Tan Tock Seng
HOSPITAL
National Healthcare Group

DEPARTMENT OF
OPHTHALMOLOGY

Glaucoma Surgery

What is Glaucoma?

Just as a car tyre has a certain pressure, your eye maintains its shape by its intraocular pressure (IOP). This pressure is generated by the balance of fluid (called aqueous humour) entering and leaving the eye. If fluid leaving the eye is reduced or blocked, pressure in the eye rises, leading to the disease called glaucoma.

In glaucoma, there is permanent and progressive damage to the eyeball nerve (called the optic nerve), which can lead to irreversible blindness.

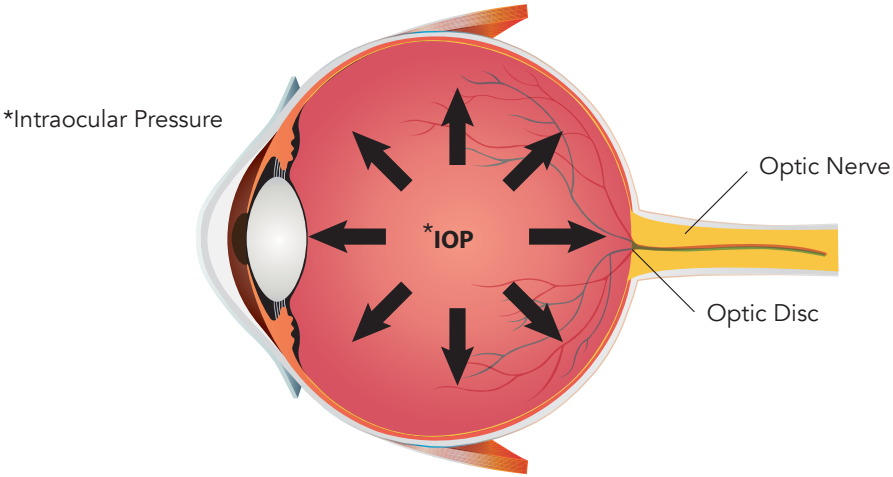
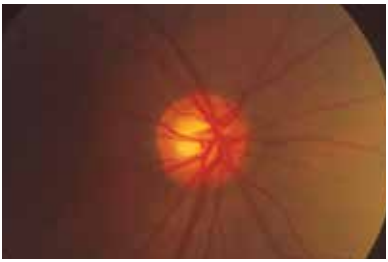


Illustration of an eye showing how intraocular pressure (IOP) is exerted on the optic nerve.



a. A normal optic nerve.

b. The optic nerve in a patient with glaucoma looks pale and "cupped".

How does surgery for Glaucoma work?

The aim of surgery is to lower the pressure in the eye. There are two ways surgery does this:

1) By creating extra flow of fluid (aqueous humour) from the inside of the eye to a space beneath the outer covering (conjunctiva: the white covering) of the eyeball or by allowing the aqueous humour to bypass the trabecular meshwork. The fluid is then absorbed by the blood vessels. (Please note that this fluid does not flow outside of the eyeball and therefore will not cause you to have more tearing), or

2) By reducing the amount of fluid produced inside the eye.

There are five forms of surgery we may offer to you:

1) Trabeculectomy with mitomycin-C

a. This involves creating a channel for fluid to flow from the inside of the eye to a space beneath the outer coat (conjunctiva) of the eyeball. The channel is called a Trabeculectomy. Mitomycin-C is an anti-scarring medication that is used during surgery to improve success. It works by preventing scarring which may close up the channel and therefore reduce flow of fluid from the inside of the eye.

2) Combined Cataract Surgery and Trabeculectomy with mitomycin-C

a. This is the same procedure as the one above (Trabeculectomy) but with the addition of cataract surgery. This is therefore a 'two-in-one" operation where both your glaucoma and cataract are treated in one operation.

b. Quite frequently, you may have glaucoma plus a cataract that is affecting your vision. If this is the case, we may suggest performing this "two-in-one" operation to save you from having to undergo two separate operations, one for the glaucoma and the other for the cataract.

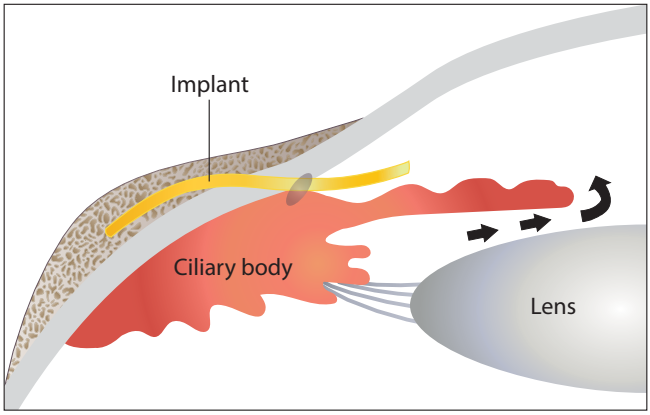
3) Glaucoma drainage (tube) implant

a. Here, instead of creating a channel, a specially designed tube implant is inserted into the eye. The tube allows flow of fluid through it.
b. This tube is inserted into the front chamber of the eye and is attached to a special plate which looks like a very small computer mouse.
c. This special plate is placed in the space beneath the outer covering (conjunctiva) of the eyeball. Fluid leaves the tube implant and is absorbed by the surrounding blood vessels. This plate is therefore covered by the outer covering (conjunctiva) of the eyeball.
d. This implant is designed to be left in your eye for life and does not need to removed unless there are special reasons to do so.
e. This surgery may also be carried out as a "two-in-one" operation together with cataract surgery if your cataract has affected your vision. The anti-scarring medication, mitomycin-C may also be applied.
f. We may offer this surgery to you when your glaucoma is more complex: due to
   i. Type of glaucoma you have or
   ii. Where previous surgery has not been successful

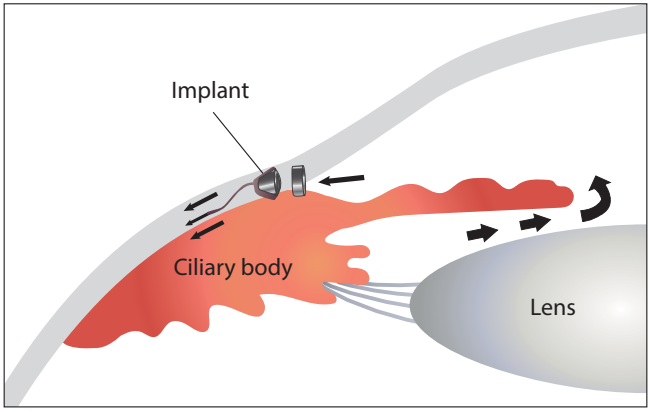
4) Minimally Invasive Glaucoma Surgery (MIGS)

a. This group of surgeries use microscopic instruments and specially designed implants to lower eye pressure. The standard glaucoma surgeries (**e.g. trabeculectomy**) are often effective in lowering eye pressure but they may also have complications. MIGS was developed to try to reduce complications. MIGS however trade off some effectiveness (they **may not lower eye pressure as much as a trabeculectomy**) for safety.
b. Many of these specially designed implants are inserted in the front chamber of the eye and act as channels for fluid inside the eye to bypass the trabecular meshwork (filter of the drainage system inside the eye) or for fluid inside of the eye to be channelled to the outer coat (conjunctiva) of the eyeball or the suprachoroidal space (space between the wall of the eye and the retina).
c. These implants are designed to be left in your eye for life and do not need to be removed unless there are special reasons to do so.

d. Quite frequently, some patients may have **mild or stable** glaucoma plus a cataract that is affecting vision. If this is the case, we may suggest performing a "two-in-one" **MIGS** combined with cataract surgery. This is to save you from having to undergo two separate operations, **and to possibly reduce your need for eye drops.**



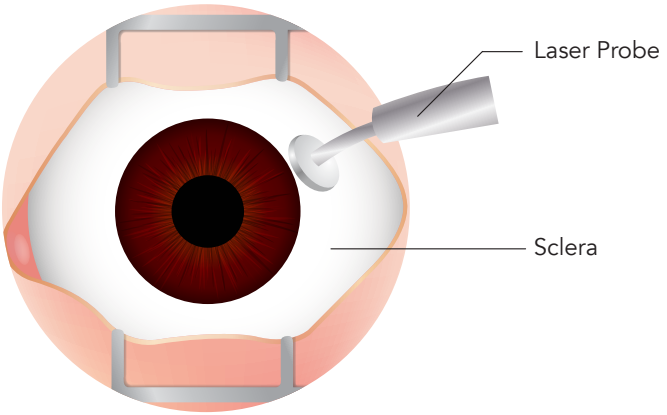
Implant for fluid inside of the eye to be channelled to the outer coat (conjunctiva) of the eyeball.



Implant for fluid inside the eye to bypass the trabecular meshwork.

5) Cyclophotocoagulation

a. This is a laser procedure and involves applying laser to the part of the eye which produces fluid in the eye called the ciliary processes. By applying laser to the ciliary processes, fluid produced in the eye is reduced which in turn lowers the eyeball pressure.



Transcleral Cyclophotocoagulation (TCP)

b. This form of treatment is usually reserved for more advanced glaucoma or in patients who are too ill or too old to undergo other operations which take longer to perform.

Who will benefit from surgery?

Patients who:

- need to lower their eye pressure further even after trying several different treatments with various eye drops and maybe even laser or previous surgery
- have difficulty using eye drops because of:
  - allergy or other side-effects
  - confusion or forgetfulness in applying the eye drops
  - conditions such as stroke or arthritis which make applying eye drops hard to do
- are on two or more eye drops for glaucoma and prefer to reduce the number of eye drops needed

Are there any other treatments available for Glaucoma?

Other treatments include eye drops, laser and less frequently, tablets. Eye drops that reduce eye pressure are applied once, twice or three times a day to the affected eye. Laser for glaucoma is a relatively mild form of treatment that is equivalent in effect to one glaucoma eye drop. Tablets for glaucoma are usually used for temporarily bringing down very high eyeball pressures and not used for long-term treatment due to increased side-effects when used for long periods of time.

You may have been offered surgery either to reduce your need for these other treatments or because your glaucoma is not responding enough to these other treatments.

Will my vision get worse if I do not undergo surgery?

If you are not on adequate glaucoma treatment, your vision may continue to deteriorate over time.

What are the success rates for surgery?

Success in glaucoma surgery is when we achieve the lower eyeball pressure we are aiming for so that your glaucoma does not progress or progresses much more slowly. It is important to understand that the surgery will not restore the parts of your vision that has been affected by your glaucoma. The aim of all glaucoma treatment, including surgery is to prevent further deterioration in your vision.

The success rate for surgery varies from individual to individual and may even vary between the two eyes of the same person. Your doctor is the best person to discuss your own likely success rates. However, in general, success rate ranges from 60 – 90% in terms of reducing your eyeball pressure significantly.

After glaucoma surgery, you may no longer need to apply glaucoma eye drops. Occasionally, your doctor may continue glaucoma eye drop(s) in order to achieve a more ideal eyeball pressure even after surgery.

How do I prepare for the surgery?

1. **You may have medical conditions requiring medications such as diabetes.** Several days or weeks before surgery, you will have a pre-operation assessment where we will review your medical fitness for surgery and all your medications. **It is important to bring all your medications with you for this review** so we can go through them with you and provide instructions on when to take your medication and whether you need to stop your medication before your operation. Sometimes, we may need to refer you to another doctor to better control your medical condition before we can proceed with the operation.
2. **You will need to fast.** Instructions on when to fast will be provided at the pre-operation assessment. **It is very important that you remember to fast as instructed.** If you have not fasted properly, your operation may need to be postponed or cancelled on the day of operation.
3. **Please continue your glaucoma eye drops until your operation.** We will also be giving you extra eye drops to apply before your operation day. Instructions will be given to you at your pre-operation assessment visit.
4. Come with a **companion** so that he/she can take you home safely.
5. If you live alone, please let us know and we can arrange for you to stay overnight at our day surgery ward.

How is the surgery carried out?

Surgery is performed at the operating theatre. Most glaucoma surgeries are performed under regional anaesthesia. This is where anaesthetic is given to the eyeball to numb the eye so you will not be put to sleep and will be awake during the operation. We appreciate that operations can be very stressful, so medications will be given by the anaesthetic doctor which will help reduce your anxiety and relax you even though you are awake during the surgery.

You should not feel any pain with this type of anaesthesia. In the unlikely case where you do feel pain, please let your doctor know and we will give additional anaesthesia so that you are as comfortable as possible during the operation. You may however feel the surgeon's hand resting on your forehead during the operation and need not be surprised by a slight feeling of pressure on your forehead.

During the operation, you can blink your eyes as needed, but **do try to avoid squeezing your eyes shut. Try not to move or talk as far as possible so your doctor can focus on your operation**.

Occasionally, you may need to undergo general anaesthesia where you will be put to sleep for the operation. This form of anaesthesia is usually used when performing Glaucoma drainage (tube) implant surgeries or when recommended for special reasons by your doctor.

How long is the duration of the surgery?

Glaucoma surgeries usually take from 20 to 90 minutes depending on the type of operation you are having. Cyclophotocoagulation, takes about 20 minutes. Glaucoma drainage tube implant surgery can take up to 90 minutes. Trabeculectomy surgery can take from 45 minutes to 90 minutes. Minimally invasive glaucoma surgery can take from 20 minutes to 45 minutes.

What happens after surgery?

Immediately after surgery, you will be taken to the day surgery ward for rest and observation. After observation for about 1 hour, you will be able to go home. **Please arrange for someone to accompany you home on that day.**

You will be given **eye drops to use at home** to help recovery and soothe any discomfort. Sometimes your doctor may give you tablets to take for a short period of time after the operation. Please carefully follow the instructions given to you on the use of the medications and ask our staff if you are unsure.

Please stop using your old glaucoma eye drops in the operated eye. Please continue your glaucoma eye drops in your other eye which has not been operated on (non-operated eye). If in doubt, please ask our staff at the day surgery ward.

Your doctor will arrange follow-up appointments for you. Usually your follow-ups will occur: the next day after operation, one week after the operation and a few more appointments quite closely spaced apart for the first 3 weeks after your operation.

You should start taking all your usual medications for your other medical conditions the next day as usual. You will be given an eye shield to wear over your operated eye. You should wear this as far as possible for the first week after operation, but especially at night when you sleep to prevent accidental rubbing of your eye while asleep. **You should not rub your operated eye** and instructions on cleaning and care of the operated eye will be given to you at the day surgery ward after your operation. You can continue watching TV or reading as much as you want. However, you should avoid strenuous exercise in the period immediately after the operation and do ask your doctor for more advice on this. **You must not swim after glaucoma surgery. Swimming can cause serious infections. You must also stop all contact lens use after surgery as this may also cause infections.**

Hospitalisation medical leave is usually given for 3 to 4 weeks depending on your recovery.

Are there side-effects from surgery?

Mild

- You may have some discomfort such as a sandy feeling in the eye or mild pain for a few days after the surgery, but this usually gets better quite quickly and most patients are not affected by this.
- You may experience some blurring of vision but it usually will not last longer than a month after your operation.
- Your operated eye may appear red after the operation but will usually clear up in a few weeks.
- Your operated eye may appear "smaller". This is usually due to slight drooping of the eyelid.
- Very occasionally, after glaucoma drainage implant surgery, you may notice some mild double vision.
- Temporary mild low eyeball pressure can occur in the immediate period after surgery but usually recovers on its own.
- Cataracts, the clouding of the natural lens in your eye causing blurring of vision, occurs commonly in older people. This can occur at a faster rate after glaucoma surgery but can be easily treated with cataract operation.

More serious

- Infection resulting in loss of vision fortunately occurs very rarely at a rate of 1 in every 1000 to 2000 operations. Milder infections usually respond to antibiotic eye drops. Severe infections require operations or eye injections as treatment.
- Severe bleeding in the eye resulting in loss of vision is also a very rare event that occurs in 1 in very 1000 to 2000 operations.
- Loss of vision from worsening of glaucoma is a rare side-effect from surgery called "wipe-out". This usually occurs in higher risk glaucomas which are more advanced to begin with.
- There may be eye inflammation and discomfort after the surgery. This is transient and with medication, the inflammation and discomfort will settle.
- Very low eyeball pressure can very occasionally occur. Fortunately, this is usually treatable but may require another operation to do so.
- Failure to lower the eyeball pressure. Infrequently, in spite of our best efforts, the operated eye fails to respond to the operation and the eyeball pressure remains too high.

We hope this has helped you and your family understand why you need to undergo Glaucoma Surgery. Please do not hesitate to ask your eye doctor or nurse if you have any other questions related to your eye condition or the surgery.

Glaucoma surgery post-operative instructions

This section provides key information for after-care in patients who have undergone glaucoma surgery.

The time frames stated are rough guides, and may differ from patient to patient. Always clarify any doubts with your doctor.

Please note: It is very important that you do not drive on the day of the surgery, and that you have someone to accompany you home as well.

THE FIRST FEW DAYS AFTER SURGERY

What to Expect

- The operated eye may have slight redness or swelling (1 – 2 days).
- Effects from the local anaesthetic will wear off over 1 – 2 days, including:
  - Numbness over the injected side of the face.
  - Light headaches.
  - Double vision.
- The operated eye will be mildly to moderately irritated and uncomfortable (usually for 2 – 4 weeks but recovering steadily).
- Vision will be blurred (usually for 2 – 4 weeks but recovering steadily).
- The eyelid may be drooping, swollen or bruised (usually for 1 – 3 days).
- Clinic visits: One visit the very next day, then at least twice in the next few weeks.

What I Must Do/ What is Safe to Do

- Apply the eye drops as instructed.
- Clean your eyes as instructed twice daily with sterile/clean cotton balls - slightly wet with sterile saline or cool boiled water, and do not allow water to enter the eye.
- Wear the plastic eye shield when sleeping (for 2 weeks).
- Protective sunglasses can be worn interchangeably with the eye shield to protect your eye when outdoors.
- The following activities are safe: watching TV, computer work, leaving the house to visit clean and uncrowded areas.

ABOUT 1 – 2 WEEKS AFTER SURGERY

What to Expect

- Eye irritation should be less.
- Vision should become more stable/ partially clearer.
- Your glaucoma specialist will gradually tail off your eye drops over weeks to months.
- There may be removal of sutures (stitches) in some cases.

What I Must Do/ What is Safe to Do

- Plastic eye shield or protective sunglasses can be worn interchangeably if outdoors.

ABOUT 4 – 6 WEEKS AFTER SURGERY

What to Expect

- Your eye should feel more comfortable.
- The maximum potential for visual recovery is attained at around this time.
- Your glaucoma specialist will gradually tail off your eye drops (over weeks to months).

What I Must Do/What is Safe to Do

- Light exercise like walking is allowed.

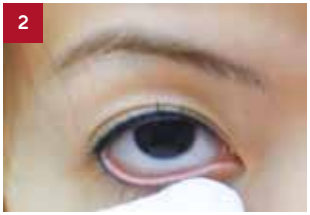
WHAT TO AVOID

- Water/Soap entering the eyes (for 2 weeks). (If it does get in, wash it out by instilling the eye drops prescribed)
- Driving (for 2 weeks).
- Coughing or sneezing too hard (2 weeks).
- Work (usually 2 – 4 weeks hospitalisation leave is given).
- Strenuous physical activities, e.g. jogging, tai-chi, badminton (for 4 weeks).
- Carrying children who may accidentally poke your eye (6 weeks).
- Carrying heavy objects (6 weeks).
- Bending down to pick up things (6 weeks); if necessary to do so, do it with a straight back and be careful of not knocking the head when standing up.
- Rubbing the eye (long-term).
- Swimming (not recommended in long-term).

MEDICATIONS

- Eye drops and all medications to be taken as prescribed.
- Most other oral medications can be continued upon returning home.
- However, please note that aspirin, anticoagulants and other antiplatelets can be continued only after consulting your surgeon.
- Apply eye drops using the following technique:

Wash your hands before applying eye drops/touching the eye.



Use cool, boiled water or sterile saline to gently clean the eyelids whenever the eye feels sticky) with a sterile cotton ball.

Shake the bottle and remove the cap.

Hold the bottle close to the eye without touching the eyelid or eyelashes.

Tilt your head back, look upwards and pull the lower eyelid down.

Instill one drop into the eye.

Close the eye.

Do not rub the eye.

Gently dab off any excess eye drops.

IN ALL CASES

- Keep eye drops in a cool place.
- If more than one type of eye drops are to be applied to the same eye, wait **3 – 5 minutes** before instilling the next eye drop.
- In general, eye medications need to be instilled during waking hours only.
- All bottles of eye drops/tubes of eye ointment should be discarded a month after opening, or upon their expiry date.

WHAT TO DO IN AN EMERGENCY?

Please call us at Tel: 8126 3632 during office hours if you experience the following:

- **Pain that is not relieved by any medication**
- **Severe swelling/redness** of the eye
- **Excessive discharge** from the eye
- **Flashes/Floaters**
- **Sudden loss of vision**

Office hours:

- Monday – Friday: 8am – 5pm
- Saturday: 8am – 12noon

*Closed on Sundays and Public Holidays.

After office hours, you are advised to seek treatment at the Emergency Department (A&E), Basement 1, Tan Tock Seng Hospital.

Clinic Appointments and Eye Screening
Subsidised: (65) 6357 7000
Private: (65) 6357 8000
Email: eye@ttsh.com.sg
Website: www.ttsh.com.sg/eye

LASIK Enquiries
Tel: (65) 6357 2255
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