

## 20 Questions – Eye Emergencies

1. You are called for an assault. The patient sustained a blow to the R eye. He is alert, awake, with a moderate headache. His R pupil is 5mm and nonreactive, L 3mm and briskly reactive. Does this patient likely have a horrible intracranial bleed?
2. What are some causes of unequal pupils?
3. What is THE number one thing you need to ask a patient with an eye injury?
4. Describe a very basic prehospital eye exam...
5. A student was punched in the eye, and complains of decreased vision (light perception only). He complains of headache and nausea. On exam, the pupil appears irregular. The sclera (white of the eye) is red and boggy. What has probably happened?
6. Why should a gauze eye patch NOT be used on this eye, and what other treatment should be provided?
7. A worker was working on a grinder and felt something 'go into his eye'. He states it is not worsening, and he will see what it feels like in the morning. What is the danger with this type of injury?
8. After tetracaine drops (topical anesthetic), the patient feels no improvement. Why is this?
9. What is one of the general risks of using tetracaine?
10. While examining a 60 year old with a headache and vomiting, you find the patient's left pupil to be fixed at 5mm and the cornea (clear part) is hazy. What could this be, and what is the risk if this is untreated?
11. A child has sudden severe swelling to the eyelids on one side of his face while blowing his nose. Though the vision is normal and the eye looks normal, the lids are terribly swollen and you feel crepitus. The boy's mother recalls he was hit in the eye a week ago with a ball, but has been 'fine' since then. What happened?
12. Another child is hit in the eye with a ball and complains of visual loss. On exam, the clear part of the eye appears partially filled with blood. What is this, and how dangerous is it?
13. On awakening after a few too many something or others which led to protracted vomiting, a teenager calls 911 because he 'freaked' when he saw that the white of his R eye was 'totally blood'. He has no pain, and his vision is fine. What is this, and how dangerous is it?
14. How important is it to remove contact lenses, and how quickly does this need to happen?
15. A child's eye has become stuck shut with superglue. She is able to move her eyeball in all directions under the lid, but is scared. Are the jaws of life indicated?
16. A janitor was splashed in the eye with a cleaning agent. The eye is red and painful. What is the treatment for chemical injuries to the eye?
17. The agent is an alkali. Why are these agents particularly dangerous?
18. A co-worker complains of her eyes feeling 'gritty' after spending the day on the water. Unfortunately you sat on and broke her sunglasses during a recent shift so she didn't have any to wear. What is this and what can you do to prevent it from happening to you?
19. Your partner gouges himself in the eye to avoid seeing any more of your vacation photos. The pain subsides briefly, but then increases progressively. He feels like something is 'scraping' the eye. This is the most common eye injury seen in the ED. What is it?
20. You try tetracaine drops, which completely relieves the pain. He wants to use them the rest of the shift. Why is this a really BAD idea?

## 20 Answers – Eye Emergencies

1. Doubtful. When a patient sustains local eye trauma and has a dilated pupil with normal mental status and normal neuro exam, the dilation is almost certainly due to the eye injury. Called traumatic mydriasis, it does not by itself signify a severe eye injury. Unless the patient's mental status or exam changes, he can be carefully monitored and transported routine.
2. 20% of the population have unequal pupils normally, but the difference is usually only a millimeter or two. Anything more is not normal. Eye drops or other medicines can cause pupils to dilate (red topped drops, Visine, or even nasal sprays and nebulizers) or constrict (green topped drops like pilocarpine). Surgery, trauma, head injury, and inflammation (iritis or glaucoma) are a few others. Rarely, tumors and strokes can cause pupil findings.
3. Oh, say can you see? Visual acuity is THE number one thing to assess, because it will tell you how much you need to worry. A good test is to have them read newsprint, the small print on an ID, etc. at about 14 inches. Many patients will say they have 'blurry' vision, but what they mean is they have lid swelling, tearing, etc. and if they focus, often their vision is normal. Abnormal vision is a cause for concern (unless they usually have glasses – in which case see if they think it's worse than usual).
4. Testing gross visual acuity is key. If they can't read, have them count fingers at an arm's length. If they can't do that, see if they can see motion, and if all else fails, can they determine light vs. dark? Check to see that the whites are white, the lids are clear, the pupils equal, round, and reactive. The cornea and the anterior chamber behind it should be clear, and the patient should be able to look up, down, and to both sides. This will tell you in 30 seconds about all you and the ED staff will need to know initially.
5. This patient has probably sustained a globe rupture, which is very bad. Fluid is probably leaking, or communicating with the outside or between the eye chambers. The key to this injury is decreased vision with a 'pointing' pupil. Look closely and you may see a tear of the iris (colored part) right where it joins the white of the eye (usually the pointing pupil points at this tear). Anytime a patient has boggy redness of the entire sclera after trauma (surface looks rough and irregular, not smooth), especially with decreased vision, think of and treat for globe rupture.
6. Pressure on the eye may cause more fluid to be forced out. This fluid loss can lead to further damage. Use a metal eye shield for all traumatic injuries (or any dressing that puts no pressure on the eye). If the patient can tolerate it, try to patch the good eye to avoid the patient looking around and possibly increasing the damage. Sit the patient at 45 degrees if possible. Treat nausea aggressively, as the increased pressure in the eye from vomiting may cause further damage. This patient will need emergency surgery, and even then is not assured of a good outcome.
7. Any metal / metal hammering or grinding injury has the potential to cause the metallic piece to penetrate the eye. The fragments are sharp and are moving at high speed. The eye's surface often self-seals, so the only way to pick this up is on x-ray. Failure to diagnose this early can lead to inflammation deep in the eye and blindness.
8. Tetracaine anesthetizes the cornea, or surface of the eye. Any irritation of the deeper structures (iris, etc.) will not respond to the drops. However, superficial injuries often improve markedly.
9. Because the surface of the eye is anesthetized, it is possible to do almost anything (rub, dig at with sharp sticks) to the cornea without feeling it, thus you and the patient need to be careful with the surface of the eye while it is anesthetized. Be sure to ask about allergies to local anesthetics before using; though rare, they may be severe.
10. Acute angle-closure glaucoma often presents with headache and vomiting. The vision is usually not normal, and the cornea appears 'steamy' or cloudy. The sclera is red, and it

usually hurts to move the eye. Untreated, the patient will probably have permanent visual loss. Emergent drug therapy to reduce the pressure in the eye is required.

11. This is a relatively common story. Trauma to the orbit is followed by a much less exciting period until the patient blows his/her nose. With the initial trauma, the patient suffered a blowout fracture of the orbit. The bone between the orbit and nasal cavity is very thin (it's latin name means paper plate) and easily fractured by a direct blow to the eye. When the patient blocks his nose and blows, the pressure forces air explosively through the fracture and into the orbit and lids. This is very dramatic, but usually requires antibiotics and observation alone, as long as the patient has normal vision. Rarely, the air pressure in the orbit becomes high enough that it disrupts vision and must be decompressed.
12. Accumulation of blood in the anterior chamber of the eye (that part in front of the iris, or colored ring) is called a hyphema. Hyphemas can vary from very small to complete (so-called 8-ball hyphema, when the entire chamber is filled with blood, and no structures are visible). Patients should be kept upright to help gravity keep the blood toward the bottom of the eye. Treatment generally is pain control and sometimes steroid eye drops, with ophthalmology following the patient to assure resolution.
13. Subconjunctival hemorrhage (no distortion of the surface of the sclera, as opposed to chemosis, in question 5) which is not associated with severe trauma or pain is benign, though it looks impressive. It usually occurs with straining, coughing, vomiting, or trauma. It will usually take 2-3 weeks to resolve. No treatment is needed. Some facial fractures may be associated with scleral hemorrhage, so if the cause was traumatic, the patient needs physician evaluation.
14. Today's contact lenses are generally designed for longer wear than the earlier true hard lenses. It is not necessary (or even desirable) to remove contacts in the field, though their presence should be noted and the receiving hospital advised (sometimes they will slip off the cornea and under the lid, and if you don't mention that you saw them, they may not be found!). The risk of leaving them in place on the cornea is corneal damage due to decreased oxygen supply and lubrication.
15. No. As long as the cornea is not glued to the lid also (freely mobile beneath the lid) the only treatment required is to apply mineral oil, Vaseline, or bacitracin to the lids frequently for a day or two. This will cause the glue to break down, and the lids will open. Acetone will break down the glue as well, but is NOT recommended on skin, especially around the eye...
16. Use topical tetracaine to anesthetize the eye, then irrigate, irrigate, irrigate. Use an eyewash if present, otherwise use normal saline poured, or via blood tubing. Help the patient keep the lids open and wash from medial to lateral (nose to ear) side. Morgan lenses are useful in cooperative patients, but can be difficult to put in.
17. Alkaline agents penetrate into the eye, and continue to burn as they go. They are very difficult to treat, as they continue to leach out for hours. Sometimes, continuous irrigation for >12 hours has been needed until the eye's pH returns to normal. Acids tend to cause local, direct damage. They can be dangerous as well, but if you have to choose one to splash in your eye, choose acid; the odds of a good outcome are much better.
18. Snow blindness, or solar keratitis, can occur in all seasons. It happens when the surface of the cornea is 'burned' from exposure to UV light. This most commonly occurs on sunny winter days when sunglasses aren't used, but can occur in summer on the water, in welders who don't wear their face shields, etc. The exposure duration required to cause the injury is directly related to the intensity of the light source. Hours after the exposure the eyes feel irritated, this progresses to severe pain that can last for a few days. It is treated with antibiotic drops or ointment, pain meds, and almost never results in lasting damage.

19. A corneal abrasion is a scratch to the cornea. The feeling that 'something's in my eye' is classic, as is progressive irritation following the injury. Deep eye pain, pupil abnormalities, and visual changes are NOT typical and usually suggest something worse. Abrasions are treated with antibiotic drops or ointment. Patching does not speed resolution. Healing usually occurs within 72h.
20. Aside from the potential to further injure your eye (above), tetracaine can slow corneal healing, and repetitive use can result in a corneal ulcer forming (though recent studies show dilute solutions may be safe to use). Corneal ulcers are deeper injuries than abrasions and are more likely to have complications that may result in permanent injury to the eye. Patients will not be aware of this, however, and will often pocket the bottle of tetracaine given the opportunity to do so after it greatly relieves their pain...

**Enjoy the last month of summer and save room for some fair food!**