Technique Guide

Orbital Floor Fractures

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Section I:
Orbital Anatomy

Orbital Anatomy: Floor

Bones
- Zygoma
- Maxillary
- Palatine

Landmarks
- Infraorbital groove and canal
- Infraorbital artery, V2
- Does not end at apex, ends at pterygopalatine fossa
  - Shortest of orbital walls
Section II: Clinical Presentation/Orbital Examination

Orbital Floor Fractures

Most common type of orbital fracture

- Thin maxillary bone medial to infraorbital neurovascular bundle
- Bone is 0.5mm thick

Orbital rim is often spared

Blow-out fracture/Indirect fracture

- Orbital floor fracture with intact rim
  - Hydraulic pressure from globe compression
  - Buckling of bone

Initial Examination of Orbital Trauma

Advanced trauma life support guidelines

- Primary Assessment
- Airway
- Breathing
- Circulation
- Neurologic Status

Secondary assessment

- Cranium
- Face and Facial Nerve
- Eye and Orbit
- Nose
- Oral Cavity
- Ear
- Neck
History

- Chief complaint
- Estimation of visual acuity before and after trauma
- Visual aberrations including distortion, flashing/flicker of light, floaters, double vision
- Past ocular history
- Past medical history

The basic eye exam

- Best corrected visual acuity
- Pupil exam
- Alignment and motility

Testing Poor Vision

- 20/200 letter moved closer
- Counting fingers
- Hand motion
- Light perception
- No light perception

External examination of ocular adnexa including:

- Lacrimal system
- Position of eyelids
- Position of globe
- General facial formation
- Sensory exam
Pupil exam

- Size
- Shape
- Reactivity to light
- Direct
- Consensual
- Swinging penlight test for Marcus Gunn Pupil

Normal pupil constriction

Paradoxial dilation with swinging flashlight test

Normal pupil constriction
Ocular Alignment & Motility

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Initial Examination of Orbital Trauma

Exophthalmometry
- Measurement of anterior-posterior position
- Lateral rim to anterior corneal surface
- > 2 mm difference suggest exophthalmos or enophthalmos
Inspection of lacrimal system

Clinical presentation of the orbital trauma

- External
- Ecchymosis
- Ephysema
- Subconjunctival hemorrhage
- Enophthalmos
- Ocular Injury
- Motility Defects
- Pupil Abnormality
- Infraorbital Hypethesia
- Oculocardiac Response
Section III: Indications for Surgical Repair

Immediate

- Muscle entrapment
- Oculocardiac reflex

Early repair - 5 to 10 days

- Symptomatic diplopia
  - CT documentation - inferior rectus muscle/perimuscular soft tissue
  - Minimal improvement
- Hypoglobus
- Large fracture - greater than 50%
- Enophthalmos greater than 2mm

Observation

- Clinically insignificant diplopia
- Intact ocular motility
- Enophthalmos less than 2mm
- No evidence of hypoglobus
Section IV: Surgical Technique

Surgical approaches to the orbital floor

- Subciliary approach
- Preseptal incision (Author’s preferred approach)
  - Transconjunctival approach
- Postseptal incision
  - Transconjunctival approach

Lid-crease extended incision can be utilized for increased exposure of the orbital floor

Perioperative preparation

- Surgical repair performed under general endotracheal tube anesthesia
- Local anesthetic (2% lidocaine with 1:100,000 epinephrine) injected into inferior fornix
- Forced duction to determine amount of restriction
Preseptal transconjunctival approach

- 5-0 silk traction suture through lower eyelid margin
- Lateral canthotomy and inferior cantholysis if needed for increased exposure
- Eversion of eyelid over Desmarres retractor
- Transconjunctival incision 4mm inferior to the inferior border of the tarsus with a 15 blade
- Preseptal dissection to the level of the orbital rim using cautery
- Wide exposure of the inferior orbital rim

Subperiosteal dissection and exposure of fracture

- Incision of periosteum with Colorado Needle
- Enter orbit insubperiosteal plane
- Using elevator, elevate periosteum to anterior aspect of the floor fracture
- Using a hand-over-hand technique with malleable retractors, reposition prolapsed orbital contents back into the orbit
- Expose 360 degrees of fracture
- Repeat forced ductions after orbital contents repositioned into orbit
**Placement of orbital implant**

- Size and shape orbital implant of choice to accommodate defect and 3-Dimensional configuration of orbit
- Pre-soak in antibiotic of choice if desired
- Appropriately place orbital implant to cover defect and ensure no orbital contents are prolapsed into the maxillary sinus
- Repeat forced duction testing
- If necessary, implant can be secured using titanium micro screws

**Closure**

- Periosteum is closed with 5-0 polyglactin 910 suture if hardware is present on the orbital rim
- Conjuctiva is closed with one 7-0 polyglactin 910 suture
- Repair lateral canthus if necessary
Section V: Orbital Implants

Orbital Implants

Autogenous grafts
- Bone
- Cartilage

Human donor grafts

Xenografts

Alloplastic implants
- Porous polyethylene
- Porous polyethylene/titanium
- Titanium mesh
- Polyamide mesh

Benefits of alloplastic implants
- Sizeable to accommodate defect in a 2-Dimensional plane
- Shapeable to accommodate the 3-Dimensional configuration of the orbit
- Durable
- Inert
- Single stage reconstruction
Post Operative Care

- Visual acuity and pupil exam should be performed in the immediate post-operative period.
- Ice packs are recommended for 20 minutes an hour while awake for 48 hours total.
- Broad spectrum antibiotics are prescribed for 7-10 days.
- Patient should be instructed to contact the surgeon with any decreased vision or increased pain.
Complications

Surgical complications

- Vision loss
- Eyelid retraction
- Enophthalmos
- Worsening diplopia
- Infection or migration of orbital implant
- Postoperative retrobulbar hemorrhage
- Inappropriate placement of orbital implant

- Lower Eyelid Retraction
  - Middle and Posterior lamellar scaring

- Retrobulbar Hemorrhage

- Clinical Manifestations
  - Decreased vision
  - Afferent pupillary defect
  - Proptosis
  - Pain
  - Subconjunctival heme
  - External ophthalmoplegia