Facial Fractures
The Emergency Department Challenge

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Fracture Patterns

- Nasal
  - Lateral Blow
  - Other
- Zygomatic
- Maxilla
  - LeFort I
  - LeFort II
  - LeFort III
- Blowout Fractures
- Frontal Sinus & Naso-ethmoid
- Mandibular
The Zygomas

- Form the “cheekbones”
- Articulate with the temporal, frontal, and maxillary bones
- Their prominent position and shape renders them susceptible to injury
Zygomatic Fractures

• **Cause:** Blunt Force
• **Signs & Symptoms:**
  – Pain
  – Numbness of the cheek, infraorbital region & upper teeth on injured side
  – Eyelid swelling
  – Inability to close mouth properly
  – Swelling, Edema, Ecchymoses
  – Flattened cheekbone
  – Palpable depression at fracture site

• **Treatment:** Reduction & fixation
The Maxillae

- Form the upper jawbone
- Contains the maxillary sinuses
- Forms the inferior floor of the orbits
- Contains a foramen to allow passage of the maxillary/infraorbital nerve
Maxillary Fractures

- Complex, Bilateral fracture that have an unstable “floating” fragment.
- Classified based on the plane of the fracture.
  - LeFort I – Transmaxillary
  - LeFort II – Pyramidal/Subzygomatic
  - LeFort III – Craniofacial
LeFort I: Transmaxillary

- The fracture occurs along the nasal and maxillary floor
- Almost always involves the pterygoid process of the sphenoid bone
- May involve the maxillary sinuses
- The resultant “floating” component is the lower part of the maxilla and its teeth
LeFort II: Pyramidal/Subzygomatic

- Result from a downward force on the nose
- Fracture runs from the peak of the nasal bone laterally beneath the orbits.
LeFort III: Craniofacial

- Most severe
- Often associated with extensive soft tissue injury
- Large force is necessary to cause this type of fracture
- The resultant “floating” component is virtually the entire face
Blowout Fracture

- Downward displacement of the orbital floor with protrusion of orbital contents into the maxillary sinus.
- Caused by a force applied to the eye, which causes an increased intraorbital pressure.
- The elevated intraorbital pressure causes a fracture at the weakest point (posterior medial floor).
- Treatment involves surgical repair of the defect in the orbital floor.
Mandibular Fractures

- Used to be involved in 2/3 of all facial fractures
- Fractures are classified as open or closed
- Described as:
  - Oblique
  - Transverse
  - Comminuted
  - Greenstick
Mandibular Fractures
Mandibular Fractures

• Signs & Symptoms:
  • Pain
  • Malocclusion
  • Excessive salivation
  • Dysphagia
  • Swelling
  • Crepitation
  • Discoloration
  • Deformity
Mandibular Fractures

Remember the Ring Bone Rule
Approach to Facial Trauma

Clinical Pathway: Facial Trauma

Facial Trauma

C-spine and airway assessment:
- Failure to oxygenate (Class Indeterminate)
- Failure to ventilate (Class Indeterminate)
- Failure to protect airway (Class Indeterminate)
- Anticipated deterioration

Intubate:
- Have cricothyroidotomy tray set up. (Class Indeterminate)
- If brain injury is suspected, consider premedication with CNS protection (lidocaine, fentanyl, and defasciculating dose. (Class II)
- If difficult airway is suspected, consider awake intubation technique.

Assess jaw/maxilla for fracture, instability, malocclusion.
If the patient is not intubated, assess jaw by having patient bite on a tongue blade while the tongue blade is twisted. (Class III)

Assess for CSF rhinorrhea using the Halo test or checking for glucose content. (Class III)
If positive, consult neurosurgery.

If Le Fort fracture or mandible fracture is suspected, obtain CT or Panorex, and consult oral maxillofacial surgery and/or ENT. (Class III)

Assess facial bones for areas of tenderness or deformity; if present, consider CT of facial bones. (Class III)

Assess eyes for range of motion; if pain, swelling, or diplopia are present, obtain CT of facial bones. (Class II)

Reassess with systematic examination of head and face.
Approach to a Suspected Fracture

• History
• Symptoms
• Physical Examination
• Imaging
History

• Cause of Fracture
• Degree of Force
• Specific Symptoms
• Time since injury
• Allergies
• Medications
• Etc.
Physical Examination

- Symmetry/Deformity
- Lacerations / Abrasions / Ecchymoses
- Palpable step deformities
  - Orbital rims
  - Zygomatic arches
  - Nose
  - Frontal Bones
  - Mandibular borders
- Movement of dental arches
- Fractured/Avulsed/Mobile teeth

- Visual disturbances
  - Diplopia
  - Reflexes
  - Extraocular muscle function
  - Acuity
  - Fields
- Intranasal Inspection
  - Hematoma
  - Airway Obstruction
  - CSF rhinorrhea
- Facial movement (including jaw excursions)
- Facial sensation
Radiographic Examination

Plain X-ray

A basic facial series consists of 3 or 4 films

- **Waters view** (PA view with cephalad angulation)
- **Caldwell view** (PA view)
- **Lateral view**
- **Submentovertex (Basal) view** occasionally

“Of these views, the most consistently helpful view in facial trauma is the Waters view. It tends to show all of the major facial structures.”
Waters view
*(OccipitoMental view)*

- Bony Nasal Septum
- Anterior Nasal Spine
- Maxillary Sinus
- Coronoid Process
- Maxilla
- Condyle
- Mastoid
- Mandibular Angle
- Frontal Sinus
- Inferior Orbital Rim
- Zygomatic Bone
- Zygomatic Arch
- Petrous Ridge
- Mandible
- Odontoid Process
Caldwell view

- Sagittal Suture
- Lambdoid Suture
- Frontal Sinus
- Ethmoid Sinuses
- Inferior Orbital Rim
- Mastoid Air Cells
- Crista Galli
- Cribiform Plate
- Petrous Ridge
- Maxillary Sinus
- Nasal Septum
- Base of Skull
Radiographic Examination

Plain X-ray

Avoiding the Confusion

1. Look at the orbits…carefully! 60-70% percent of all facial fractures involve the orbit in some way
   Exceptions include:
   a. A localized nasal bone fracture
   b. A zygomatic arch fracture
   c. A LeFort I fracture

2. Know the common facial fracture patterns and look for them
   a. Zygomaticomaxillary complex fracture (tripod fracture)
   b. LeFort I, II, and III
   c. Zygomatic arch
   d. Orbital blow-out fracture (examiner may see a soft tissue mass on the superior margin of the maxillary sinus, representing the herniated intraorbital soft tissues protruding into the maxillary sinus)
   e. Alveolar process of the maxilla

3. Look at both sides of the facial films … bilateral symmetry is a friend.

4. Carefully trace along the lines of Dolan
Waters view
(OctipitoMental view)

Lines of Dolan & Elephants of Rogers
Radiographic Examination

Plain X-ray

Radiographic signs of facial fractures

Direct Signs
- nonanatomic linear lucencies
- cortical defect or diastatic suture
- bone fragments overlapping causing a "double-density"
- asymmetry of face

Indirect Signs
- soft tissue swelling
- periorbital or intracranial air
- fluid in a paranasal sinus
Lines of Dolan & Elephants of Rogers
Radiographic Examination

Plain X-ray

Best View

**Mandible**
- Condyle/Coronoid
- Ramus/Body
- Condyle & Neck
- Symphysis
- Symphysis/Body/Ramus

**Maxilla & Zygoma**
- Waters
- Lateral

**Frontal & Orbital Floor**
- Caldwell
- Waters

- Lateral Oblique
- Reverse Townes
- Occlusal
- Panoramic
Radiographic Examination

*CT Scan & Three-Dimensional CT*
Thank You