Maxillofacial and Ocular Injuries
Objectives

At the conclusion of this presentation the participant will be able to:

• Identify the key anatomical structures of the face and eye and the impact of force on those structures
• Discuss assessment priorities for a patient with maxillofacial and ocular injuries
• Prioritize the care of a patient with facial and ocular injuries
• Discuss psychosocial support for a patient with maxillofacial and ocular injuries
Mechanism of Injury

Low velocity

High velocity
Pathophysiology

- Bones of face make up the most complex skeletal area of the body
- Maxillofacial fractures result from either blunt or penetrating trauma
Pathophysiology

• ‘G’ force is a measure of acceleration not produced by gravity

• **High Impact:**
  • Supraorbital rim – 200 G
  • Symphysis Mandible – 100 G
  • Frontal – 100 G
  • Angle mandible – 70 G

• **Low Impact:**
  • Zygoma – 50 G
  • Nasal bone – 30 G
Etiology

- 60% of patients with severe facial trauma have multisystem trauma and the potential for airway compromise
Etiology

- 25% of women with facial trauma are victims of domestic violence
  - Increases to 30% if an orbital wall fx is present
- 25% of patients with severe facial trauma will develop Post Traumatic Stress Disorder
Ocular Structures

Human Eye Anatomy

- Ciliary body
- Sclera
- Choroid
- Retina
- Iris
- Fovea centralis
- Optic disc (blind spot)
- Blood vessels
- Pupil
- Cornea
- Lens
- Suspensory ligament
- Optic nerve
Bony Orbit

- **Roof**
  - Frontal bone
  - Sphenoid

- **Medial wall**
  - Maxilla,
  - Lacrimal, ethmoid
  - Body of sphenoid

- **Floor**
  - Maxilla
  - Palatine
  - Zygoma

- **Lateral**
  - Zygoma and greater sphenoid
Cranial Nerves

- Olfactory nerve fibers (I)
- Optic nerve (II)
- Oculomotor nerve (III)
- Trochlear nerve (IV)
- Trigeminal nerve (V)
- Abducens nerve (VI)
- Facial nerve (VII)
- Vestibulocochlear nerve (VIII)
- Glossopharyngeal nerve (IX)
- Vagus nerve (X)
- Accessory nerve (XI)
- Hypoglossal nerve (XII)
Orbital Fractures
• Orbital Fractures
  • Usually through floor or medial wall
  • Enophthalmos
  • Anesthesia
  • Diplopia
  • Infraorbital stepoff deformity
  • Subcutaneous emphysema

Image found on Rad.washington.edu
Orbital Fractures

- Symptoms
  - Periorbital swelling
  - Crepitus
  - Proptosis
  - Ophthalmoplegia
  - Enophthalmos
  - Palpable defects
- Assess for globe injury
- Avoid nose blowing
- Assess for entrapment
Facial Structures

- Frontal bone
  - Glabella
  - Supraorbital notch (foramen)
  - Orbital surface

- Nasal bone

- Lacrimal bone

- Zygomatic bone
  - Frontal process
  - Orbital surface
  - Temporal process
  - Zygomaticofacial foramen

- Maxilla
  - Zygomatic process
  - Orbital surface
  - Infraorbital foramen
  - Frontal process
  - Alveolar process
  - Anterior nasal spine

- Coronal suture
- Parietal bone
  - Sphenoid bone
    - Lesser wing
    - Greater wing
- Temporal bone
- Ethmoid bone
  - Orbital plate
  - Perpendicular plate
  - Middle nasal concha
  - Inferior nasal concha
- Vomer
- Mandible
  - Ramus
  - Body
  - Mental foramen
  - Mental tubercle
  - Mental protuberance
LeFort I Fracture

Image found on Wikimedia.com
LeFort III Fracture

Image found on Wiimedia.com
Le Fort Fractures
Le Fort III Fracture

- Periorbital hematoma
- Racoon eyes suggestive of basal skull fracture.
- Inappropriate placement of nasogastric tube
Tripod Fracture

Image found on Rad.washington.edu
Orbitozygomatic Fractures

- Complex fractures of the zygoma and orbital floor
- May have double vision, ocular proptosis or enophthalmos
- Must assess for entrapment of extraocular muscles
- Surgical management directed at decompression of entrapped muscles and anatomic realignment of zygoma
Naso-Ethmoidal-Orbital Fracture

- Fractures that extend into the nose through the ethmoid bones.
- Associated with lacrimal disruption and dural tears.
- Suspect if there is trauma to the nose or medial orbit.
- Patients complain of pain on eye movement.
Mandibular Fractures
Mandibular Fracture

- Direct frontal trauma with jaw fracture
Mandibular Fractures Treatment

- Nondisplaced fractures:
  - Analgesics
  - Soft diet
  - Oral surgery referral in 1-2 days

- Displaced fractures, open fractures and fractures with associated dental trauma
  - Urgent oral surgery consultation

- All fractures should be treated with antibiotics and tetanus prophylaxis.
Maxillofacial Injuries General Assessment

- ABC’s
- Assess for symmetry of facial structures
  - Assess for paresthesias
  - Assess symmetry of facial movements
- Assess the ears, nose and oral cavity for occult lacerations, hematomas
- Palpate for crepitus, tenderness or deformity
- Assess sense of smell
Ocular Assessment

- Visual acuity
- Pupil assessment
- Extraocular movements
- Eye position and movement
- Intraocular pressure
- Fundoscopic exam
Physical Examination

• Inspect open wounds for foreign bodies
• Palpate the entire face
  • Supraorbital and Infraorbital rim
  • Zygomatic-frontal suture
  • Zygomatic arches
Physical Examination

- Inspect the nose for asymmetry, telecanthus, widening of the nasal bridge
- Inspect nasal septum for septal hematoma, CSF or blood
- Palpate nose for crepitus, deformity and subcutaneous air
- Palpate the zygoma along its arch and its articulations with the maxilla, frontal and temporal bone
Physical Examination

• Check facial stability
• Inspect the teeth
• Intraoral examination:
  • Manipulation of each tooth
  • Check for lacerations
  • Stress the mandible
  • Tongue blade test
• Palpate the mandible for tenderness, swelling and step-off.
Physical Examination

- Check visual acuity
- Check pupils for roundness and reactivity
- Examine the eyelids for lacerations
- Test extra ocular muscles
- Palpate around the entire orbits
Physical Examination

• Examine the cornea for abrasions and lacerations
• Examine the anterior chamber for blood or hyphema
• Perform fundoscopic exam and examine the posterior chamber and the retina
Airway Management

- Protect and maintain airway
  - Pull tongue forward with padded forceps or sutures
  - Endotracheal intubation
  - Anticipate need for cricothyroidotomy

- Prevent aspiration

- Ensure adequate oxygenation and ventilation
Airway Management

Protection of airway

- Keep HOB elevated
- Aggressive pulmonary toilet
- Frequent suctioning
Management

- Control hemorrhage
  - Direct pressure
  - Nasal and oral packing
  - Reduce fractures

- Restore intravascular volume

- Anticipate intracranial injury and need for intervention
  - Serial neurologic exams
Management

- Protect eyes from further injury
- Pain management
- Early Rehab Consult
Management

• Nutrition management
  • Early initiation of enteral feeding
  • Keep HOB elevated
  • Evaluate for swallowing dysfunction prior to oral feeding
  • Wire cutters at bedside at all times
Management

- Prevention of infection
  - Perioperative antibiotics
  - Frequent oral lavage
  - Minimize nasal packing and tubes
  - Decongestants
  - Avoid blowing nose
  - Avoid foreign bodies or instrumentation in nares or ear canal
Direct Eye Trauma
Thermal Injury

- Eye is usually spared
- Corneal exposure may occur as burn heals and skin contracts
Corneal Abrasion
Traumatic Hyphema

- Limit activity
- Keep HOB elevated
- Protect the eye
- Cycloplegic agents
- Monitor for re-bleeding
- Avoid NSAIDS and anticoagulants
- Aminocaproic acid
Lid Lacerations
Lid Laceration

- REFER for
  - Depth
  - Extensive tissue loss

- REFER for location
  - medial
  - margin
Open Globe

- Globe laceration
- Tetanus
- Antibiotics
- REFER
  - 24 hours
  - no altitude restrictions
Open Globe

• Minimize additional damage
  • Make sure a shield is used
  • Do not use a patch which applies pressure
  • Avoid bearing down
  • Be prepared for patient to go to the OR
• NPO
Complications
Sympathetic Ophthalmia

- Inflammatory condition
- Common after penetrating injury or ruptured globe
- Occurs 5 days to many years after injury
- Results in loss of vision of uninjured eye
- Prevented by early enucleation of injured eye
Psychosocial Support

• Provide communication aids
• Frequent positive reinforcement
• Early referrals to psychiatric liaisons or counselors
• Early referrals to community agencies for the blind
• Referrals for home safety evaluations
• Referrals to local and state agencies for financial assistance
Patient and Family Education

- Reinforce surgical plan of care
- Medications
- Nutrition management
- Wound care
- Tracheostomy care
- Avoid direct sunlight for 6-12 months
- Use of cosmetics
Summary

• Facial and ocular trauma requires a comprehensive multidisciplinary team to maximize outcomes

• Early incorporation of rehabilitation services is necessary for functional recovery

• Overall prognosis of reconstruction may take months or years