Imaging Facial Trauma

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References
- Diagnosis of Midface Fractures with CT: What the Surgeon Needs to Know – Hopper RA et al. RadioGraphics 2006;26(3)

Facial Buttress
- 3-5 vertical and 3-5 horizontal (L beams) – major support for facial skeleton to maintain form and function
- Stable reference point linked directly or by another buttress to the cranium or cranial base
- Have bone thickness that can accommodate screw fixation
- Transverse buttress reduction reestablishes facial profile and width. Vertical buttress reduction reestablishes facial height
- Reduction establishes functional support for the teeth and globes

Buttress Fx Patterns
- Orbital fractures
- Naso-orbito-ethmoidal fractures (NOE)
- Zygomaticomaxillary complex fractures (ZMC)
- Le Fort fractures

Subunit-Specific Midfacial Fx Classification
- Nasoseptal
- Naso-orbito-ethmoidal (NOE)
- Orbital
- Zygomaticomaxillary complex (ZMC)
- Le Fort maxillary occlusion-bearing segment

Nasoseptal Fx
- Anatomy of nasal pyramid
  - Nasal bones
    - Frontonasal suture
    - Nasal septum
    - Frontal process of maxilla
    - Nasomaxillary suture
  - Septum
    - Cartilaginous septum fx underestimated
    - Anterior nasal spine fx is a marker for septal cartilage fracture
  - Septal fx cause upper lateral cartilages to exert deforming forces on nasal bones during healing
- Sagittal images helpful
Naso-orbito-ethmoidal (NOE)

- Anatomy (fx of ≥4 of 5 cardinal tracts)
  - Lateral nose and pyriform aperture, nasomaxillary buttress, inferior orbital rim and floor, medial orbital wall, and frontomaxillary suture
  - 3-D images overall helpful, axial for medial wall, and coronal for floor
  - Markowitz and Manson Classification
  - Evaluate frontal recess and nasolacrimal duct

Markowitz and Manson Classification

- Hopper RA et al. RadioGraphics 2006;26(3)

Orbital

- Anatomy
  - Orbital walls
  - Internal orbital buttress
  - Convex junctional bulge
- Imaging – 3 planes
  - Coronal best to characterize displaced fragments, defect size, orbital shape and volume, and status of internal orbital buttress
  - High risk of enophthalmos
    - >25-50% floor or medial wall
    - Collapse of internal orbital buttress and junctional bulge
    - Surface area > 2 cm²
    - Soft tissue herniation volume > 1.5 ml

Orbital Fxs

Orbital Apex Syndrome

combines optic neuropathy and ophthalmoplegia from superior orbital fissure syndrome

Zygomaticomaxillary Complex (ZMC)

- 4 points of failure
  - Zygomaticomaxillary suture/buttress to orbital rim
  - Zygomaticotemporal suture
  - Zygomaticofrontal suture
  - Zygomaticosphenoid suture
- Deformity at the zygomaticosphenoid suture is the most sensitive CT indicator of ZMC malalignment and orbital volume changes
- Imaging
  - Axial – depicts fx, maxillary retrusion, and rotation at the zygomaticosphenoid suture
  - Coronal – depicts orbital fx
  - 3-D helpful
- Failure to anticipate floor defect enlargement is a major cause of late enophthalmos after repair

Dreizin D, et al. Radiographics 2018;38(1)

ZMC

Le Fort Maxillary Occlusion-Bearing Segment

- Le Fort I – floating palate
- Le Fort II – floating maxilla
- Le Fort III – craniofacial dissociation
- Upper Le Fort usually have components of NOE, ZMC, and orbital fx that are handled individually
- Occlusion-bearing segment
  - Managed independently
  - Primarily evaluated Clinical
  - Maxillary alveolus, dentition, palate
  - Goal to restore occlusion of maxillary and mandibular dental arches by maxillomandibular fixation
- 2-3 mm malocclusion results in impairment
- Characterize palate fx

Dreizin D, et al. Radiographics 2018;38(1)

Le Fort I

(B) Le Fort I and II and (R) Le Fort III ((R) ZMC and (B) NOE)

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Surgical Repair

Facial Smash/Complex Midfacial Fx

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