


On behalf of Vision Expo, we sincerely thank you for being with us this year.

Vision Expo Has Gone Green!

We have eliminated all paper session evaluation forms. Please be sure to complete your electronic session evaluations online when you login to request your CE Letter for each course you attended! Your feedback is important to us as our Conference Advisory Board considers content and speakers for future meetings to provide you with the best education possible.




1

Disclosure Slide

- Dr Bozung, faculty for this educational event, has no relevant financial disclosures to disclose.

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Trauma Rounds



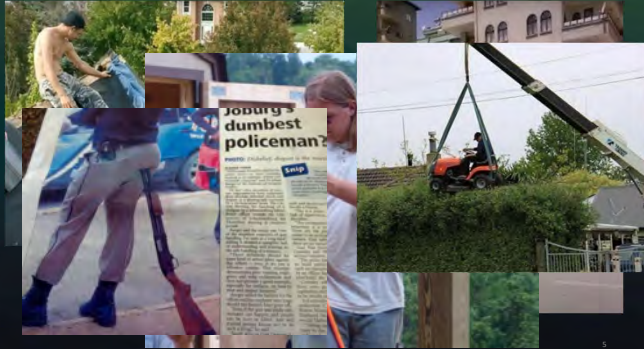
Alison Bozung, OD, FAAO
Bascom Palmer Eye Institute | Miami, FL

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Ocular Trauma


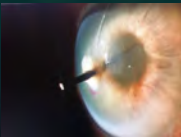

- Men >> women
- 20-50 years of age
- Each year ~2.4 million eye injuries occur in the United States
- Occupational Safety and Health Administration (OSHA) estimates workplace eye injuries cost \$300 million a year in lost productivity, medical treatment, and worker compensation.
- Ophthalmic trauma can happen to anyone – anytime!

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Mechanisms of Ocular Trauma

Blunt Trauma	Sharp Object	Projectile
		
Rapid IOP increase and equatorial expansion.	Full or partial thickness laceration. Penetrating or perforating.	High speed, small sized particles may penetrate eye wall.

<https://www.aao.org/topic-detail/trauma-europe-2> <https://www.eyeworld.org/article-taking-a-team-approach-to-ocular-trauma>

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Obtain a thorough history

- What happened and when?
- Patient occupation (if occurred at work)?
- Any ophthalmic surgeries in the past?
- Prior status of the eye?

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Complete a thorough examination

- Vision
- Pupils
- Extraocular motilities
- Intraocular pressure
- Slit lamp/anterior segment evaluation
- Fundus

• Caution in open globes – okay to defer certain testing

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- Periorbital Trauma
- Anterior Segment Trauma
- Posterior Segment Trauma
- Globe Trauma



Creator: Lauren Sharrell / Design Post / Credit: Getty Images/George Fiedler

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Eyelid lacerations

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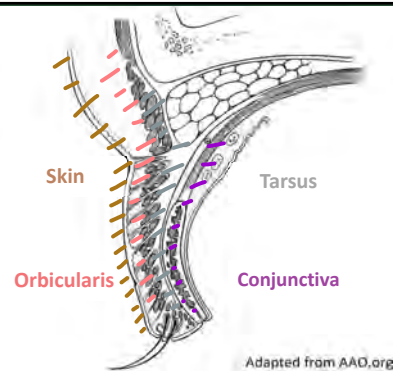


What if this walked into your office?

- We won't be treating this, but..
- How would you document?
- When should this patient have surgery?

Andrew Rong, MD
Instagram: @orbital_ophthalmic_images

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Anterior lamella

Posterior lamella

Labels: Skin, Tarsus, Conjunctiva, Orbicularis

Adapted from AAO.org

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Etiology

- Often sharp, penetrating objects
 - Dog bite, glass from car accident, fall

Evaluation

- How deep is the laceration?
 - Partial vs full thickness
- What structures are involved?
 - Lid margin
 - Canaliculus
 - Orbital septum



Instagram: @orbital_ophthalmic_images 13

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No sutures required

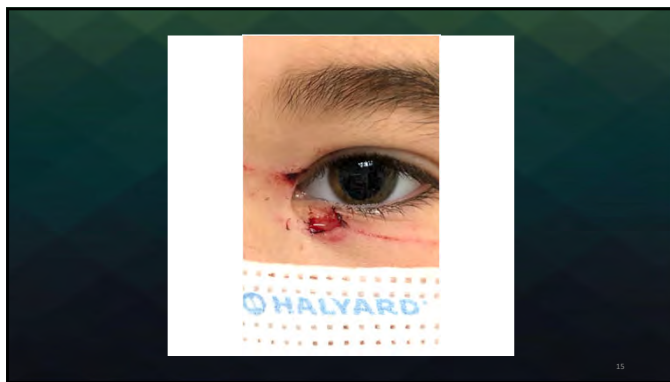
1. Superficial
2. Involve <25% lid length
3. Follow skin tension lines

- Management
 - Clean/irrigate the wound
 - +/- topical antibiotic
 - Proper closure
 - Butterfly bandage or adhesive skin strip (*Steri-Strip®*)
 - Glue / cyanoacrylate (*Dermabond®*)

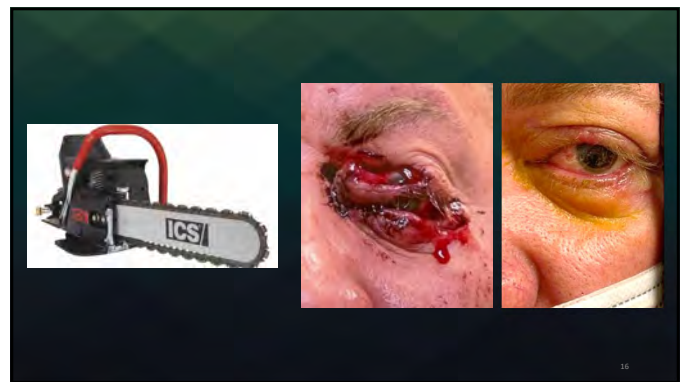


lacerationrepair.com 14

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What do you think?

- 38 year old male
- Presents after being punched in the left eye during an altercation
- Complains of double vision, eye pain, redness, and loss of vision
- Past medical/ocular history unremarkable

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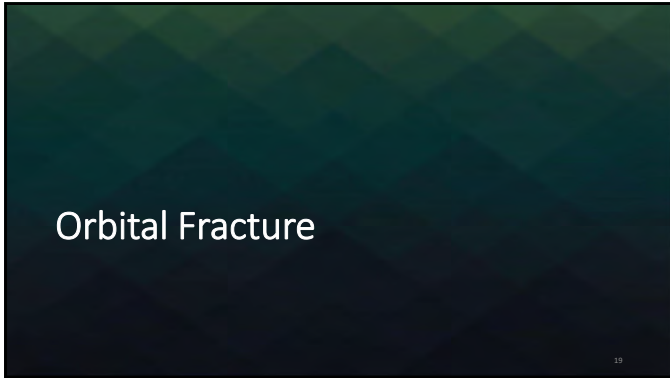
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Right eye: 20/20, 21mmHg
Left eye: 20/80, 23mmHg

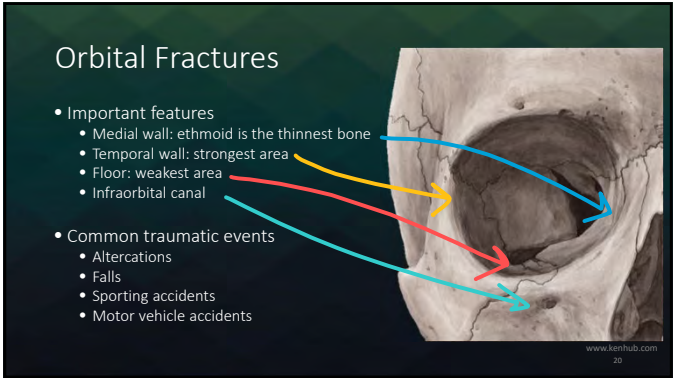


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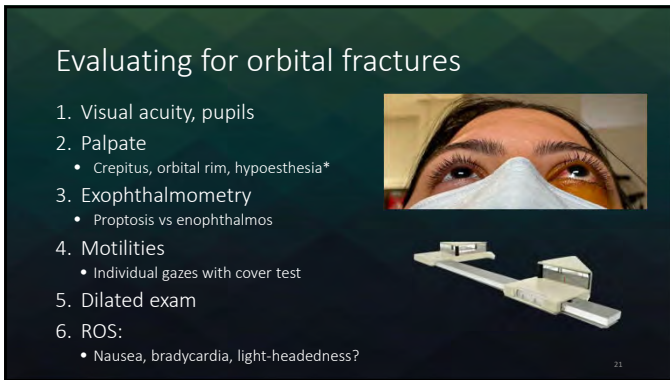
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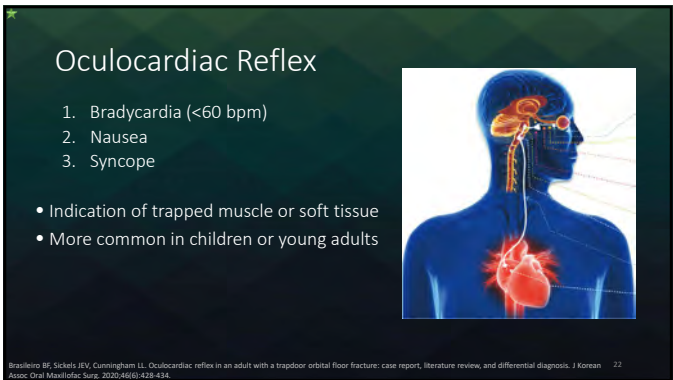
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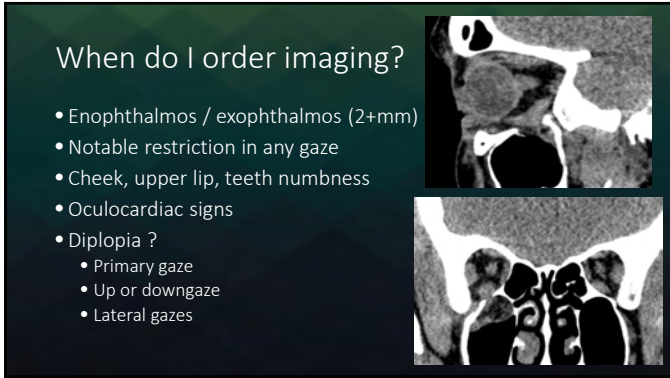
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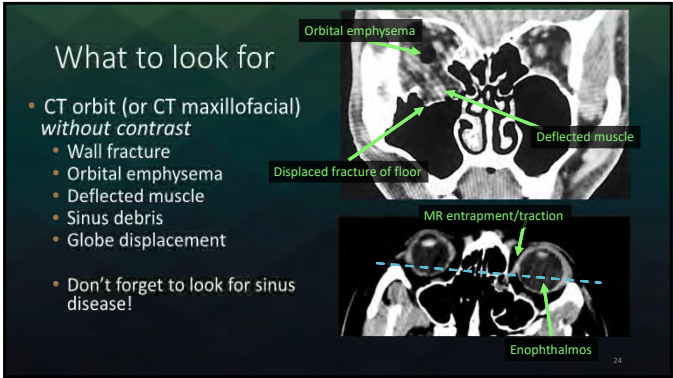
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Management of Orbital Fractures

- Ice packs to periorbital region
- Advise them to be a mouth sneezer (don't hold it in!)
- Nasal decongestant x 1 week
 - Phenylephrine HCl
 - Sudafed®
 - Oxymetazoline HCl
 - Vicks Sinex®
 - Afrin®

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Role of antibiotics in orbital fracture?

- Self reported prescribing patterns¹
 - 70% ED physicians
 - 52% ENT physicians
 - 42% ophthalmologists

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Role of antibiotics in orbital fracture?

- Simon et al¹
 - 4 out of 497 patients developed infection (0.8%)*
- Reiss et al²
 - 194 patients, 0 infections. 12% no antibiotics, 79% oral antibiotics
 - NNT: 75, NNH: 198
 - 5-7 day course as effective as 10-14 day course
- Esce et al³
 - 154 patients: 0 infections, 89% no antibiotics
- If you DO prescribe...
 - Cephalexin or penicillin derivative
 - Active sinus disease and immunocompromised individuals
 - Short course of antibiotic is reasonable

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When do I refer?

Orbital fractures are repaired emergently when..

- Muscle entrapment
- Oculocardiac reflex

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Back to our patient.. CT ordered. Now what?

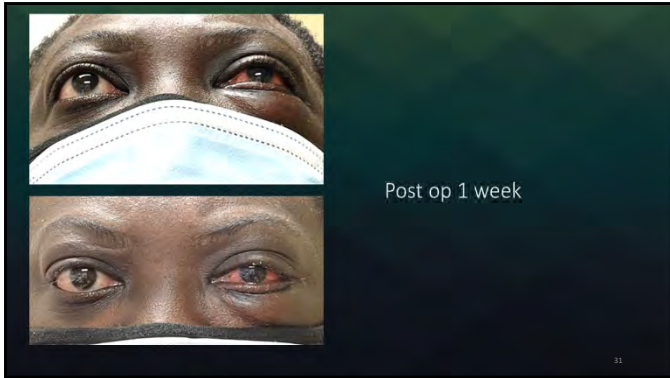
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3D Orbital floor

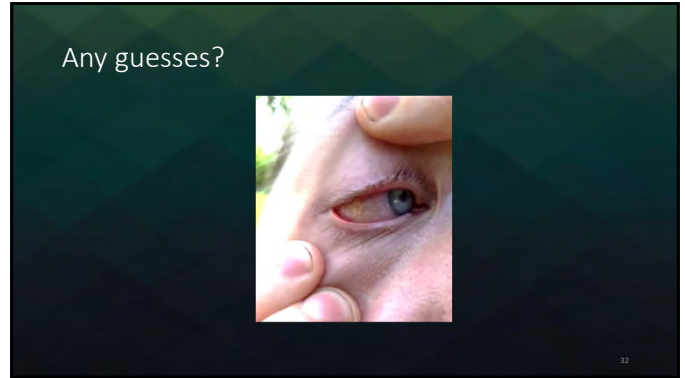
Headsets designed using CT scans allow us to approximate the anatomy of the orbital floor. Headsets are available in either left or right eye. Headsets are available in either left or right eye. Headsets are available in either left or right eye.

Model	A	B	C	D
Large L&R	1.5mm	1.5mm	1.5mm	1.5mm
Small L&R	1.5mm	1.5mm	1.5mm	1.5mm

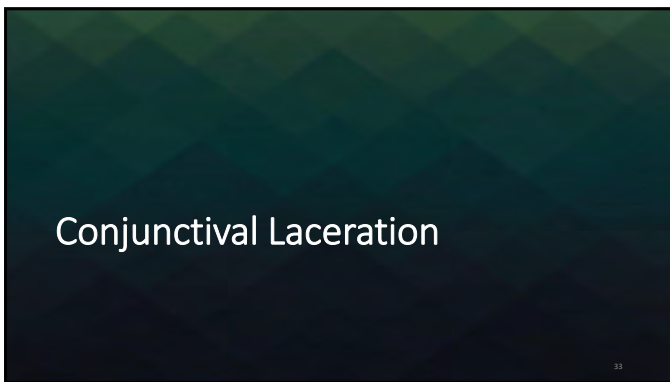
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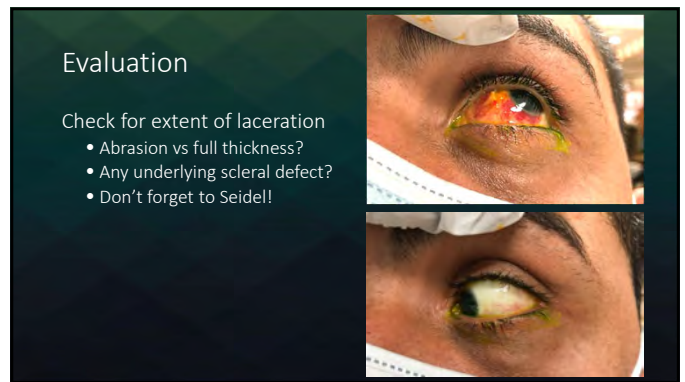
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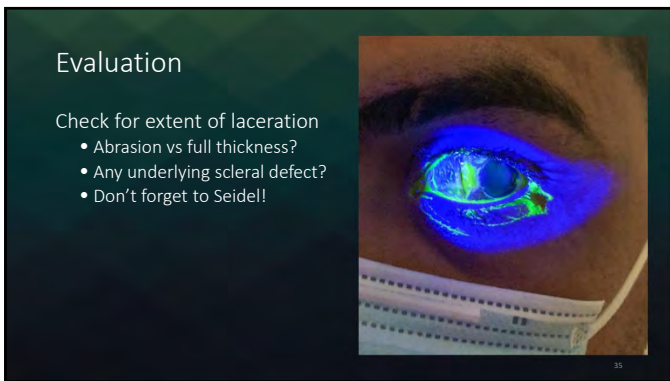
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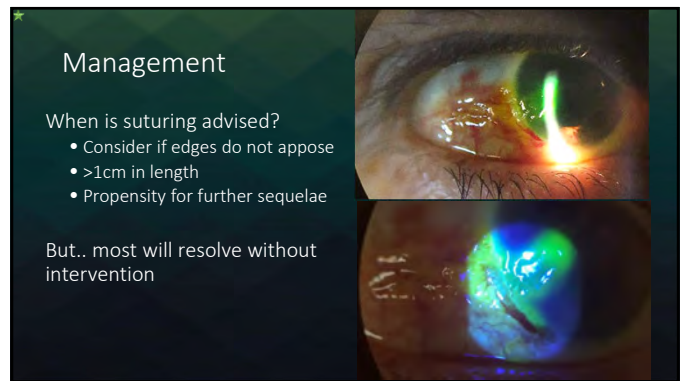
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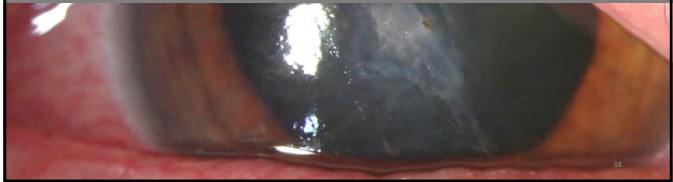
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Corneal Abrasions, Lacerations, and Foreign Bodies

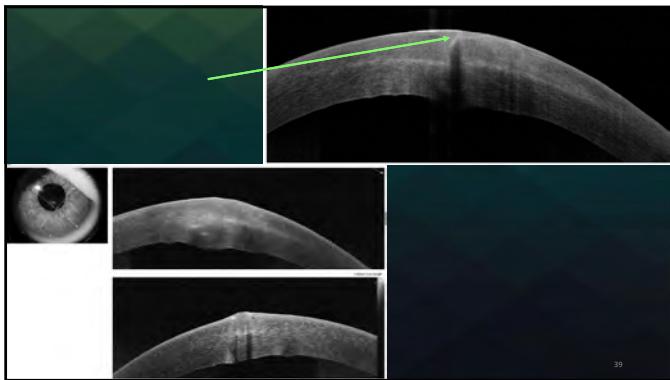
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What do you think?

- 52yo Hispanic male
- Tree branch injury to left eye
- Eye pain, photophobia, blurred vision



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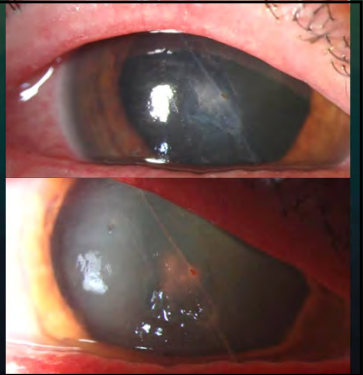
Evaluation

Assess depth of defect

- Use thin optic section
- Anterior segment OCT imaging

Tissue involvement

- Epithelium only = abrasion
- Partial thickness laceration
- Full thickness laceration
 - Check Seidel!!
 - Could be provocative positive



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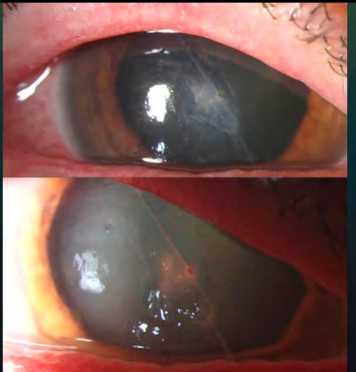
Evaluation

What we expect for STERILE defect

- Moderate to high pain
- +/- can have mild AC reaction
- +/- corneal edema

Higher chance of NON-STERILE defect

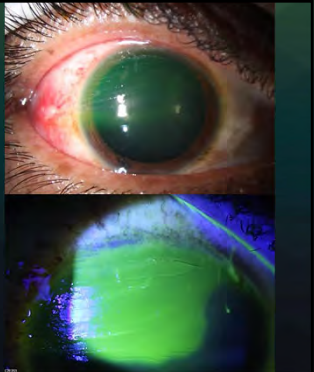
- Any infiltrate
- Any foreign material
- Severe AC reaction or hypopyon
- "Dirty" mechanism



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Management

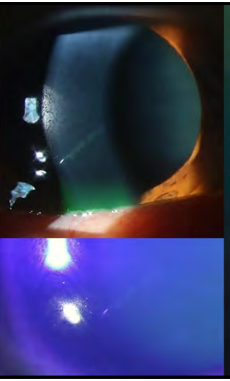
- Debride loose epithelium in abrasion
- Broad spectrum antibiotic
- Consider bandage contact lens
 - Large epithelial defect
 - Good reliability
 - No vegetative matter
 - No infiltrate
- Partial K laceration
 - Seidel!!!
 - Consider BCL if sterile
 - Couple with night shield



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Corneal foreign body

- Second most common form of ocular trauma
- FBs should almost always be removed
- Inert, deep, small FBs are left occasionally...




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79 yo male History of bee sting



Courtesy of Nimesh Patel, MD & Sonia Yoo, MD

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Courtesy of Nimesh Patel, MD & Sonia Yoo, MD

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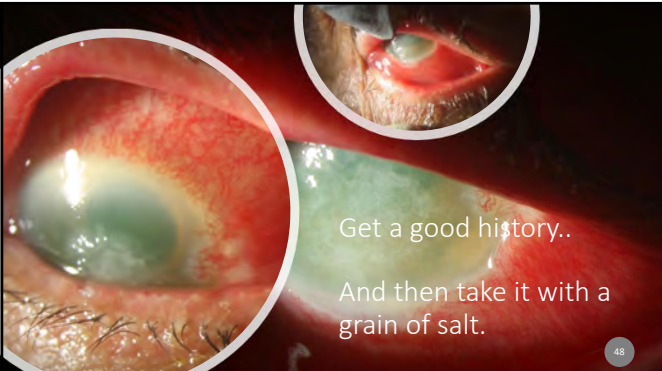


2009!

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Chemical Burns

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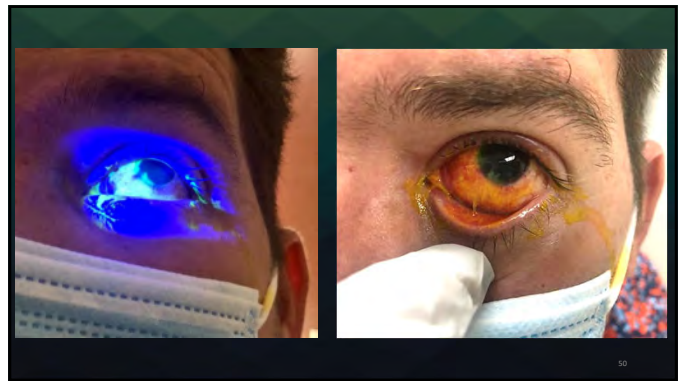


Get a good history..
And then take it with a grain of salt.

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Chemical burn

- 36,000 ocular chemical burns annually in US¹
- Men > Women
- Most at risk age group?
 - 20 to 29 year-olds**
- Alkaline (54%) > Acid (46%)¹
- Cause for loss of workdays, loss of productivity, increased administrative and medical care costs, and loss of visual acuity

Haring RS, Sheffield JD, Channa R, Cannon JK, Schneider EB. Epidemiologic Trends of Chemical Ocular Burns in the United States. JAMA Ophthalmol. 2016;134(10):1115-1124. 51

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A true ocular emergency!

Alkaline (pH > 10)

- Cement, cleaners, bleach, ammonia, fertilizer
- Alkaline burns are more common and often worse

Acid (pH < 4)

- Sulfuric, hydrochloric, hydrofluoric, battery acid

Teach your staff how to triage

- Over the phone AND in person

Haring RS, Sheffield JD, Channa R, Cannon JK, Schneider EB. Epidemiologic Trends of Chemical Ocular Burns in the United States. JAMA Ophthalmol. 2016;134(10):1115-1124. 52

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At Home

- Have patient flush with copious clean water

On Arrival

- Check pH!
- Irrigate with sterile water, sterile balanced saline solution, or amphoteric solution
 - Amphoteric solutions may be BEST¹
- Depending on injury, may need multiple rounds
 - Wait 5-10 minutes to obtain accurate pH

Examination

- Classification systems helpful to guide management

1. Lewis CJ, Al-Mousawi A, Jha A, Allison KP. Is it time for a change in the approach to chemical burns? The role of Diphoterine® in the management of cutaneous and ocular chemical injuries. J Plast Reconstr Aesthet Surg. 2017;70(5):563-567. 53

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Clinical findings

- Conjunctival injection
- Corneal haze
- Conjunctival ischemia*
- Chemosis
- Epithelial defect
- Elevated IOP

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Roper-Hall Classification Method for Ocular Chemical Burns

Grade	Prognosis	Cornea	Conjunctiva/Limbus
I	Good	Corneal epithelial damage	No limbal ischemia
II	Good	Corneal haze, iris details visible	<1/3 limbal ischemia
III	Guarded	Total epithelial loss, stromal haze, iris details obscured	1/3 to 1/2 limbal ischemia
IV	Poor	Cornea opaque, iris and pupil obscured	>1/2 limbal ischemia

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Grade	Treatment	Follow Up
I	<ul style="list-style-type: none"> • Prednisolone acetate 1% QID • Antibiotic drop or ointment QID • Cycloplegic BID • Frequent non-preserved ATs 	Every 2-3 days Surface check IOP

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Grade	Treatment	Follow Up
II	<ul style="list-style-type: none"> • Prednisolone acetate 1% Q1-2h • Progestational steroid (i.e. medroxyprogesterone 1%) may be used after 7-10 days 	Every 1-2 days Surface check IOP
III	<ul style="list-style-type: none"> • Antibiotic drop QID • Cycloplegic BID 	
IV	<ul style="list-style-type: none"> • PO Doxycycline 100mg BID • PO Vitamin C 2g BID • Consider amniotic membrane 	

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Complications

- Dry eye disease
- Cicatricial changes of lids
- Reduced goblet cell function
- Stem cell deficiency
- Corneal scarring
- Neurotrophic keratitis

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Hyphema

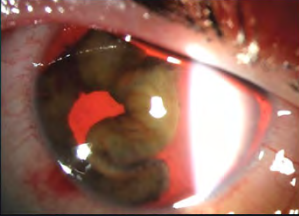
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How are these different?

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Evaluation in hyphema

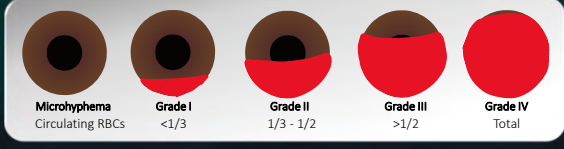
- Other signs of trauma?
 - Iridodialysis
 - Iris sphincter tear
- Does the trauma fit the bill?
 - Look for neovascularization



Nimesh Patel, MD
Instagram: @nemo_patel_md

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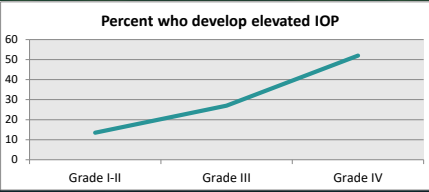
Evaluation



1. Walton W, Von Hagen S, Grigorian R, Zarbin M. Management of traumatic hyphema. Surv Ophthalmol. 2002;47(4):297-334. 2. Coles WH. Traumatic hyphema: an analysis of 235 cases. South Med J. 1968;61(10):813-6.

62

Percent who develop elevated IOP



- IOP can be elevated in ~30% of all hyphemas¹
- 50% chance of elevated IOP after a rebleed
 - Usually occur within the first week²

1. Walton W, Von Hagen S, Grigorian R, Zarbin M. Management of traumatic hyphema. Surv Ophthalmol. 2002;47(4):297-334. 2. Coles WH. Traumatic hyphema: an analysis of 235 cases. South Med J. 1968;61(10):813-6.

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Management

- Topical steroids Q2-4h
 - Slow taper
- Topical cycloplegic BID-TID
 - Stop when AC nearly quiet
- Elevated IOP?
 - Topical: Aqueous suppressants
 - Oral: Acetazolamide, methazolamide*

* Sickle Cell?

- Trait OR Disease!
- Test patients of African or Middle-Eastern descent
- AVOID acetazolamide

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Management


- Quiet ambulation
- Head of bed elevated and shield at night
- No need to stop anticoagulants or antiplatelet medications
- Don't forget to follow for glaucoma!
- Angle recession in up to 85% of patients with hyphema¹
- Higher risk of glaucoma²
 - Angle recession $\geq 180^\circ$
 - More pigment in TM
 - Higher initial IOP

1. Bhandari S, Gnanasekaran DV, Dasgupta S. Pathogenesis, epidemiology and management of angle recession glaucoma. J Glaucoma. 2015;24(11):777-782. 2. Zarbin M. Anterior chamber angle recession: a study of the aetiology. Br J Ophthalmol. 1968;51(11):712-4.

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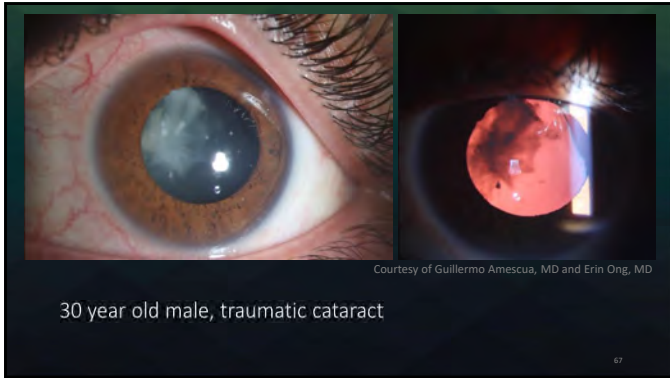
Who needs surgery?

- Uncontrolled IOP
 - > 60mmHg x 2 days
 - > 35mmHg x 1 week
 - > 25mmHg x 1 day in Sickle cell (+)
- Total hyphema > 5 days
- Corneal blood staining
 - Risk higher when IOP >25mmHg 6+ days



Eyeyounds.org

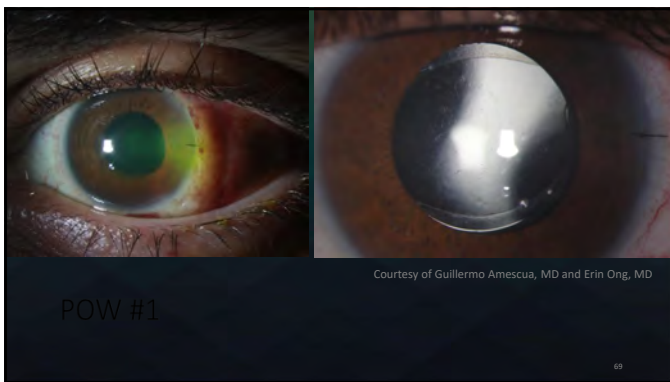
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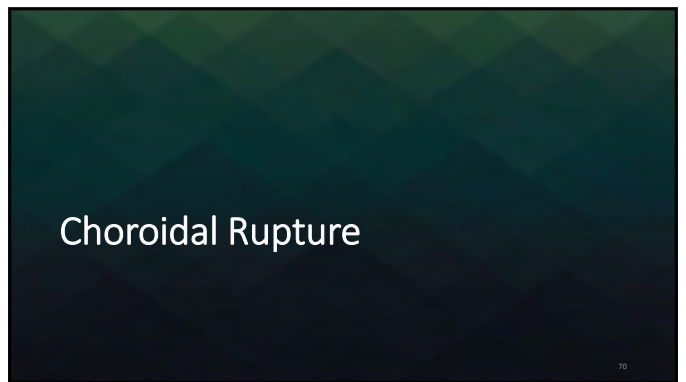
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Choroidal Rupture

- Break in choroid, Bruch's membrane, and RPE
- Direct or indirect trauma
 - Direct – Form peripheral rupture lines parallel to and near the ora
 - Indirect – Form around the nerve.
- Etiologies
 - Trauma
 - Tumor
 - Angioid streaks

Choroidal rupture in angioid streaks

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Signs of choroidal rupture

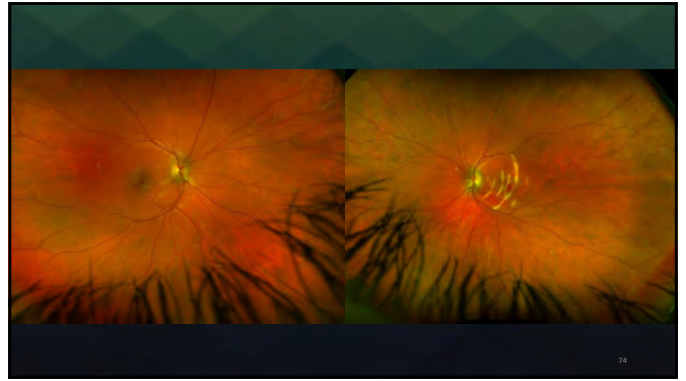
- Multi-layered deep red or purple hemorrhage

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Signs of choroidal rupture

- Multi-layered deep red or purple hemorrhage
- Concentric yellow or white subretinal streaks
 - Often located near optic nerve

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Complications

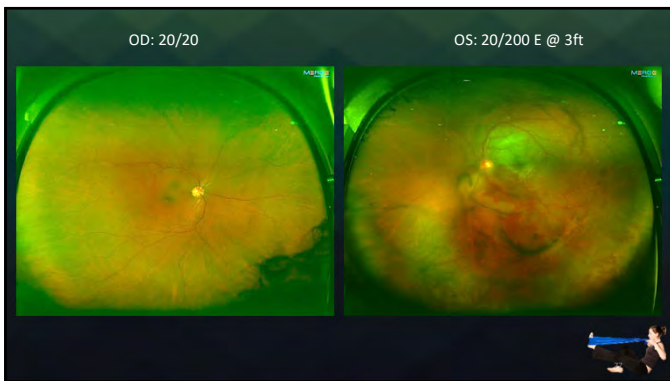
- Choroidal neovascular membranes more likely¹:
 - Older age
 - Macular location
 - Longer length of rupture
- Treatment
 - Careful observation for SRF
 - Anti-VEGF injections → when vision threatening
- Outcome depends on location

Injections were not indicated in either case of choroidal rupture picture below in (top) Trauma or (bottom) Angioid streaks

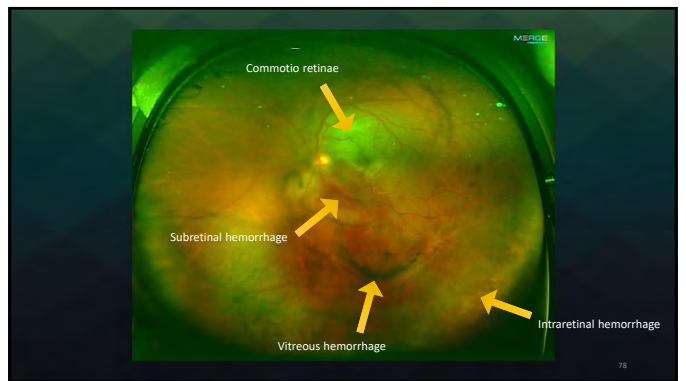
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Comotio Retinae

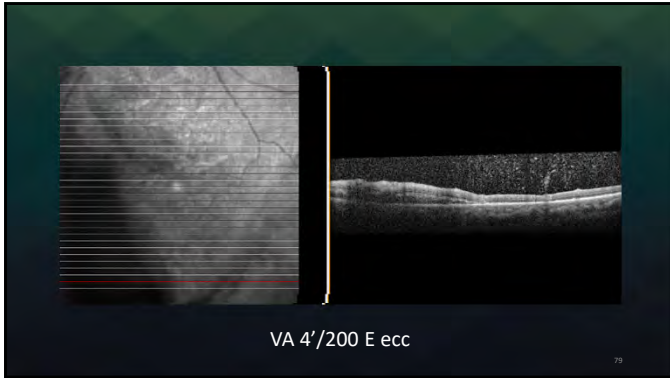
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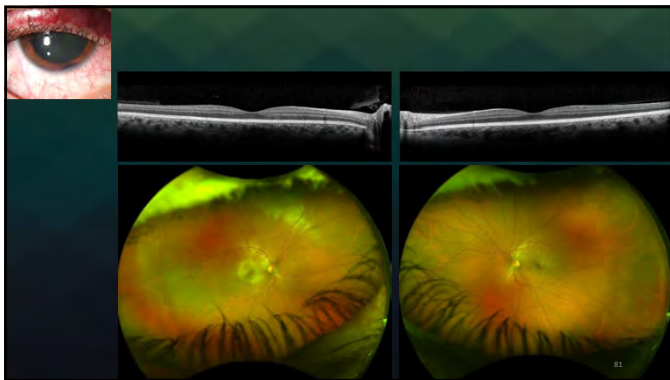


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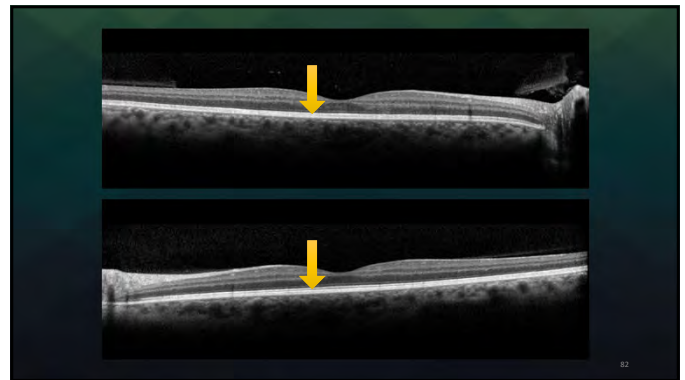
Commotio Retinae

- Outer retinal (photoreceptor/RPE) damage
- Clinical features
 - Confluent area(s) of retinal whitening
 - May be in posterior pole or periphery
 - Vision may be reduced or “dimmed”
 - Transient appearance

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Management of commotio retinae

- Gradual resolution of whitening within ~1 week
- Vision may gradually improve over 1-6 months
- There is NO widely used treatment to improve outcomes
- About **1 in 4 patients** with macular involvement have residual vision deficit with a VA of 20/30 or worse¹

Blanch RJ, Good PA, Shah P, Bishop JRB, Logan A, Scott RAH. Visual outcomes after blunt ocular trauma. *Ophthalmology*. 2013;120(6):1588-1591.

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Purtscher’s Retinopathy

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Purtscher's Retinopathy

- Cotton wool spots, hemorrhage, and "Purtscher flecken" in the posterior pole, predominantly around the optic disc.
- Etiology
 - Head trauma
 - Compressive chest injury
 - "Purtscher-like retinopathy" → Long bone fracture, vasculitis, pancreatitis

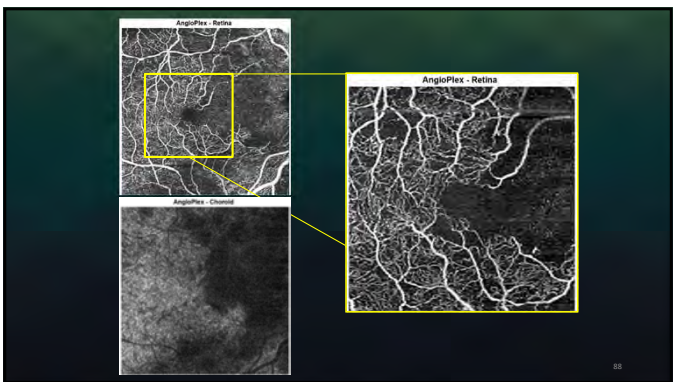
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Follow Up: 1 week

Initial Visit
CF

1 week
20/300

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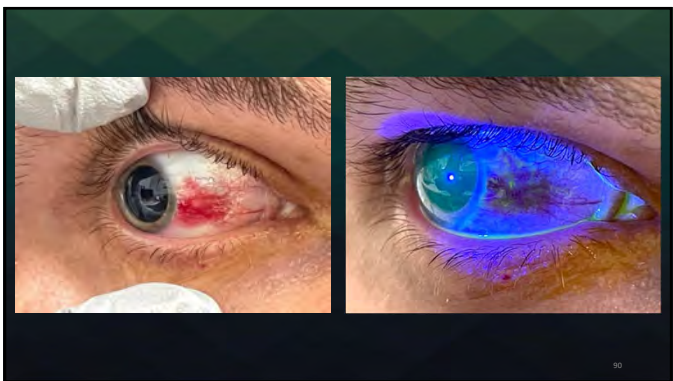


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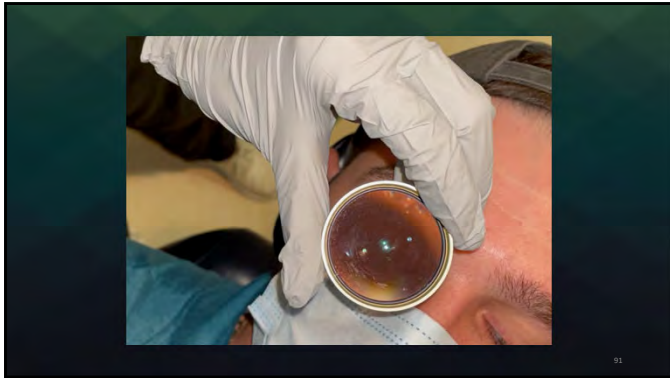
Purtscher's Retinopathy: in summary

- Vision loss 0-48 hours after injury
- Treatment options limited
 - High dose IV steroids have been used
 - Benefit is not statistically significant¹
 - There is no standard of care
- Prognosis
 - Guarded
 - Based on initial VA

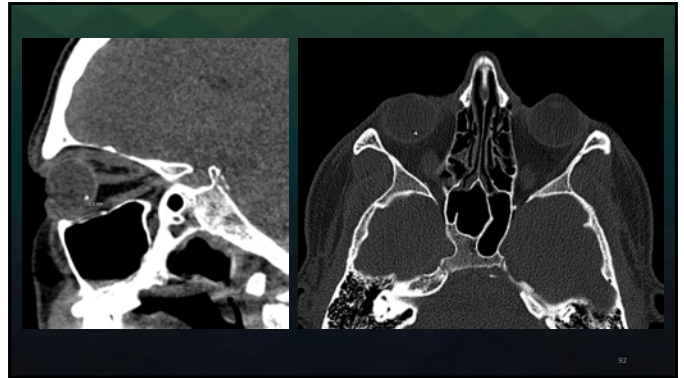
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Open Globes and Intraocular Foreign Bodies

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- ### What is considered an Open Globe?
- Full thickness violation of the wall of the eye
 - Cornea, sclera, and/or limbus
 - Blunt trauma
 - Rupture at site of "weakness"
 - Limbus
 - Posterior to rectus insertion
 - Prior surgical incision
 - Sharp, high velocity, projectile objects
 - Penetrating vs perforating injuries
 - Concern for intraocular foreign body (IOFB)

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Evidence of open globe

- Penetrating eyelid injury

Michelle Maeng, MD

Eye vs Chainsaw

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Evidence of open globe

- Penetrating eyelid injury
- Extensive subconj hemorrhage
- Shallow or flat anterior chamber
- Hyphema
- Irregular pupil (especially peaked!)
- Hypotony
- Intraocular foreign body (IOFB)
- Vitreous hemorrhage

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Vitreous hemorrhage?

- In the setting of ocular trauma and "open globe" concern, ultrasonography may still be indicated – but should be done only with extreme caution

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What should YOU do in office?

- Considered an emergency
- Protect the globe: place a hard shield
- Instruct not to touch or rub eye
- Have patient stand or sit upright
- No food or fluids
- Up to date on tetanus?
 - Will be done at referral site, typically

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What happens next?

- Examination**
 - Open globe confirmed/suspected
- Imaging**
 - CT orbit 1mm cuts w/wo contrast
- Decrease risk of infection**
 - Assess tetanus status
 - Systemic antibiotics (PO levofloxacin vs IV)
 - Topical vancomycin or moxifloxacin
- Reduce collateral damage**
 - Start antiemetic
 - Fox shield + bed rest (bathroom privileges)
- Prepare for surgery**
 - Medical clearance for anesthesia
 - NPO (6+ hours)
- Surgery**
 - Goal is to close the globe and remove any IOFB

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What happens next?

- Globe repairs often require multiple steps
- Outcome ultimately depends on..
 - Mechanism of injury
 - Severity of initial injury
 - Time to treatment/evaluation
 - Patient follow up and compliance

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Ocular Trauma Score (2002)

- Helpful in counseling patient
- Can aid in decision-making

Calculation of the OTS						
Initial visual factor			Raw points			
A. Initial visual acuity category			NIP=65			
			LP to 184=70			
			1/200 to 19/200=80			
			10/200 to 20/50=90			
			≥20/40=100			
B. Globe rupture			-23			
C. Endophthalmitis			-17			
D. Penetrating injury			-14			
E. Retinal detachment			-11			
F. Affluent papillary defect			-10			
Probability of visual outcome						
Raw score sum	OTS-Score category	NIP (%)	LP (%)	1/200-19/200 (%)	20/200-20/50 (%)	≥20/40 (%)
0-44	1	73	17	7	2	1
45-65	2	28	26	18	13	15
66-80	3	2	11	15	28	44
81-91	4	1	2	2	21	74
92-100	5	0	1	2	5	92

OTS based on treatment: LP, Alpha paraneurotic NIP, no built correction; OTS, Ocular Trauma Score.

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Thank you!

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Young male with decreased vision in the left eye.

One month prior, he sustained a corneal abrasion at construction site that was treated with topical antibiotics.

Case courtesy of Nimesh Patel MD & Diana Laura MD

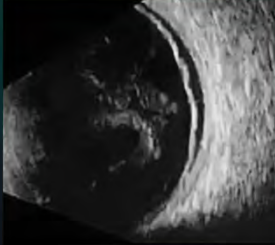
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Corneal scar

- 20/20 OD, 20/200 OS
- AC quiet / formed
- Vitreous haze
- Poor view posteriorly

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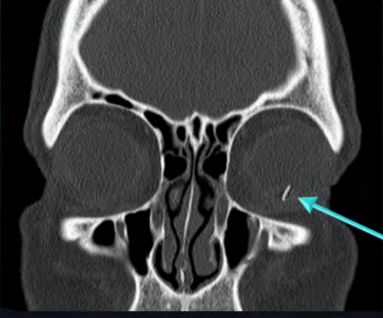
- B scan suggestive of retinal detachment

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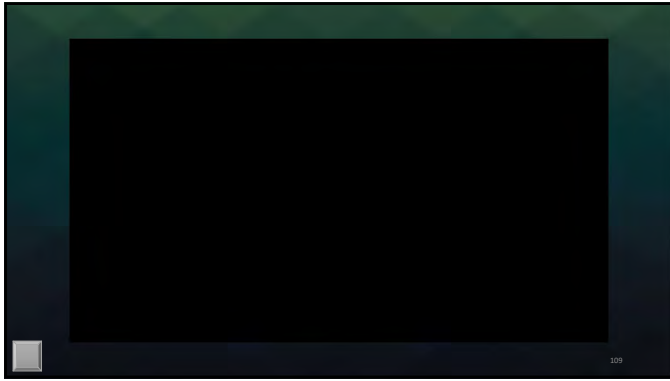
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IOFB

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