

Corneal Transplantation

The cornea is the clear window of the eye which allows light to be focused onto the back of the eye. Different diseases can compromise the clarity, shape or integrity of the cornea resulting in a perforation. This can result from infection, injuries, predisposition to thinning of the cornea and inherited conditions which cause the cornea to become cloudy or unable to maintain its own clarity.



Why do I need a corneal transplant?

Many diseases affecting the cornea may be overcome by wearing glasses or using contact lenses. Sometimes these approaches do not help or patients may not be able to tolerate contact lenses. In these instances it may be necessary to replace part or all of your cornea through surgery by undertaking a corneal transplant called a graft or keratoplasty. This graft will come from a donor who has died and given consent for their cornea to be used for transplantation after their death.

There are three layers in the cornea:

1. The epithelium (the front surface like a skin)
2. The stroma (the middle part which makes up most of the cornea)
3. The endothelium (the back surface which acts as a pump to stop the cornea from becoming waterlogged)

What types of corneal transplant are there?

Different diseases may affect all or part of the cornea. There are three broad approaches

1. Penetrating Keratoplasty (PK – a full thickness corneal transplant)
2. Endothelial Keratoplasty e.g. Descemet Stripping Automated Endothelial Keratoplasty (DSAEK) – a partial thickness corneal transplant replacing the endothelium
3. Deep Anterior Lamellar Keratoplasty (DALK – a partial thickness corneal transplant replacing the epithelium and front part of the stroma up to 90% depth)

All involve the replacement of some or all of your cornea. Like all organ transplants, this involves taking corneal tissue from someone who has died and donated their organs for transplantation

How is the decision made?

Your doctor will usually discuss with you what type of condition you have, and may organize other scans or tests to confirm your diagnosis. Traditionally corneal

transplantation involved a full thickness or penetrating keratoplasty (**Figure 1**). This kind of graft is helpful if you have a scar involving most of the thickness of the cornea, an infection which may have caused a hole to develop in the eye or when other surgery is not possible.

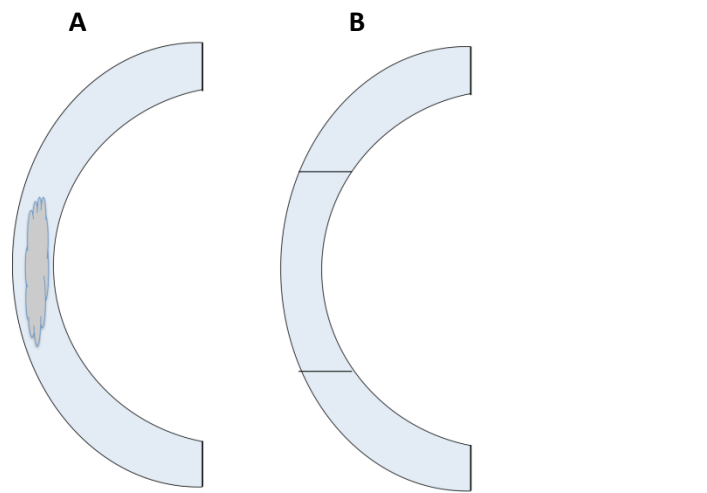


Figure 1: Penetrating Keratoplasty. A side profile cartoon showing a scar involving most of the cornea (Part A). Part B shows the replacement of the scar with a full thickness graft

If the endothelium (the back layer of the cornea) is not working properly then liquid cannot be pumped out of the cornea properly and it becomes waterlogged (**Figure 2A**). This may occur in conditions such as Fuchs' Endothelial Corneal Dystrophy (FECD) and/or following decompensation/failure of the cornea following cataract surgery. These conditions are usually approached by selective replacement of the endothelium which has stopped working properly by endothelial keratoplasty (**Figure 2B**).

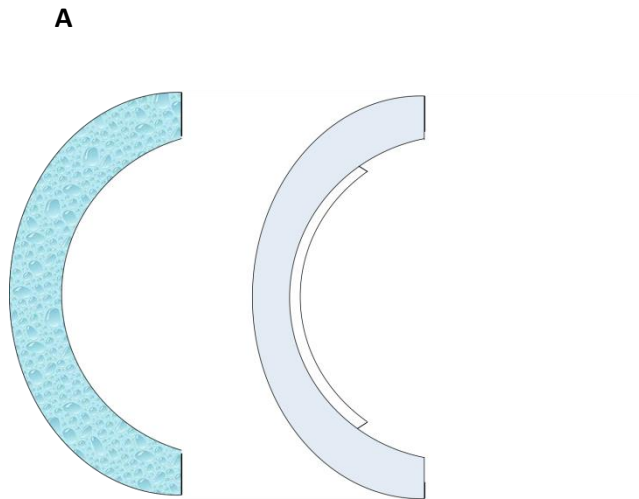


Figure 2: Endothelial Keratoplasty. A side profile cartoon showing a waterlogged cornea (Part A). Part B shows the replacement of the back surface of the cornea with donor endothelium (white).

Finally if the front part of the cornea is affected but the endothelium appears to be working your surgeon will attempt to remove the defective part of the cornea and replace it with the donated part of a donor cornea (DALK). This may take place because of a scar that does not involve the back part of the cornea (**Figure 3A**) or when the cornea is misshapen e.g. in conditions such as Keratoconus. The selective replacement of the front part of the cornea may involve removing the diseased cornea by hand (manual DALK) (**Figure 3B**) and/or injecting an air bubble to try and remove as much tissue as possible (big bubble DALK).

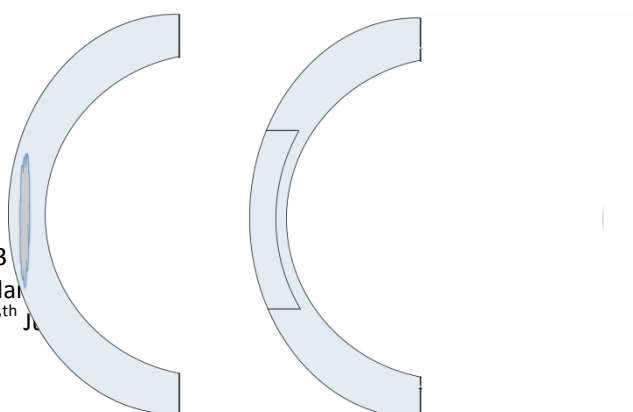


Figure 3: Deep Anterior Lamellar Keratoplasty. A side profile cartoon showing a scar involving the front part of the stroma of the cornea only (Part A). Part B shows the replacement of the front surface of the cornea with donor tissue.

What is involved in the surgery?

Surgery is usually undertaken under general anaesthetic in the case of PK and DALK (as these are longer procedures) or local anaesthetic for DSAEK and performed as a day case.

A PK or DALK involves the removal of all or some of the cornea as outlined and replacement with a donor graft measuring 7.5-8.5mm in diameter. The graft must be sutured (stitched) into place and this may involve inserting several (typically 16) interrupted or continuous (usually one or two) 'permanent' stitches (**Figure 4A or 4B**). These will remain in place and will usually be completely or selectively removed several months after surgery.

A DSAEK involves a smaller incision that allows replacement graft material to be placed inside the anterior (front) part of the eye e.g. with an insertion device which allows coiling of the graft and unfurling inside the eye, akin to getting a 'ship in a bottle'. The graft is floated onto the back surface of the cornea with an air bubble and only a few sutures are required (**Figure 4C**). This procedure may be combined with cataract surgery or completed as a separate operation. For the air bubble to attach the graft you will usually be asked to lie flat on your back for an hour or so after the operation.

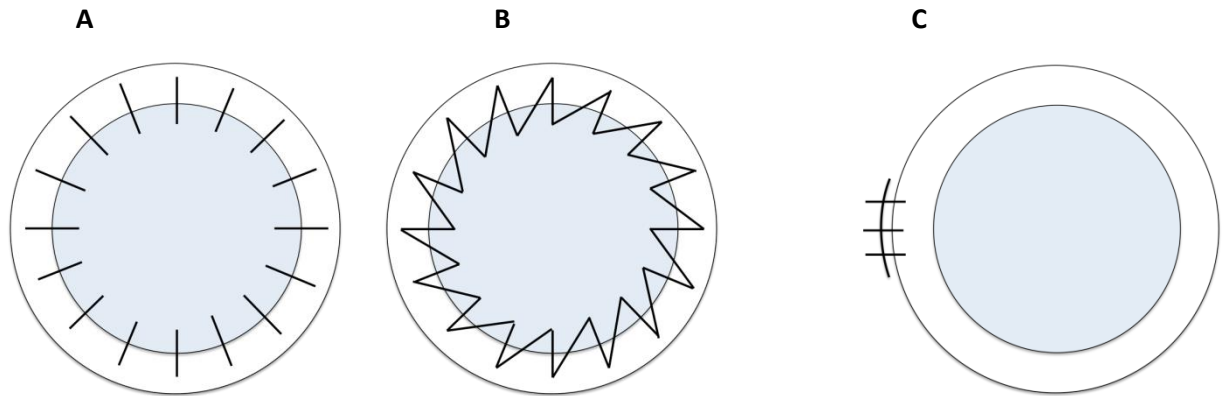


Figure 4: Corneal suturing in different types of grafts (blue). Interrupted (Part A) or Continuous stitches (Part B) in a Penetrating/Deep Anterior Lamellar Keratoplasty. A small side incision with limited sutures is seen for an Endothelial Keratoplasty e.g. DSAEK (Part C)

What are the benefits of surgery?

DALK vs. PK

By maintaining the back surface of the cornea, selective replacement of corneal tissue in a DALK procedure allows the integrity of the eye to be maintained, reducing the risk of complications such as bleeding inside the eye during surgery and longer term the risk of rejection. It also facilitates removal of sutures more quickly.

DSAEK vs. PK

By making a smaller incision (up to 4.5mm) in DSAEK, the strength of the eyeball is maintained and makes this a much safer operation than in PK. This means fewer stitches and a faster recovery. The risk of rejection is overall much less and if problems are encountered with the graft it is much simpler to replace it

What are the risks and complications of surgery?

All Grafts

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All grafts carry a risk of rejection. This is because the body's immune system may recognize the transplant as not belonging to the patient's body. This can occur in less than 20% of patients in a PK at 2 years but is lower, around 10% for a DSAEK. Corneal graft rejection may or may not be reversible with treatment, usually steroid eye drops or tablets to dampen the immune response. All patients are given steroid drops after transplantation as a preventative measure but it is unusual for immune suppressing tablets to be given for most patients needing a corneal graft. Rejection may lead to failure of the graft i.e. it no longer works and the graft becomes cloudy resulting in blurring of vision.

Other risks include:

- Astigmatism (curvature of the eye becoming more steep in one plane after suturing)
- Glaucoma (high pressure in the eye which can usually be managed with drops)
- Cataract (clouding of the lens), which is amenable to surgery. However, the cataract is usually removed prior to or at the time of DSAEK.
- Retinal detachment
- Infection
- Bleeding within the eye
- Loss of sight which may be permanent, especially if unusual but serious complications such as infection or bleeding occur

DALK

There is a risk of conversion to a full thickness graft (PK) in around 10% of cases.

DSAEK

There is a risk of the graft becoming detached from the cornea. This happens to around 10% of patients and will usually require a further air injection to re-attach the graft.

Follow up and aftercare

Your surgeon will assess you following the operation and the vast majority of patients will be able to go home the same day and will be followed up in clinic within a week. You will be advised on specific aftercare e.g. intensity of anti-rejection drops and antibiotic drops. We usually advise avoiding submerging the eye, taking care to wear a shield at night or when near young children and pets and to remain off work for at least two weeks. Individual circumstances can be discussed with your surgeon.

You will be monitored more closely in the first few weeks with outpatient appointments usually being spread out over the coming months. It may also be necessary to organise additional visits to an optician to help optimise your vision later on, and this may include where appropriate the use of specialist contact lenses to maximize your vision. This will usually be organized following the removal of stitches.

Other advice

- Stop wearing your usual contact lenses prior to and after your surgery until advised to do so.
- You may feel that wearing sunglasses can make your eye(s) feel more comfortable following surgery.
- Contact the department as soon as you notice any problems e.g. increased blurring of vision, redness or pain which is getting worse. See an ophthalmologist as soon as possible if you start noticing these symptoms or any problems that may be of concern, so that the right treatment can be started straight away.

Patient Experience

Being admitted to hospital can be a worrying and unsettling time. If you have any concerns or questions you should speak to a member of staff in the ward or department who will do their best to reassure you. If you are not happy with their response, you can ask to speak to someone in charge.

Patient Advice and Liaison Service (PALS)

Our PALS staff will provide advice and can liaise with staff on your behalf if you feel you are unable to do so. They will also advise you what to do if your concerns have not been addressed. If you wish to discuss making a formal complaint PALS can provide information on how to do this. Telephone: 0300 123 1732. Monday to Thursday 8.30am to 4.30pm. Friday 8.30am to 4pm.

An answerphone operates outside office hours. Or email us at: wah-tr.PET@nhs.net

Feedback

Feedback helps us highlight good practice and where we need to improve. There are lots of ways you can give feedback including completing a Friends and Family Test card or undertaking a survey. For further information please speak to a member of staff, see our Patient Experience leaflet or visit www.worcsacute.nhs.uk/contact-us

If you would like this leaflet in an alternative language or format, such as audio or braille, please ask a member of staff.

Polish

Jeżeli są Państwo zainteresowani otrzymaniem niniejszej ulotki w innej wersji językowej lub formacie, prosimy zwrócić się w tej sprawie do członka naszego personelu.

Bengali

আপনি যদি এই লিফলেটটি অন্য ভাষায় বা ফর্ম্যাটে পেতে চান যেমন, অডিও বা ব্রেইল তাহলে অনুগ্রহ করে সদস্য বা কর্মীদেরকে তা জানান।

Urdu

اگر اس کتابچہ کو آپ کسی متبادل زبان یا ہیئت جیسے آڈیو یا بریل میں چاہتے ہیں، تو برائے کرم اسٹاف رکن سے مانگیں۔

Romanian

Pentru a obține această broșură în altă limbă sau în alt format fie audio sau limbajul Braille, vă rugăm să apelați la un membru al personalului.

Portuguese

Caso deseje este folheto numa língua ou formato alternativos, tal como ficheiro áudio ou em Braille, por favor dirija-se a um dos nossos funcionários.

Chinese(Mandarin)

如果您想要本手册的替代语言或格式的版本，如音频或盲文，请向工作人员咨询

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