Orbital Fractures

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Orbit Anatomy

- Frontal bone
- Zygoma bone
- Maxilla- inferior and lower medial rim.
  Floor of orbit - upper border maxillary sinus
- Lacrimal bone
- Ethmoid bone
- Two wings sphenoid- posterior orbit
Orbit Anatomy

- Frontal
- Sphenoid
- Palatine
- Zygomatic
- Maxillary
- Ethmoid
- Lacrimal

Our Patient, FK:

- 96 y.o. woman brought to EW for fall with LOC. No memory of fall, no witness. Woke up on bathroom floor with bloody and bruised right face.
- PMH- pacemaker, left eye blindness
- PE- remarkable for severe bruises on right half of face, especially periorbital region
Menu of Radiologic tests for imaging suspected orbital fractures

- Plain films
  - Waters (PA with cephalad angulation): best displays inferior orbital rims, nasoethmoidal bones, maxillary sinuses.
  - Caldwell (PA view): best view of lateral orbital rim and ethmoid bone
  - Lateral: least helpful
Waters and Caldwell

Menu of Tests Cont.

- **CT**
  - Considered test of choice
  - Complex anatomy and fractures shown well
  - Better evaluation of soft tissue complications

- **MRI**
  - Does not demonstrate bony structures well, limited use in fracture assessment
Radiographic signs of orbital fractures

- **Direct signs**
  - abnormal linear density or intensity
  - cortical defect, break, separation
  - cortical overlay
  - absent bony fragment
  - asymmetry

- **Indirect Signs**
  - soft tissue swelling, soft tissue emphysema, paranasal sinus fluid or blood
Our patient received facial plain films
Plain film - Waters View

Increased Density

From BIDMC PACS patient F.K.
Plain film - Caldwell View

From BIDMC PACS patient F.K.
Plain film - Lateral View

From BIDMC PACS patient F.K.
The facial plain films confirmed the clinical suspicion of fracture. A CT was obtained to better define the exact location of all fractures.
CT- Axial View
Depressed Fx Ant Maxillary Sinus

Depressed fx
Subcutaneous emphysema
Air fluid level

From BIDMC PACS patient F.K.
CT- Axial Views
Depressed fx ant maxillary sinus

From BIDMC PACS patient F.K.
CT- Axial View

Lateral Wall Right Orbit Fx

Possible Cortical Defect

From BIDMC PACS patient F.K.
CT- Axial View
Lateral Wall of Right Orbit Fx

Fx confirmed on additional cut
CT-Axial Views
Additional cuts to determine extent of fracture

From BIDMC PACS patient F.K.
DISCUSSION
Orbital fractures

• 60-70% of all facial fx involve orbit
• Result from trauma - MVA, assaults, falls, sports, industrial accidents, gunshot wounds
• Major morbidity is eye injury - globe rupture, Retinal detachment, ocular muscle entrapment, optic nerve damage, hyphema, lens dislocation
• Males at higher risk - increased trauma
Types of Orbital Fractures

• Simple
  – Only orbital rim - uncommon since rim strongest part of orbit
  – Blowout - sudden increase in intraorbital pressure, orbital floor or medial wall fx (weak)
Mechanism

• “Retropulsion” theory - sudden increase in intra-orbital pressure, hydraulic forces of closed orbital cavity results in fx

Types of Orbital Fractures

- Complex
  - Tripod fx - inferior, lateral orbital rim & floor
  - Le Fort II - medial portion of orbit
  - Le Fort III - medial and lateral aspects of orbit
LeFort and tripod fractures

Frontal views of LeFort complex fractures I - III

Lateral views of LeFort complex fractures I - III

Zygomaticomaxillary complex (tripod fracture)

Let’s look at a number of different CT’s from patients with orbital trauma.
Hematoma

Hematoma with bony fragments

Medial Rectus Thickening

Medial Wall Blowout

From Daniel Crosby, MD, University of Iowa Radiology On Call Handbook, www.vh.org
Medial Wall Orbital Floor Blowout

From Daniel Crosby, MD, University of Iowa Radiology On Call Handbook, www.vh.org
Trapdoor

Tripod Fracture

From Daniel Crosby, MD, University of Iowa Radiology On Call Handbook, www vh.org
Treatment

- Most fractures do not require surgery
- Surgery for marked muscle restriction, marked diplopia, large (50%) floor fx
- Observe 1-2 wks, steroids to decrease swelling, fibrosis
- Abx, nasal decongestants, instructions not to blow nose to decrease orbital emphysema
In Summary

• 60 – 70% all facial fractures involve orbit
• Major morbidity eye injury
• CT and plain films
  – Four “S” approach
    • Symmetry
    • Sharpness – margins or bone fragments
    • Sinus – air fluid levels, bone fragments
    • Soft tissue – edema, emphysema
References

• Widell, Thomas, “Orbital Fractures”, Emergency Medicine, The Chicago Medical School, Mt. Sinai Hospital Medical Center, 2000, www.emedicine.com
• All websites accessed on Sept. 16, 2000
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