

High-intensity Focused Ultrasound

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What is High-intensity Focused Ultrasound?

The high-intensity focused ultrasound is a non-invasive procedure that delivers highly concentrated sound waves to the part of the eye that produces fluid, reducing fluid production and thereby lowering eye pressure.

Who is suitable for High-intensity Focused Ultrasound?

High-intensity focused ultrasound can be performed in most types of glaucoma, both early or late in disease. The procedure can be performed early to prevent or delay or the need for more invasive surgery. Alternatively, it can be used when other treatments have failed.

Eye words to know

Aqueous: A clear fluid that circulates inside the front portion of the eye.

Conjunctiva: A thin membrane that covers the white part of the eye.

Cornea: A clear, dome-shaped window at the front of the eye.

Drainage angle: The area between the iris and cornea where the drainage pathways are located.

Intraocular pressure: The fluid pressure inside the eye.

Iris: The coloured part of the eye that controls the size of the pupil.

Glaucoma: A condition that damages the optic nerve of the eye, often associated with high eye pressure.

Pupil: The opening at the centre of the iris.

Schlemm canal: A circular canal into which aqueous drains after passing through the trabecular meshwork.

Trabecular meshwork: A sieve-like meshwork through which aqueous drains before entering Schlemm canal.



How does it work?

Inside the eye, a clear watery fluid called aqueous is produced by a part of the eye called the ciliary body which is located just behind the coloured part of the eye. The clear fluid circulates inside the eye before draining away through drainage channels. In glaucoma, these drainage channels do not work properly and this can cause a build-up of pressure inside the eye. This pressure can damage the optic nerve which carries images from the eye to the brain affecting your vision.

High eye pressure occurs when more fluid is produced than can drain away. This procedure accurately delivers sound waves to the part of the eye that produces fluid (the ciliary body), causing a reduction in fluid production and thereby lowering eye pressure. The procedure reduces fluid inside the eye, which is separate from tears.

What are the benefits?

The benefit of high-intensity focused ultrasound is to reduce eye pressure to prevent or delay further damage or reduce pain from high eye pressure.

In a multicentre clinical study, patients treated with high-intensity focussed ultrasound had a 30% reduction in eye pressure. Patients were also able to reduce the number of glaucoma medications they needed to take from an average of 3 to an average of 1 medication.

The effects of ultrasound may wear off over months or years, however the treatment can be repeated if required.



What does the procedure involve?

High-intensity focussed ultrasound is usually performed in an operating theatre under local anaesthetic, meaning you are awake but your eye will be numb so you will not feel anything. Your eye will be numbed with eye drops and then a small injection will be given around your eye. The injection may cause a pressure sensation and brief discomfort. You will have the option of requesting light sedation. The local anaesthetic takes several hours to wear off and may affect your vision during this time. The procedure can also be performed while you are asleep under general anaesthetic.

A small plastic suction cup containing the probe will be placed over your eye to help accurately focus the sound waves. You will not feel or see anything during the procedure, which lasts only a few minutes. At the end of the procedure an eye pad will be placed over your eye.

You will be given new eye drops to take following the procedure. You should also continue your existing glaucoma medications (and/or tablets) as the ultrasound does not begin to work straight away. You will be given an appointment to come back to clinic several weeks following the procedure.

At the end of the procedure your operated eye will be padded. If your unoperated eye does not see well, your operated eye may not be padded and instead covered with a clear plastic shield.

You will usually be able to go home the same day. Most patients will need to be examined in the first few weeks after surgery.



How soon will I recover?

It is normal for your eye to be slightly blood shot and sore after the procedure. You may want to take a painkiller such as paracetamol following the procedure.

Your vision may also be blurry for 1 – 2 weeks after the procedure.

You will be given new anti-inflammatory and antibiotic eye drops to prevent inflammation and infection.

The ultrasound takes 4 – 6 weeks to have its full effect and during this time you will need to continue your glaucoma medications. Your doctor will advise you when you can stop your glaucoma medication.


Most people will take 1 – 2 weeks off work, however the length of time will depend on the nature of your work.

It is safe to fly after surgery, however you will need to be seen regularly by your surgeon in the early post-operative period.

What are the risks?

Your eye may feel bruised and swollen following the procedure. However some patients may experience pain or have inflammation/swelling in their eye following the procedure. You will be given eye drops following the procedure to control this inflammation and help relieve discomfort.

It is not uncommon to require a second ultrasound treatment should your eye pressure remain high after the first treatment.



Your vision may be blurry for a few weeks following the procedure. There is a very small risk your eye pressure may become too light following the procedure.

Exceedingly rarely, ultrasound to one eye may cause inflammation or swelling in your other eye.

Are there any alternatives?

Other treatment options include medications (eye drops and/or tablets), laser, or operations such as trabeculectomy or aqueous shunt insertion.

Alternative procedures that reduce the production of fluid inside the eye include endoscopic cyclophotocoagulation (ECP) and micropulse cyclodiode.

If you do not have treatment, there is a risk that the sight or pain in your eye will get worse because of glaucoma.

References and Disclaimer

Aptel F, Denis P, Rouland JF, Renard JP, Bron A. Multicenter clinical trial of high- intensity focused ultrasound treatment in glaucoma patients without previous filtering surgery. *Acta Ophthalmologica*. 2015.

This leaflet is for information only and should not be used for the diagnosis or treatment of medical conditions. Consult your ophthalmologist for further information.