Repair nasoethmoid area

Repair orbital rim
Nasoethmoid Fracture with Anterior Skull Base Fracture

- This 19 year old male was involved in a motor vehicle accident, sustaining left orbital trauma. On examination he was noted to have left periorbital trauma and a detachment of his left medial canthus.
Nasoethmoid Fracture with Anterior Skull Base Fracture

- A 3-D CT scan as well as a standard axial CT demonstrate what is consistent with a large "central fragment" of the medial orbital rim and nasal framework.
Nasoethmoid Fracture with Anterior Skull Base Fracture

- Coronal CT scans suggest that a portion of the orbital roof has been displaced into the anterior cranial fossa, or base of the skull. Additionally, the floor of the frontal sinus is involved.

**Diagnosis:** left nasoethmoid fracture with canthal detachment, frontal sinus, and anterior skull base fracture.

**Plan:** intracranial repair of anterior skull base fracture via frontal craniotomy and frontal bar osteotomy, transnasal wiring of left medial canthus, subciliary approach to infraorbital rim and medial orbital floor.

A concern exists that there is a direct connection between the paranasal sinus cavities (contaminated) and the cranial fossa (sterile), thus raising the risk of intracranial infection along with a cerebrospinal fluid leak. Accordingly, the goals are to both separate the anterior cranial fossa from the paranasal sinuses as well as to repair the left medial orbit and medial canthal tendon.
Nasoethmoid Fracture with Anterior Skull Base Fracture

- In this case, bone grafts taken from the inner table of the frontal craniotomy are used to reconstruct the medial orbit and orbital roof defects, the defect of the anterior skull base, and to block the nasofrontal duct.
Nasoethmoid Fracture with Anterior Skull Base Fracture

- A pericranial flap is positioned over these grafts to further bolster the reconstruction.
Nasoethmoid Fracture with Anterior Skull Base Fracture

- Note the over-correction of the medial canthal pull, as it will generally loosen postoperatively.
Nasoethmoid Fracture with Anterior Skull Base Fracture

- The separation of the anterior cranial fossa and the perinasal sinuses is demonstrated.
Nasoethmoid Fracture with Anterior Skull Base Fracture

- The postoperative correction shown in a photograph at one year after surgery
Zygomatico-orbitomaxillary Complex Fracture
ZOMC
Zygomatic Arch Fracture
Isolated Zygomatic Arch Fracture

Elevated from a Gilles Approach
Indications for Malar Repair

- A variety of deformities.
- Impingement of the mandibular coronoid process.
- Trismus.
- Nerve impingement.
Procedure

- Planned when swelling has disappeared and the degree of deformity can be appreciated.
- Between 7-14 days post trauma.
- ORIF vs CREF
- Exposure can be obtained through lacerations if present or various different incisional locations.
Zygomatic Complex Fracture

- This is a 20 year old female hit in right cheek region with an errant softball throw. She complains of swelling and pain around the right eye. Note the flattening of the right malar (cheekbone) region. There does not appear to be any globe (eyeball) malposition.
Zygomatic Complex Fracture

- Axial and coronal CT scans are obtained. In the axial CT, note the posterior impaction of the right malar eminence and the contiguous lower portion of the infraorbital rim, consistent with a zygomatic complex (ZMC) fracture.
Zygomatic Complex Fracture

- In the coronal CT, note the medial movement of the right malar eminence and loss of continuity of the lateral buttress of the maxilla. Also note the relatively normal position of the orbital floor. However, when the zygoma is repositioned laterally, a significant floor defect will likely be created.

**Diagnosis:** displaced right zygomatic complex fracture with orbital floor fracture

**Plan:** transvestibular approach, ORIF, plates at lateral buttress, infraorbital rim, and frontozygomatic fractures; exploration of orbital floor, reduction of contents, implant reconstruction.
Zygomatic Complex Fracture

- The surgical approaches include the upper buccal sulcus, lower eyelid, and upper eyelid incisions. The unilateral upper buccal sulcus approach allows for exposure of the maxilla. Reduction of the displaced zygoma is usually possible via this approach. Several options exist for approaching the fractured orbital rim and orbital floor. These include the transconjunctival incision, subciliary incision, and the mid-lid incisions for the lower lid approach to the infraorbital rim and floor. A lateral orbital rim or upper eyelid tarsal fold (crease) incision allows exposure of the lateral orbital rim and lateral wall of the orbit.

- After reduction of the displaced zygoma, a 2.0 mm straight plate is used to bridge the lateral buttress fracture. An alternative would be the use of an "L"-shaped plate.
Zygomatic Complex Fracture

- A 1.0 mm microplate is placed across the infraorbital rim. An alternative would be a 1.3 mm plate. Note the gap in the rim from a comminuted bone segment. The large screw in the rim has been used for manipulation and reduction of the rim. It is removed after plate placement.
Zygomatic Complex Fracture

- For the frontozygomatic fracture, a 1.0 mm microplate is used. A 1.3 mm plate or a 1.0 mm strut plate could also be placed instead.
For the orbital floor repair, a porous polyethylene sheet was contoured and fixed with a 1.3 mm screw. Alternatives would include titanium mesh, or a contoured 3-dimensional "fan" plate.
Zygomatic Complex Fracture

Six months postoperatively, note the improvement of the zygomatic projection and the normal globe position.
Zygomatic Complex Fracture
Bony Anatomy

- 1- frontal process of the maxilla
- 2- lacrimal groove
- 3- lacrimal bone
- 4- lamina papyracea
- 5- optic canal
- 6- superior orbital fissure
- 7- frontal bone
- 8- greater wing of the sphenoid
- 9- orbital plate of the zygoma
- 10- inferior orbital fissure
- 11- infraorbital groove
- 12- zygoma
- 13- infraorbital foramen
- 14- supraorbital foramen
Bony Orbit

- The bony orbit protects the globe from impact with large objects.
- A marginal fracture usually causes no decrease in function.
Anatomic & Development Considerations

- The orbits are two recesses that contain the globes, extraocular muscles, blood vessels, lymphatics, CNs II, III, IV, V, VI and sympathetic and parasympathetic nerves, adipose tissue, connective tissue and most of the lacrimal apparatus.
Bony Orbit

- Orbital floor blow out fracture may cause intraprament of the inferior rectus and inferior oblique muscles causing diplopia due to restricted vertical movement.
- A medial wall fracture through the ethmoidal bone is often associated with sub-Q air of the eyelids.
Bony Orbit

- A fracture at or near the optic canal, through which the optic nerve and ophthalmic artery pass, may cause visual loss.
- The trochlea of the superior oblique muscle may be lacerated, causing diplopia on downward gaze.
Bony Orbit

- The medial palpebral ligament may be torn or be attached to fragmented bone.
- Lacrimal apparatus injury may occur with bony fracture.
- Orbital cellulitis.
- Retinal artery occlusion may also occur.
Repair of Orbital Floor Fractures

- Most blowout fractures need to be repaired surgically. Best performed 7-14 days post trauma.
- Absolute indications.
  - Hypophthalmos and/or enophthalmos of >2-3mm.
  - Muscular entrapment causing restricted gaze or diplopia.
Orbital Floor

Repair with:

- Universal Fracture Plate/absorbable
- Fan Plate
- Countourable Mesh