Oculoplastic Surgery

For Certified Ophthalmic Technicians

Tips on Trauma, Tumors, Tearing, Thyroid, and pTosis

Nicole Langelier, MD, MBE
Oculoplastic and Reconstructive Surgery Fellow
Duke Eye Center

Photos removed from handouts for HIPAA compliance
It’s good news. We can fix it with some simple plastic surgery.

Thank you doctor.
Oculoplastics

Medical and Surgical Management of:

Orbit                        Eyelids                        Lacrimal System
Topics

• Trauma
• Tearing
• Tumors
• Thyroid
• pTosis (and other lid malpositions)
Topics

- Trauma
- Tearing
- Tumors
- Thyroid
- pTtosis (and other lid malpositions)
"In my opinion your blurred vision is caused by the axe in your head. But you may want a second opinion."
QUESTION

HOW DO YOU GET THIS OUT?
FRACTURES

• Blowout
  – Floor
  – Medial wall

• ZMC or “tripod” fractures

• Roof: notify neurosurgery

• Naso-orbital ethmoid

• Le Fort
Orbital Floor “Blow Out” Fracture

Clinical Consequences:
Black and blue to double vision to globe rupture to cardiac arrest!
Orbital “Blow Out” Fracture
Muscle Tethering vs Entrapment

Clinical Consequences:
None
Double vision
Muscle Ischemia
Cardiac Arrest
Blow Out Fracture EMERGENCY

**Entrapment**

- “Trap Door” or “White Eyed Blowout”
- Usually pediatric. Uncommon.
- Flexible bones, greenstick fracture
- Entrapped muscle is pinched in the fracture causing ischemia, possible oculocardiac reflex, n/v, severe pain
- Both passive and active movement is restricted.

Photos: Roberta Gausas, MD
Checking for Entrapment

CLINICAL DIAGNOSIS

• Unlikely to occur in large fractures
• Motility restriction is seen
• Positive forced ductions
  – Tetracaine + pleget
  – Grab IR with toothed forceps
  – Can also grab at limbus
  – Positive if restricted
Forced Duction vs Forced Generation

**Forced Duction**
- Checks **passive movement**
- Patient is passive and **you move the eye**
- Can the eye be moved or is it stuck?
- Checks for **muscle restriction**

**Forced Generation**
- Checks **active movement**
- You hold still and **patient tries to move eye**
- Can the patient generate force?
- Checks for **muscle paresis**
DECREASED MOTILITY WITHOUT ENTRAPMENT

- This is the most common
- Muscle is surrounded by a sheath which is connected to septae which has connections to fat
- Prolapse of tissue into maxillary sinus can cause restriction from tethering, no entrapment
- EOM intramuscular hemorrhage can also restrict EOM.
- Both passive and active restriction is seen.
QUESTION

You are evaluating a 32M with a right orbital blow out fracture. On exam, he has a right hypertropia and is unable to look down with the right eye. Does this patient need emergent surgical intervention?

- No. *Probably* too old for entrapment. Muscle likely paretic. How can you know for sure?
- Forced ductions and forced generations (negative forced duction and will not be able to generate force on forced generation).
Muscle Paralysis

• Inferior rectus doesn’t work!
  – Patient can’t move eye, but the examiner can.
• Can be seen immediately after a fracture due to damage to the nerve
• Can be seen in delayed presentation if an entrapped (pinched) muscle becomes ischemic and dies.
• Diplopia in downgaze = difficulty reading and going down stairs.
• Need strabismus surgery!
Orbital Fractures – Tech Tips

HPI
• Mechanism
• Any systemic symptoms (head injury? Nausea?)

Exam
• Vital signs (HR, BP, O2 sat)
• Visual acuity
• Pressure
• Signs of optic neuropathy (pupils, color vision)
• Motility (check for signs of entrapment: motility, oculocardiac reflex with bradycardia or nausea/vomiting)
• Exophthalmometry (proptotic or enophthalmic?)
• V2 hypoesthesia (test the cheek for sensation)
• Imaging to review?
Exophthalmometry
MANAGEMENT – NON EMERGENT

- Ice
- Elevate head
- No nose blowing. Can use Afrin spray
- If pain meds needed, give antiemetics to prevent orbital hemorrhage from vomiting
- No strenuous activity
- PO steroids if significant swelling and no contraindication
- Antibiotics (especially if +sinusitis, but studies show no change in outcome with or without antibiotics)
- Treat other ocular injuries (traumatic iritis is common)
- Follow up approx 1 week for re-eval after swelling improved
- If surgery needed, ideally within 2 weeks (before scarring but after swelling improved)
Contraindications
Contraindications for Repair

- Medical instability
- Ruptured Globe (absolute)
- Hyphema (pretty absolute)
- Ocular injury deemed to potentially worsen with globe compression (retinal detachment) (relative)
INDICATION FOR SURGICAL INTERVENTION (non-urgent)

- **Diplopia central 30 degrees**
  - If after 1-2 weeks, double vision with positive forced duction indicates tethering of tissues that will not improve without repair.

- **Large floor fracture (>50%)** is likely to lead to enophthalamos.

- **Enophthalamos >2mm**
  - After 1-2 weeks, if enophthalamos is >2mm and patient desires repair for cosmesis or diplopia.
Diplopia is no fun.
Blow Out Fracture Repair

• Goals of Repair
  – Release trapped tissue from fracture line
  – Bring up orbital tissue from sinus into orbit
  – Cover the floor defect anatomically to restore orbital volume

Improve motility
Resolve diplopia
Restore volume
Don’t hit the infraorbital nerve
Fracture Post-Op Follow Up

• Immediately Post-Op
  – Check vision, ensure no hemorrhage

• Post-Op Instructions
  – Ice, elevate HOB, no strenuous activity, antibiotic drops +/- PO, no nose blowing
Tech Tips: Fracture Follow Up

- Post-Op Clinic Follow Up
  - Visual acuity
  - Pressure
  - Motility/diplopia
  - Pupils/color (any sign of optic neuropathy)
  - V2 (infraorbital nerve) sensation
  - Lower lid retraction?
Other Fractures on the Radiology Report
Zygomatic Fracture
(NOT a “Tripod” Fracture)

Zygomaticofrontal
Zygomaticotemporal
Zygomaticomaxillary
Zygomaticosphenoid

Photos: http://radiopaedia.org/articles/zygomaticomaxillary-complex-fracture-1

Zygomatic Fracture Findings

- Flattened malar eminence (cheek)
- More prominent zygomatic arch
- Lower lid retraction
- Lateral canthal dystopia
- Enophthalmos (increased orbital vol)
- Trismus (impinges coronoid)

Photos: http://radiopaedia.org/articles/zygomaticomaxillary-complex-fracture-1

Cho RI, Durairaj VD, Langer PD.
http://www.aao.org/publications/eyenet/201402/trauma.cfm
Naso-Orbital Ethmoid (NOE)

- Depressed nasal bridge and telecanthus
- Complications
  - Orbital hemorrhage (ethmoid arteries)
  - CSF leak
  - Nasolacrimal system damage
- Treatment
  - Miniimplating
  - Transnasal wiring


Type 1:
- single central segment
- no disruption of medial canthal tendon (MCT)

Type 2:
- comminuted central segment
- no disruption of MCT

Type 3:
- severe comminuted central segment
- Disrupted / avulsed MCT
Midface Fractures:
Le Fort Fractures

CRANIOFACIAL DYSJUNCTION

Le Fort 1:
- Low transverse maxillary fracture
- Orbit is not involved
- Fix with maxillomandibular fixation

Le Fort 2:
- Pyramidal configuration
- Involve maxillary, nasal, lacrimal, ethmoid, floor
- Lateral wall (zygoma) not involved

Le Fort 3:
- Facial skeleton detached from skull base
- Floor, medial wall, lateral wall (zygoma) is involved

Next Patient
Orbital Foreign Body

- Take a Good History
  - Mechanism of Injury
  - What type of FB (Metal? Wood? Plastic? Lead?)
  - Tetanus up to date?

- Thorough Exam
  - Vision, pupils, globe status, eye motility, FB entry point, eyelid exam

- Imaging

- Surgical plan?
Orbital FB

• High Speed Metallic less likely to infect
  – BB and other metal FB may be left in the orbit depending on level of dysfunction caused. In the eye: more often requires removal due to toxicity.

• Vegetation is dirty—IV abx, get it out asap

• Wood FB
  – Suspect wood if something isn’t adding up
  – Any late non-healing or chronically discharging periorbital situation
Bullet
Orbital FB - Tech Tips

- Special Attention to
  - History—mechanism, material, timing etc
  - Tetanus up to date?
  - Motility
  - Diplopia
  - Pain
  - If infected looking, check temperature
  - Any imaging to review
Next Case
What is the diagnosis?

40M in MVC. He reports severe pain, nausea, cannot open his left eye.

Vision: CF 2 ft
IOP: 15,58
Pupil: +APD
Motility: flick
Retrobulbar Hemorrhage
“Compartment Syndrome of the Orbit”

- Occur in the setting of:
  - trauma, surgery (blepharoplasty), retrobulbar block

- Signs/symptoms
  - Vision loss, proptosis, elevated IOP, periorbital swelling, decreased motility, severe pain, nausea/vomiting
  - Orbital compartment syndrome causes vision loss via decreased perfusion or compression

- Treatment
  - Get MD stat
  - Emergent Canthotony/Cantholysis
  - Cutting the eyelid free from the orbital rim in order to release blood and allow pressure in the orbit and the eye to decrease
RB hemorrhage $\rightarrow$ cantholysis
• Hopefully this patient is not hanging out in the waiting room!

• For canthotomy-cantholysis will need:
  – Lidocaine with epinephrine, 3cc syringe, fill needle, 30g needle, Adson forceps, straight scissors, gauze.
Next Patient 😞
Eyelid and Lacrimal Lacerations

- Explore Thoroughly!!!!!
- Check the lacrimal system
- Assess for levator damage
- Repair
Anatomy
Irrigation
Probing/Irrigation

Photos: Jason Liss, MD
Explore Carefully

Photos: Jason Liss, MD
Canalicular Tears
Final repair

Photos: Jason Liss, MD
Eyelid Lacs – Tech Tips

Mechanism
– Dog bites, bungee, fishing, fish fight, car accident, etc
– Tetanus shot up to date?
– Ensure this is not a “distracting injury”

If in the medial canthus, doc will do probing and Irrigation
– Gauze and saline to clean the wound well
– Bowman probe, 3cc Syringe, cannula, BSS or other solution
Topics

• Trauma
• Tearing
• Tumors
• Thyroid
• Ptosis (and other lid malpositions)
Epiphora (tearing)

Two Causes
- Insufficient drainage
  - Drain clog, poor drain position, bad pump function
- Excess production
  - Reflex tearing

Evaluation
- History
- Clinical Exam
- Probing and Irrigation
Treatment: Excess Production

• Treat the underlying trigger
  • Dry eye
  • Mucous fishing syndrome/Self-induced repetitive trauma
  • Lid malposition

• Botulinum to lacrimal gland (off label)
Causes of Insufficient Drainage

Lid Position, Pump Function, Obstruction

- Punctal eversion
- Lid laxity
- Involutional = most common
- Punctal plug in canaliculus
- Scarring from autoimmune disease (OCP, SJS)
- Scarring from trauma
- Scarring from eyedrops, medication, radioactive iodine
- Blockage from tumor or growth (SCC, inverted papilloma)
- Sinusitis
- Previous dacryocystitis
- Children: early in life usually blockage at valve of Hasner = dacryocystocele
Treatment: Insufficient Drainage

- Punctal scarring
  - 3 snip punctoplasty

- Lid position problem
  - Tighten lower eyelid
    (lateral tarsal strip)
  - Put puncta in proper position

Treatment: Insufficient Drainage

- **Canalicular problem**
  - Canaliculoplasty
  - Jones tube

- **Nasolacrimal duct problem**
  - Crawford tubes
  - DCR (dacryocystorhinostomy)
Dacryocystitis

- INFECTION of the nasolacrimal sac
- Treat with antibiotics, warm compresses, I+D in adults
- Surgery (DCR) is definitive treatment
- Beware of spread to orbit
- Any mass above the medial canthus is NOT from the lacrimal sac!
Which of the following is NOT dacryocystitis?

FAIL
Dacryocystocele

• Valve of Hasner commonly closed at birth
• Amniotic fluid or mucous fills the sac, swelling closes off the valve of Rosenmuller.
• Initially sterile. Treat with Crigler massage and prophylactic topical antibiotics
• Often an intranasal cyst by the inferior meatus is seen.
• Beware of bilateral involvement = breathing problems!
• If no response or infection: proceed to probing
• NO I+D. Will get fistula!

http://www.eyerounds.org/cases/166-dacryocystocele.htm
Epiphora – Tech Tips

• How often, under what circumstances
  – Constant? Only when irritated? Bothersome enough to want surgery?

• History
  – Previous dacryocystitis? Previous plugs? Previous cancer treatment? Previous cancer on face? Previous trauma? Previous treatments?

• Doc will likely irrigate
  – Cannula, 3cc syringe, saline, consent form
Topics

• Trauma
• Tearing
• **Tumors**
• Thyroid
• Ptosis (and other lid malpositions)
Orbital Tumors
Sphenoid Wing Meningioma
Orbital Tumors – Tech Tips

• History
  – Timing: acute, subacute, chronic
  – Symptoms: visual (blur, diplopia, peripheral), is it painful or painless?

• Special Attn:
  – Acuity (if not 20/20 always check pinhole)
  – Color Vision!
  – IOP
  – Relative APD?
  – Confrontation visual fields
  – Exophthalmometry and globe displacement
  – Motility
  – Any fields to review
  – Any Imaging to Review
Eyelid Lesions

*Benign or Malignant?*
Benign or Malignant?

- Papilloma
- Chalazion
- Hidrocystoma
- Amelanotic Nevus
- Xanthelasma
- Seborrheic Keratosis
It's not a tumor!
**Basal Cell Carcinoma**

Pearly margins and telangiectasia, irregular border, nontender, loss of lashes, not scaly
Basal Cell Carcinoma

• 90% of skin malignancies (but <0.1% of deaths from cancer overall)

• Sun damage: Lower lid 50-60%, medial canthus 20-30%, upper lid 15%, lateral canthus 5%

• Pearly margins and telangiectasia, irregular border, nontender, loss of lashes, not scaly
Squamous Cell Carcinoma

Indurated plaque with hyperkeratosis; often ulceration; usually no pearly margins or telangiectasias
Squamous Cell Carcinoma

- Occurs in sun-damaged skin
- Less common than BCC
- Indurated plaque or ulceration with hyperkeratosis; usually no pearly margins or telangiectasias
- More aggressive than BCC; can spread along nerves and cause cranial nerve palsies or pain
You are very familiar with your next patient because he has yet ANOTHER stye on his right upper eyelid. This is the third time! You remind him about the importance of eyelid hygiene and your team drains the chalazion and sends tissue to pathology.

**SEBACEOUS CARCINOMA**
Metastatic potential is high.
Palpate lymph nodes.
Will need additional surgery for resection
Will need oncology referral.
Melanoma

- Rare on the eyelids
  - <0.1% of eyelid cancers
- Invasive melanoma has vertical growth that results in an elevated or indurated mass
- Mets to lymph nodes first
- Follow LFTs in long-term monitoring
- Brain mets not uncommon

https://en.wikipedia.org/wiki/Melanoma
Melanoma

Lentigo (Benign)
• from age (lentigo simplex) and sun (solar lentigo)

Lentigo Maligna
• Melanoma in situ (still in epidermis)
• 30-50% progress to LMM

Lentigo Maligna Melanoma
• 90% of head/neck melanomas
• Vertically invasive
• Pigmented macule with nodule

Nodular Melanoma
• 10% of cutaneous melanoma, rare on eyelids

http://www.dermnetnz.org/lesions/melanoma.html
Melanoma

Treatment
• Wide excision with frozen section or Mohs
• Sentinel node bx: if >1mm Breslow thickness
• Full metastatic work up: if >1.5mm thick

Prognosis
• Depth <0.75 = 98% 5 year survival
• Depth > 4mm = 50% 5 year survival
Lid Lesion Mantras

When in doubt, cut it out!

Tissue is the issue!

You never regret the specimen you send to the lab!
Periocular Lesions – Tech Tips

• History
  – Time Course, change in size, discharge?
  – Pain?
  – Any biopsies done? Have reports?
  – History: other skin cancer, radiation, immunosuppression

• Appearance
  – Raised, scaly, what color, firm, soft etc

• Biopsy:
  – Shave: betadine, lido w/ epi on 30g needle 3cc syringe, 15 blade, 0.5 forceps, +/- hand held cautery
  – Excisional: above + Westcott scissors + Castro needle driver + suture (usually 6-0 fast gut)
SCC Reconstruction
Topics

• Trauma
• Tearing
• Tumors
• **Thyroid Eye Disease**
• Ptosis (and other lid malpositions)
Thyroid Eye Disease

• Autoimmune-mediated inflammatory disease of the orbit associated, to varying degrees, with a thyroid abnormality

• Affects orbital tissue including:
  – Extraocular muscles
  – Fat and connective tissue

Resulting in orbital congestion and all of its sequelae
Symptoms and Signs

- Tearing, foreign body sensation, light sensitivity, pressure, pain, double vision, blurred vision.
- Eyelid retraction – 90% (Most Common!)
- Exophthalmos – 60% -- unilateral or bilateral
  - Most common cause of proptosis in adults
- EOM restriction and double vision – 40%
- Lid fullness, edema, erythema, festoons
- Corneal erosion/ulceration from exposure keratopathy
- Optic neuropathy (5-6%) → 1/3 of those permanent vision loss despite treatment
CT scans
TED – Tech Tips

• Special Attn to:
  – History: thyroid dysfunction, medications, surgeries, radiation, recent labs, smoking
  – Symptoms: pain, double vision, lid edema worse in morning
  – Acuity: get BCVA
  – Pupils: check for APD
  – IOP in primary gaze and upgaze
  – Motility
  – Color Vision
  – Exophthalmometry
  – HVF 24-2: if not ordered ask if doc wants one
  – Is there imaging/scan to review?
So, What to Do with a TED pt?

1. Make the diagnosis
2. Provide emotional support
3. [assess activity and severity]
4. Prevent vision loss
5. Maximize comfort
6. Restore function, appearance

*Frueh pearls, from Lelli*
Surgical Management

- First: Orbital Decompression
- Then: Strabismus Surgery
- Then: Eyelid Recession
Surgical Treatments

• Orbital Decompression
  – Performed as vision saving surgery or cosmetic
  – Lateral wall, orbital floor, medial wall
  – The roof is not decompressed
  – Endonasal and transantral (maxillary sinus) endoscopic option with ENT for medial and floor.
  – Fat decompression
Lower Eyelid Recession

Lower lid retractors are attached to the inferior rectus via Lockwood’s Ligament. Changing the position of the inferior rectus will change the eyelid position.
Topics

• Trauma
• Tearing
• Tumors
• Thyroid
• Ptosis (and other lid malpositions)
Ectropion

- **Outward rotation** of the eyelid margin
- Most common cause is aging changes and eyelid laxity
- May be caused by scarring of the eyelid/cheek skin, or paralysis of the facial nerve
- Repair with horizontal eyelid shortening, “lateral tarsal strip”, or skin graft
Entropion

- **Inward rotation** of the eyelid margin
- **Involutional** - Most common cause is aging changes and lid laxity
- **Cicatricial** - caused by scarring of the conjunctiva
- Squeeze test can reveal it if intermittent
- Repair with horizontal eyelid shortening combined with eyelid retractor reinsertion or orbicularis tightening
Exposure keratopathy

• Many causes: (structural, nerve palsy)
  – Upper lid: incomplete closure, 7\textsuperscript{th} nerve, scarring,
  – Lower lid: ectropion, 7\textsuperscript{th} nerve, scarring
  – Beware of bad Bells response
  – Repair by fixing the cause. Tarsorrhaphy if severe
Tarsorrhaphy
Lid Malposition – Tech Tips

• History
  – Any reasons for scarring?
    • Stevens Johnson, trachoma, burns, cryotherapy, prior surgery including blepharoplasty, trauma
  – Symptoms?
    • Epiphora, irritation, dryness, pain

• Exam
  – Lid laxity? Corneal appearance? Scarring on conj or skin? Punctal position? Vision better with drops?
Blepharoplasty vs Ptosis (*TOE-sis*)

Dermatochalasis
- Extra skin

Steatoblepharon
- Fat prolapse

Ptosis
- Drooping of the eyelid
Dermatochalasis

Photos: Jason Liss, MD
Ptosis
Congenital Ptosis
Eyelid Level – Tech Tips

- **MRD1** – from light reflex to upper lid margin
- Try to lift the excess skin and check the lid level
- **Lid crease** – from lid margin to lid crease
- **Levator function** – lid excursion from downgaze to upgaze
- Neutralize the brow for all measurements
Chemodenervation (Botox) and Facial Fillers