The cornea is a curved, clear layer that lines the front of the eye – it can be thought of as the eye’s ‘windscreen’. A number of conditions can affect the cornea (e.g. keratoconus, Fuchs’ dystrophy, keratitis, ocular herpes) and impair vision. If other available treatment options do not work or have stopped working, a corneal transplant may be recommended to restore sight.

Although corneal transplantation is the most frequently performed transplant procedure in the world, there are still a lot of misconceptions about it that I’d like to address.

- **Your eye colour will not change after a corneal transplant.** Eye colour is determined by the part of the eye called the iris, which sits under the cornea. The cornea itself is clear, so replacing it won’t change the colour of your eye.

- Unlike organ transplants, the donor and recipient don’t need to ‘match’ on factors such as blood type or HLA type (immune system markers). Donor age, eye colour and vision are also irrelevant. The main criteria when assessing donor corneal tissue is that it is healthy and intact. People with infections or diseases such as HIV and hepatitis are not able to donate their corneas.

- Even though a blood match isn’t needed, a corneal transplant can still be rejected by the body. Rejection occurs when the body recognises the donor tissue is foreign, which triggers an immune response. This can happen in about 20% of cases and can occur soon after surgery or decades later. An illness or injury may trigger rejection of the transplanted tissue, but that doesn’t necessarily mean it needs to be removed. Signs for tissue rejection include redness in the eye, light sensitivity, vision loss and pain. If started early enough, anti-rejection medication may be able to bring this under control. If medication is unsuccessful, a new transplant may be required.

- **Corneal transplantation can be used to treat a number of conditions**, including keratoconus, Fuchs’ dystrophy or corneal oedema. Sometimes, a transplant is needed because of significant corneal scarring (e.g. due to ulcers, injury or infection).

- **Corneal transplantation is not new** – the first successful transplant was performed in 1905. Over the years, the technique has been further developed and refined. Through my research, I have developed new techniques for corneal transplantation, including pioneering the use of a single donor cornea to treat three different patients.

- **Two main methods are used to perform corneal transplantations.** The difference between the two is the amount of corneal tissue that is replaced. When all five layers of the cornea are removed and replaced, this is known as a full-thickness transplant. On the other hand, a partial-thickness transplant involves replacing only the affected corneal layers and is called customised corneal transplant surgery.

- **Corneal transplants may not last forever.** The length of time that the transplant lasts will depend on the initial reason for the transplant and type of corneal transplant performed i.e. full-thickness or partial-thickness. Fortunately, patients can receive multiple corneal transplants.

- **Contact lenses, glasses or laser eye surgery may be required to improve vision following a corneal transplant.** This is necessary if the transplanted cornea does not achieve the precise rounded shape required for clear vision.

Advances in the field of corneal medicine mean that alternative treatments may soon be possible, bypassing the need for corneal transplantation altogether. For example, we might soon be able to fix some patients using the iFix Pen, a novel device that my colleague Professor Gerard Sutton is collaborating on with a number of others. The iFix Pen delivers a bio-ink formulation to injured corneas to promote healing and prevent infection.

Corneal tissue used in transplantations is generously donated by people who have opted to be donors.

All medical and surgical procedures have potential complications – check with your ophthalmologist before proceeding.
Part 4: What to expect on the day of the surgery

We continue our series of articles answering frequently asked questions about laser eye surgery.

In this post, we’ll look at what actually takes place during laser eye surgery, so you know what to expect on the day.

Before surgery

Before coming to the clinic for your surgery, you need to follow our preparation guidelines. You can expect to be in the clinic for around two hours, and in the laser suite for no more than 30 minutes. If you need laser eye surgery on both eyes, this will generally be done on the same day.

Prior to the surgery, anaesthetic eye drops will be applied to numb your eyes. You can also choose to have a mild oral sedative to help relax you before the procedure – this is optional. After allowing a short time for the sedative to work, you will be shown to the laser suite.

During surgery

Before you enter the laser suite, the laser will have been pre-programmed to correct your refractive error. Your surgeon will talk to you throughout the process to make sure you know what is going to happen next.

The laser will be moved into position after you lie flat on the bed, so that the eye being operated on is directly in line with it. To prevent blinking, a prop called a speculum will be fitted over your eye to hold it open. The laser has an infrared eye-tracker that measures and compensates for any movement in your eye.

Your surgeon will raise the bed so that the laser fits comfortably around your eye and will let you know when the procedure is about to start.

LASIK is a two-step vision correction procedure. In the first step, the surgeon uses either a femtosecond laser or a microkeratome to create a hinged flap on the top layer of your cornea, exposing the tissue bed underneath. You may feel slight pressure during this stage. In the second step, the excimer laser is used to reshape the cornea. As the laser moves across the cornea, you may feel a slight sensation but no pain. Once reshaping is complete, the surgeon gently replaces the corneal flap and the healing process begins immediately.

SMILE is a one-step, one-laser vision correction procedure. The surgeon uses a femtosecond laser to create a 3mm keyhole entry point. Next, the laser creates a precise lens-shaped disc of tissue within the cornea. This disc of tissue (called a lenticule) is then removed through the keyhole incision. During the procedure, you may feel some pressure or mild discomfort but no pain.

ASLA is a two-step, one-laser procedure. In the first step, the surgeon applies a topical solution to soften and remove the top layer of corneal cells. In the second step, an excimer laser is used to reshape the corneal tissue. During the laser step, you may feel a slight sensation but no pain. Afterwards, a ‘bandage’ contact lens is placed on top of the eye to assist with the healing process.

Following the laser procedure for the first eye, the speculum will be removed and the procedure will be repeated on your second eye (if required).

Ultimately, all three techniques achieve the same result – that is, restoring your vision by correcting your specific refractive error. The procedure that is best for you will have been established during your pre-operative consultation.

After surgery

Once the laser procedure is complete, you will be helped off the bed and led into the recovery room. You may be able to see distant objects, but your vision will be slightly blurry. This is normal. You will need to remain in the recovery room for around half an hour to allow your eyes to adjust and the effects of the sedative to wear off.

Before you leave, you’ll be given medicated eye drops to use and a follow-up appointment will be made for later that same day or the next day. A friend or family member must accompany you when you are discharged – you won’t be allowed to drive home. Once home, you should rest for the remainder of the day.

Next time, we’ll explain what is involved during the post-operative recovery period and how long vision takes to stabilise following each procedure.

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A pterygium is a visible growth on the surface of the eye. It typically emerges as a triangular, soft-tissue growth from the corner of the eye, with a pink and fleshy appearance.

This growth is the body’s way of trying to protect the eye from intense environments, such as high levels of sunlight, dust, sand or wind. Surfers are one group of people who are prone to developing this condition, which is also known as Surfer’s Eye. Other at-risk groups include farmers, welders and people living in northern (sunnier) areas of Australia.

In general, pterygia (plural) are not dangerous. During the early stages of pterygium development, the main concern is cosmetic – they change the eye’s appearance – but there is no effect on vision. Symptoms in the early stages may include irritation, itching or burning. These can generally be managed with eye drops. Avoid further exposure to sunlight and wind to reduce the stimulus for it to grow larger. A small pterygium that has stopped growing is relatively harmless and may not need any further treatment.

However, in some cases, the pterygium may continue growing across the eye and either directly block vision or distort the shape of the cornea and cause blurred vision (astigmatism). In these cases, surgery is recommended. Surgery is also an option if you are worried about the cosmetic appearance of your eye.

Importantly, pterygia are not cancerous – they are benign growths. That means that while they may grow locally (and possibly affect your sight), they won’t spread to other parts of your body. Nevertheless, it’s important that you have an ophthalmologist evaluate any growth on your eye to rule out more serious conditions, such as a conjunctival or iris tumour.

And while pterygia themselves are not cancerous, new findings published by Australian researchers suggest that people who have a pterygium are nearly 25% more likely to develop malignant melanoma – a fatal form of skin cancer. Tell your GP or dermatologist if you have (or have had) a pterygium, make sure that you protect your skin from the sun/UV exposure (i.e. sunscreen, long-sleeved tops, shade) and always have regular skin checks.

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