Introduction

Glaucoma is the name given to a group of eye conditions that affect vision.

Research suggests that a form of glaucoma affects about two out of every 100 people in the UK who are over 40 years of age. As the risk of developing glaucoma increases as you get older,, it is important that you have your eyes tested regularly.

Glaucoma often affects both eyes, usually in varying degrees. One eye may develop glaucoma quicker than the other.

If glaucoma is left untreated it can cause blindness. However, if you have the condition diagnosed and treated early enough, further damage to your vision can be prevented.

There are four main types of glaucoma;

- open angle glaucoma (chronic glaucoma),
- acute angle closure glaucoma (acute glaucoma),
- secondary glaucoma, and
- developmental glaucoma (congenital glaucoma).

Open angle glaucoma (chronic glaucoma)

Open angle glaucoma is the most common type of glaucoma. It develops very slowly, so you may not realise that it is happening. Open angle glaucoma occurs when the drainage tubes (trabecular meshwork) within the eye become slightly blocked, preventing eye fluid (aqueous humour) from draining properly.

When the fluid cannot drain properly, pressure builds up (intraocular pressure) which can cause damage to your optic nerves and the nerve fibres from your retina. The term 'open angle' refers to the angle of space between the iris (coloured part of the eye) and the sclera (the white outer covering of the eyeball). The fact it is an open angle means that there is no physical obstruction blocking the drainage; it is the tubes that have a blockage.

Acute angle closure glaucoma (acute glaucoma)

Acute angle closure glaucoma refers to a narrowing of the angle between your iris and sclera. The narrowing often happens quickly, causing a sudden and painful build up of pressure in your eye. Acute angle closure glaucoma is quite rare.

Secondary glaucoma

A secondary glaucoma may occur as a result of an eye injury, or another eye condition, such as uveitis. Secondary glaucoma can be open angle, or closed angle.

Developmental glaucoma

Developmental glaucoma is very rare, but it can be serious. It is usually present at birth, or develops shortly after birth. Developmental glaucoma is caused by an abnormality of the eyeball.

Symptoms

Open angle glaucoma (chronic glaucoma)

There are usually no symptoms with chronic glaucoma because it occurs so slowly. People with this type of glaucoma often do not realise that their sight is being damaged. This is because the first part of the eye to be affected is the outer field of vision (peripheral vision). This often means that vision is lost from the outer rim of the eye, slowly working inwards towards the centre.

Changes in vision are often linked to getting older, which is why regular eye checks are so important. It is recommended that people who are over 40 years of age have an eye test every two years.

Acute angle closure glaucoma (acute glaucoma)

Due to the rapid development of acute glaucoma, the symptoms are often severe. They include:

- intense pain,
- redness of the eye,
- headache,
- sore, tender eye area,
- seeing halos, or 'rainbow-like rings' around lights, and
- misty vision.

As a result of these symptoms, some people may experience nausea and vomiting.

The symptoms of acute glaucoma are not constant, and they can last a few hours before disappearing again. However, each time the symptoms occur, your vision is damaged a little more. It is important that you contact your GP straight away if you experience any of the above symptoms because early treatment can prevent further damage from occurring.

If you experience symptoms outside of your GP's normal working hours, visit your nearest accident and emergency (A&E) department. The healthcare staff will be able to relieve the pressure within your eye and treat any pain and discomfort that you are experiencing.

Secondary glaucoma

As secondary glaucoma is caused by other conditions, or eye injuries, it is possible that the symptoms of glaucoma itself may be confused with the original cause. However, the glaucoma may still cause misty vision, and rings, or halos, around light sources.

Developmental glaucoma (congenital glaucoma)

Recognising the symptoms of developmental glaucoma can be very difficult due to the young age of the baby, or child.

However, your child may display some symptoms, such as:

- having large eyes, due to pressure causing the eye to expand,
- being sensitive to light,
- having a cloudy appearance to their eyes,
- having watery eyes,
- jerky movements of the eyes, and
- having a squint, which is an eye condition that causes one of the eyes to turn inwards, outwards, or upwards, while the other eye looks forward.

If you notice any of these symptoms, you should visit your GP as soon as possible, or consult an optician.

How the eye works

The eyeball is filled with a watery substance called aqueous humour, which creates pressure in the eye to give it shape. In healthy eyes, this fluid constantly flows in and out of the eye to nourish it. It drains back into the bloodstream at the same rate that it is produced in order to maintain the correct pressure.

Glaucoma occurs when the drainage tubes (trabecular meshwork) within the eye become slightly blocked, preventing the aqueous humour from draining properly. It can also occur if there is an obstruction within the eye.

An obstruction within the eye, such as a blood vessel blocking the trabecular meshwork, can also prevent fluid from draining properly.

When the fluid cannot drain properly, the pressure in the eye builds up and can cause damage to the optic nerves, and the nerve fibres from the retina.

It is unknown why the drainage tubes get blocked, or why other parts of the eye obstruct the tubes.

Other causes

There are various other factors that can lead to glaucoma. These are listed below.

- **Age** - chronic glaucoma becomes more likely as you get older, affecting about 1% of people who are between the ages of 40-65, and 5% of people who are over 65 years of age.
- **Ethnic origin** - people of African, or Afro-Caribbean origin, tend to have a greater chance of developing chronic glaucoma. Also, people of Asian origin are more likely to develop acute glaucoma.
- **Short sightedness** - people who are short-sighted are more likely to develop to chronic glaucoma.
- **Family history** - if you have a close relative, such as a parent, brother, or sister who has glaucoma, you may also have a increased chance of developing the condition yourself. You should therefore have regular eye tests in order to monitor the condition of your eyes.
- **Medical history** - research suggests that people with diabetes are also more likely to develop glaucoma than those without the condition.

Diagnosis

If you have glaucoma, it can take a long time before you realise that you have a problem with your eyesight. This is because glaucoma tends to damage the outer edge of the eye and work slowly inwards. You may not notice a problem until glaucoma is near the centre of the eye.

It is very important to have regular eye tests so that problems like this can be detected and treated as early as possible.

Once you are 40 years of age, you should have an eye test every two years. You should also have regular eye tests if you are over 30 years of age, and you have a close blood relative with glaucoma (for example, a parent, sister, or brother).

There are three glaucoma tests that your optician can perform. They are painless and quite quick. All three tests should be carried out during the same appointment in order to make sure the results are as accurate as possible.

The three tests for glaucoma are outlined below.

An eye pressure test (tonometry)

An eye pressure test (tonometry) involves a small amount of anaesthetic and some dye being put onto your cornea (the clear front of the eye). A blue light from the head of the tonometer

is held against your eye to measure the intraocular pressure (IOP) in the eye. A tonometer is the instrument that is used to measure pressure within the eye.

An optic disc appearance test (opthalmoscopy)

An optic disc appearance test (opthalmoscopy) uses a special torch and magnifier to look at the optic nerve at the back of your eye.

A visual field test (perimetry)

A visual field test (perimetry) checks for missing areas of vision. A sequence of spots of lights is shown to you, and you will be asked which ones you can see. Some dots will appear in your peripheral vision (around the sides of your eyeball) which is where glaucoma begins.

If the optician finds glaucoma, you will be referred to an eye specialist for treatment. The specialist will perform more detailed eye tests to discover how developed the glaucoma is, and how much damage it has done. Tests may also be carried out to check the cause of the glaucoma .

Treatment

Any damage to your vision that is caused by glaucoma cannot be repaired. This is why it is so important for you to get an early diagnosis, so that glaucoma can be treated and prevented from developing further.

The aim of treatment for every type of glaucoma is to reduce the pressure in the affected eye.

Treating open angle glaucoma (chronic glaucoma)

Open angle glaucoma is often treated using eye drops. There are several different types of eye drops that may be given to you, which are outlined below.

Beta-blockers

Beta blockers help to reduce the amount of fluid produced in your eyes. However, if you have asthma, or heart disease, you should not use this type of eye drops because they can cause side effects which may worsen these conditions. Beta blockers are usually taken once, or twice, a day.

Alpha agonists

Alpha agonists also help to reduce the amount of fluid that is produced in your eyes, and help to improve the flow of fluid out of your eye.

Children should not use these alpha agonists because an active ingredient can cause nightmares in young users. Users of these eye drops have also reported side effects that

include a dry mouth and generally feeling unwell. Alpha agonists are often taken two, or three, times a day.

Prostaglandin or prostamide analogues

Prostaglandin, also known as prostamide analogues, help to improve the flow of fluid out of your eye. Side effects include pinkness of the eye, which may last for several days.

Your eye colour may also change; it often gets darker. Your eyelashes may also grow thicker and darker. These eye drops are generally used once a day.

Carbonic anhydrase inhibitors

Carbonic anhydrase inhibitors reduce the amount of fluid produced in your eye. These drops may be taken two, or three, times a day, and may cause a bitter taste in your mouth.

Cholinergic agonists

Cholinergic agonists help the fluid to flow out of your eye more effectively. Using these eye drops may cause headaches, eye ache, and dark, or blurred, vision.

Cholinergic agonists should be taken three, or four, times a day. Sometimes, a cholinergic agonist gel can be applied at night in order to assist with the flow of fluid out of your eye. You therefore do not have to wake up during the night in order to put eye drops in.

Other treatments for open angle glaucoma

If the use of eye drops does not improve open angle glaucoma, a different type of treatment, such as laser treatment, or surgery, may be recommended.

Laser treatment can be used to open up the blocked trabecular meshwork (drainage tubes) within your eye. The procedure is usually quick and painless, although you may experience some mild discomfort.

The most common form of glaucoma surgery is a trabeculectomy. This removes part of the trabecular meshwork to allow the flow of fluid through the eye's drainage system.

Other types of surgery include a viscocanalostomy and a deep sclerectomy operation.

Viscocanalostomy operations remove part of the sclera, enabling the eye fluid to filter out of your eye and into your body. A deep sclerectomy operation involves implanting a tiny silicone device in order to widen the trabecular meshwork.

Treating acute angle closure glaucoma (acute glaucoma)

As acute glaucoma develops rapidly, the condition needs to be treated quickly. The most common forms of treatment for this type of glaucoma include;

- **Eye drops** - see above for further details.
    - **Systemic medicines** - these medicines are injected into your bloodstream and quickly reduce the pressure in your eye.
    - **Laser treatment** - this creates a hole in your iris (coloured part of the eye) in order to maintain some vision. Both eyes will need to be treated, even if only one has acute angle closure glaucoma. This is because this form of glaucoma always develops in both eyes at some point.
    - **Surgery** - a trabeculectomy is the most common form of surgery for acute glaucoma.

Treating other types of glaucoma

For other types of glaucoma, your specialist will usually recommend eye drops, laser treatment, or surgery, depending on the type of glaucoma that you have, and how advanced it is.

Complications

Glaucoma is one of the main causes of people registering as blind in the UK. Therefore, early detection and treatment is very important.

If you have surgery to treat glaucoma, there is always a risk of infection. Most infections can be treated with a course of antibiotics.

You may also have a reaction to treatments, such as eye drops. You should speak to your GP if you feel unwell while you are being treated for glaucoma.

Prevention

Regular eye tests are very important in preventing glaucoma. If you are over 40 years of age, and have a first-degree relative (mother, father, sister, or brother) with glaucoma, you are entitled to a free NHS eye test.

You may also be entitled to a free eye test if an ophthalmologist (eye specialist) thinks that you are at risk of developing glaucoma. You can also have a free NHS eye test if you are over 60 years of age.

Your optician will normally talk you through each part of the eye test so that you know what they are testing for. However, it is always best to ask them to carry out the three glaucoma tests, as some opticians do not perform them as standard. You should also tell the optician if glaucoma runs in your family.