

Angle-Closure Glaucoma (Closed-Angle)

Your iris flips forward like a curtain and blocks the drain — fluid piles up, pressure spikes fast, and without emergency care you can lose your sight before the day is over.

THE ONE-LINE TRUTH

The drain inside your eye suddenly slams shut, pressure shoots sky-high in minutes, and the nerve that carries pictures to your brain can die within hours.

The chain — how it unfolds

1. The iris bows forward and its outer edge presses flat against the trabecular meshwork, blocking the drainage angle completely. — why: Fluid trapped behind the iris (often by pupillary block — the iris sticking to the lens) pushes the iris forward like air inflating a sail. The peripheral iris then touches the inside corner of the cornea and seals off the drain, so aqueous humor has nowhere to go.
2. Intraocular pressure spikes — often shooting above 40 to 60 millimeters of mercury within minutes to hours (normal is 10 to 21). — why: The ciliary body keeps making fluid at the usual rate (about 2 microliters per minute), but now the drain is shut. Fluid piles up inside a closed space, and pressure climbs fast — like blowing air into a balloon that cannot let any out.
3. The cornea swells and turns cloudy (corneal swelling (edema)), and you see rainbow halos around lights. — why: High pressure forces water into the layers of the cornea faster than the pump cells (the corneal endothelium) can clear it. The swelling scatters light, making your vision foggy and creating colorful halos — a hallmark sign.
4. You feel crushing pain in and around the eye, a severe headache on that side of your head, and often nausea and vomiting. — why: The sudden stretch activates pain fibers in the eye itself and along the branches of the trigeminal nerve (cranial nerve V), which supplies sensation to the eye, forehead, and face. Those nerve signals cross paths in the brainstem with the vagus nerve (cranial nerve X), which controls the stomach, so the brain's vomiting center can fire even though the problem is in the eye.

5. The pupil becomes mid-dilated (partially open), often oval instead of round, and does not react to light (a fixed pupil). — why: The iris muscle is stunned by starved blood flow (ischemia) (the high pressure crushes the tiny blood vessels feeding it, so it runs out of oxygen) and cannot squeeze or relax normally. A stuck, misshapen pupil is a classic exam finding.
6. The optic nerve at the back of the eye starts to die (ischemic optic neuropathy). — why: The skyrocketing pressure squeezes the small arteries that feed the optic nerve head (where the nerve enters the eyeball). Without blood flow, the nerve fibers run out of oxygen and begin to die within hours — just like a stroke in the brain.
7. Vision loss becomes permanent if the pressure is not lowered within hours. — why: Once optic nerve fibers are dead, they never grow back or regenerate. You lose that part of your visual field forever — often starting with peripheral (side) vision and progressing to total blindness in that eye if untreated.
8. Without emergency treatment, the entire eye can go blind and develop chronic pain, inflammation inside the eye (uveitis), or scarring. — why: Prolonged high pressure kills the whole optic nerve and damages other structures (the retina, the iris, the lens). The dying tissue can trigger ongoing inflammation, and scar tissue can form, leading to a painful, blind eye that may eventually need to be removed or treated with ongoing drops to control pain.

Spot it — what you see, and why

- Sudden, severe eye pain: The pressure inside the eye shoots up very fast when the drain for eye fluid suddenly gets blocked (the iris flops forward and covers the drainage angle like a curtain falling over a gutter). This stretches the eyeball's wall and presses on pain nerves inside, causing intense aching or throbbing pain.
- Blurry vision or sudden vision loss: When pressure inside the eye spikes (sometimes above 40 or 50 mmHg, much higher than the normal 10–21), it squeezes the optic nerve (the cable that carries pictures from your eye to your brain) and cuts off blood flow to the retina (the thin sheet at the back of the eye that captures light). Without enough blood and oxygen, the nerve and retina can't work right, so vision gets foggy or goes dark.
- Seeing halos or rainbow rings around lights: The high pressure makes the cornea (the clear dome on the front of your eye) swell with fluid, like a sponge soaking up water. The swollen cornea scatters light into colors as it passes through, creating rainbow rings around lamps, headlights, or any bright source.
- Red eye: The sudden pressure increase makes tiny blood vessels on the white part of the eye (the conjunctiva and episclera) swell and leak, turning the eye pink or red. It's like when your skin gets red and puffy after you bump it—the blood vessels open up in response to stress and injury.

- Headache (often on the same side as the affected eye): Pain nerves from the eye share the same pathways to the brain as nerves from your forehead and temples (they all feed into the trigeminal nerve, the face's main feeling nerve). When the eye hurts badly, the brain sometimes reads that signal as head pain too, especially around the eyebrow and temple on that side.
- Nausea and vomiting: The eye pain is so intense that it triggers the vagus nerve (a big nerve that runs from your brain down to your stomach and gut). This nerve tells your stomach to feel sick and sometimes makes you throw up, even though the problem is in your eye, not your belly.

Red flags — act now

- Sudden severe eye pain with vision loss (permanent blindness can happen within hours if pressure is not brought down)
- Headache with nausea and vomiting along with eye redness (not just a stomach bug—this triad means possible angle closure)
- Eye feels rock-hard to gentle touch through the eyelid (sign of dangerously high pressure)
- Pupil is mid-sized, oval, and does not shrink in bright light (shows the iris sphincter muscle is damaged by pressure)
- Symptoms in someone over 60, far-sighted, or of East Asian or Inuit descent (these groups have narrower drainage angles and higher risk)

Treat it — in this order

1. Intravenous hyperosmotic agent: mannitol 20% IV (1–2 g/kg over 30–60 minutes) OR oral glycerin 50% solution (1–1.5 g/kg) → These medicines pull water out of the eye by creating a concentration difference in the blood—like adding salt to a sponge to make it release water. Mannitol and glycerin shrink the vitreous gel (the clear jelly that fills the back of the eyeball), which drops the pressure fast, usually within 30–60 minutes. This buys time to do definitive treatment such as laser iridotomy. Mannitol is given in the hospital through an IV; glycerin can be given by mouth in the office or emergency department.
2. Topical beta-blocker (timolol 0.5% eye drops, one drop twice) and topical alpha-2 agonist (apraclonidine 1% or brimonidine 0.2%, one drop) → Beta-blockers reduce the amount of clear fluid (aqueous humor) your eye makes inside the ciliary body (the ring of tissue behind the iris that produces eye fluid), by blocking beta receptors on the cells that make fluid. Alpha-2 agonists (apraclonidine and brimonidine) also reduce fluid production and help fluid drain out through a backup route called the uveoscleral pathway (through the wall of the eye). Together they lower pressure by 20–30% within 1–2 hours—like turning down the faucet and opening a second drain at the same time.

3. Carbonic anhydrase inhibitors: oral acetazolamide 500 mg OR topical dorzolamide 2% or brinzolamide 1% eye drops → These medicines block an enzyme called carbonic anhydrase inside the ciliary body, which the cells need to make aqueous fluid. Blocking this enzyme cuts fluid production by 40–50%. Oral acetazolamide works faster and stronger than the eye drops and begins lowering pressure within 2 hours—like shutting off most of the water supply to a backed-up sink. The eye drops (dorzolamide or brinzolamide) are weaker but still help and can be used if the patient cannot take pills.
4. Topical pilocarpine 1–2% eye drops (one drop every 15 minutes for two doses, then every 6 hours), given ONLY after IOP drops below 40 mmHg → Pilocarpine is a cholinergic agonist that forces the pupil to constrict (get very small) by stimulating the iris sphincter muscle. This pulls the peripheral iris away from the trabecular meshwork (the drain) and can help open the angle—like pulling back a curtain. It also makes the ciliary muscle contract, which stretches and opens the trabecular meshwork to help fluid escape.
5. Topical corticosteroid eye drops (prednisolone acetate 1%, one drop every 1–2 hours initially, then tapered) → Steroid eye drops reduce inflammation inside the eye triggered by the high pressure and the blocked angle. Inflammation causes pain, redness, and makes the angle tissues sticky and swollen, which can keep the angle closed even after pressure drops. Steroids (such as prednisolone acetate) calm this inflammation by blocking inflammatory signals like prostaglandins and cytokines inside the eye.

Your top priorities at the bedside

1. Get the patient to an eye doctor (ophthalmologist) immediately, or call for emergency help if one is not available right away. — why: The pressure inside the eye is crushing the nerve that sends signals to the brain. If the pressure stays high for more than a few hours, the nerve dies permanently and the person goes blind in that eye. This is a true eye emergency, just like a heart attack is a heart emergency. Every minute counts.
2. Keep the patient calm, in a comfortable position (sitting up is often easier), and dim the lights in the room. — why: Bright lights make the pupil shrink, which sounds good, but the sudden change can sometimes make the blockage worse at first. Dim lights are gentler. Sitting up can also help fluid drain a bit better. Staying calm keeps blood pressure steady, which helps prevent the eye pressure from climbing even higher.
3. Do not give the patient anything to eat or drink until the doctor says it is okay. — why: The patient might need emergency surgery or a laser procedure to open the drain and save the eye. If there is food or liquid in the stomach, anesthesia (medicine to make them sleep or numb) is more dangerous because the person could vomit and breathe it into the lungs. Keeping the stomach empty keeps them safe if they need a procedure quickly.