

Glaucoma

Eye series 7

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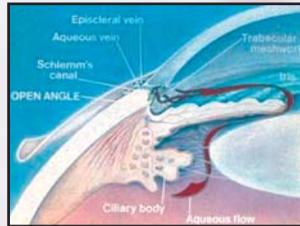


Figure 1. Aqueous humour flow

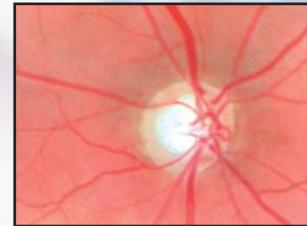


Figure 2. Appearance of glaucomatous optic nerve

A 48 year old woman presents for a check up. She mentions that during a recent eye check, the ophthalmologist told her she was at high risk for glaucoma and should return in six months for review. She wears glasses for driving but has had no previous ocular trauma and is unsure of any family history of glaucoma. Apart from slightly raised blood pressure she is very healthy.

Question 1

What is glaucoma?

Question 2

What clinical features alerted the ophthalmologist to the possibility of glaucoma?

Question 3

What symptoms will a patient with glaucoma suffer?

Question 4

List the known risk factors of glaucoma.

Question 5

How is glaucoma treated?

Answers

Answer 1

The third leading cause of blindness in the world, glaucoma refers to a group of diseases leading to optic nerve head damage that correlate with changes in the patient's visual field. Intraocular pressure (IOP) is the major risk factor, however, glaucoma can occur with normal IOP (Figure 1).

Answer 2

On a dilated retinal examination the practitioner will see a number of changes:

- the optic nerve head shows loss of neural tissue with cupping (Figure 2)
- increased intraocular pressure (IOP). The normal range of pressure within the eye is between 12–22 mmHg. Although not a diagnostic sign for glaucoma, an IOP measurement above 22 mmHg represents a significant risk factor for the disease. Importantly up to one-third of patients with glaucoma have an IOP less than 21 mmHg at the initial exam
- typical peripheral vision loss on visual field testing (Figure 3).



Figure 3. Visual field of a patient with advanced glaucoma

Answer 3

Unfortunately symptoms rarely occur until late in the disease. Indeed, around 50% of cases will remain undiagnosed. For this reason it is common for the patient to be unaware of any particular family history of the condition. As the condition increases, small blind spots may begin to appear in the peripheral vision. Patients may note that they are beginning to notice problems reading if the blurred spot is close to fixation.

Rarely, a person will have an acute attack of angle-closure glaucoma. This will lead to severe pain, headache and nausea and a severe decrease in vision. This is an ocular emergency, and the patient should be referred immediately to an ophthalmologist. Those particularly at risk are

the elderly with cataract, especially those who are longsighted as the anterior chamber is shallower.

Answer 4

Several risk factors exist for glaucoma. These include:

- IOP – the higher the IOP the greater the risk of developing glaucoma
- age – the older the person the greater the prevalence
- race – although no particular reason is known, black people are at a higher risk
- family history – a first degree relative with glaucoma signifies a three-fold increased risk of developing the disease
- diabetes – possibly due to a compromise of the circulation of the optic disc, diabetic patients are at double the risk of the average person
- blood pressure – poorly controlled hypertension has the strongest relationship with glaucoma. Any patient diagnosed with glaucoma that has concurrent hypertension should work closely with both their GP and ophthalmologist
- migraine and vasospasm – alterations in the blood flow such as those due to vasospasm and migraine can also be associated with ocular changes
- myopia – the more shortsighted a patient, the higher the risk of developing glaucoma. A moderately myopic patient has approximately twice the risk of the average person
- steroid treatment can lead to an increase in IOP
- corneal thickness – thinner corneas are associated with increased risk in those patients with elevated IOP.

Answer 5

Treatment involves:

- reducing IOP. Studies have shown that although elevated IOP is a high risk factor, even in the patient with relatively normal pressure, the act of lowering the IOP can help reduce the progression of glaucoma

- reducing other risk factors and improving retinal blood flow. Hypertension and diabetes need to be closely monitored, with careful attention given to eliminating nocturnal hypotension. Sleep apnoea is an emerging cause of increased optic nerve damage
- encouraging adherence to treatment and follow up. Over 10% of blindness as a result of glaucoma is due to non-compliance.

To reduce IOP, drainage needs to be enhanced or the production of aqueous reduced. Prostaglandin type eye drops (eg. Xalatan, Travatan, Lumigan) are the usual first line treatment. These require only a single dose per day and are well tolerated by patients (initial ocular redness and foreign body sensation settles over the first month). Alpha agonist drops (eg. Alphagan) are an alternative, but these may cause drowsiness and fatigue in some patients. Beta blockers have long been used, however, this classification of drugs has been shown to produce side effects (hyperaemia, stinging, bradycardia or bronchoconstriction) in over 25% of patients.

If medication does not provide adequate control, laser therapy may be required to increase the aqueous flow by opening the trabecular meshwork (laser trabeculectomy). In patients who are at increased risk of pupil block and angle closure glaucoma due to narrow anterior angles, a peripheral iridotomy (PI) is performed to ensure aqueous flow.

In severe cases, surgery is used to bypass the conventional outflow pathways to allow drainage from inside the eye. In trabeculectomy surgery, a portion of the trabecular meshwork is removed under a partial thickness scleral flap (or ‘bleb’) allowing the aqueous to flow externally. Local antimetabolites (5 FU or Mitomycin) may be used to reduce the incidence of scarring and bleb failure. Gene therapy and neuroregeneration therapies are currently being investigated and present possible future alternatives.

Conflict of interest: none declared.

Further reading

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