

Super Review Quiz

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It's doubtful that you'll come across many eye questions on your medical boards, but it's always possible. All of the background knowledge needed to answer these questions can be found throughout the prior chapters and I've attempted to keep the difficulty at a student level.

To save you from excessive page flipping, I've listed the answers *after* each question. You may want to put your hand over the answer box as you work through these problems. In the immortal words of Douglas Adams:

Don't Panic!

1. Which **conjunctivitis** is *least* likely to occur bilaterally?
 - a. allergic
 - b. viral
 - c. bacterial
 - d. vernal

Answer: The correct answer is (c) bacterial. Allergies are likely to affect both eyes and present with itching and watering. Vernal is a type of seasonal allergy you see in young boys. Viral conjunctivitis usually starts in one eye, but hops to the other eye as it is very contagious. Bacterial conjunctivitis can occur bilaterally, but of the available choices is most likely to occur in just one eye.

2. You're consulted by an intern from the ICU because his ventilated patient, with a head injury, has a fixed and dilated pupil. The intern is concerned for acute glaucoma. What do you tell him?
 - a. find a Tono-Pen and check the pressure
 - b. call his upper-level fellow immediately
 - c. taper the patient's benzos
 - d. increase the PEEP ventilator setting

Answer: Well, you need more history, of course, but any blown pupil in a trauma-ICU should make you think of an uncal-herniation and impending death. Tell him to (b) find his senior resident/fellow/attending immediately and call you back if they still want an eye-consult.

3. Which optic nerve finding is most concerning for glaucomatous damage?

- a. large disk size
- b. horizontal cupping
- c. vertical cupping
- d. disk tilt

Answer: The correct answer is (c) increased vertical cupping, which would go against the ISNT rule (the **I**nferior and **S**uperior neural rim is normally the thickest with the **N**asal and **T**emporal thinner). Many patients have large myopic (near-sighted) eyes with resulting large optic disks and disk “tilting” from the angle at which the nerve enters the back of the eye – these are physiologically normal variants and are not concerning for glaucoma.

4. A young 23-year-old black man presents with a **hyphema** in the right eye after blunt injury. All of the following are acceptable initial treatments except?

- a. sleep with the head elevated
- b. prednisolone steroid eye drops
- c. cyclopentolate dilating drops
- d. carbonic anhydrase inhibitor pressure drops

Answer: The correct answer is (d). For patients with hyphema (blood in the eye) advise them to avoid straining and sleep with their heads elevated to allow the blood to settle. Use steroids to decrease the inflammation and a medium-acting cycloplegic to dilate the eye for comfort and to keep the inflamed iris from “sticking” to the underlying lens. If the pressure is high, you can use pressure drops, but we avoid CAIs in African Americans as it induces RBC sickling in sickle-cell patients. You can get a sickle prep if you are suspicious for this disease.

5. A 7-year-old boy presents with a grossly swollen eyelid. His mother can't think of anything that set this off. What finding is *most* characteristic of a dangerous **orbital cellulitis**?

- a. chemosis
- b. warmth and erythema of the eyelid
- c. physically taut-feeling eyelid
- d. proptosis

Answer: The correct answer is (d). With any eyelid cellulitis, you must determine if the infection is pre-septal or post-septal (i.e., orbital cellulitis). While chemosis is certainly seen with orbital infection, a proptotic bulging eye is even more indicative of orbital infection. Other signs include decreased eye-movement, pain with eye-movement, and decreased vision.

6. What location for a **retinal detachment** would be most amenable to treatment by pneumatic retinopexy?

- a. inferior rhegmatogenous detachment
- b. superior tractional retinal detachment
- c. superior rhegmatogenous detachment
- d. traumatic macular hole

Answer: This question covers several concepts. Rhegmatogenous detachments are the classic detachment occurring from a break in the retina. A pneumatic retinopexy is the technique of injecting a gas bubble into the eye that floats and tamponades the break. Gas bubbles require careful head-positioning and work best for superior breaks (patients can't stand on their heads for weeks for inferior breaks). The correct answer is therefore (c).

7. A mother brings in her two-year old child because she is concerned that her baby is cross-eyed. Which of the following is an *inappropriate* statement:

- a. the baby may maintain 20/20 vision
- b. the esotropia could lead to permanent vision loss
- c. the esotropia might be corrected with glasses alone
- d. surgical treatment should be delayed until adolescence

Answer: Answer (d) is the inappropriate statement. Esotropia (cross-eyed) is a common finding in the pediatric clinic. There are many causes, and one of them is poor vision in one eye. Spectacle vision can help anisometropic eyes fuse images properly and correct the alignment problem. This condition should be treated promptly, via spectacle correction, and possibly patching the strong eye to avoid amblyopia – if the crossing doesn't correct with these measures, then you proceed to surgical options. A child may maintain good vision in each eye if he/she learns to cross-fixate (switch eye dominance depending upon what direction the child is looking). There is no point in waiting until adolescence – you want to avoid an amblyopic eye and give the child a chance to develop good stereopsis at an early age.

8. Which of the following is the biggest risk factor for primary open angle glaucoma?

- a. Asian ancestry
- b. smaller diurnal pressure IOP changes
- c. thin corneas
- d. large optic disks

Answer: Asians are more likely to develop acute angle-closure glaucoma, not POAG. Everyone has diurnal eye pressure changes, and there is some evidence that glaucomatous patients have *larger* shifts in their pressure throughout the day. Large optic disks aren't concerning, though large *cupping* of a disk could indicate nerve fiber loss from glaucoma. Thin corneas ARE associated with glaucoma, as shown by the famous OHTS clinical trial. We measure every new glaucoma patient's corneal thickness with a small ultrasound pachymeter. The correct answer is (c).

9. A 27-year-old **contact lens** wearer presents to the ER complaining of ocular irritation. On exam he has a small 2mm corneal abrasion. You should

- a. treat with erythromycin ointment
- b. treat with ciprofloxacin drops
- c. bandage contact lens for comfort and speed reepithelialization
- d. patch the eye and follow-up in 72 hours

Answer: You need to be concerned for pseudomonas infection in any contact lens wearer. Erythromycin is great stuff, but these higher risk patients should get something stronger like a fluoroquinolone (cipro). A bandage contact lens can help with painful abrasions, but I'd avoid one in this patient as the abrasion isn't big, and you typically don't patch ulcers. Patching can also be used to help with lubrication and comfort, but I never patch a potential infection, as bacteria like to grow in dark warm environments. If you decide to patch, you need to see your patient daily to make sure nothing is brewing under that patch. The most appropriate answer is (b).

10. A woman presents to you complaining of a **red**, watering eye for the past two days with stinging and some photophobia. Her vision has dropped slightly to 20/30. She has a history of diabetes and is taking drops for glaucoma, but is otherwise healthy. The most likely cause of her redness is:

- a. angle-closure glaucoma
- b. viral conjunctivitis
- c. diabetic retinopathy
- d. papilledema

Answer: This woman probably has a history of POAG (primary open angle glaucoma) if she is on drops. If she were to have an acute angle closure, her eye would be very painful and the vision would have gotten much worse from corneal edema. Diabetic retinopathy is usually a background finding of leaky vessels in the retina and doesn't create this picture. She merits a full eye exam, but her symptoms are consistent with "pink eye," with viral conjunctivitis being the most common cause in an adult. The correct answer is therefore (b).

11. A patient presents after MVA with a fracture of the orbital floor. What would be the indication for surgery in the near future?

- a. double vision that worsens with upgaze
- b. chemosis and moderate proptosis
- c. restricted forced ductions
- d. decreased extraocular movement

Answer: Floor fractures are very common and these patients always look impressively bad on exam, with marked swelling and subconjunctival bleeding. They can have decreased EOMs and proptosis from this swelling alone, which shouldn't concern you. More worrisome is entrapment of the inferior rectus muscle in the orbital floor – this entrapment can only be determined by forced ductions ... grab the limbus with forceps and tug on the eye to see if movement is restricted. The correct answer is (c).

12. A 64-year-old man presents to you with new onset of “crossed-eyes.” His left eye can't move out laterally and he has a chronic mild headache that he attributes to eyestrain. Which of the following is least likely the cause of his condition:

- a. hypertension
- b. diabetes
- c. aneurysm
- d. increased intracranial pressure

Answer: The most common causes of all the ocular nerve palsies are from vasculitic events secondary to diabetes or hypertension. It sounds like this patient has a CN6 palsy as he can't abduct his eye. With abducens palsy you should always consider increased intracranial pressure. An internal carotid aneurysm *could* hit the 6th nerve in the cavernous sinus, but you would expect other findings with these cavernous lesions. Aneurysms in general cause more third nerve palsies. Thus, the correct answer is (c).

13. The abducens nucleus would be most affected by a brainstem lesion at:

- a. pons
- b. mid-brain
- c. medulla
- d. foramen magnum

Answer: To answer this question you need to know where the 6th nerve nucleus is located. One useful aid is the “4-4 Rule,” which states that the bottom four nuclei (CN 12,11,10,9) are in the medulla, while the next four nuclei (CN 8,7,6,5) are in the pons. The correct answer is therefore (a).

14. The pupillary defect that affects the *afferent* arm of the pupillary response is the:

- a. Marcus Gunn pupil
- b. Argyll Robberson pupil
- c. Adies pupil
- d. Horner's pupil

Answer: A Marcus Gunn pupil is the classic afferent pupillary defect (APD) that we check with the swinging light test. The Argyll Robberson is the syphilitic pupil that reacts with near vision, but doesn't respond to light. Horner's and Adies are disorders of the sympathetic and parasympathetic efferent pupil response. The correct answer is (a).

15. Aqueous fluid is produced in which chamber?

- a. anterior chamber
- b. vitreous chamber
- c. posterior chamber
- d. trabecular chamber

Answer: There are actually three chambers in the eye. Aqueous is produced in the posterior chamber where it flows forward into the anterior chamber and drains through the trabecular meshwork into the canal of Schlemm. The vitreous chamber is the big one in the back that is filled with jelly-like vitreous humor. The correct answer is therefore (c).

16. Which **orbital bone** is most likely to fracture with blunt trauma to the eye?

- a. zygomatic
- b. maxillary
- c. ethmoid
- d. sphenoid

Answer: The orbital floor, which is formed by the maxillary bone, is the most commonly fractured wall of the orbit. Orbital fat will commonly herniate through this bone and muscle can get stuck if the break acts like a trapdoor. The ethmoidal lamina papyracea is also often broken because it is the thinnest, but this occurs less often because of extensive bolstering. The lateral zygomatic component of the orbit is rarely broken, nor the more posterior sphenoid. The correct answer is (b)

17. When a patient focuses on near objects, the lens zonules:

- a. rotate
- b. contract
- c. relax
- d. twist

Answer: The zonules connect to the lens periphery and suspend the lens like a trampoline to the surrounding ciliary muscle. With near vision, the ciliary body contracts like a sphincter, causing the zonules to relax, and the lens to get “rounder.” This rounding of the lens increases its refractive ability and allows focusing on near objects. With age, the lens hardens and loses its ability to round out – a process called presbyopia. The correct answer here is (c).

18. What is glaucoma?

- a. retinal damage from high intraocular pressure
- b. optic nerve death caused by mechanical stretching forces
- c. ischemic nerve damage from decreased blood perfusion gradients
- d. none of the above

Answer: The best answer here is probably the last one, as no one really understands the pathogenesis of glaucoma. Ultimately, it involves death of the nerve fibers and it seems associated with high ocular pressure. However, there are plenty of patients out there with glaucoma damage and normal eye pressure, so pressure isn't the “ultimate cause” – but this is certainly the only risk factor that we can treat. There are many mechanical and biochemical theories that explain glaucoma damage, and each has its merits and faults.

19. Which condition would result in an inaccurately high reading with applanation pressure measurement?

- a. thin cornea
- b. thick cornea
- c. edematous cornea
- d. keratoconus

Answer: We measure pressure by pushing the cornea with a weighted device called an applanation tonometer – a process I compare to kicking a car tire to determine the air pressure. Thick “truck-tire corneas” are going to feel hard when you measure them. Conversely, thin “bicycle-tire” corneas are going to feel softer. Corneal edema also makes the eye feel squishy (giving a falsely low pressure) and patients with keratoconus often have thin corneas. The correct answer here is (b).

20. Gonioscopy overcomes the concept of:

- a. angled biomicroscopy
- b. spherical aberration
- c. total internal reflection
- d. specular microscopy

Answer: The trabecular meshwork can't be visualized directly because light coming from this angle bounces off the cornea (technically, the tear film) back into the eye because of Snell's Law and total internal reflection. By placing a hard glass lens onto the eye, the cornea-air interface is broken and light can escape and be seen through the microscope. The correct answer is therefore (c).

21. A 32-year-old white man with a history of type-1 diabetes presents to you complaining of decreased vision. He has not seen an eye doctor in years. On exam, you find numerous dot-blot hemorrhages, hard exudates, and several areas of abnormal vasculature in the retina. Pan-retinal photocoagulation might be done in this patient to:

- a. kill ischemic retina
- b. tamponade retinal tears
- c. ablate peripheral blood vessels
- d. seal off leaking blood vessels

Answer: PRP is performed to kill areas of peripheral ischemic retina. By doing so, less VEGF is produced, leading to cessation and regression of neovascularization. While it is true that we sacrifice some of the peripheral retina with PRP, it is worth it to save important central vision. Lasers *can* be used to help peg down retinal tears and to help with leaking vessels ... but this is called “focal laser therapy.” The correct answer here is (a).

22. Which of the following is a risk factor for retinal detachment?

- a. black race
- b. male sex
- c. presbyopia
- d. myopia

Answer: The correct answer is (d) myopia. Myopic (near-sighted) eyes are large eyes with a stretched-out retina that is more likely to tear at the periphery. Neither blacks nor males are at higher risk of RD. Presbyopic lens hardening occurs with age and doesn't have anything to do with the retina.

23. A 57-year-old man complains of flashing lights and a shade of darkness over the inferior nasal quadrant in one eye. On exam you find the pressure a little lower on the affected eye and a questionable Schaffer's sign. What condition would lead you to immediate treatment/surgery?

- a. macula-off rhegmatogenous retinal detachment
- b. epi-retinal membrane involving the macula
- c. dense vitreous hemorrhage in the inferior nasal quadrant
- d. mid-peripheral horseshoe tear with sub-retinal fluid

Answer: Schaffer's sign is when you see pigment behind the lens on slit-lamp exam, and occurs when a tear of the retina allows the underlying pigment to release into the vitreous chamber. A macula-off retinal detachment is unfortunate, but isn't an immediate emergency. It certainly needs to be repaired, but can wait for a few days if necessary, as the damage to the detached macular photoreceptors has already occurred. Epi-retinal membranes are common and aren't an emergency unless actively creating a tractional detachment. Vitreous hemorrhage is not an emergency either, assuming there isn't a detachment behind that blood on your ultrasound. Smaller retinal tears, however, need to be treated early to make sure they don't progress and peel off the macula. The answer is (d).

24. Oral doxycycline helps blepharitis patients by:

- a. antibiotic tear secretion
- b. changing lipid viscosity
- c. inhibiting cytokine release
- d. improved lacrimal gland excretion

Answer: Doxycycline changes the lipid viscosity of the meibomian gland secretions, improving oil secretion from the gland into the tear film. This superficial lipid layer is needed to keep the tears from evaporating too quickly. The correct answer is (b).

25. Put the following retinal layers in order from inside (next to the vitreous) to outside:

- a. ganglion nerves, photoreceptors, choroid, then sclera on the outside.
- b. photoreceptors, ganglion nerves, choroid, then sclera on the outside.
- c. choroid, photoreceptors, ganglion nerves, then sclera on the outside.
- d. choroid, ganglion nerves, photoreceptors, then sclera on the outside.

Answer: The correct answer is (a). This question illustrates a few important concepts. The first is that the photoreceptor cells lie relatively deep in the retina, such that light has to pass through many layers to reach them. One of these layers is the ganglion nerve layer, comprised of nerve fibers that course along the surface of the retina toward the optic nerve. The choroid is a deeper bed of blood vessels that nourishes the photoreceptors from below, while the sclera is the tough collagen matrix that forms the outer wall of the eye.

26. In the absence of lens accommodation, a myopic eye focuses images:

- a. in front of the lens
- b. In front of the retina
- c. behind the retina
- d. behind the cornea

Answer: The correct answer is (b). Myopic, or near-sighted eyes, are typically large eyes that focus images in the middle of the eye, in front of the retina within the vitreous chamber. These eyes require a minus concave-shaped lens in their glasses - this effectively weakens the overall refractive power of the eye, allowing images to focus further back on the retina.

27. A man calls the office complaining of eye pain after splashing bleach in his eye. You should instruct him to:

- a. patch the eye and immediately go to the office
- b. irrigate the eye for 15 minutes and then go to the office
- c. immediately apply lubricating ointment and then go to the office
- d. immediately wash the eye with contact saline solution and go to the office if he notices any change in vision

Answer: The final visual outcome for a chemical burn is going to depend upon how quickly the chemical is washed out of the eye, so have your patient wash out their eye immediately! Chemical injury is one of the few eye problems that you treat prior to checking vision. The correct answer here is (b).

28. What antibiotic would you use in a newborn with suspected chlamydial conjunctivitis?

- a. Ciprofloxacin drops
- b. Erythromycin drops
- c. Oral Doxycycline
- d. Erythromycin drops and oral erythromycin

Answer: Chlamydia is one cause of conjunctivitis you should suspect in the newborn. Treatment involves topical drops such as erythromycin and systemic coverage because of concurrent respiratory infections these kids can develop (chlamydia infects mucous membranes and can cause pneumonitis). You don't use doxy in children (especially under the age of eight). Fluoroquinolones might work, but we don't use them in children because of theoretical bone suppression. The correct answer is (d).

29. You are measuring eye deviation in a child with strabismus. The corneal light reflex is 2mm temporal to the pupil in the right eye. How much deviation would you estimate?

- a. 10 diopters esotropia
- b. 20 diopters exotropia
- c. 30 diopters esotropia
- d. 40 diopters exotropia

Answer: You can estimate eye alignment using the Hirschburg rule – for every millimeter the corneal light reflection is decentered, equals 15 diopters of deviation. This child has 30 diopters of esotropia, so (c) is the correct answer.

30. Steroids typically induce what kind of cataract?

- a. Nuclear sclerotic
- b. Posterior polar
- c. Posterior subcapsular
- d. Cortical

Answer: Steroids and diabetes are classically known to cause posterior subcapsular cataracts on the back surface of the lens. Nuclear sclerotic cataracts are common and usually result from aging, while posterior polar cataracts are often congenital. Cortical cataracts are also common and are rather nonspecific. The correct answer is (c).