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GLAUCOMA

Glaucoma is a chronic progressive eye disease causing gradual reductions in vision due to damage of the optic nerve. It is a leading cause of vision loss.

Glaucoma prevalence and incidence is highest amongst older people and affects about 1 in 10 Australians aged over 80 years. According to Glaucoma Australia 50% of people with glaucoma are undiagnosed. Initially peripheral vision declines, followed by central vision, resulting in irreversible blindness if not treated.
As there is no cure for glaucoma, the goal of treatment is to preserve remaining visual field. Intraocular pressure (IOP) reduction is the only proven treatment to prevent visual field defect progression. Eye drops, oral medications, laser therapy, and surgery have all been used to decrease IOP in glaucoma patients. Topical eye drops are the first choice as they have the highest efficacy and lowest incidence of adverse reactions.

Classification
Glaucoma can be classified as open-angle or angle-closure. Open-angle glaucoma is the most common form of glaucoma which develops slowly over time and there is no pain.

Closed-angle glaucoma can present gradually or suddenly, with severe eye pain, blurred vision, eye redness and nausea. Acute angle glaucoma is a medical emergency.

Risk factors
Risk factors for glaucoma include elevated pressure in the eye (intraocular pressure). A family history of glaucoma doubles the risk of glaucoma.
First-degree relatives have a 9-fold increased risk of developing glaucoma. Higher glaucoma prevalence has been found in Asian populations.
Obstructive sleep apnoea is associated with a nearly 2-fold risk of glaucoma. Myopia (near-sightedness) and diabetes are other significant risk factors for glaucoma.

Treatment
If treated early, it is possible to slow or stop the progression of disease. Topical drugs are first-line treatment for open-angle glaucoma, either alone or in combination.

The IOP-lowering effect of eye drops seems to wear off in some people, so annual review is necessary; and switching between classes of medications may be necessary.
Glaucoma treatment options include:

- Prostaglandin analogues (bimatoprost, latanoprost, tafluprost, travoprost)
- Beta-blockers (betaxolol, timolol)
- Alpha2 agonists (apraclonidine, brimonidine)
- Carbonic anhydrase inhibitors (brinzolamide, dorzola mide)
- Cholinergic (pilocarpine)

Prostaglandin analogues are the most effective class of eye drops. They should be administered once daily at night for best effect.

Beta-blocker eye drops are also used as first-line therapy. Beta-blocker eye drops are usually administered twice daily, with Timoptol-XE administered once daily.

Timolol eye gel (Nyogel) should be stored upside down so that the gel collects in the bottle neck.
Alpha² agonist apraclonidine (Iopidine) should only be used short-term (up to 3 months) as it is associated with a high incidence of allergic blepharoconjunctivitis (inflammation of eyelid margin and conjunctivitis). Brimonidine (Alphagan) is well tolerated when used long-term.

Alpha² agonist eye drops need to be administered two or three times daily.
Numerous fixed-dose combination products are available, combining different classes of glaucoma eye drops.
Fixed-combination eye drops should be prescribed to minimize the number of eye drops used.
Oral acetazolamide tablets (Diamox) are used to reduce intraocular pressure prior to surgery.

Angle-closure glaucoma is initially treated with laser or surgical interventions. Topical treatment may be used in those with persistent raised IOP despite laser or surgical procedures.

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Adverse reactions to glaucoma medicines

Adverse reactions to medicines used to treat glaucoma may either result from the main active ingredient or from preservatives used in the drops.

Adverse reactions may be minimized when they are detected early and prevented by:

- reducing the number of different eye drops used
- reducing the number of times eye drops are administered
- using preservative-free eye drops
- using lower concentration eye drops
- providing proper drop instillation training

Glaucoma eye drops may have hypotensive effects leading to falls, especially among older persons.
Prostaglandin analogues are well tolerated with minimal systemic side effects. All prostaglandin analogues can cause eyelash bristling/lengthening, eyelid pigmentation, iris pigmentation, and upper eyelid deepening.

Iris pigmentation occurs gradually over months to years and is irreversible. Gradual darkening, lengthening and thickening of eyelashes is reversible when treatment is stopped. This class of eye drops may also cause eye irritation, with grittiness, itching or stinging.
Prostaglandin analogues rarely cause systemic side effects.

Beta-blockers may cause systematic adverse reactions, including bradycardia, decrease in blood pressure, irregular pulse and asthma flare-ups. Timolol (Timoptol, Tenopt) is more commonly associated with systemic side effects than betaxolol (Betoptic, Betoquin).

It is generally safer to use other types of anti-glaucoma eye drops that are associated with fewer systemic side effects, especially in older people with multiple chronic conditions.
Beta-blocker eye drops may sting on installation, especially betaxolol. Alpha² agonists can cause numerous local side effects, including contact dermatitis, ocular irritation, and hyperemia (red eye). Systemic effects include fatigue, dizziness and systemic hypotension.

Carbonic anhydrase inhibitor eye drops may cause eye irritation, foreign body sensation or a bitter taste. Blurred vision is common after instillation.
Cholinergic eye drops are rarely used, as pilocarpine has a high incidence of adverse effects, including blurred vision and headache. Systemic side effects include intestinal cramps and bronchospasm.

The preservative benzalkonium chloride causes frequent adverse reactions such as superficial punctate keratitis, corneal erosion, conjunctival allergy, and conjunctival injection.
Brimonidine is available with (Alphagan) and without (Alphagan P) benzalkonium chloride preservative.
Preservative-free prostaglandin analogues (Lumigan PF, Saflutan) are available as single-dose units.

Oral acetazolamide (Diamox) is poorly tolerated with common complaints of paraesthesia of hands, face and feet.

It can also cause a bitter or metallic taste. Acetazolamide should not be used in people with a documented history of allergy to sulfonamides.

Eye drop administration

Age-related factors including visual impairment, arthritis or tremor may impair the ability to self-administer eye drops.
Contamination of the eye drop bottle tip must be avoided, particularly in people who have undergone glaucoma surgery.

Proper eye drops administration is important to reduce systemic effects. Residents should be instructed to close their eyes and to gently press on the lacrimal duct for 5 minutes after eye drops instillation. Only one drop should be administered at a time.

If eye drops spill during administration, the risks of blepharitis and eyelid pigmentation increase.
Wiping spilled eye drops off with a tissue should be avoided, as this generally spreads the medication to the lower eyelid, which exacerbates eyelid pigmentation changes.
It is better to wash off any spilled eye drops.

References:
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