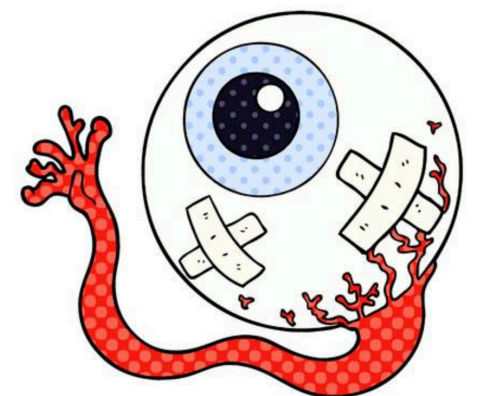


Traumatic Chorioretinopathy

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Retina Fellow
Charles Retina Institute



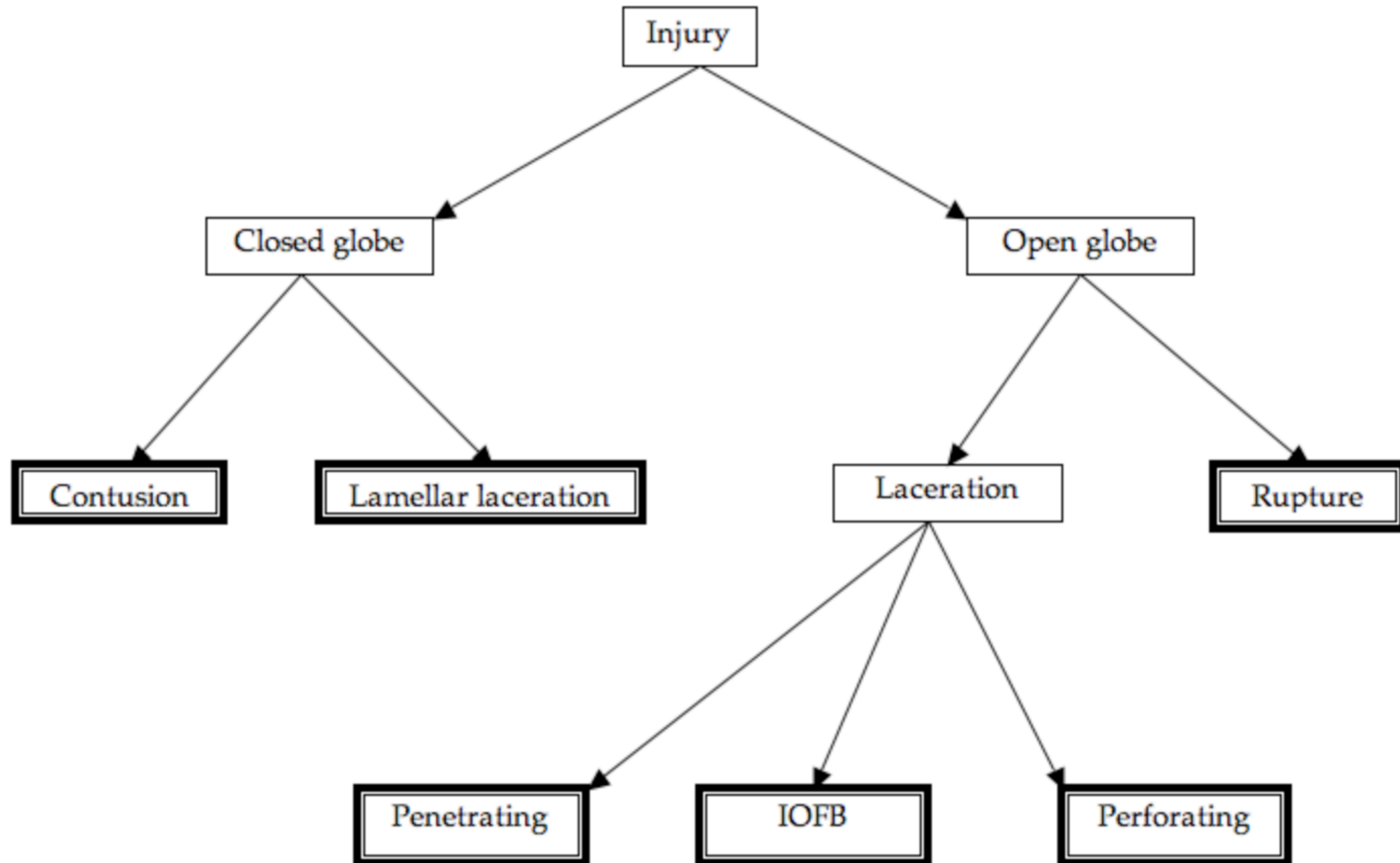
Introduction

- The eye care provider must be familiar with the wide variety of posterior segment manifestations of trauma to perform appropriate evaluation and treatment.
- The prevention of ocular trauma is of equal importance.
 - Encourage the use of protective eyewear in the industrial workplace and during athletic events
 - Prescribe polycarbonate spectacle lenses in the trauma patient with an intact fellow eye

Epidemiology

- In the US in 2001, an estimated 1 990 872 (6.98 per 1000 population) individuals experienced an eye injury requiring treatment.
- Most eye injuries are treated in ER (50.7%), followed by ***private offices (38.7%)***, and outpatient (8.1%) and inpatient (2.5%) facilities.
- Eye injury rates were highest among individuals in their ***20s, males, and whites.***

Birmingham Eye Trauma Terminology System (BETTS)



Traumatic Chorioretinopathy

DIRECT OCULAR INJURY (OPEN GLOBE)

- Penetrating or Perforating Ocular Injury
- Intraocular Foreign Body

DIRECT OCULAR INJURY (CLOSED GLOBE)

- Commotio Retinae
- Traumatic Retinal Pigment Epitheliopathy
- Traumatic Macular Hole
- Choroidal Rupture
- Traumatic Retinal Breaks and Detachments
- Chorioretinitis Sclopetaria
- Optic Nerve Avulsion

INDIRECT OCULAR INJURY

- Valsalva Retinopathy
- Purtscher Retinopathy
- Terson Syndrome
- Shaken Baby Syndrome
- Solar and/or Laser-Induced Retinopathy

DIRECT OCULAR INJURY (OPEN GLOBE)

Ruptured Globe

- Pain, decrease vision, loss of fluid from eye. Hx of trauma or fall.
- Full-thickness scleral or corneal laceration
- Diffuse chemosis or subconjunctival hemorrhage suggest occult scleral rupture.
- Deep or shallow AC vs fellow eye, peaked or irregular pupil, iris TID, lens material or vitreous in AC, new cataract, limited EOM
- IOP usually low, but normal or high does not r/o a rupture.



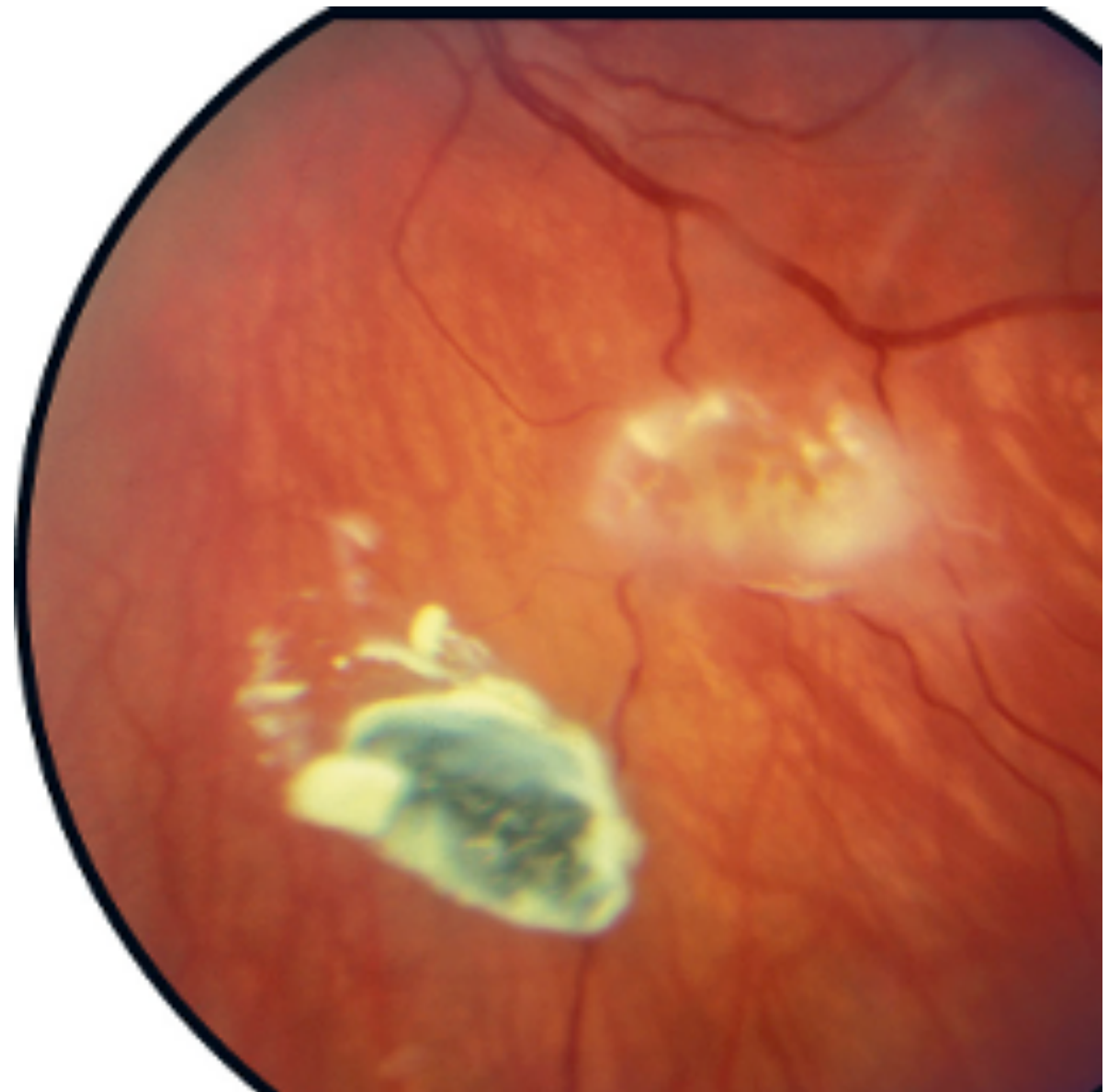
Ruptured Globe

- Once the diagnosis of a REG is made, further examination should be deferred until the time of surgery to avoid pressure on globe and risking extrusion of intraocular contents.
- Place a shield, NO patch.
- Send to ER, keep NPO, restrict activity
- CT of orbit 1mm section to r/o IOFB (MRI is contraindicated)
- Systemic broad spectrum antibiotics, tetanus prophylaxis
- Surgical repair ASAP



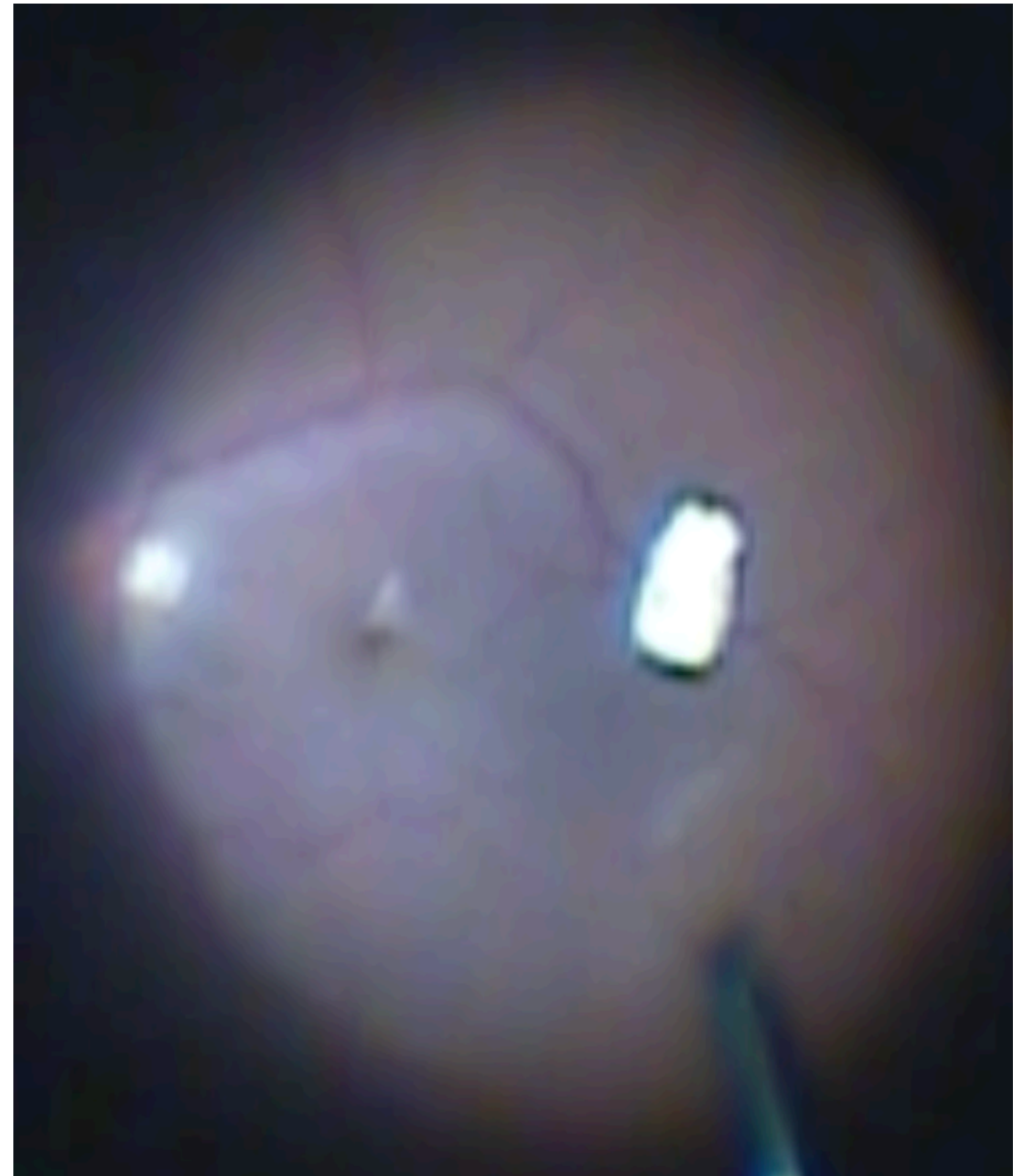
Intraocular Foreign Body

- Pain, decrease vision or asymptomatic; suggestive hx (hammering metal)
- FB may cause an inflammatory reaction (ex. magnetic- iron; nonmagnetic- copper).
- Most bb and gunshot pellets are 80-90% lead, 10-20% iron
- FB may be inert (silver, lead, glass). Even inert FB can be toxic because of a coating or chemical additive.
- Long standing iron IOFB may cause siderosis



Intraocular Foreign Body

- Hx: composition of FB.
- Exam: Localize site of perforation and detect FB. Check A/C, iris (embedded FB or TID), lens disruption or cataract, DFE
- CT of orbit 1mm section- best way to r/o metallic FB. MRI is contraindicated. B-scan, UBM.
- Treatment: surgical removal
- Chronic FB, remove if severe recurrent inflammation, affecting visual axis, or causing siderosis.



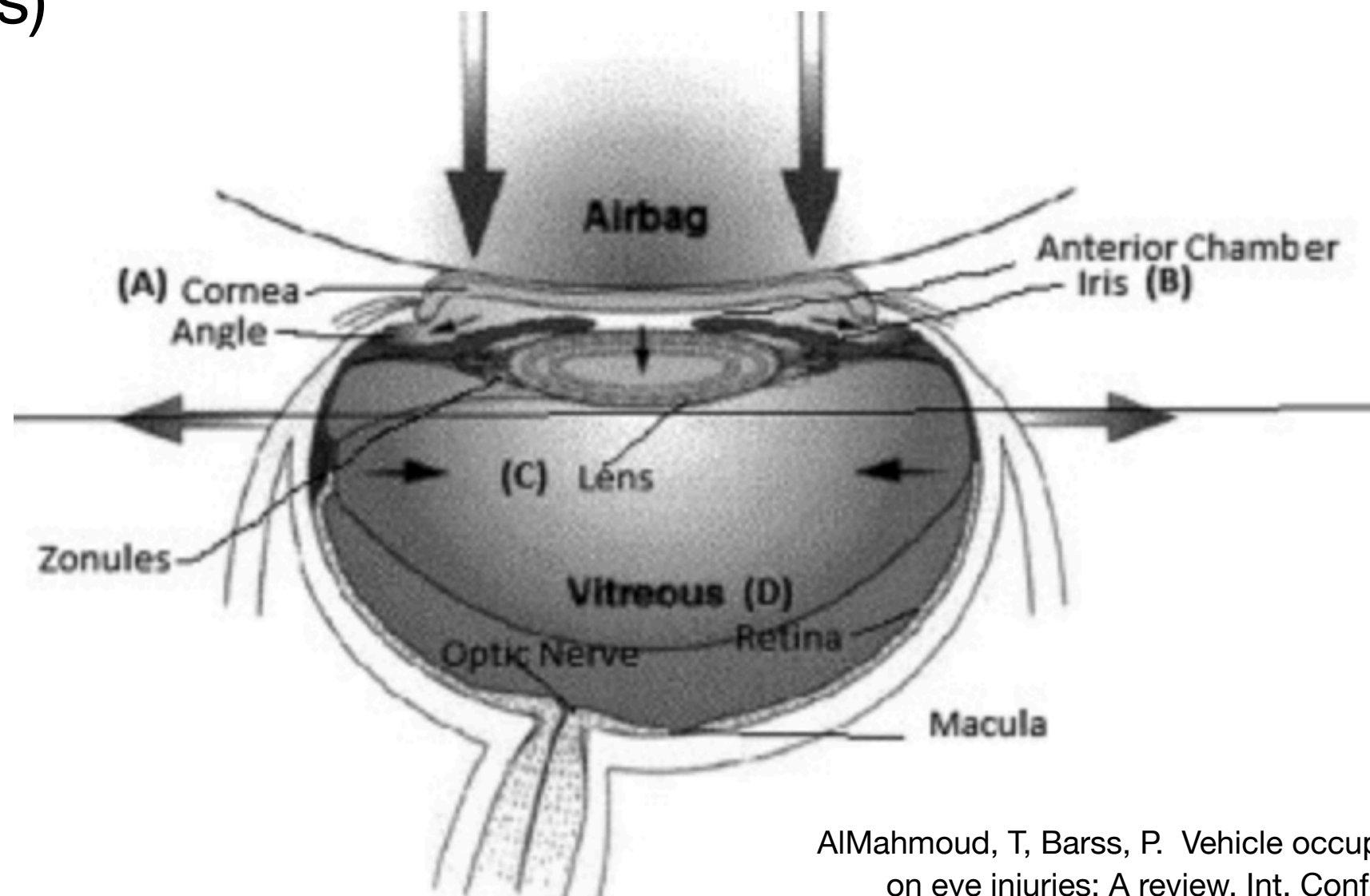
DIRECT OCULAR INJURY (CLOSED GLOBE)

Pathogenesis of posterior segment involvement from blunt ocular trauma:

- ***Coup injury:*** damage at the site of impact (sclopetaria)
- ***Contrecoup injury:*** damage occurs at tissue interfaces opposite the site of impact (commotio, choroidal rupture)

Pathogenesis of posterior segment involvement from blunt ocular trauma:

Direct ocular compression: Anteroposterior compression results in equatorial stretching (vitreous base avulsion, retinal dialysis)



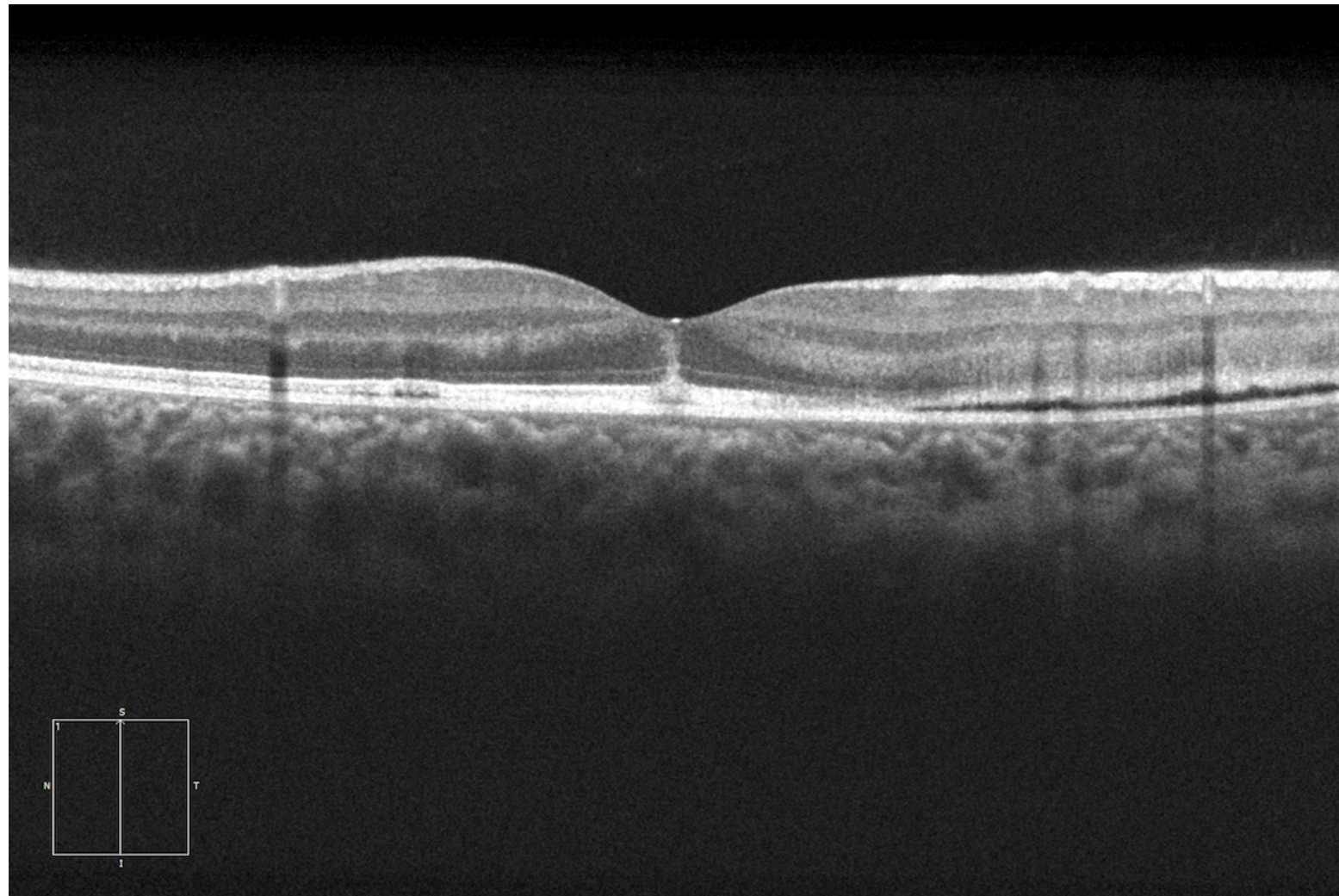
AlMahmoud, T, Barss, P. Vehicle occupant restraint systems impact on eye injuries: A review. Int. Conference Trauma Management, Critical Care and Prevention, United Arab Emirates. 2009.

Commotio Retinae

- Decrease VA or asymptomatic
- Confluent area of retinal whitening.
- Berlin edema when occurring in the posterior pole.
- Blunt trauma to globe causes shock waves which lead to ***disruption of photoreceptor outer segments and intracellular edema*** of RPE.
- DDx: BRAO, WWP
- If fovea involved, may have chronic visual impairment.
- No treatment

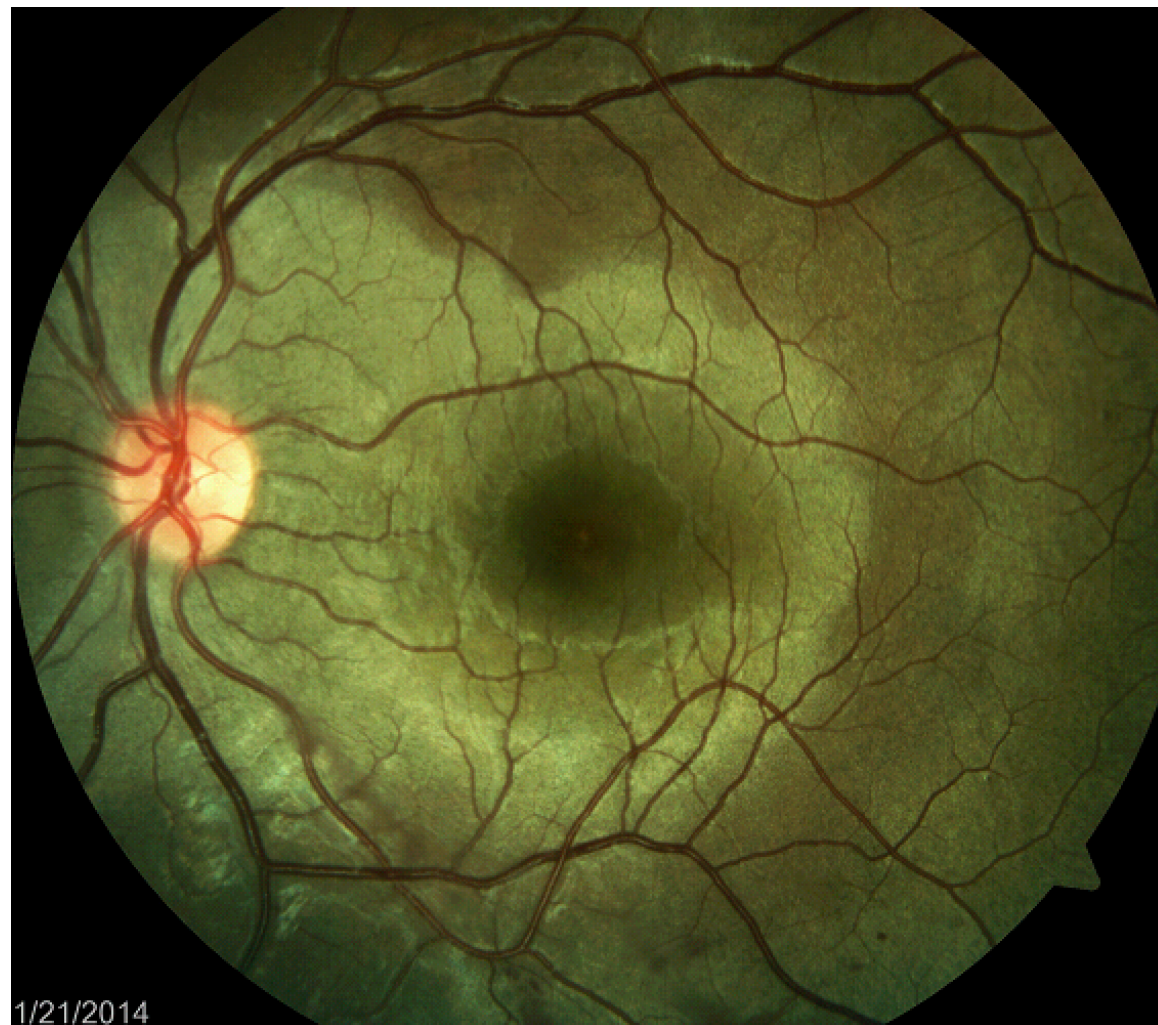


Commotio Retinae



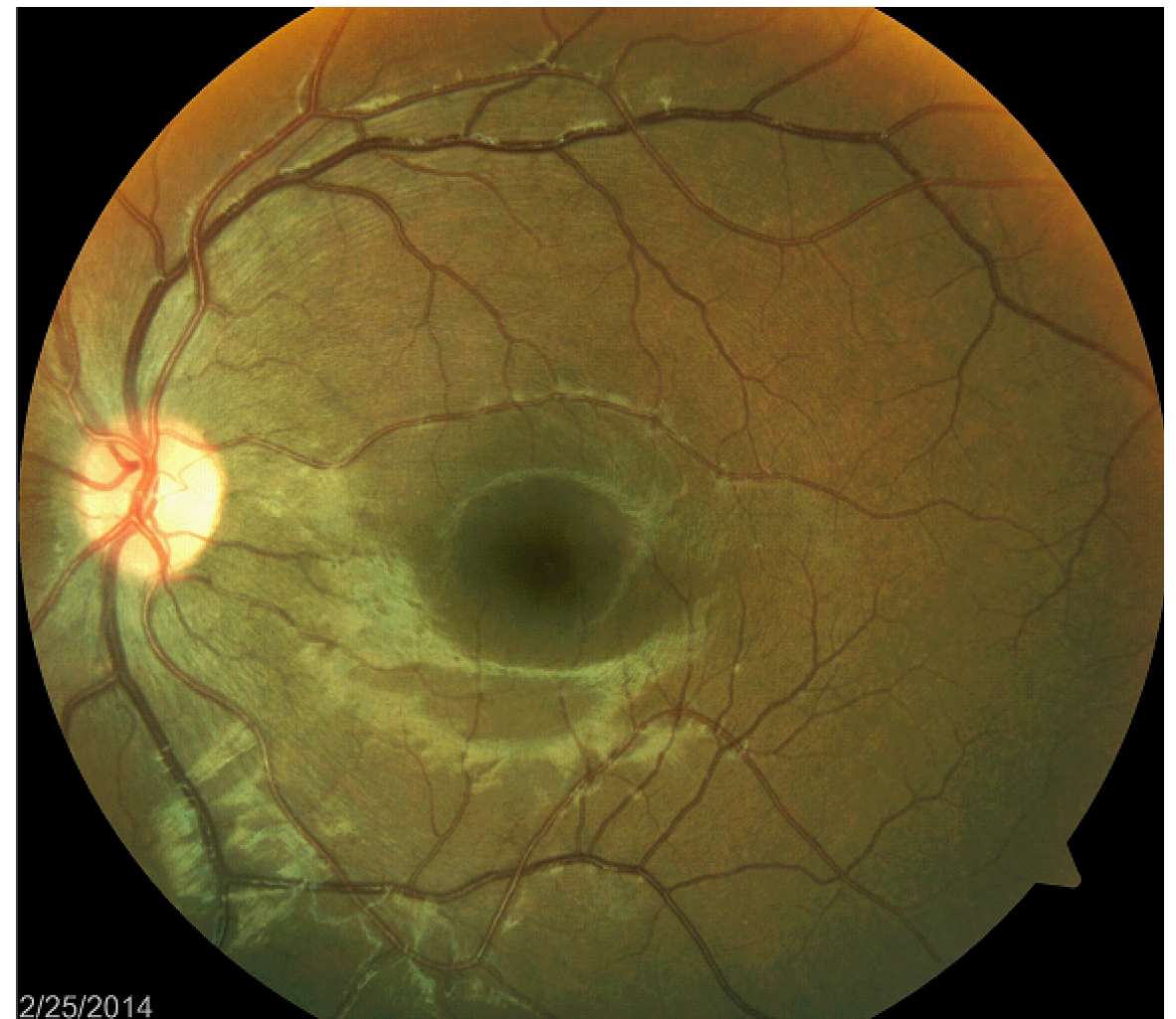
OCT: Acute disruption of ellipsoid zone and hyper-reflectivity of overlying retina

Commotio Retinae



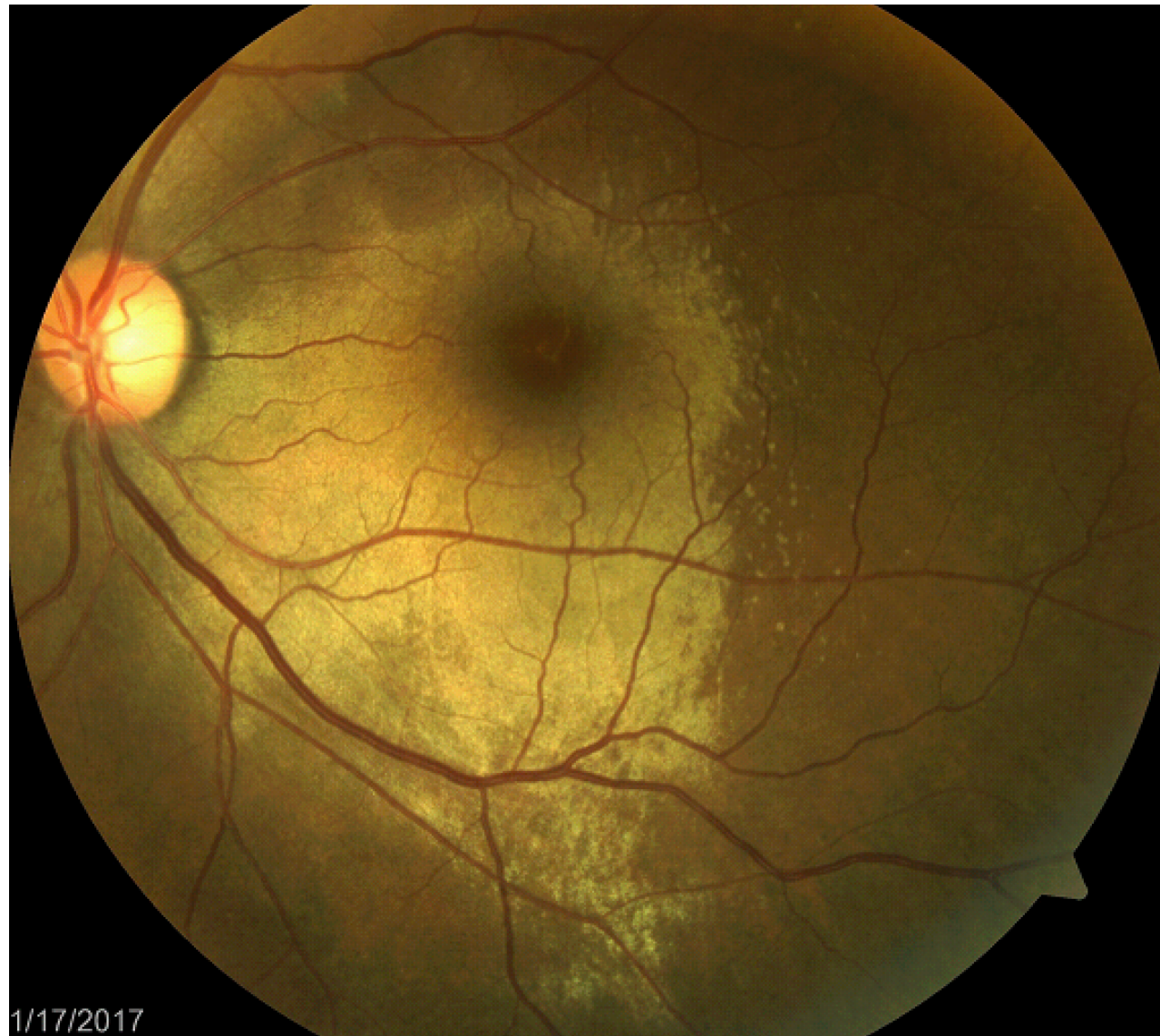
VA 20/30

1 month later



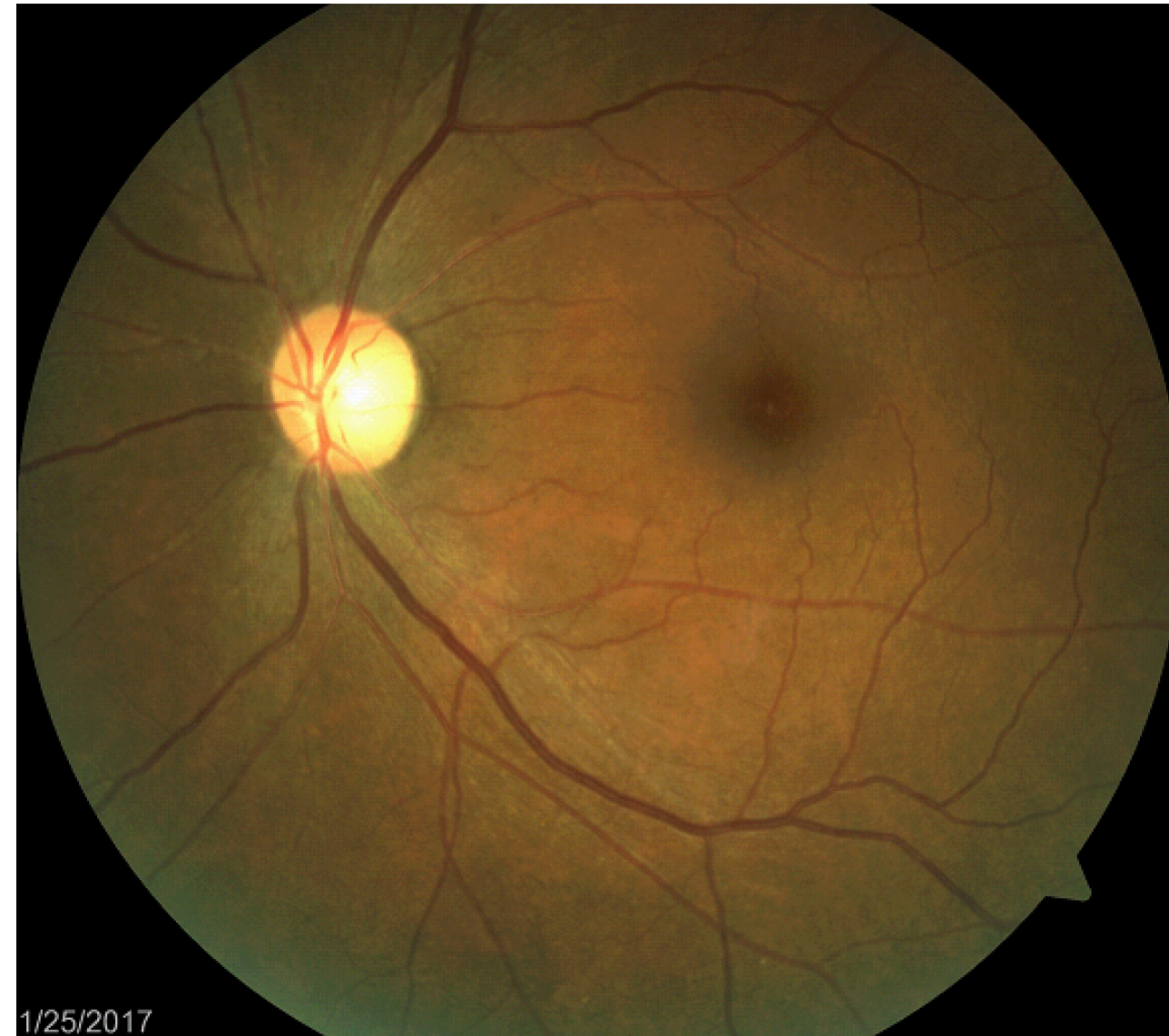
VA 20/25

Commotio Retinae



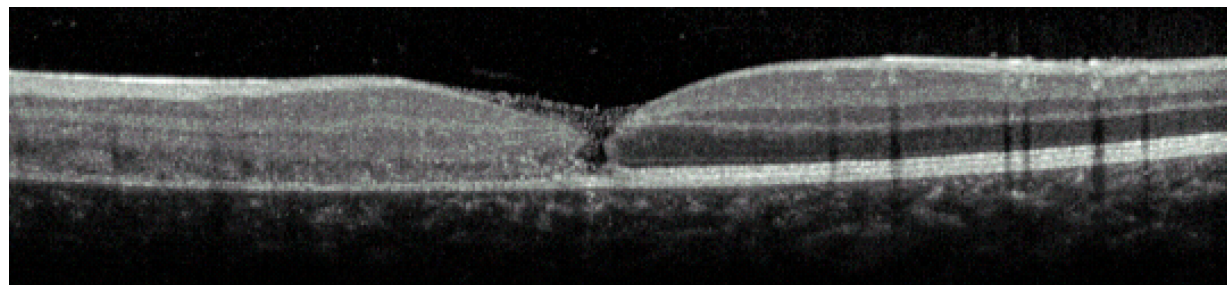
VA 20/20

1 week later



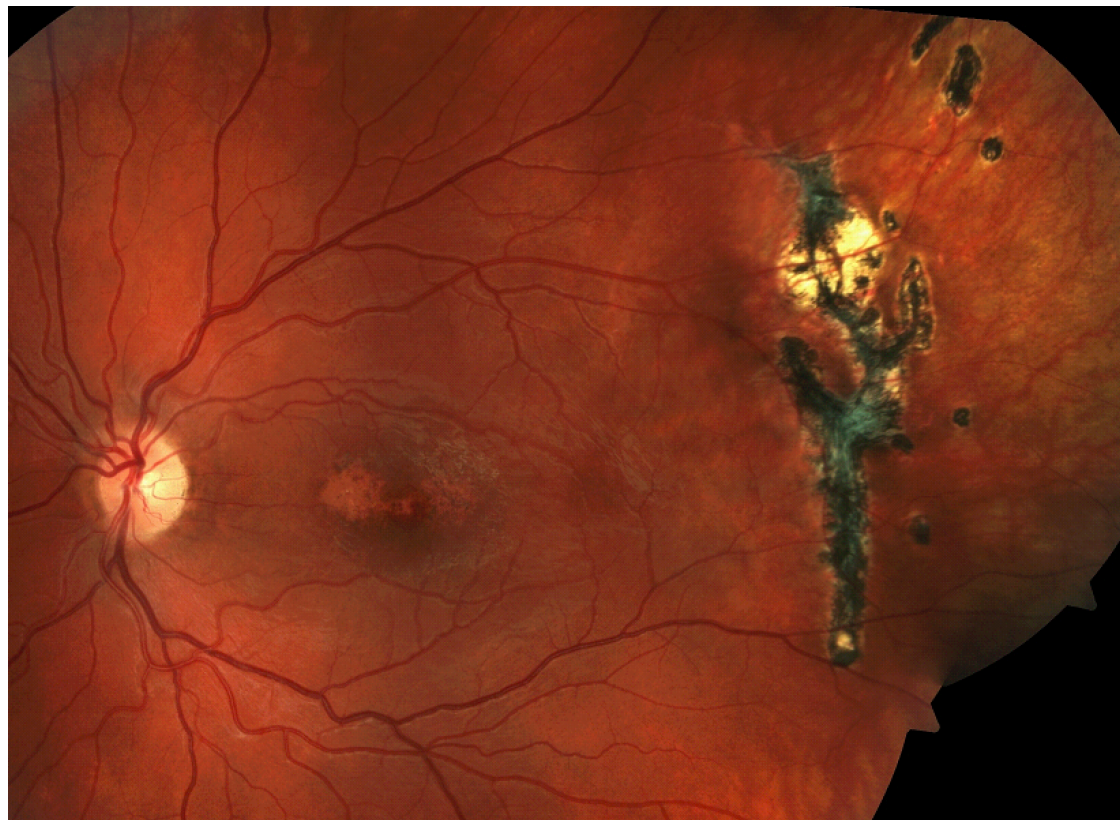
VA 20/20

Commotio Retinae



Traumatic Retinal Pigment Epitheliopathy

- Depending on the extent of trauma, any eye can develop fibrous degeneration.
- May be atrophic, pigmentary, or fibrotic.



Choroidal Rupture

- Decrease vision or asymptomatic
- Yellow or white crescent-shaped subretinal streak, concentric to ON. May not be seen initially if overlying blood.
- CNV may develop later. Higher risk if long or close to fovea.
- Treatment only for CNV; anti-VEGF
- Amsler grid/education
- F/u every 6-12 months

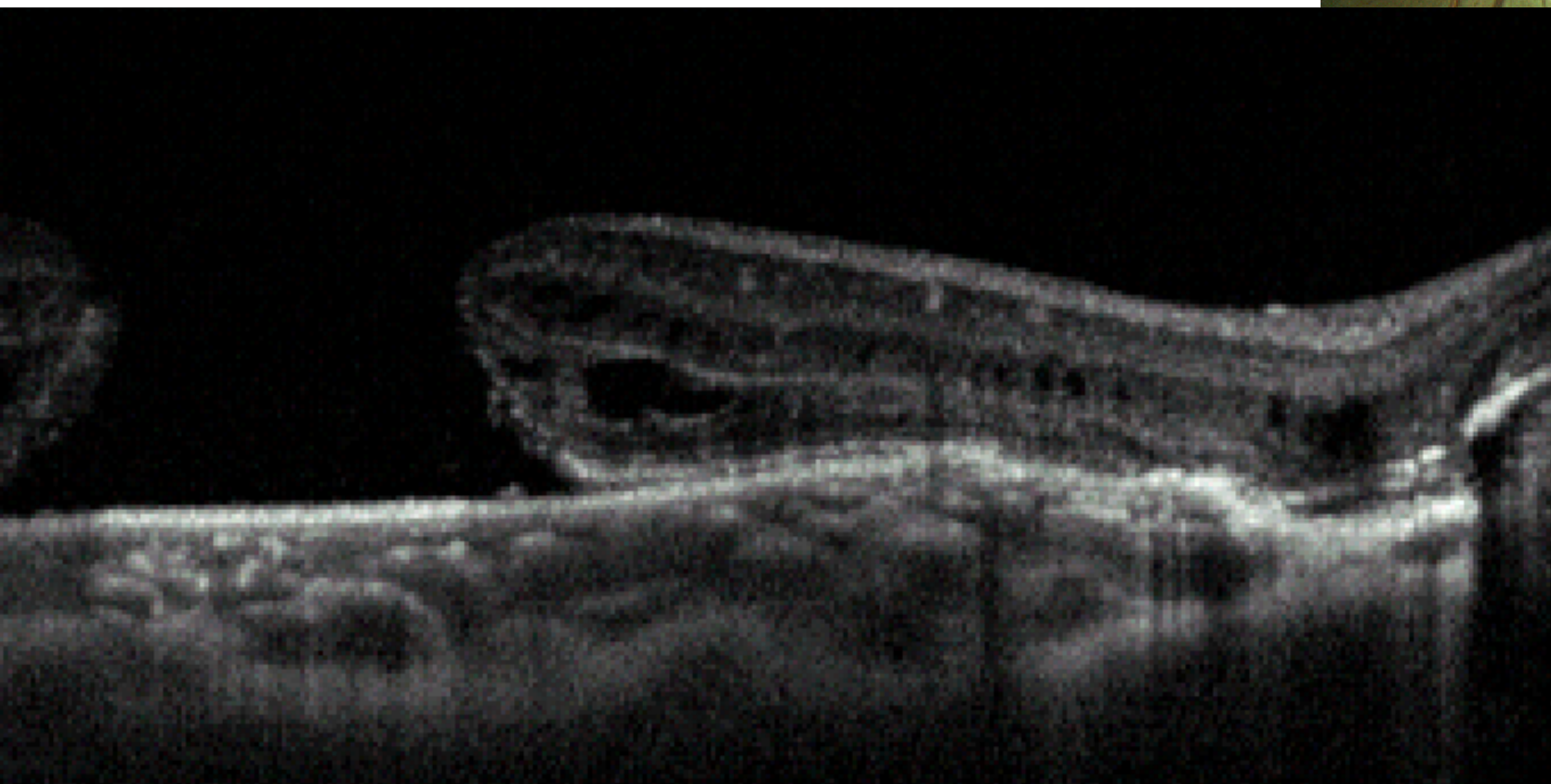
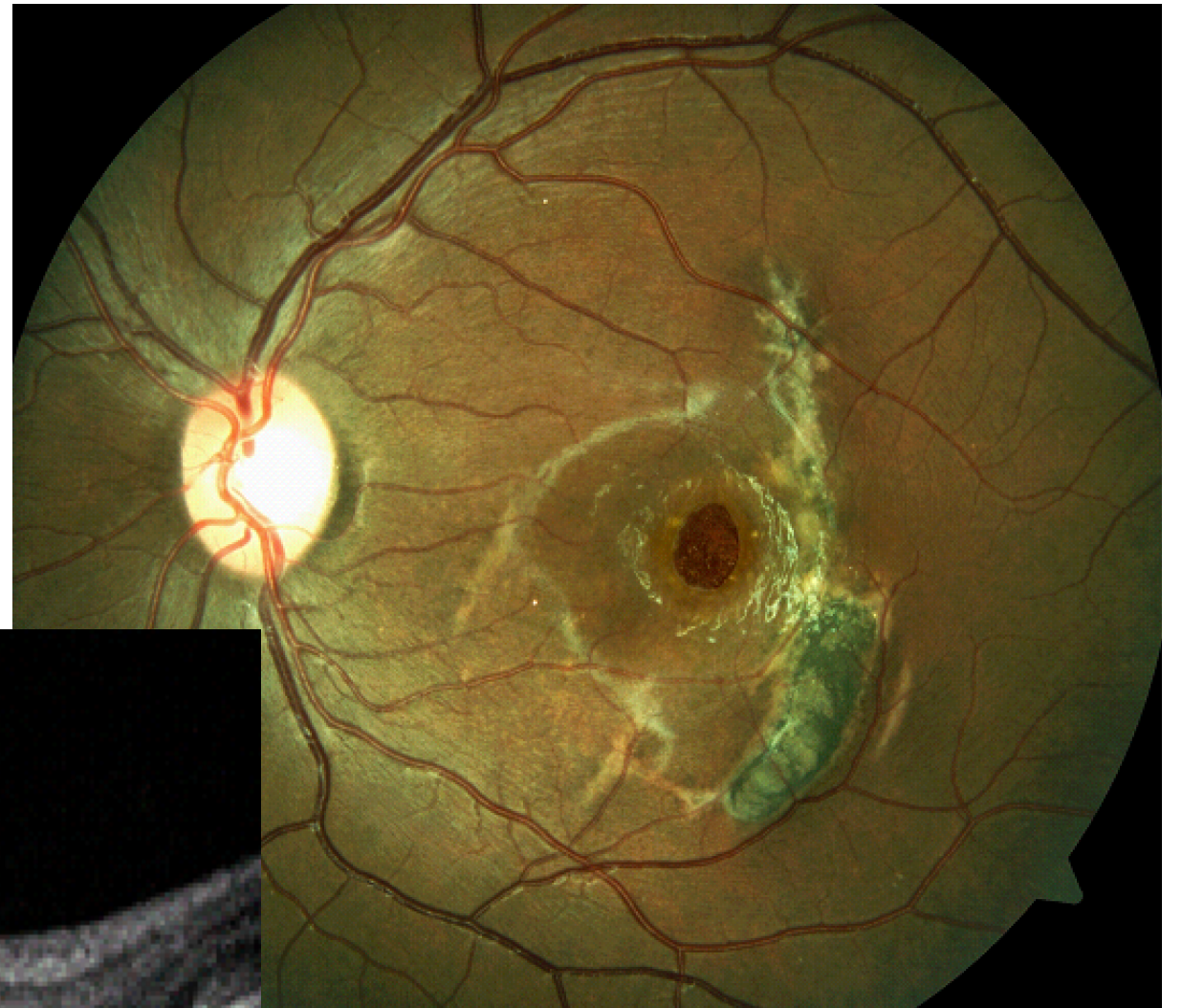


Choroidal Rupture



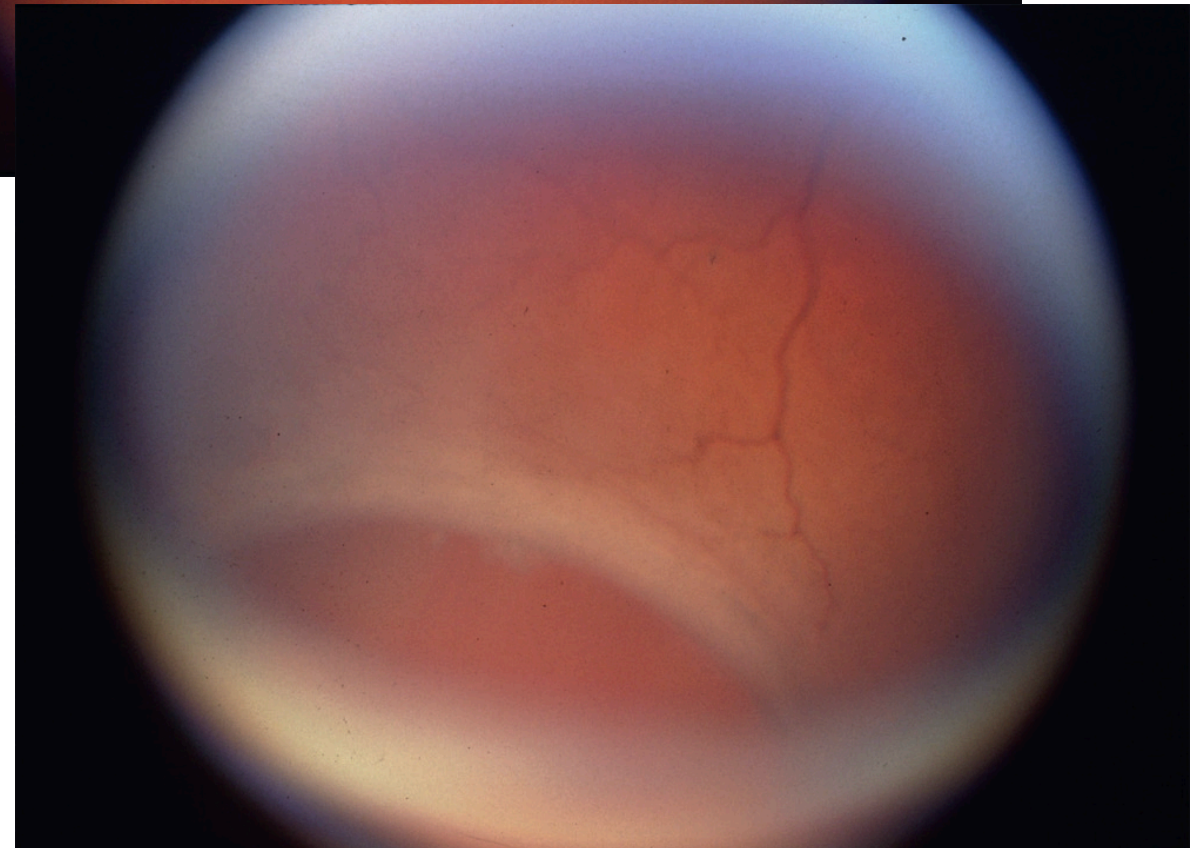
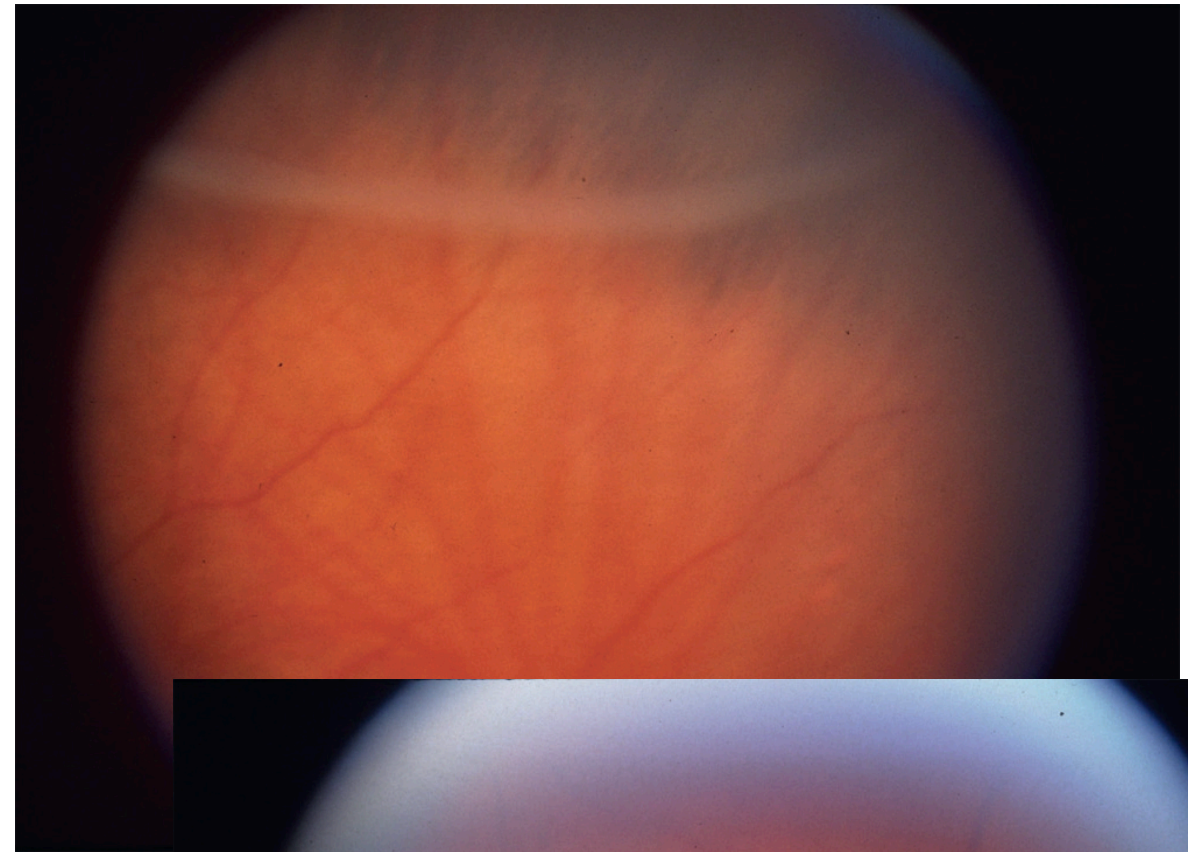
Choroidal Rupture

OCT: Disruption of RPE-
choriocapillaris layer,
photoreceptor ellipsoid zone,
ELM



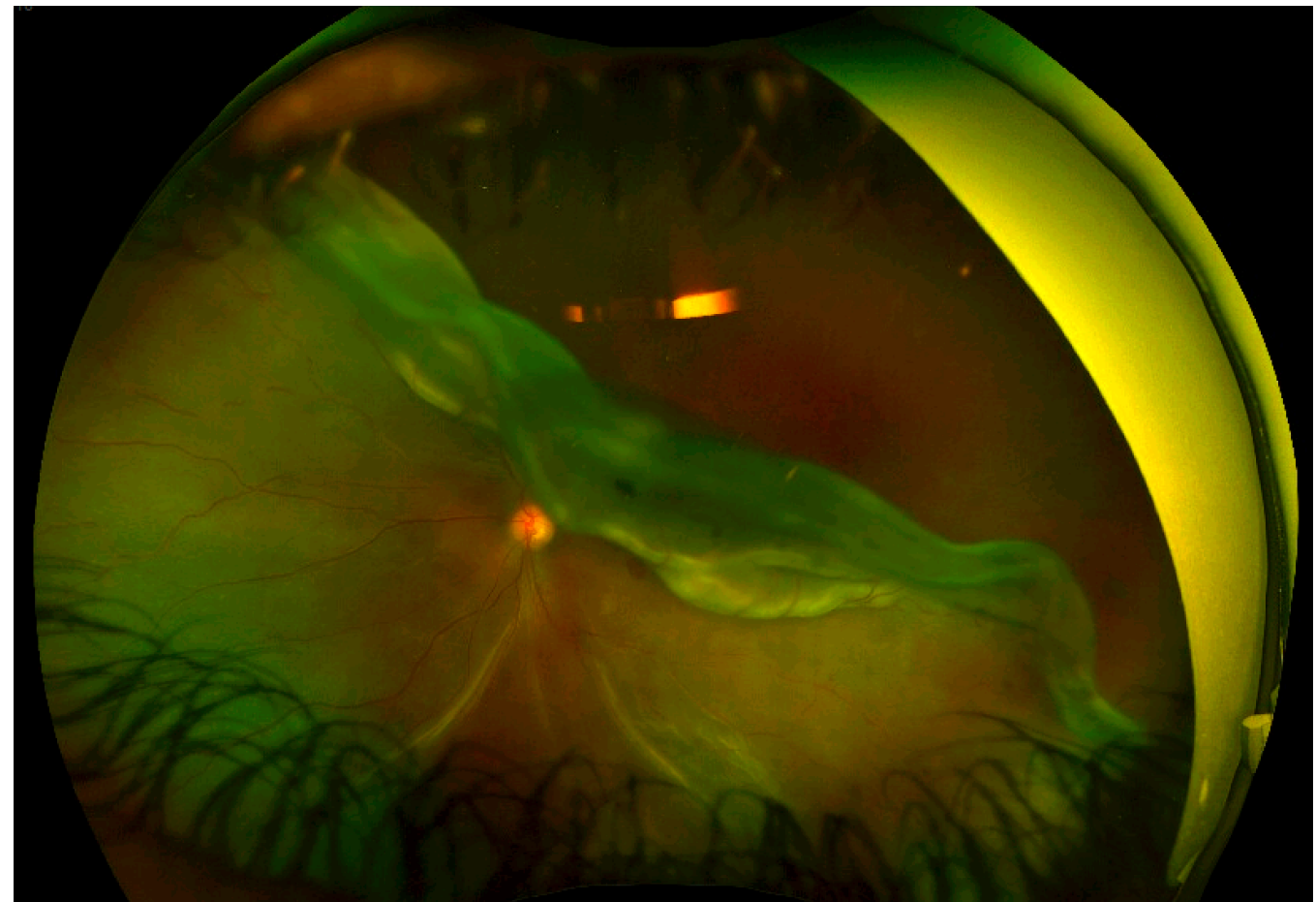
Traumatic Retinal Breaks

- Blunt trauma can cause breaks by direct contusive injury to the globe (Coup and Contrecoup).
- Blunt trauma compresses the eye in the anteroposterior axis and expands it in the equatorial plane —> severe traction on vitreous base —> retinal tear
- Most common sites of breaks IT and SN.
- Most common injury: dialysis
- Avulsion of vitreous base



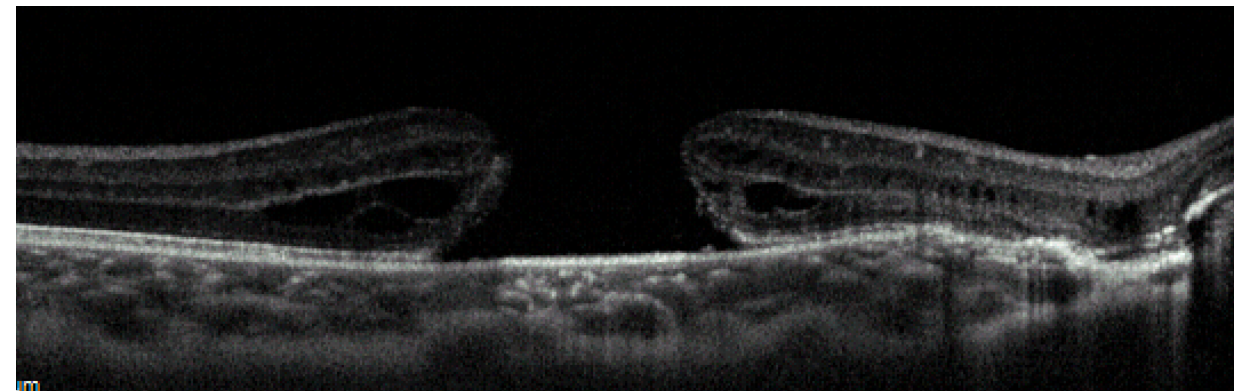
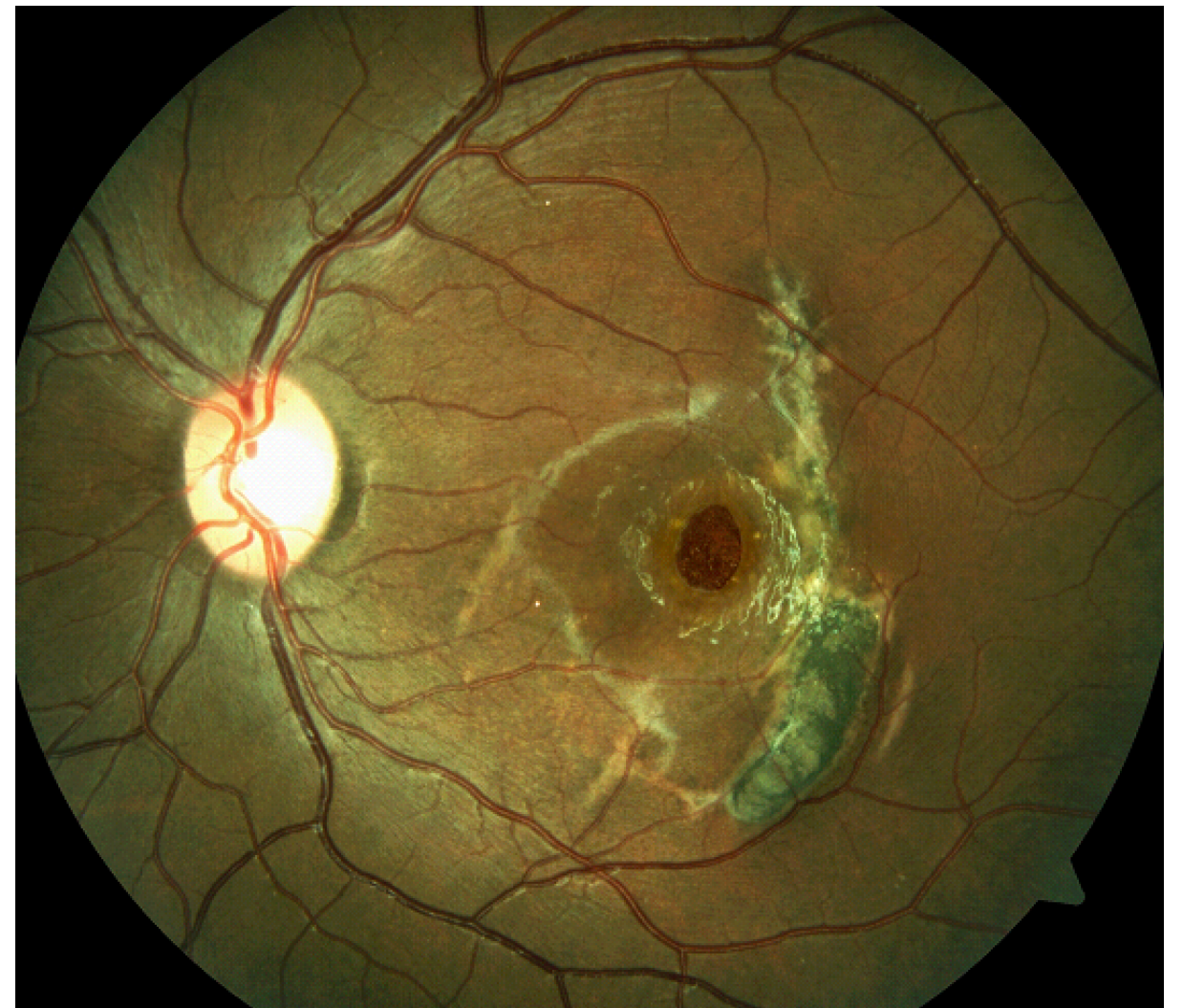
Retinal Detachment

- Is uncommon to develop an acute RD after blunt trauma. Most patients are young with solid vitreous.
- RD presentation:
 - 12% immediately
 - 30% within 1 month
 - 50% within 8 months
 - 80% within 2 years

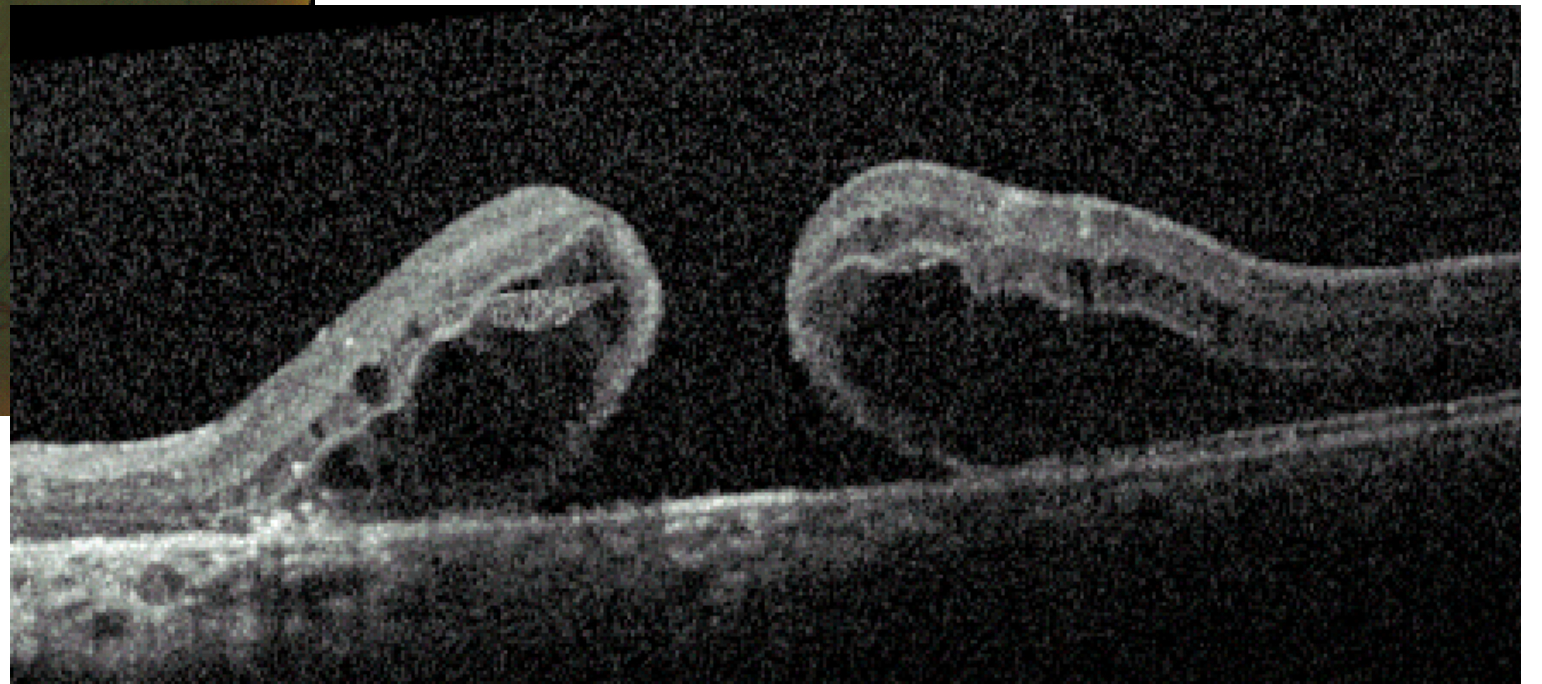
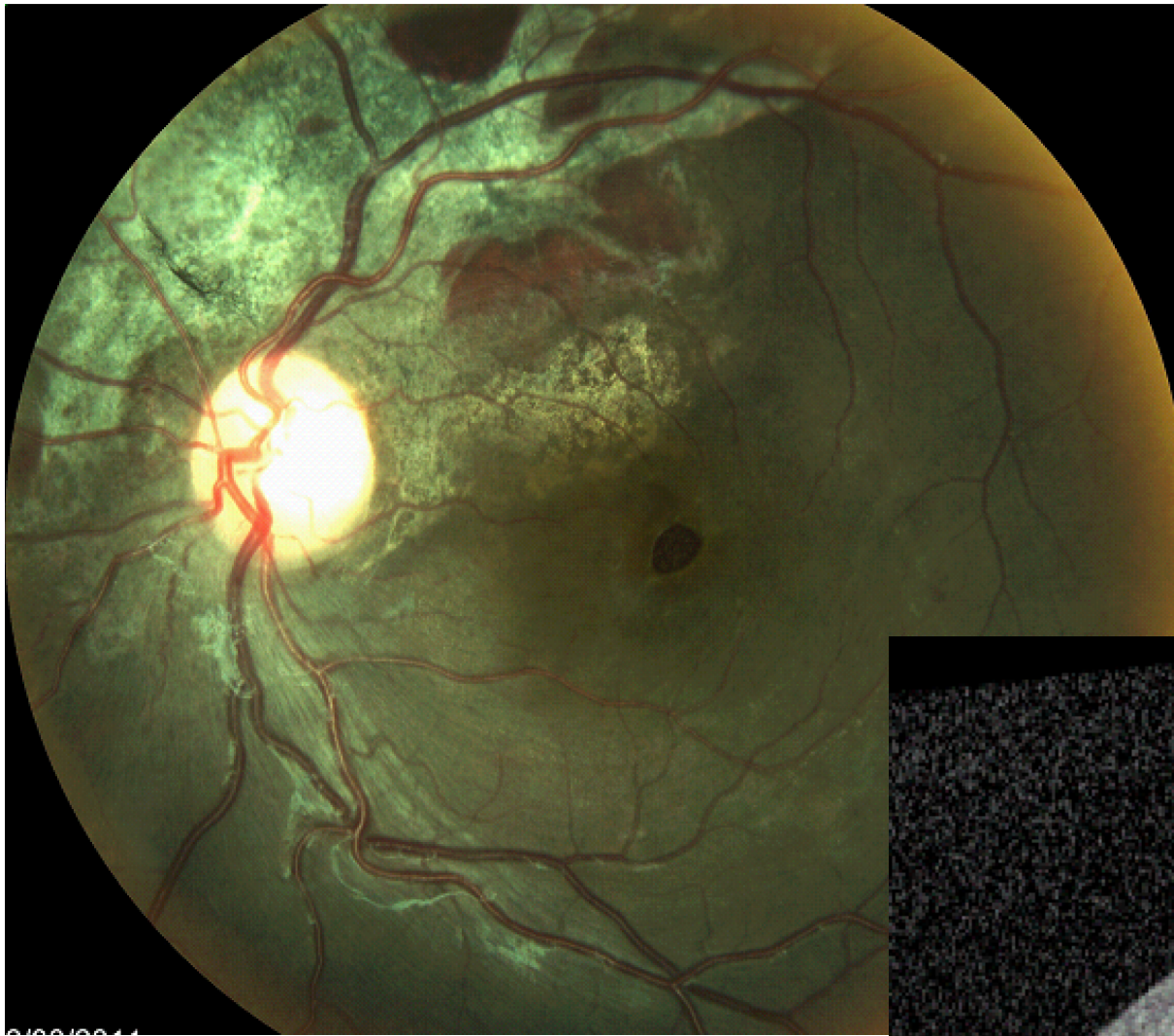


Traumatic Macular Hole

- Occur in 6.3% of eyes after blunt trauma.
- Often accompanied by other ocular injuries (Commotio, Choroidal rupture).
- Mech: cystoid degeneration and anteroposterior vitreofoveal traction
- May close spontaneously but usually need surgery. Success of surgery 83%.

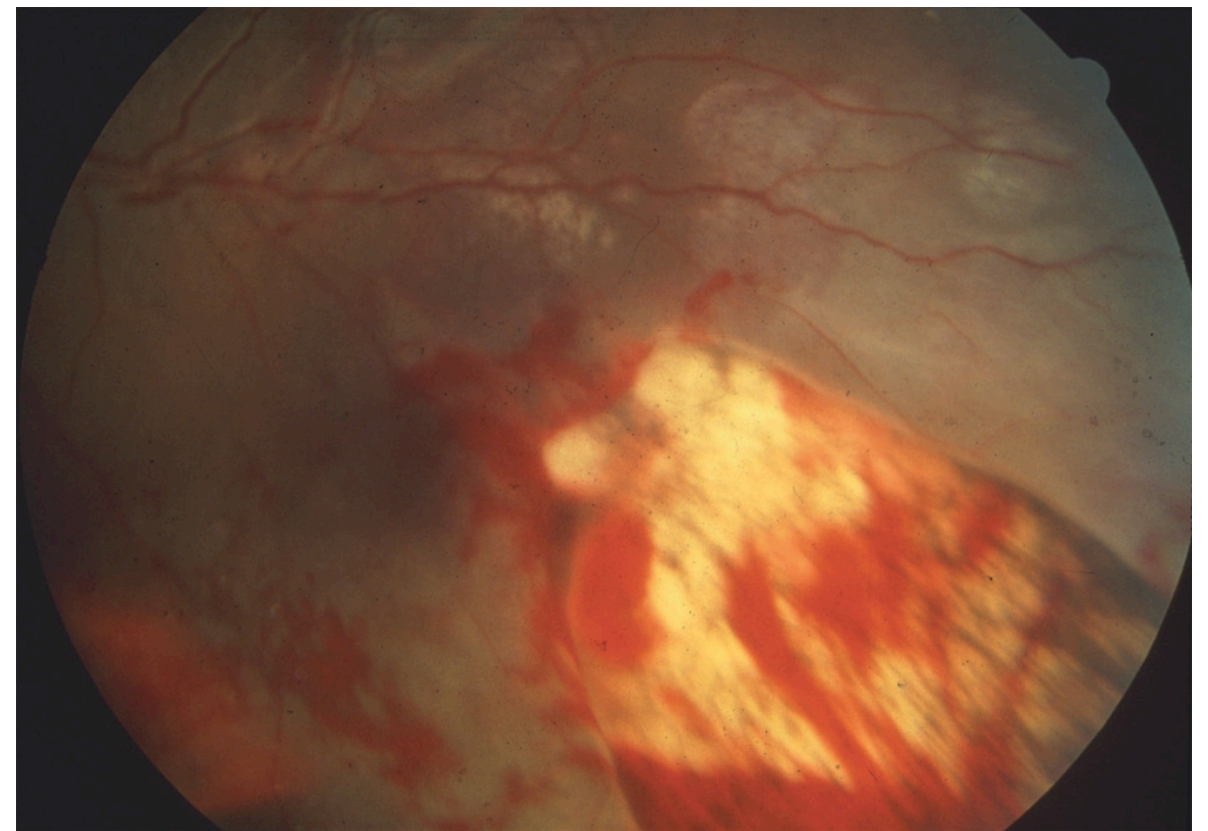


Traumatic Macular Hole



Sclopetaria (Chorioretinal Rupture)

- High velocity injury to orbit (shotgun or bb pellet)
- Absent retina and choroid in same quadrant as projectile injury (coup)
- Bare sclera, VH, intra-, subretinal hemorrhage. Eventually blood reabsorbs and results in fibrous tissue.
- No treatment

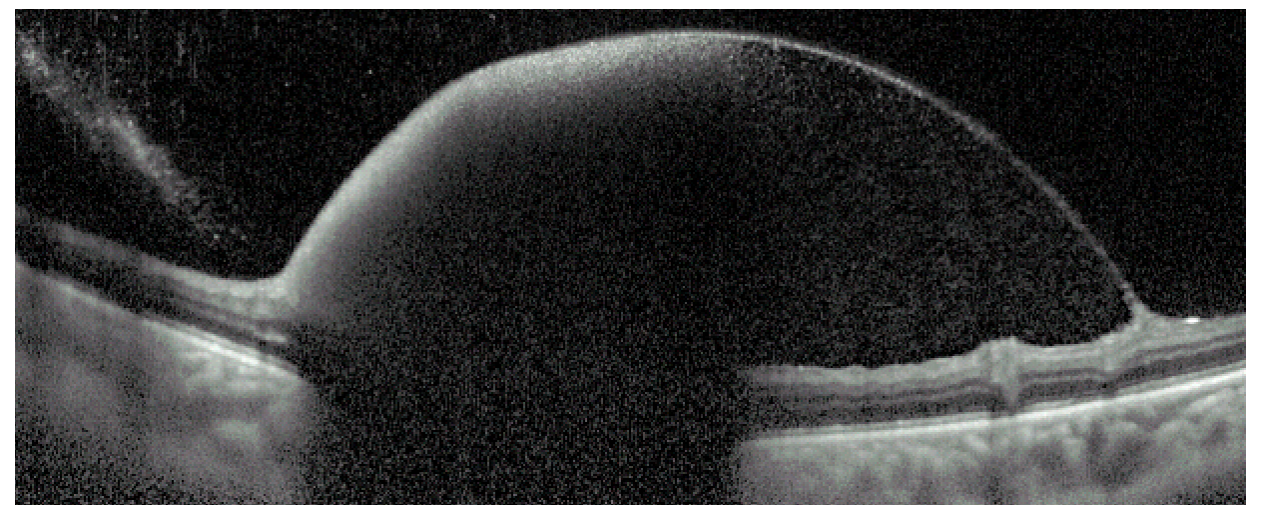
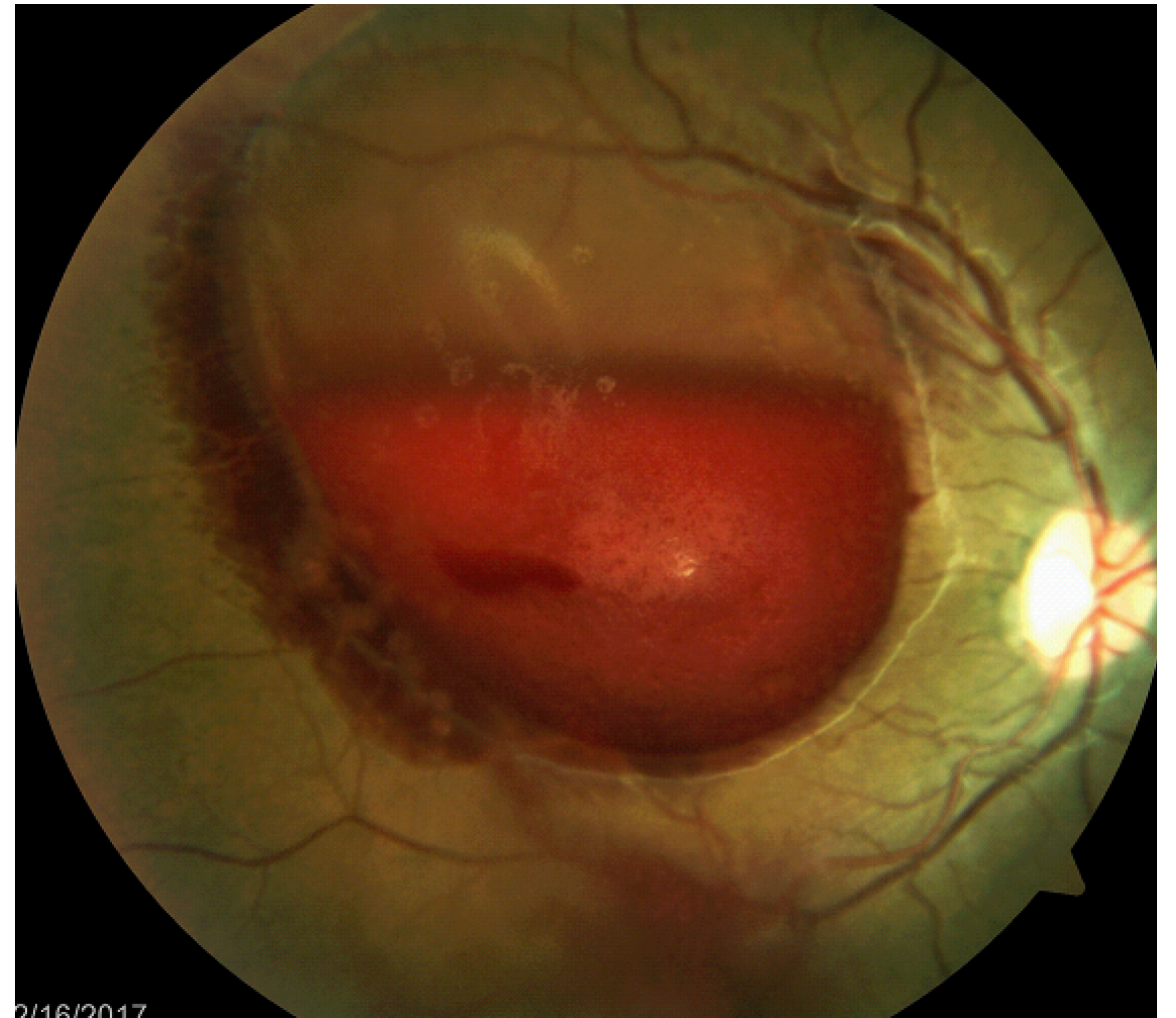


Ryan's Retina 6th ed

INDIRECT OCULAR INJURY

Valsalva Retinopathy

- Pre-retinal hemorrhage, usually subhyaloid.
- Hx of coughing, vomiting, lifting or straining for a BM
- Sudden increase in intrathoracic or intraabdominal pressure against a closed glottis.
- Increase in intraocular venous pressure causes retinal capillaries to spontaneously rupture and bleed.
- Observe, usually reabsorbs



Purtscher Retinopathy

- Decreased vision, often sudden
- Hx of compression injury to the chest or head but not direct ocular injury.
- Cotton wool spots, hemorrhages, retinal edema around the ON; usually bilateral.
- Due to occlusion of small arterioles in the peripapillary retina.
- Injury induced complement activation causes granulocyte activation and leukoembolization.
- No ocular treatment
- VA may improve in 50% of cases



Ryan's Retina 6th ed

Purtscherlike Retinopathy

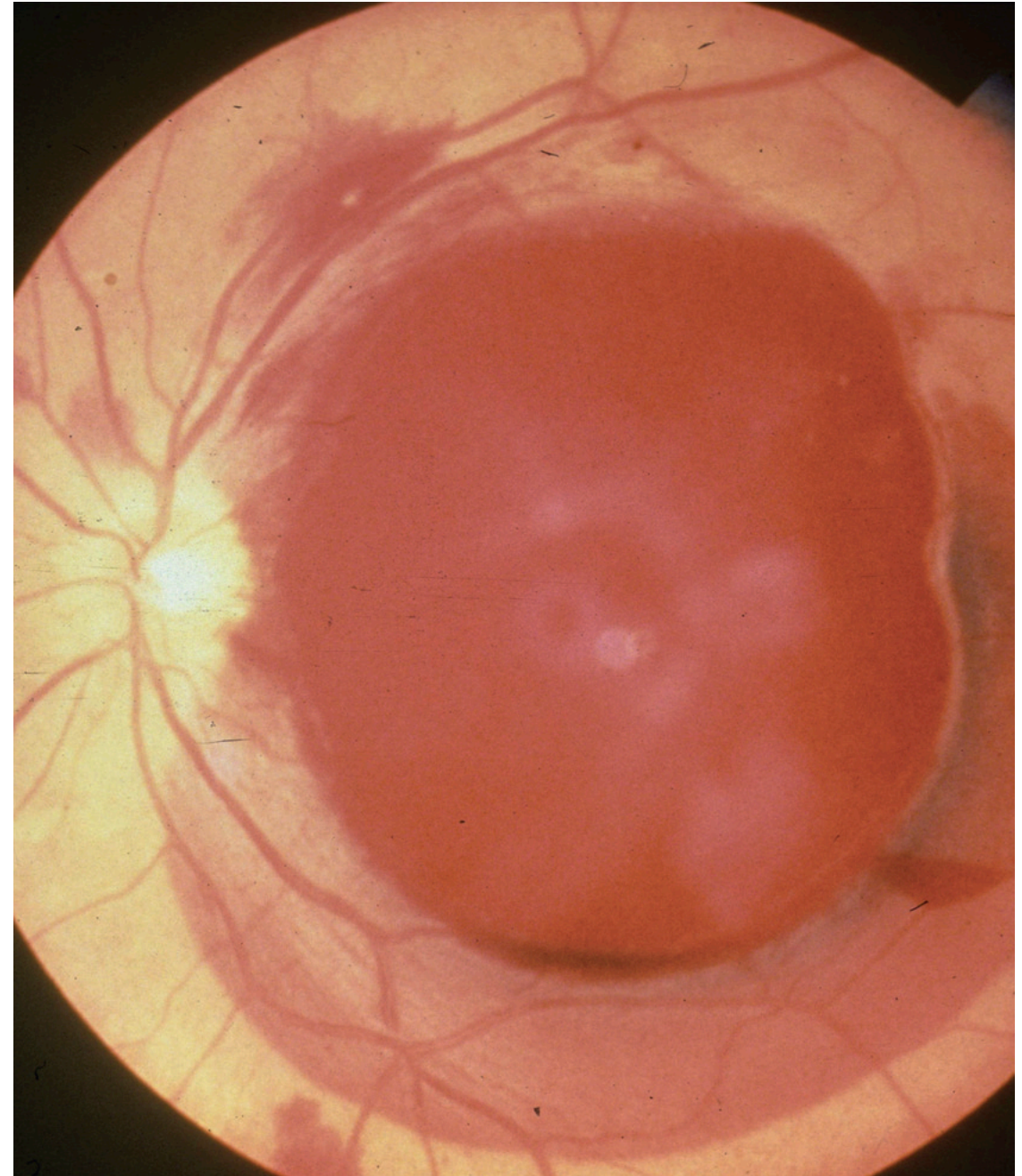
- Same presentation but not associated with trauma
- Acute pancreatitis
- Malignant hypertension
- Collagen vascular diseases (SLE, Scleroderma, TTP, etc)
- Chronic renal failure
- Amniotic fluid embolism
- Long bone fracture



Ryan's Retina 6th ed

Terson Syndrome

- Intraocular hemorrhage caused by an abrupt intracranial hemorrhage.
- Hemorrhage in vitreous, sub-hyaloid, or sub-ILM.
- Cause by intracranial hypertension —> increase in intraocular venous pressure —> rupture of retinal vessels
- Most cases the visual function is unaffected.
- Observation for spontaneous resolution. Occasional vitrectomy.



Shaken Baby Syndrome

- Abusive head trauma characterized by ICH, brain injury, multifocal fractures, and retinal hemorrhages.
- Due to repeated acceleration-deceleration forces with or without blunt head impact.
- External signs of trauma often absent.
- Child <1 y/o, mental status change, new seizures, poor feeding.



Shaken Baby Syndrome

- Retinal hemorrhages in 85% of cases. Many multilayered hemes that extend throughout the retina to ora. Bilateral.
- Death in 20 -30% of cases
- Admit to hospital. Must report suspected child abuse. Careful documentation.



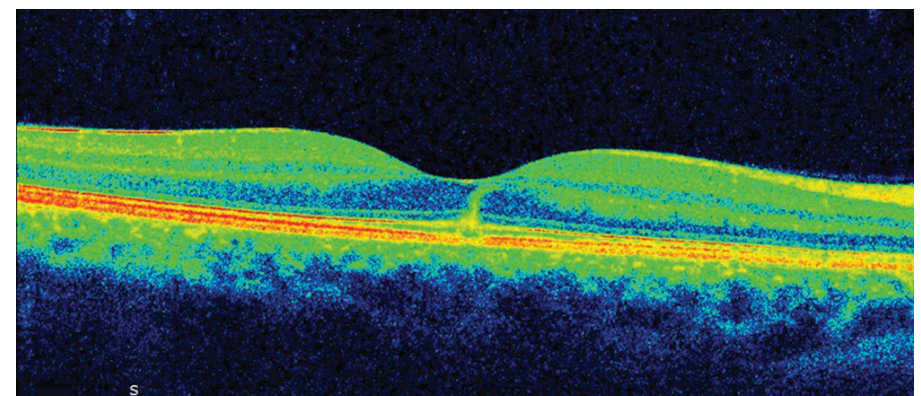
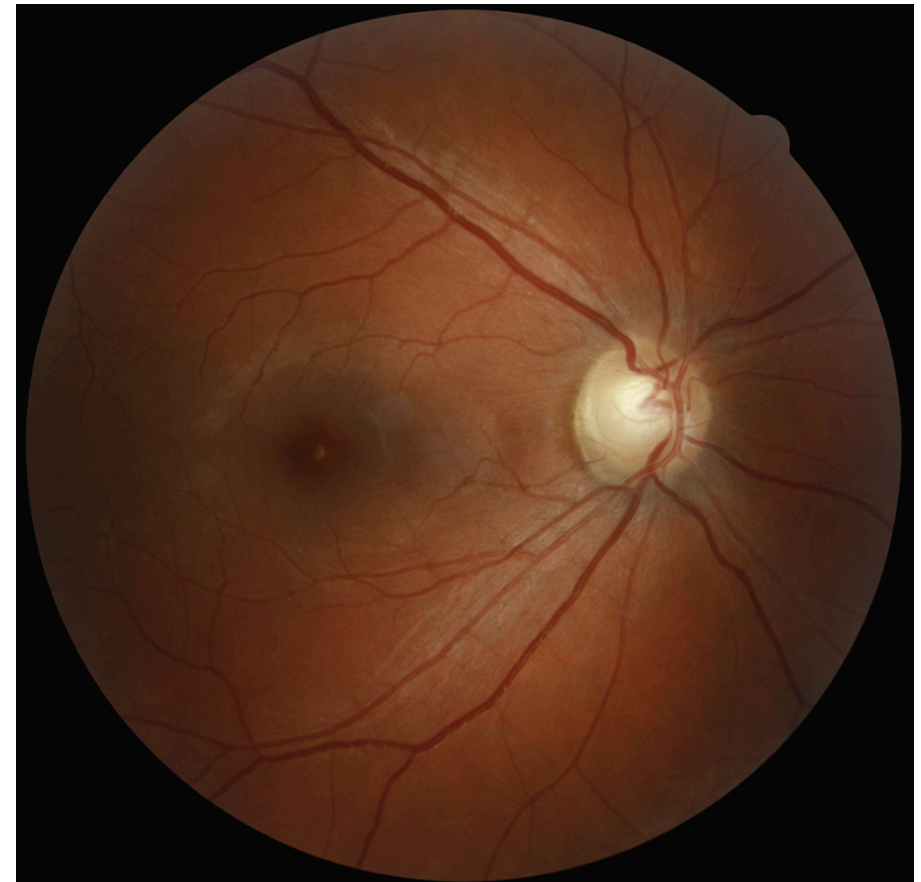
Photic Retinopathy

- Solar or Welding maculopathy
- Photochemical mechanism
- Dependent upon duration, intensity, and spectrum of light exposure.
- Blurred vision, central scotoma.
- VA normal or decrease 20/40-20/200
- VA usually returns to 20/20-20/40 over 6 months.

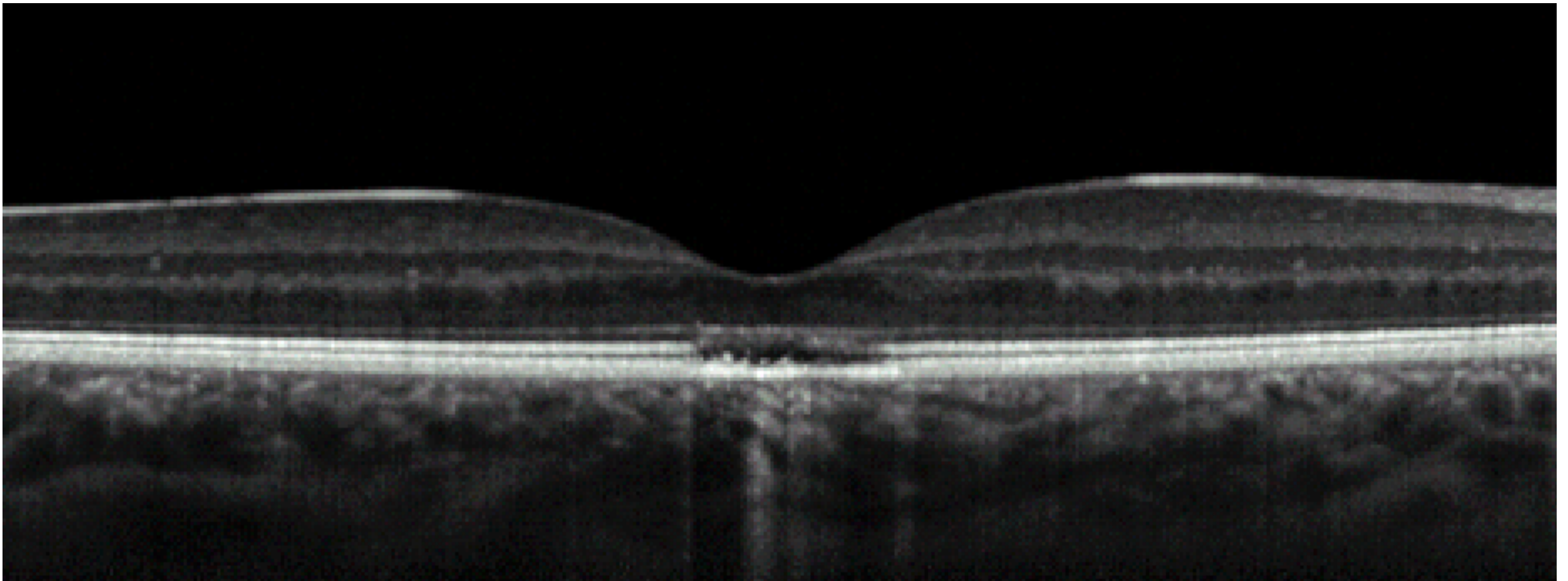


Solar Retinopathy

- Yellow-white retinal lesion. Over several weeks may resolve or leave foveal distortion, pigment mottling, or MH.
- OCT (acute): full-thickness hyperreflective lesion
- OCT (months to years after injury): outer retinal hyporeflective gap in the ellipsoid zone



Solar Retinopathy



OCT: disruption of photoreceptor IS-OS layer

Conclusion

- The eye remains a high risk organ for ocular injuries resulting in visual impairment.
- Clinically the predictor of visual outcome is the location of a posterior wound.
- ***Prevention of eye injuries*** cannot be over emphasized and this is a combined responsibility of ophthalmologists, optometrists, pediatricians, parents, teachers and coaches.