

# Corneal Transplant Information

**Patient Information Leaflet**

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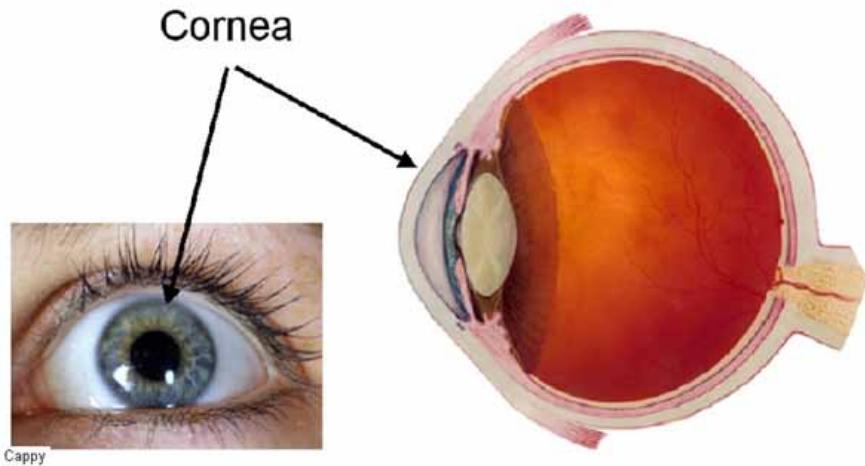
## **What is a Cornea?**

The cornea is the transparent portion of the eye which allows light to enter and performs 2/3rds of the focusing tasks. The cornea also covers both the iris (the coloured portion of the external eye) and the pupil (the reactive 'light meter' in front of the lens). There are no blood vessels in the cornea, but there are nerves. Nutrients for the cornea are supplied by the same source as the tear-ducts and internal eye fluids.

The cornea allow lights to enter the eyeball, and the cornea's convex shape focuses that light towards the pupil and another structure called the lens. In essence, the cornea performs the broad brushstrokes of vision, while the shape-shifting lens performs the fine details before all of the light hits the retina. It is the shape of the cornea's dome which determines whether or not a person may be nearsighted, farsighted or astigmatic (Distortion of the Cornea).

During vision correction procedures, external lenses may be used to re-focus images in the eye's lens or the shape of the cornea may be modified. Contact lenses placed directly on the cornea change its thickness, creating a new focal point. Some advanced contact lenses use tension to reshape the

entire cornea, allowing near-normal vision until the cornea resumes its original shape and the blurriness returns



## **What is Corneal Transplantation?**

This is the procedure whereby abnormal tissue is replaced by a healthy donor cornea. It has been performed for over 100 years and is the most common and most successful of transplant procedures. It may be:

- Full thickness: penetrating keratoplasty (corneal transplantation)
- Partial thickness: lamellar or deep lamellar keratoplasty (corneal transplantation)

A corneal graft is a transplant operation.

Although the operation itself is often reasonably straightforward, the recovery period often takes a long time and this information is to help you to understand what to expect. It is not however possible in an information leaflet such as this to provide specific information that is accurate for all patients' circumstances. The doctor looking after you will give you additional information based upon your own condition.

### **Why do you need this operation?**

The usual reason for performing a corneal graft is to help you to see better. For some people, however, the operation may be advised to help in the treatment of chronic pain and irritation in the eye. In that case, the operation may be worthwhile even if it does not greatly improve your vision. Rarely, the operation may be advised in order to save the eye, for example if there is very severe corneal ulceration. It is very important that you understand why it is being recommended in your case, and what it is hoped the operation will achieve for you.

### **Where does my new cornea come from?**

Your cornea will have come from someone who has expressed a wish that their corneas be used to

help someone else to see, after their death. People who offer their organs in this way are called donors, and transplant operations would not be possible without their generosity. The donor's cornea will have been thoroughly tested and kept in an Eye Bank for a period of time, before being sent to the hospital where the operation is to be carried out. The Eye bank is responsible for ensuring that your new cornea is in good condition, and also performs checks to try and ensure that your risk of catching an infection is limited.

## **The operation itself**

This is usually done under a full (general) anaesthetic although if your general health is poor, it may be possible to use local anaesthetic. It takes between 1- 2 hours. During the operation, the surgeon removes a circular piece of your cornea and replaces it with a similarly sized piece of the donor's cornea, which is stitched into place. In some cases other procedures, such as cataract extraction may be done in combination with the corneal graft. These may increase the duration of the operation. You will awaken with some soreness in the eye and a protector taped over it. Your eye will not be bandaged up. You will be allowed up and about after the operation. You may be allowed home the

same day or, if not, 1 to 2 days later.

## **After the operation**

Pain after a corneal graft is seldom severe and can be expected to settle quite quickly. The improvement in vision, however, is often rather slow. This is because the cornea takes a long time to heal and as it does so, shape changes in the cornea lead to changes in the way it focuses light. It is unlikely that your vision will be "stable", i.e. worth prescribing new glasses or contact lenses, for at least 6 months after the operation, and in some people it can take a year or more.

## **Stitches**

The very tiny stitches (properly called sutures) that are put into the cornea hold the graft in place but also affect its shape and therefore, the way the eye focuses. They are not dissolving sutures and will eventually need to be removed. Two main patterns of suturing are used - interrupted (or individual) suturing and continuous. Some surgeons use both methods combined.

In some patients, it becomes apparent after the operation that the sutures are causing sufficient distortion of the cornea (astigmatism) for it to interfere significantly with the quality of vision. It

may then be necessary to adjust or remove sutures. Adjustment may be done in the clinic or in the operating theatre, depending upon circumstances. It enables the cornea to sit more snugly in place, allowing it to focus better. The exact timing of suture removal varies greatly between individual patients and has to be decided on an individual basis. Removal of sutures too early after the operation could result in the graft coming apart and requiring resuturing. Eventually, however, approximately 12 to 24 months after the operation, all your remaining sutures will be removed.

### **Seeing clearly after the operation**

You are most unlikely, after a corneal graft, to be able to see perfectly without some assistance. All corneal graft patients have some degree of distortion of their cornea (astigmatism) which needs to be corrected, usually with spectacles, for them to see clearly. Some patients have large amounts of astigmatism, or are rather long or short-sighted, in the eye that has been grafted. They may need to wear contact lenses for the best level of vision, or to avoid clashes between their two eyes. However, a small proportion of corneal graft patients (around 10%) need to have a further operation on their corneas, in order to improve their focussing, and enable them to see

better. There are three main different types of this 'secondary refractive surgery'

- keratotomies ("relaxing incisions")
- resuturing (i.e. replacing sutures or putting extra ones) and lamellar surgery with the excimer laser (LASIK).

A full discussion of them is outside the scope of this document.

## **Grafts, work and activity**

After a corneal graft, your eye is at first very vulnerable to blows on it and to the effects of severe straining (bending down, pushing or lifting).

You should not take any more exercise than a brisk walk for the first month after the operation.

You should avoid lifting heavy objects, and if you have to bend down, do so **slowly** from the knees, keeping your-head up. It's a good idea to get help with hair washing, and you should do it with your head back, avoiding shampoo in the eye.

You should wear an eye shield at night until you are used to not sleeping on the side of the operated eye.

It is a good idea to wear glasses or sunglasses simply for protection, even if they don't help the vision. Above all, don't poke or rub the eye!

If you do a desk job, you can usually go back to

work after about 2 weeks, but if your job is more strenuous, you will be advised to stay off work for at least 4 weeks, or in some cases even longer. If you drive, you can usually start again after your first check-up, provided that the vision in the other eye remains satisfactory.

Once home, normal bathing and showering can resume but care must be taken not to get water in the eye for a month.

If the eye gets sticky, gently wash with cooled, boiled water. Eyelid make-up should also be avoided for this time.

Sunglasses can minimise discomfort but contact lenses should be avoided for at least 8 weeks - the patient should talk to their surgeon before resuming wear.

It is **very important** that the patient does not rub their eye in the early weeks post-operatively. Additionally, an eyeshield will be given to the patient to wear whenever they sleep or have a nap, for several weeks, to avoid inadvertent rubbing of the eye.

Swimming should be avoided for at least 4 weeks.

Light work can be resumed in 2-3 weeks and manual labour in 3-4 months.

If you play sports, it is essential to wear eye protection **at all times** after a corneal eye graft. Eye protectors for racket sports are available in sports shops. If you swim, you should wear goggles (primarily for protection from injury, not contact with water) and you should not dive in.

If you play football, there is a small risk of serious injury, particularly when heading the ball. Again you should consider eye protectors. **You are strongly advised not to play major contact sports** such as rugby, judo etc. at any time after a corneal graft, and not to recommence sports until you have been told that it is safe to do so.

In the long term, a corneal graft is strong enough to stand the rigours of ordinary life, but an eye with a corneal graft is never as strong as a normal eye and may be split open by a severe blow such as a punch in the eye. **Such an injury can cause blindness.**

### **Treatment and supervision**

Everyone must use steroid eye drops after the operation. These are necessary to ensure that your eye does not get too inflamed, which would cause

you pain and damage the graft. Steroid drops can have side effects, which must be watched for. They can cause pressure rises inside the eye, they reduce resistance to infection and, with very prolonged use, can cause cataracts. Therefore it is very important that you are examined regularly to monitor the treatment, and that you report promptly to your doctor if you think you have a problem. The steroid drops are slowly reduced in strength and frequency and are usually stopped between 3 and 6 months after the operation, although some people may need to use them for longer.

Most patients can expect to attend Outpatients between 8 and 10 times over the first year after a graft, with gradually increasing gaps between appointments. Patients are generally kept under review for several years after the operation.

### **Possible complications of the operation**

There are risks attached to any operation, involving the operation itself and the anaesthetic given in order to carry it out. These are some of the most important risks of corneal grafts.

**Minor** complications happen from time to time but do not usually affect the result. They include brief

periods of raised pressure or leaks of fluid between the stitches from within the eye. These generally settle within a few days of the operation. However, occasionally, it is necessary to replace a stitch or put in an extra one, if a leak doesn't seal up on its own.

**Major** complications of the operation itself are rare, but when they occur they can threaten sight or even possibly cause the loss of the eye. They include bleeding within the eye and infection entering the eye. They may require further operations if they occur.

**Disease transmission** is a possible complication of any transplant - in other words, the recipient could possibly catch a disease from the donor.

All corneal donors are tested for the viruses that cause hepatitis and AIDS. However, there is no test which will detect the germ which causes Creutzfeld-Jakob disease (CJD) and unknown viruses may also exist for which there is currently no test. The risk of catching such a disease is unknown, but likely to be very small.

**Rejection** is a major complication, which can affect any transplant. It happens when your body detects that a piece of tissue from another person has been

put into you, and your immune system then tries to destroy it. About 1 in 7 patients who have a corneal graft will have a rejection attack at some stage, although some patients are at a much greater risk than others. Rejection can start as soon as 2 weeks after a graft but is most common several months afterwards, and may occur years later. The quicker rejection is diagnosed, the better the chance of recovery.

If your eye gets red, watery, gritty, develops cloudiness of the vision then rejection may be the cause and you are advised to **attend your eye casualty department immediately**. If rejection is found, it is treated with very frequent, strong steroid drops, and occasionally with steroid tablets or drip feeds. Most corneal grafts do recover from their rejection attack, but a lot of patients will need to go on with the steroid drops for a long time afterwards, sometimes permanently. Patients who are in the "high rejection risk group" may be advised to have a "tissue matched" graft. However, some patients have to wait a long time for a suitable cornea to become available. Tissue type is determined by a blood test. The degree of benefit from tissue matching is unclear but is the subject of further research at present.

## **Causes of failure of corneal transplants**

A failed corneal transplant generally looks cloudy and dull, making the vision very blurred. This list gives the commonest reasons why a corneal transplant may eventually fail. Most patients with a failed transplant can be offered another one, but individual circumstances will dictate what is recommended in each case.

**Rejection** (discussed above) may lead to failure of transplant, which may happen immediately or sometimes may happen some time later.

**Failure of the endothelium** (or decompensation) means that the graft no longer has enough cells on its inner surface to keep it clear, and so it must be replaced.

**Recurrence of the original disease** can happen to people whose corneal graft was done because of a genetic disease (corneal dystrophy) or an infection (viral keratitis).

**Infection** causing ulceration leading to scarring, may occasionally cause graft failure.

**Unacceptable refractive result** means that the graft cannot be made to focus satisfactorily for its

recipient, perhaps because of marked astigmatism. Such a graft may have to be considered as a failure, and replaced.

## **Deep Anterior Lamellar Keratoplasty (DALK) (Lamellar Transplant)**

Your surgery will be carried out by a Consultant who is suitably experienced and qualified.

A DALK is a partial thickness graft of the cornea in which we replace the front 95% of the cornea and it is used as an alternative to penetrating keratoplasty (PK), which involves a full-thickness corneal graft.

By preserving that part of the cornea that is healthy, the risks of graft surgery such as graft rejection, bleeding and infection inside the eye, are decreased. In this case, the tissue preserved is the back 5% of the cornea including a layer called "Descemet's membrane". After removing the unhealthy part of the cornea, a donated cornea is stitched into place and the sutures remain for approx 12 to 18 months.

### **What are the risks?**

The risks of the surgery include, but are not limited to:

- Infection
- Bleeding

- Non adherence of graft
- Loss of Vision
- Graft Rejection
- Increased pressure inside the eye
- Conversion to full thickness graft (Penetrating Keratoplasty)
- Cataract formation
- Recurrence of the original problem

NB. Please also be aware that you may need to use glasses or contact lenses after you have had surgery. Although we have discussed with you the purpose and likely outcome of the proposed procedure, it is not possible for us to guarantee a successful outcome in every case. Should any of the above complications occur, you may require further surgery.

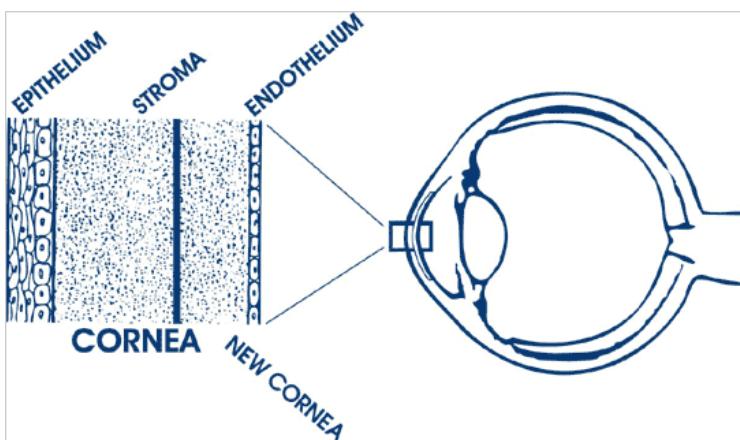
## **What are the benefits?**

Replacing the abnormal corneal tissue with healthy donor tissue should improve the visual potential of the eye and also where the cells of the cornea are damaged (dystrophies), this will improve the comfort by decreasing occurrence of ocular surface breakdowns.

## **Are there any alternatives to surgery?**

In the case of keratoconus, possible alternatives are the continuation of contact lens use, or the implantation of semicircular plastic rings (INTACS) inside the cornea, a less invasive procedure, to change the shape of the cornea.

In corneal dystrophies, possible alternatives are laser surgery (PTK/PRK) to reshape the surface of the eye and remove some of the abnormal tissue, or conservative treatment with bandage contact lenses and eye drops. If you have any specific concerns, you should discuss them with your surgeon before the operation.



## **Descemets Stripping Endothelial Keratoplasty (DSEK)**

If the corneal endothelium is damaged and the cornea is water-logged but otherwise clear, e.g. Fuch's dystrophy, then penetrating keratoplasty or endothelial keratoplasty may be used. Endothelial grafting is carried out by a procedure described as "Descemet's stripping endothelial keratoplasty" (DSEK), and is the preferred choice in most cases of endothelial failure because of its relatively rapid visual recovery. If your cornea has both damaged endothelium and corneal scarring, penetrating keratoplasty is necessary.

This is a more recently developed procedure that involves only replacing the innermost layers of the cornea, rather than the whole cornea as in a Penetrating Keratoplasty or Full Thickness graft. In conditions such as Fuchs endothelial Dystrophy, the innermost layer, the endothelium is diseased. The rest of the cornea is normal. Previously to replace the valuable endothelial layer, the whole central cornea was replaced by performing a Penetrating Keratoplasty. With innovative techniques, we are now able to replace just the innermost layer. The procedure involves peeling off the inner two layers of the diseased cornea. A donor cornea is then split

or dissected to create a flap of the inner two layers and a small portion of stroma (to provide substance for manipulation). This 3 layer donor is then folded and inserted into the eye and floated up to stick onto the inside of the cornea, replacing the layers removed earlier.

## **About the procedure**

DSEK is a technique where the endothelial cells are removed from your eye and selectively replaced with a new layer of endothelial cells. These new cells are held in place temporarily by a bubble of air inside your eye. In the past, a full thickness corneal transplant has been the preferred technique.

However, this procedure requires stitches and a full thickness wound which will remain weak and results in a prolonged recovery time. Since surface corneal incisions and sutures are not used in this more modern technique (DSEK), the corneal shape is preserved which allows a more rapid visual recovery than a full thickness corneal graft.

The procedure is technically challenging, however can be accomplished very quickly often with very few stitches. The procedure is becoming more and more popular and will in time become the Gold Standard.

## **What are the risks?**

- Graft dislocation
- Temporary increased eye pressure
- Graft failure, which will require further surgery
- Graft rejection
- Blurred vision due to macular oedema (swelling of the central part of the retina)
- Retinal detachment
- Eye infection with loss of vision - very low risk

## **After the operation**

You will be asked to lie flat face up as much as possible for 1 to 2 days after surgery, as we usually leave an air bubble in the eye to push the new endothelial graft in position. This air bubble is usually absorbed within 48 hours.

You will need to use pupil-dilating eye drops 3 times a day for 3 days following the surgery. You will also be given two more lots of drops (an antibiotic and a steroid) to use, at first, 4 times a day. The dosage and frequency of these will be reduced gradually, as prescribed by the corneal surgeon. Your vision will be misty for a few days after surgery, but it will improve over the next 3 to 4 months, as the cornea gradually clears.

## **Resuming normal activities**

*Work* - You are likely to need 1 week, or longer, off work, depending on the type of job you have.

*Sport/hobbies* - We advise that, should the surgery be successful, you wait for 4 weeks before returning to sport or active hobbies.

*Flying* – Air travel is usually permissible 3 days following surgery, providing the air bubble has been absorbed into the eye, as previously described.

## **Future**

One of the most challenging aspects of DSEK surgery is creating a reproducible donor layer. This can vary considerably and its irregularity could theoretically affect visual outcomes.

## Options available

If you'd like a large print, audio, Braille or a translated version of this booklet then please call  
**01253 955588**

## Patient Relations Department

For information or advice please contact the Patient Relations Department via the following:

Tel: **01253 955588**

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You can also write to us at:

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Further information is available on our website: **www.bfwh.nhs.uk**

## Travelling to our sites

For the best way to plan your journey to any of the local sites visit our travel website:  
**www.bfwhospitals.nhs.uk/departments/travel/**

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## References

This booklet is evidence based wherever the appropriate evidence is available, and represents an accumulation of expert opinion and professional interpretation.

Details of the references used in writing this booklet are available on request from:

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