

YAG laser iridotomy

Narrow angle glaucoma

There are a number of different types of glaucoma, and these glaucoma conditions have in common the fact that the pressure inside the eye is raised, and that this causes damage to the optic nerve, and to the field of vision.

Narrow angle glaucoma refers to a situation where the rise in intra-ocular pressure is due to obstruction of the flow of aqueous fluid out of the eye, because access to the normal drainage channels is obstructed by the narrowness of the angle between the iris and the cornea. In a normal eye, aqueous fluid is formed in the ciliary body behind the iris, and circulates over the surface of the lens, through the pupil, into the anterior chamber, and finally out through the trabecular meshwork. Normally there is no obstruction of flow to the trabecular meshwork, but in some situations the access to the meshwork is closed off because the space between the iris and cornea becomes too narrow. The reason that this situation arises is related to the size of the eye, the size of the lens, and the size of the pupil.

Growth of the eye

In an infant, the eyes are very large relative to the size of the face because they have developed in advance of the rest of the face. This is a reflection of the importance of the visual system for the survival of the child. During the first couple of years of life the eyeball grows further – reaching its adult size early in childhood as the visual system matures. In some people, the eyes are relatively small, and this is often the case when the eye is long-sighted or hypermetropic.

Although the eyeball reaches its adult size in early childhood, the lens inside the eye continues to grow throughout life. As the lens grows, it pushes the iris forward and this narrows the angle between the iris and the cornea. Thus in general, the older you are, and the more hypermetropic you are, the more likely you are to develop narrow angle glaucoma.

The cause of acute glaucoma

The size of the pupil varies with the amount of light that is entering the eyes, and is also affected by some drugs and eye drops. When the pupil is in a semi-dilated state, the inner iris margin is still resting on the lens capsule, but the peripheral iris is slack, and tends to bow forward because of the pressure differential between the anterior and posterior chambers. This causes further narrowing of the drainage angle, and may indeed cause complete obstruction of aqueous flow. If there is partial obstruction of the drainage channels, the intraocular pressure may rise only a small amount, which the patient would be unaware of at the time. When the angle obstruction is complete, the pressure in the eye rises rapidly to a high level, and the aqueous fluid is forced into the cornea making it water logged and hazy. Patients who develop this angle closure glaucoma experience blurring of vision such as haloes around street lights.

For some patients an attack of angle closure glaucoma may be precipitated by pupil dilatation in dim light. If the patient goes back into a bright light, the pupil constricts, and pulls the iris clear from the trabecular meshwork. The intra-ocular pressure may then return to normal and the vision clear. Many patients however do not have such sub-acute attacks, but go into a full blown acute attack. In this situation the eye becomes locked into the situation of extremely high pressure that will not resolve without medical intervention. This is because once the pressure in the eye becomes very high, the blood supply to the iris becomes impaired, and so the reaction of the iris muscle to bright light is no longer effective. If an acute glaucoma attack persists, the eye becomes painful and inflamed, and irreversible damage to the optic nerve can rapidly occur.

Because damage to the vision from glaucoma is irreversible, it is preferable to have prophylactic treatment to prevent an attack occurring, rather than wait until an acute attack has occurred. Unfortunately there is no test which can accurately predict whether or when an acute glaucoma problem is going to arise. However an assessment of the risk can be made by your ophthalmologist, and if necessary, prophylactic treatment will be recommended.

Laser iridotomy

In the past, narrow angle glaucoma was treated surgically by cutting a small hole in the peripheral iris, to allow aqueous fluid to pass directly into the anterior chamber. By equalising the anterior and posterior chamber pressures, the forward bowing of the iris is eliminated, allowing it to fall back and open the drainage angle. Although surgical peripheral iridectomy is still an option, nowadays a similar effect can be achieved with a YAG laser. This infra-red laser can be focussed onto the iris, and can be used to vapourise the iris tissue to create one or two small channels for the aqueous fluid to pass through. Typically the treatment is carried out by putting anaesthetic drops into the eye, and placing a special contact lens onto the surface of the cornea to help focus the laser beam. The treatment itself is virtually painless, and takes only a few minutes to complete. Normally the treatment does not affect the vision, but occasionally bleeding from the iris can cause temporary blurring of vision.

Effect of laser iridotomy

Provided that the laser treatment creates an adequately sized hole in the iris, the risk of developing acute angle-closure glaucoma is virtually eliminated by laser iridotomy treatment. In some patients, who have very narrow angles which have been untreated for some time, the laser iridotomies will prevent acute angle-closure, but may not eliminate some chronic angle-closure. This may mean that additional medical or surgical treatment is required to reduce the intra-ocular pressure to normal.

It is thought that laser iridotomy can possibly accelerate cataract formation. If a cataract develops, this can be treated surgically in the normal way by cataract extraction with intra-ocular lens implantation. In patients who have narrow angles and who already have early cataracts, an alternative approach is to carry out cataract surgery as the only procedure, since by doing so the risk of angle closure is avoided. This is because the intra-ocular lens implant is physically smaller than the natural lens of the eye, and this allows the angle between the iris and cornea to open up.