

# EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER  
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

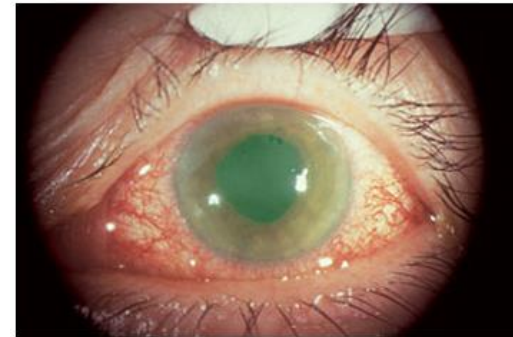
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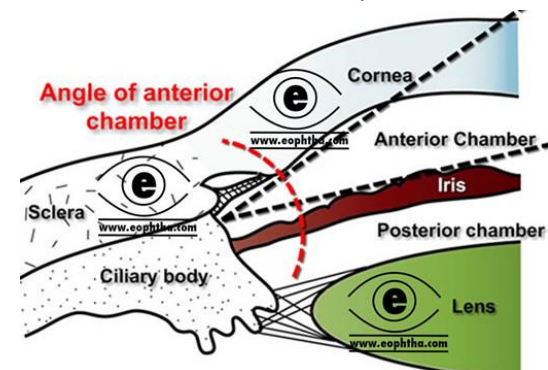
## Acute Angle-Closure Glaucoma

A 52-year-old female with a past medical history of hypertension presents to the ED with left eye pain, redness, and loss of vision for 3 days. The patient has never experienced these symptoms prior to this. She admits to headache and nausea but denies fever, neck stiffness, paresthesias, weakness, or trauma to the eye. The patient is hypertensive at 210/90 mmHg, with the rest of the vital signs being within normal limits. On physical exam, her left pupil is moderately dilated and non-reactive to light. The patient's left conjunctiva is injected, and her left cornea is hazy. On acuity testing, the patient has light perception only in the left eye. Tonometry measures 18 mmHg in the right eye, and 49 mmHg in the left eye. Which of the following is the most likely mechanism for this pathology?

- A. Nonreactive pupil resulting in increased intraocular pressure
- B. Decreased aqueous humor outflow
- C. Retinal separation leading to a decrease in visual acuity
- D. Increased intraocular pressure due to an increase in aqueous humor production



**Figure 1.** Conjunctival hyperemia, corneal edema, iris atrophy, and mid-dilated pupil. Reproduced from the Focal Eye Centre, Mt. Elizabeth Novena Hospital



**Figure 2.** Anterior chamber angle. Reproduced from Eophtha.com

Acute angle-closure glaucoma is characterized by narrowing or closure of the anterior chamber angle, which is between the cornea and iris, and it is an ophthalmologic emergency.

*EM Case of the Week is a weekly "pop quiz" for ED staff.*

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

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**The correct answer is B.** The sudden rise in intraocular pressure in acute-angle closure glaucoma is a result of the blocked outflow of aqueous humor and not increased production.

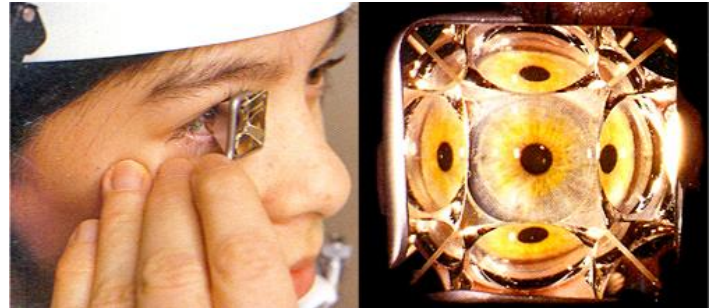
As the anterior chamber angle closes and intraocular pressure rises, optic nerve ischemia occurs, resulting in decreased vision.

### Discussion

Normal intraocular pressure ranges from 8 to 21 mmHg. In acute angle-closure glaucoma, pressures are often 30 mmHg or higher. Along with vision loss, acute angle-closure glaucoma can include the visualization of halos around lights, headache, severe eye pain, and nausea and vomiting. Signs include conjunctival injection, corneal edema or cloudiness, a shallow anterior chamber, iris atrophy, and a mid-dilated (4-6 mm) pupil that reacts poorly to light.

The differential diagnosis for acute-angle closure glaucoma includes iritis, traumatic hyphema, conjunctivitis, episcleritis, subconjunctival hemorrhage, corneal abrasion or ulcer, orbital cellulitis, retinal detachment, and more. One set of diagnostic criteria for acute-angle closure glaucoma is as follows:

- Presence of at least 2 of the following symptoms-
  - Ocular or periocular pain
  - Nausea/vomiting
  - Antecedent history of intermittent blurring of vision with halos
- Presenting intraocular pressure greater than 21 mmHg
- Presence of at least 3 of the following signs-
  - Conjunctival injection
  - Corneal epithelial edema
  - Mid-dilated and unreactive pupil
  - Shallow anterior chamber



**Figure 3.** Gonioscopy. *Reproduced from UpToDate.*

The gold standard for diagnosing angle-closure is gonioscopy (Figure 3). This involves using a special lens in the slit lamp, which allows the ophthalmologist to visualize the angle and diagnose the condition. Gonioscopy requires experience and expertise to perform accurately.

### Management

As acute angle-closure is an emergency, immediate ophthalmology consultation is important. The ultimate goal of therapy is to control the intraocular pressure to below 35 mmHg or with a reduction greater than 25%.

There are no trials comparing the medical options for treatment of acute angle-closure glaucoma, but an empiric protocol based on clinical experience has been developed and is as follows:

- Oral or IV acetazolamide (500 mg) or IV mannitol
- 1 drop of 0.5% timolol maleate ( $\beta$ -1 and  $\beta$ -2 receptor agonist that reduces aqueous humor production), wait 1 minute, then
- 1 drop of 1% apraclonidine ( $\alpha$ -2 blocker that also reduces aqueous humor production), wait 1 minute, then
- 1 drop of 2% pilocarpine (cholinergic agonist that lowers intraocular pressure by decreasing resistance to aqueous humor outflow and constricting the pupillary sphincter)
- Symptomatic therapy for pain and nausea

For a list of educational lectures, grand rounds, workshops, and didactics please visit [BrowardER.com](http://BrowardER.com) and click on the **"Conference"** link.

*All are welcome to attend!*

# Warriors

## Management (cont.)

Eye pressure checks should be performed every 30-60 minutes after the medications have been given. Laser peripheral iridotomy, which is performed 24-48 hours after the intraocular pressure is controlled, is the definitive treatment. This involves creating a tiny hole with a laser in the peripheral iris so that aqueous humor can flow through and reach the angle.

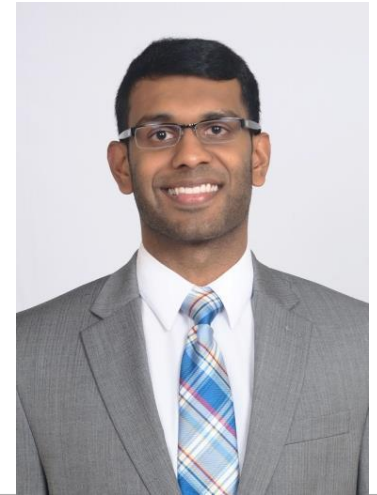
## Prognosis

Attacks of acute angle-closure glaucoma can resolve spontaneously but then recur repeatedly if not treated. Without therapy even complete vision loss, due to the irreversible nature of damage to the optic nerve, can occur during an attack over hours to days. For this reason, it is critical for an ophthalmologist to see an afflicted patient emergently in order to provide timely diagnosis and treatment.

Despite angle-closure commonly presenting in just one eye, it is important to examine the other eye as well, since the angle for that eye may also be narrow and could cause future attacks. Prophylactic treatment, which is early laser peripheral iridotomy, for that eye may also be considered.

## Take-Home Points

- Angle-closure glaucoma involves narrowing of the anterior chamber angle, resulting in blocked outflow of aqueous humor, increase in intraocular pressure, and optic nerve ischemia.
- Signs and symptoms include conjunctival injection, corneal haziness, a mid-dilated pupil, vision loss with presence of halos around lights, severe eye pain, and nausea and vomiting.
- Diagnosis involves considering these characteristics as well as the presence of an intraocular pressure greater than 21 mmHg. The gold standard diagnostic strategy is gonioscopy.
- Management is aimed at decreasing intraocular pressure and includes medical therapy, notably eye drops, and eventually laser peripheral iridotomy.
- Since it is an ophthalmologic emergency with the potential to cause complete vision loss, acute angle-closure glaucoma should be diagnosed and treated swiftly.



## ABOUT THE AUTHOR

This month's case was written by Samir Shah. Samir is a 4<sup>th</sup>-year medical student at NSU-COM. He did his Emergency Medicine rotation at BHMC in December of 2016. Samir plans on pursuing a career in Internal Medicine after graduation.

## REFERENCES

- Weizer, J., Trobe, J., *et al.* Angle-closure glaucoma. UpToDate. Retrieved December 14, 2016.
- Freedman, J., & Sinert, R. H. Acute Angle-Closure Glaucoma Treatment & Management. Medscape. Retrieved December 14, 2016.
- Prum, B. E., Herndon, L. W., Moroi, S. E., Mansberger, S. L., *et al.* Primary Angle Closure Preferred Practice Pattern® Guidelines. *Ophthalmology*, 123(1). Retrieved December 14, 2016.