Facial Fractures

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Our Patient

- 82 year old male
- Had a mechanical fall with blunt force to face
- Taken to BIDMC by ambulance
Facial Fractures

- Most common mechanism is auto accidents
  - 70% of auto accidents produce some type of facial injury, although most are limited to soft tissue
- The face is a target in fights or assaults
- Remainder of facial fractures produced by falls, sports, industrial accidents and gunshot wounds
Facial Fractures

- Analysis of the fractured face requires
  - knowledge of normal anatomy
  - common fracture patterns in the face
Anatomy-Frontal View

http://www.emedicine.com/ent/images/Large/22ent0009-01.jpg
Anatomy-Lateral View

http://www.bartleby.com/107/
Imaging Studies

- Plain Film
  - universally available
  - quickly obtained
  - economical

- CT
  - more accurate
  - 3D reconstruction very useful
    - fractures involving multiple planes
    - fracture displacement
    - assessment of facial symmetry
  - assess fractures, soft tissue injuries, and intracerebral hemorrhage simultaneously
Standard Views for Plain Films

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

- Non-traumatized patient
  - should be obtained with the patient erect and all frontal projections with the central-beam PA

- Patients with facial trauma
  - obtained with the patient supine
  - Cervical spine must be cleared
Waters View
PA with cephalad angulation

http://anatomy.uams.edu/anatomyhtml/xrays/xra_atlas28.html
http://www.bcm.edu/oto/studs/nose.html
Caldwell View
PA

Frontal sinuses
Ethmoid sinus
Maxillary sinus
Petros pyramid
Nasal septum (bony)

Caldwell view

15-20°

http://anatomy.uams.edu/anatomyhtml/xrays/xra_atlas27.html
http://www.bcm.edu/oto/studs/nose.html
Lateral View

Lateral view

Sphenoid sinus

Mandible

http://anatomy.uams.edu/anatomyhtml/xrays/xra_atlas30.html
Submentovertex View

- a-zygomatic arch
- b-maxillary sinus
- c-anterior wall, maxillary sinus

http://www.uth.tmc.edu/radiology/test/er_primer/face/images/subment02.html

http://www.bcm.edu/oto/studs/nose.html
Facial CT Views

Coronal View

Axial View

http://uuhsc.utah.edu/rad/protocol/fbones.htm
Key Points for Assessing Fractures

- Look at orbits carefully
  - Involved in 60 - 70 % of all facial fractures
- Look for most common fracture patterns
- Bilateral symmetry can be very helpful.
  - Normal radiopacities are usually bilateral. Abnormal ones are usually unilateral.
- Look for aberrant air
Zygomaticomaxillary complex (tripod fracture)

www.emedicine.com/ent/topic166.htm

http://www.rad.washington.edu/mskbook/facialfx.html
Orbital Floor Fractures

- "blowout" fracture
- usual mechanism is a blow to the eye
- common clinical signs
  - enophthalmos
  - diplopia

http://www.rad.washington.edu/mskbook/facialfx.html
http://www.nature.com/eye/journal/v20/n1/fig_tab/6701801f2.html#figure-title
Le Fort Fractures

http://www.rad.washington.edu/mskbook/facialfx.html
Our Patient
Coronal CT

Fracture at naso-frontal suture

Bilateral fractures at zygomatico-maxillary sutures

Bilateral Le Fort II

Courtesy of Dr. Handwerker-BIDMC
Fracture at naso-frontal suture

Axial view through orbits
Our Patient
Axial CT, Bone Window

Fracture of anterior maxillary walls
Aberrant air in subcutaneous tissues
Fracture of posterior maxillary walls

Axial view through maxillary sinuses

Courtesy of Dr. Handwerker-BIDMC
Our Patient
Axial Views Through Nasal Bones

Comminuted nasal bone fractures
Our Patient
3D Reconstruction

Courtesy of Dr. Handwerker-BIDMC
Our Patient
3D Reconstruction

Courtesy of Dr. Handwerker-BIDMC
Our Patient
3D Reconstruction
3D Reconstruction

- CT 3D reconstruction can often be used to plan surgical management
- Can also be used to evaluate facial skeleton post-surgically
Second Patient

- Post-fixation CT with 3D Reconstruction slides of another patient with a bilateral Le Fort Type II fracture
Second Patient
Second Patient
Second Patient

[CT scan image of a human skull with annotations]

Courtesy of Dr. Guo - BWH
Second Patient

Courtesy of Dr. Guo - BWH
Second Patient
Second Patient
Second Patient
Second Patient
Second Patient
Second Patient

Courtesy of Dr. Guo - BWH
Second Patient
Second Patient
Second Patient

Courtesy of Dr. Guo - BWH
Summary

- Knowing normal anatomy and common fractures is important
- CT-most common modality used
- Consider mechanism
- Look for asymmetry
- Look for cortex interruption
**Resources**

- Mullins RJ. The Influence of Imaging on the Trauma Surgeon’s Initial Evaluation of Seriously Injured Patients. Seminars in Roentgenology 2006; 41: 159-167.
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