**Corneal Transplantation**

**Penetrating Keratoplasty (PKP) and Deep Anterior Lamellar Keratoplasty (DALK)**

This information leaflet is designed to educate about the various options available to you. It is intended to make you better informed about the risks, benefits, and alternatives of corneal transplant surgery. If the full thickness of the cornea is affected by disease, then a full thickness transplant is performed. This is known as a Penetrating Keratoplasty (PKP). If the anterior two-thirds of the cornea is affected by disease, the outer two layers of the cornea (about 90-95%) are removed and replaced with the outer two layers from a donor cornea to give a partial-thickness transplant. This is known as a Deep Anterior Lamellar Keratoplasty (DALK).

**Introduction**

You have a condition that has affected your cornea (the front part of your eye) that may benefit from a corneal transplant. This surgery involves replacing your cornea with a cornea that has been donated by someone who has died (the donor cornea). The donor cornea to be used for your transplant will be provided by a certified Eye Bank in the UK.

Please take as much time as you need to ask questions and to discuss the surgery with your doctor and the medical staff, or with family, friends or your general practitioner. A balanced appreciation of the benefits of surgery (pain relief, improved vision) and the potential risks are key to making any decision. You may also decide that you do not wish to have surgery at this time.

**Goals of Corneal Transplant Surgery**

In most cases, the primary goal of corneal transplant surgery to improve the vision of the operated eye. In doing so it is hoped that your ability to function at home or at work will also improve. Corneal transplant surgery may also be done to provide more comfort to patients with recurrent corneal pain from blisters. In cases of severe corneal infection or perforation, corneal transplant surgery may be performed to save the eye. When the primary reason for surgery is chronic pain, infection or structural damage, corneal transplantation may preserve the eyeball, but may not result in an improvement in your vision.

It is important that you understand that improvement in visual and functional status is dependent not only on having a clear cornea, but also a healthy eye. Diseases such as glaucoma (pressure in the eye), cataract, and retinal swelling and scarring will adversely influence the final visual result. The effect that these problems have on the final vision is often difficult to predict prior to corneal transplantation surgery.

**Alternative Treatments**

You may decline to have a corneal transplant operation. Other treatment alternatives may be applicable to the specific condition affecting your eye. These may include the following:

1. **Observation**

Many of the conditions that affect the cornea and lead to decreased vision are non-progressive or very slowly progressive. Careful and regular observation is an alternative in some of these conditions when other treatment approaches are undesirable or have proved unsuccessful. No improvement in vision or increased comfort would be expected with this approach.

1. **Eye Drops**

Eye drops that reduce corneal swelling and intraocular pressure may improve vision or reduce ocular discomfort in some patients. These drops are most helpful in patients with symptoms due to small amounts of corneal swelling. There are few risks associated with these medications.

1. **Contact Lenses**

Conditions of the cornea that are associated with surface irregularity or scarring may sometimes achieve visual improvement with soft or hard contact lenses. Occasionally a contact lens can be used as a bandage to reduce ocular discomfort. Handling of a contact lens is difficult for some individuals, and not everyone can tolerate them.

1. **Conjunctival Flap or Amniotic Membrane**

Patients who have persistent ocular pain due to corneal disease may achieve symptomatic relief from a conjunctival flap or amniotic membrane. This surgical alternative is less involved than a corneal transplant. It involves removing the thin tissue layer (epithelium) covering the cornea and placing a flap of tissue (conjunctiva or amniotic membrane) over the cornea. Because this surgery does not improve corneal clarity, it is not a good choice for patients interested in visual improvement.

1. **Corneal Transplantation**

Corneal transplantation is a surgical procedure in which a donated human cornea is used to replace a portion of your diseased cornea. It is capable of correcting certain corneal disorders that are associated with decreased vision or pain. A full thickness cornea transplant (PKP) or a deep partial thickness (DALK) corneal transplant is being recommended for you. Occasionally, it is not possible to perform a DALK transplant and a PKP transplant must be performed instead. In some cases, a partial thickness cornea transplant (DSAEK, DMEK, lamellar keratoplasty, etc.) may be a suitable alternative procedure.

**Procedure**

If you choose to have a corneal transplant (PKP / DALK), the surgery will be scheduled in coordination with the Eye Bank and hospital operating schedule. It is usually performed as an inpatient procedure under general anaesthesia, with one night post-operative hospital stay.

On the day of your procedure, an eye examination will be performed to make sure that clinical findings have not changed and that it is safe to proceed with the planned operation. Very rarely, the surgical plan may have to be altered, and if so, your surgeon will discuss alternative options. Consent to proceed with the operation will be confirmed and the appropriate eye for surgery will be marked. Nursing staff will instil drops in to the eye prior to your transfer to the operating room in preparation of the surgery. You will also be reviewed by an anaesthetist.

The surgical procedure takes about 90 minutes to perform. A central 8mm button of your cornea is removed and a similar sized button of the donor cornea is stitched in with tiny sutures. These cannot be felt or seen. The abnormal cornea, which is removed, is sent to our pathology laboratory for examination under a microscope.

You will then be transferred to the inpatient ward with a patch on your eye. If you have a DALK corneal transplant, an air bubble will be placed beneath the donor cornea and you will be asked to lie flat on your back with your face towards the ceiling for 24 hours. This helps the air bubble keep the donor cornea attached in the correct position. The patch will be removed and your eye will be examined 1-2 hours after the procedure. You will be placed on antibiotic and steroid drops to prevent infection and to help with healing. Your doctor will review you again the following day prior to your discharge from hospital.

You will generally have additional visits with your doctor at one week, one month, three months, six months, and 12 months after surgery. We will of course see you at any time that you have concerns, questions or problems after your surgery.

**What to Expect and possible Complications, Risks, and Side Effects of**

**Corneal Transplant Surgery**

1. There is often mild to moderate pain and irritation for several days after the surgery. The pain is usually controlled with drops and paracetamol. Stronger painkillers are generally not needed. The eye may be red and the eyelids may be swollen.
2. One of the most common causes of graft failure is a “rejection” reaction. In a graft “rejection” the body’s immune system (inflammation) attacks the donor cornea. The rejection is usually reversible if treated promptly, but sometimes rejections lead to clouding and failure of the corneal transplant. In most patients undergoing corneal transplant surgery, the risk of graft failure from rejection is less than 5% to 20%. In some cases, the risk may be much higher. Symptoms of rejection are sudden onset of redness, sensitivity to light, deterioration of vision or pain. If you experience any of these symptoms, you need to

urgently get in touch with the eye casualty (Acute Referral Clinic) or the on-call duty eye doctor at the Royal Bournemouth Hospital.

1. The transplant may also become cloudy due to late functional failure of the tissue, scarring, uncontrollable pressure or nonspecific inflammation. Depending on the original disease process, the condition may reoccur in the corneal transplant. If a corneal transplant fails, the vision usually deteriorates. The transplant may be repeated in most cases, but the prognosis is not as good for a repeat corneal transplant operation. The patient’s doctor may be able to provide more precise information about each patient’s particular risk.
2. The eye is never structurally as strong as a normal eye after corneal transplant surgery, even many years later. Eye trauma may result in a rupture of the corneal transplant wound and this can lead to possible loss of vision or even the eye. Protection of the eye from minor and major trauma with glasses or a protective shield is extremely important and cannot be overemphasised.
3. The corneal transplant is secured in place with many small non-dissolvable sutures (stitches). The doctor will begin to remove sutures several months after your surgery. Some sutures may be left in place indefinitely. These sutures can lead to problems such as surface irregularity, discomfort, blood vessel formation, infection, and corneal wound problems. Patients should be examined at regular intervals until all sutures are removed.
4. A successful corneal transplant results in a clear cornea. Most eyes will have some astigmatism and will be either near or far sighted. Glasses are the most common method to correct for these changes. Usually patients must wait 12 months or more before their vision is restored and stable enough to obtain new glasses. Sometimes the glasses are unacceptably thick or strong, or the vision cannot be adequately corrected with glasses. In these cases, a rigid contact lens, or additional surgery may be needed to help improve vision. Unfortunately, there is no guarantee that a corneal transplant will ultimately result in improved vision.
5. Patients who undergo corneal transplant surgery often have problems with glare and distortions due to surface irregularity from the large corneal wound and many corneal sutures. During transplant surgery, all the corneal nerves are cut. While the nerves eventually grow back, this sometimes leads to healing problems on the surface of the cornea which can result in irritation, blurred vision, erosions, infection, and scarring.
6. Less commonly, other eye problems may develop after corneal transplant surgery. Some of these conditions include elevated pressure, worsening of glaucoma, cataract formation, retinal swelling, retinal detachment and persistent corneal irregularity. You may need additional treatment or surgery to treat these and other possible complications. Additional treatment or surgery is not included in the fee for this procedure.
7. Rarely (approximately 1 in 500) a severe haemorrhage or infection occurs that results in loss of all vision or loss of the eye.
8. The donor cornea is obtained from the NHS Blood and Transplant Special Health Authority (NHSBT) or other accredited Eye Banks. A past medical history is obtained from the donor. The donor is screened carefully for evidence of potentially transmissible infectious or neurological disease. Blood is drawn and tested for hepatitis, AIDS, and other diseases. Every effort is made to exclude donors that could transmit diseases. The risk of getting a serious disease from a donor cornea is felt to be extremely small. Nevertheless, it is still possible that a serious disease could be transmitted from the donor cornea.
9. As with all types of surgery, there is the possibility of complications due to anaesthesia, drug reactions or other factors which may involve other parts of the patient’s body, including difficulty awakening from anaesthesia, neurological problems from the anaesthesia, or even death. Some anaesthetic complications may include: perforation of the eyeball, damage to the optic nerve, bleeding around the eye, interference with the circulation of the blood vessels in the retina and drooping of the lid.
10. Since it is impossible to state every complication that may occur as a result of surgery, the list of complications in this information factsheet is incomplete.

**Pregnancy Warning**

Pregnant patients should NOT undergo elective corneal transplant surgery. It is possible that the medications used during anaesthesia and the eye medications used after the surgery could have adverse effects on a foetus. Women of child bearing potential should be certain they are not pregnant prior to corneal transplant surgery. For women at risk for pregnancy, a blood or urine pregnancy test must be obtained prior to the surgery.

**Consenting for Information Sharing**

To comply with the law and to ensure high quality transplant material, we are required to share your information with the NHSBT. However, we require your consent to share this information. If you do not give consent for your information to be shared with or held by the NHSBT, this may affect availability of donor cornea for the transplant or create problems with contacting you should any issues be identified later on with the corneal transplant you received. For further details, please read the leaflet ‘NHS Blood and Transplant: Giving consent for use of your information’ which can be found here:

 <https://www.organdonation.nhs.uk/newsroom/publications/living_donor_consent.pdf>

**Statement of Consent to Investigation or Treatment**

You will be asked by your doctor to provide a signed statement of consent to proceed with your treatment.

You agree that corneal transplant surgery, its advantages and disadvantages, risks and possible complications, as well as the treatment alternatives have been explained to you by your doctor.

You recognise that it is impossible for your doctor to inform you of all complications and that no guarantees or promises have been made to you concerning the results of any procedure or treatment.

You have been explained the need for follow up as frequently as advised by your doctor and that it may span up to several years, with multiple investigations at each visit.

You have been explained that using medications properly is essential for the success of the corneal transplant.

It usually takes 6-18 months for the transplant to heal and stabilize enough for new glasses to be prescribed.

While sutures are often left in place when vision has stabilized, there is a risk that these sutures may break and lead to an infection.

It is possible for a rejection reaction to develop years after surgery.

In some cases a steroid drop is continued as a preventative measure – when this is the case the eye and intraocular pressure will need to be monitored a number of times each year.

Safety glasses are strongly recommended in all patients after corneal transplant surgery since the junction between the new transplanted cornea and your own tissue will never be as strong as it was prior to corneal transplant surgery.

If at any point you notice pain, loss of vision or other eye problems, notify your eye doctor and arrange to be seen promptly.

You understand that there may be other unexpected risks or complications that can occur that were not listed in the information factsheet or discussed by your doctor. You also understand that during the course of the proposed operation unforeseen conditions may be revealed that require the performance of additional procedures, and you authorise such procedures to be performed. These may include cataract removal with or without intraocular lens implantation, removal of an intraocular lens, exchange of an intraocular lens, removal of vitreous gel, and production of an alternate pathway for the drainage of ocular fluid (glaucoma procedure).

You understand that post-operative follow-up appointments for ninety (90) days after surgery are included in the original surgery billing. After ninety (90) days, or if a consultation during that 90 day period is unrelated to the surgery, you and/or your insurance company will be billed and responsible for all charges.

You have had ample opportunity to read this form, ask questions of your surgeon to your satisfaction, and have been offered a copy of information factsheet to take home. You voluntarily give your authorisation and consent to the performance of the procedure(s) described above by your doctor and/or his associates, assisted by hospital or surgery centre personnel and other trained persons.