EM CASE OF THE WEEK.
BROWARD HEALTH MEDICAL CENTER
DEPARTMENT OF EMERGENCY MEDICINE

BROWARD HEALTH
Care Warriors

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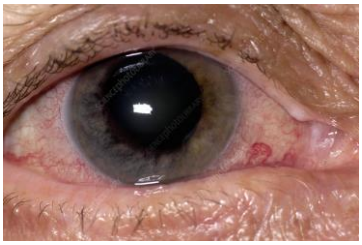
Vol 8 | Issue 6

Acute Angle-Closure Glaucoma

onset right sided eye pain and headache. She reports blurred vision that coincided with the onset of pain two hours ago. Her pain is worse when she is exposed to bright light. She feels nauseated but has not vomit. She denies traumatic injury or any other inciting event. She normally wears eyeglasses for hyperopia but has no other significant medical history. Her vital signs are within normal limits. Physical examination is notable for right side lacrimation and scleral injection. She has significantly decreased visual acuity in the right eye. The right pupil is mildly dilated and sluggishly responsive to light. Neurologic examination otherwise reveals no focal abnormalities.



Which of the following is expected?

a. Fluorescein staining of the cornea
b. Fundoscopic findings of cherry red macula
c. Fundoscopic findings of cotton wool spots
d. Intraocular pressure > 21mmHg
e. Ultrasound showing a linear density in the posterior globe

Differential Diagnosis & Emergent Referral for Red Eye(s)

Acute Angle-closure glaucoma
- Emergency
- Dull/achy HA, Fixed, mid-dilated pupil w/ a high ocular pressure.

Iritis/uveitis
- Urgent
- Ciliary flush, very small pupil

Infectious keratitis
- Emergent

Hyphema & Hypopyon:
- Emergency

Hypopyon

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.

BROWARD HEALTH MEDICAL CENTER

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The correct answer is **D**.

Acute angle-closure glaucoma is characterized by obstructed outflow of aqueous humor from the anterior chamber of the eye causing **elevated intraocular pressure**. It commonly presents with symptoms of sudden onset severe unilateral eye pain and blurred vision associated with headache and nausea.

Discussion

Pathogenesis - Aqueous humor is produced by the ciliary body, flows through the pupil, reaches the anterior chamber angle, and exits the eye. The balance between fluid production and drainage determines the intraocular pressure.

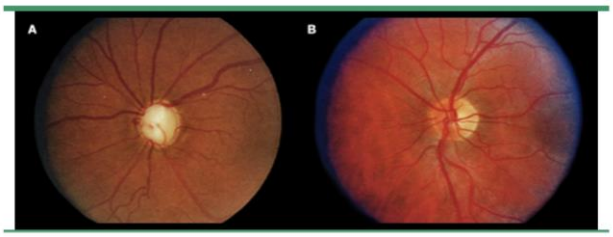
In primary angle-closure, the lens is located too far forward anatomically and rests against the iris. This results in pupillary block, a condition in which aqueous humor can no longer flow normally through the pupil. Pressure builds up behind the iris, relative to the anterior chamber, causing the peripheral iris to bow forward and cover all or part of the anterior chamber angle.

Prolonged or repeated contact between the iris and the angle can lead to scarring and functional damage to the trabecular meshwork, the tissue in the angle that acts as a sieve through which the aqueous humor drains (figure A-B). Once the optic nerve shows damage from the high intraocular pressure, the disease is called primary angle-closure glaucoma.

If the entire angle is blocked suddenly, as occurs in complete pupillary block, the intraocular pressure rises rapidly, and acute symptoms can occur. These attacks of acute angle-closure glaucoma may resolve spontaneously and recur repeatedly if not treated.

Without treatment, vision loss and even blindness can occur quickly during the attack (over hours to days). Therefore, acute angle-closure glaucoma is considered a true ophthalmic emergency.

Glaucoma



(A) Extensive cupping of the optic disk typical of glaucoma.
(B) Compared with a normal optic disk.

Courtesy of the W.K. Kellogg Eye Center, University of Michigan.

Acute angle-closure glaucoma

The conjunctival vessels are dilated, especially near the cornea (ciliary flush) and the cornea is slightly hazy (edematous).

Diagnosis - Patients with the above symptoms or signs should undergo emergent examination of both eyes by an ophthalmologist, including:

- Visual acuity
- Evaluation of the pupils
- Intraocular pressure
- Slit-lamp examination of the anterior segments
- Visual field testing (either by confrontation [finger testing] or by formal methods, depending on the acuity of the clinical situation)
- Gonioscopy (gold-standard)
- Undilated fundus examination

Pupillary dilation should be deferred in untreated cases of suspected angle-closure glaucoma, as this may exacerbate the condition.

For a list of educational lectures, grand rounds, workshops, and didactics please visit ***BrowardER.com*** and **click** on the ***"Conference"*** **link**.

All are welcome to attend!

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Rapid overview: Emergency management of severe acute angle-closure glaucoma

Clinical presentation
Rate of onset and degree of IOP increase determine symptoms
With rapid increase in IOP, patients can experience sudden onset of eye pain, headache, blurry vision, halos around lights, and nausea and/or vomiting; some symptoms may not be present
Episode is often triggered by sudden pupillary dilation from darkness (eg, lights go down in theater), sympathetic arousal (eg, emotional upset), medications
Predisposing medications include: Over-the-counter decongestants, motion sickness medications, adrenergic agents, antipsychotics, antidepressants, and anticholinergics
Examination
Signs associated with rapid increase in IOP include: Reduced visual acuity, red/injected conjunctiva, mid-dilated pupil (4 to 6 mm) that reacts poorly to light or is fixed, corneal edema or cloudiness
Measure IOP: Generally between 40 to 70 mmHg (normal is approximately 8 to 21 mmHg)
Usually one eye is affected at a time, but both eyes must be carefully examined
Management
Obtain emergency ophthalmology consultation for immediate evaluation and to discuss appropriate medical treatment
Place the patient supine
If an ophthalmologist is not available within an hour to confirm the diagnosis, and the patient has a significant decline in vision (eg, with affected eye, patient cannot read text they would normally be able to or cannot count fingers), provide immediate treatment to reduce IOP (consider possible contraindications to medications [eg, beta blocker contraindicated with severe bronchospasm, 2 or 3 degree atrioventricular block, uncompensated heart failure]):
▪ Give timolol 0.5%, one drop to the affected eye, wait one minute, then
▪ Give apraclonidine 1%, one drop to the affected eye, wait one minute, then
▪ Give pilocarpine 2%, one drop to the affected eye, wait one minute, then
▪ Give acetazolamide 500 mg IV (may give by mouth if IV medication not available)
If an ophthalmologist is not available within an hour to confirm the diagnosis, and the patient does **NOT** have a significant decline in vision, immediate treatment should be withheld **UNLESS** the IOP is significantly elevated (eg, >40 mmHg)
For all patients, relieve associated symptoms with analgesics (eg, morphine, titrate to effect) and antiemetics (eg, ondansetron, initial dose 8 mg IV)

IOP: intraocular pressure; IV: intravenous.

Take Home Points

- In a patient presenting with red eye or vision loss, obtain a detailed history of ocular symptoms (onset, progression, and previous episodes; trauma; pain; vision loss) and pertinent systemic illness (temporal arteritis, ankylosing spondylitis, fever).
- Acute angle-closure glaucoma is an ophthalmologic emergency characterized by increased eye pain, vision changes, headache, and nausea and/or vomiting. It is associated with elevated intraocular pressure due to buildup of aqueous humor in the anterior chamber.
- Management of angle-closure glaucoma involves medical control of elevated intraocular pressure followed by reversal of angle-closure by laser peripheral iridotomy or other surgical treatment. The patient should be referred urgently to an ophthalmologist.

ABOUT THE AUTHOR

This month's case was written by Maria Labra. Maria is a 4th year medical student from NSU-COM. She did her emergency medicine rotation at BHMC in April 2021. Maria plans on pursuing a career in Internal Medicine after graduation.

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