lacerations between the anterior parotid gland and this orifice can potentially damage the parotid duct.
Treatment of Maxillofacial Fractures
Basic Concepts

• Differs from treatment of the axial skeleton
• Two windows for optimum treatment of maxillofacial injuries
• The first 6 to 12 hours post-injury, before edema onset, is typically reserved for urgent comorbities
• Optic nerve compression, uncontrolled bleeding
Basic Concepts

- For multiply-injured patients, early treatment may not be possible because of the higher priority of other injuries.
- The most common timing for repair is 3 to 7 days post-injury, after the initial edema has subsided and patient is stabilized.
- If complicating injuries do not exist, most bony facial repair is done as an outpatient.
Repair

- Successful repair requires adequate exposure and visualization,
- mobilization and reduction and
- stable internal fixation of the fractured segments
- especially along the facial buttresses
Facial Buttresses

- Are all linked either directly or through another buttress to the cranium or cranial base as a stable reference point

- Have sufficient bone thickness to accommodate metal screw fixation

- Accessible through standard limited surgical incisions
Mandibular Fractures

- Signs = gross mobility, malocclusion and numbness of the lower lip
- Ecchymoses in the floor of the mouth or vestibule are also suggestive
- Historically treated with several weeks of IMF
- ORIF offers more immediate mobility
Mandibular Fractures

- Teeth, complicated movement patterns and relatively less vascularity ➔ higher complication and infection rate than other facial fractures
- The presence of one fracture should raise the suspicion for a contralateral injury
- Should be treated sooner rather than later
- Open – 2 to 3 days
- Closed – 7 to 10 days
Maxillary Fractures

• Midface is designed to crumple in the presence of blunt force – absorbing energy and protecting the cranium and c spine
• Relatively vascular and immobile – infection and nonunion are less common
• In 1901, Rene Le Fort performed a series of experiments demonstrating that blunt force fractures the midface along certain lines of inherent weakness
Types

- Le Fort I
  - horizontally separates the palate and tooth-bearing maxilla from the rest of the midface
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  - pyramidal fracture
  - includes lower maxilla + medial infraorbital rim, orbital floor and nasal bones
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- **Le Fort III**
  - craniofacial disjunction – pass through upper portions of the orbits and include the zygomas
Characterized by complete separation of the entire midface from the cranium
Zygomatic Fractures

- Zygoma forms the prominence of the cheek and a large part of the orbit
- 2\textsuperscript{nd} most common bony injury
- To prevent noticeable flattening of the face or impingement of the mandibular opening, even minimal displacement can require repair
Orbital Fractures

- Main concern = injury to the globe and visual loss
- Orbit is lined by thin bone that fractures when the globe is struck
- The globe is prevented from rupturing by fracture of this thin bone, instantly increasing the volume of the orbit
What You Need to Know

- Facial trauma should be considered a marker of associated critical injuries.
- Initial evaluation should include consideration of airway management, cervical spine injury, visual assessment, control of bleeding, ID of CSF leaks and neurologic injury.
- Dx follows structured H&P + close evaluation of CT imaging.
What You Need to Know

- Patients with obvious major facial trauma need early control of the airway
- Maintain a high index of suspicion for potential of delayed airway compromise
- Foley catheters can be your best friend with significant facial bleeding
- Early transarterial embolization is the most effective treatment for significant persistent facial hemorrhage