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### Retinal Detachment with Vitreous Hemorrhage Causing Acute Angle Closure Glaucoma

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## History of Present Illness

- 90-year-old female
- Alerted and oriented to self only
- Past medical history: trigeminal neuralgia and age-related macular degeneration
- Four-day history of a left-sided headache, nausea, and vomiting
- Intermittent flashes of light over the past month and complete vision loss for four days in her left eye
- No history of diabetes, hypertension, anticoagulant use, or ocular trauma
- Ocular history: reading glasses and bilateral cataract surgery

## Physical Exam

- Uncomfortable appearing
- Right eye:
  - Clear cornea with pupil responsive to light
  - 20/200 with an intraocular pressure of 16 mm Hg
- Left eye:
  - Diffusely injected with a cloudy cornea and a fixed, mid-dilated, and non-reactive pupil
  - No light perception with an IOP of 56 mm Hg

## Ultrasound as Extension of Physical Exam

- In concert with a "traditional" physical examination, an ultrasound was brought to the bedside to evaluate the ocular complaint
- Equipment used: high-frequency linear probe on a Sonosite X-porte
- Image findings:
  1. Large area of mixed echogenicity within the subretinal space and vitreous cavity consistent with both subretinal and vitreous hemorrhages
  2. Flap tethered to the optic nerve concerning for an associated retinal detachment

## Emergency Department Work-up

**Given presenting story concerning for acute angle closure glaucoma, the patient was started on an intraocular pressure lowering regimen from triage**

- Dorzolamide 2% ophthalmic solution
- Brimonidine 0.2% ophthalmic solution
- Latanoprost 0.005% ophthalmic solution

## Ophthalmology consulted

- Slit lamp exam: left anterior chamber noted to be flat, with a bulging iris and a detached retina that was visible through the pupil through the posterior chamber. The right eye showed geographic atrophy, consistent with age related macular degeneration.

**Given concern for altered mental status, a CT head without contrast was ordered which showed:**

- Lentiform hyperdensities within the left globe which appeared to converge at the optic disc, concerning for hemorrhagic retinal detachment

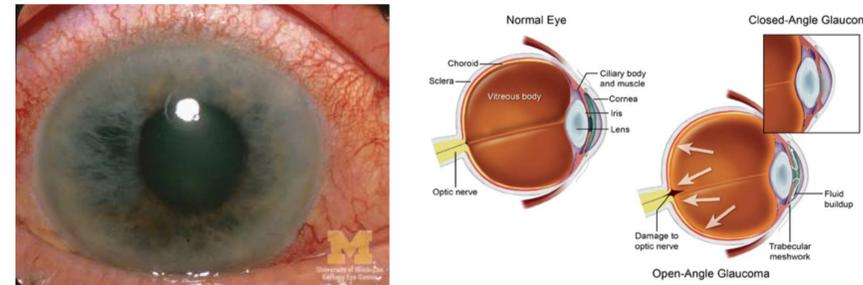
## Primary Acute Angle Glaucoma

- Insufficient aqueous humor outflow from the anterior chamber through the trabecular meshwork due to mechanical obstruction
  - Aqueous humor: structural support for the eye that delivers oxygen to the avascular lens and cornea
- Symptoms classically can be precipitated by dilating the pupil, either through physiologic means or medications, such as sympathomimetics or anticholinergics
- Normal intraocular pressure: 10-20 mm Hg

### Management \*\*\*

1. Reduce the production of aqueous humor
  - Prostaglandins (latanoprost)
  - Beta-blockers (timolol)
  - Carbonic anhydrase inhibitors (acetazolamide)
2. Increase outflow of aqueous humor
  - Alpha agonists (brimonidine)
  - Miotics (pilocarpine)
  - Steroids (prednisolone acetate)

\*\*\*No randomized controlled trials demonstrate one medication regimen is superior to another<sup>10</sup>



## Inpatient Evaluation

**Additional medications given for diagnosis of secondary acute angle closure glaucoma**

- Prednisolone acetate 1% ophthalmic solution
- Atropine 1% ophthalmic solution

**Given concern for headache refractory to home carbamazepine, MRI orbit with and without contrast was ordered which showed:**

- Blood products in the left globe and irregularity of the choroid/retina, consistent with retinal detachment



From left to right: Ultrasound, CT, and MRI imaging demonstrating a fluid level representative of subretinal and vitreous hemorrhages, concerning for secondary angle closure glaucoma

## Secondary Acute Angle Glaucoma

- Precipitated by conditions that increase posterior segment pressure by anteriorly displacing the lens/iris diaphragm<sup>3,5,9</sup>
  - Examples: choroidal swelling or hemorrhage, space occupying lesion, neovascularization, ocular inflammation that causes fibrosis or contractions

**Risk factors for hemorrhagic retinal detachment**<sup>1,4-7,11</sup>

- Age-related macular degeneration
- Anticoagulant use
- Hypertension
- Diabetes
- Trauma

### Management

- Treat with IOP lowering medications as in primary acute angle closure
- Atropine
  - Secondary acute angle closure: indicated
    - Induces ciliary body relaxation which can aid in posterior lens displacement and IOP reduction
  - Primary acute angle closure: contraindicated
    - Dilatory effect further closes the angle, delaying aqueous humor outflow, increasing IOP

## Point of Care Ultrasound

- Quick and inexpensive
- Without need for consult service
- No increased risk of radiation to the patient<sup>8</sup>
- 94% sensitive and 96% specific for the diagnosis of retinal detachment
  - No statistically significant differences comparing scans from emergency department (ED) providers to non-ED providers<sup>2</sup>
- CT and MRI have poorer spatial resolution and can have limited role in the study of the vitreous, retina, and choroid<sup>1</sup>

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