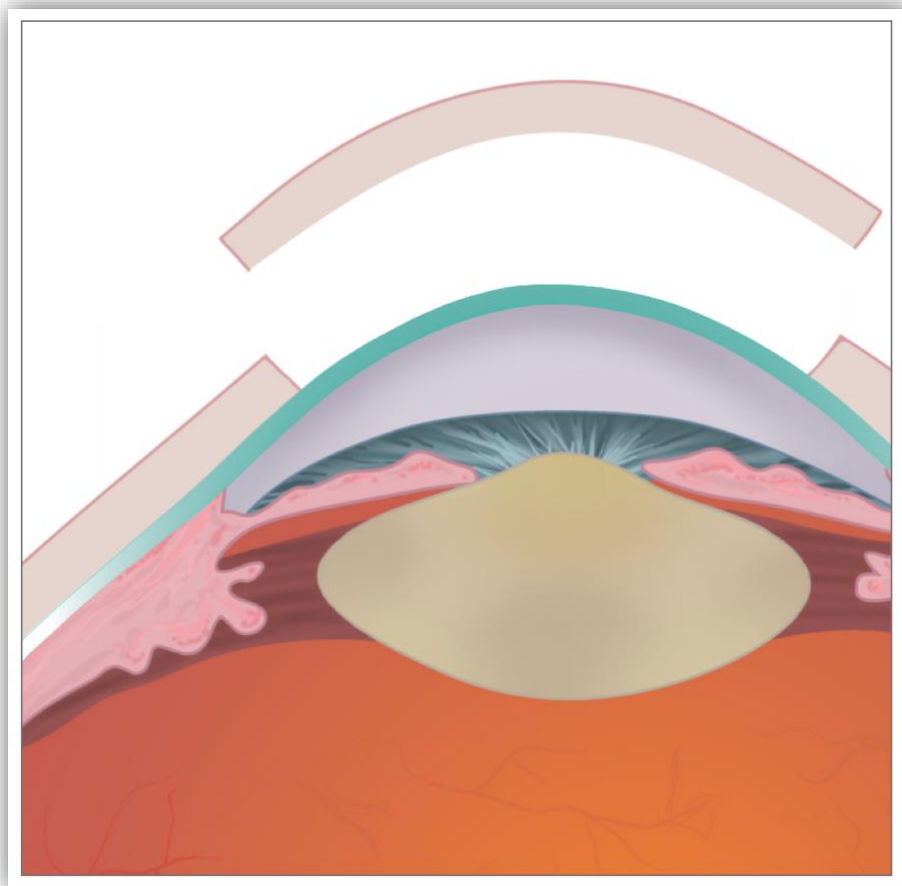


Deep Anterior Lamellar Keratoplasty (DALK)

Patient Information



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Illustrations courtesy of Medical Illustration, Countess of Chester Hospital

The information herein should help supplement the consultation with your doctor in clinic. Should you have further or specific questions these should be discussed with your eye doctor.

The cornea is the clear window at the front of the eye that allows light to enter for you to see (Figure 1A). The cornea consists of several layers including a thin outer layer (the epithelium), a thick middle layer (the stroma) and a thin inner layer (the endothelium) (Figure 1B). Your vision has deteriorated due to the disease of the outer and/or middle layers of the cornea. The innermost layer of your cornea is thought to be healthy and does not require replacement at this stage.

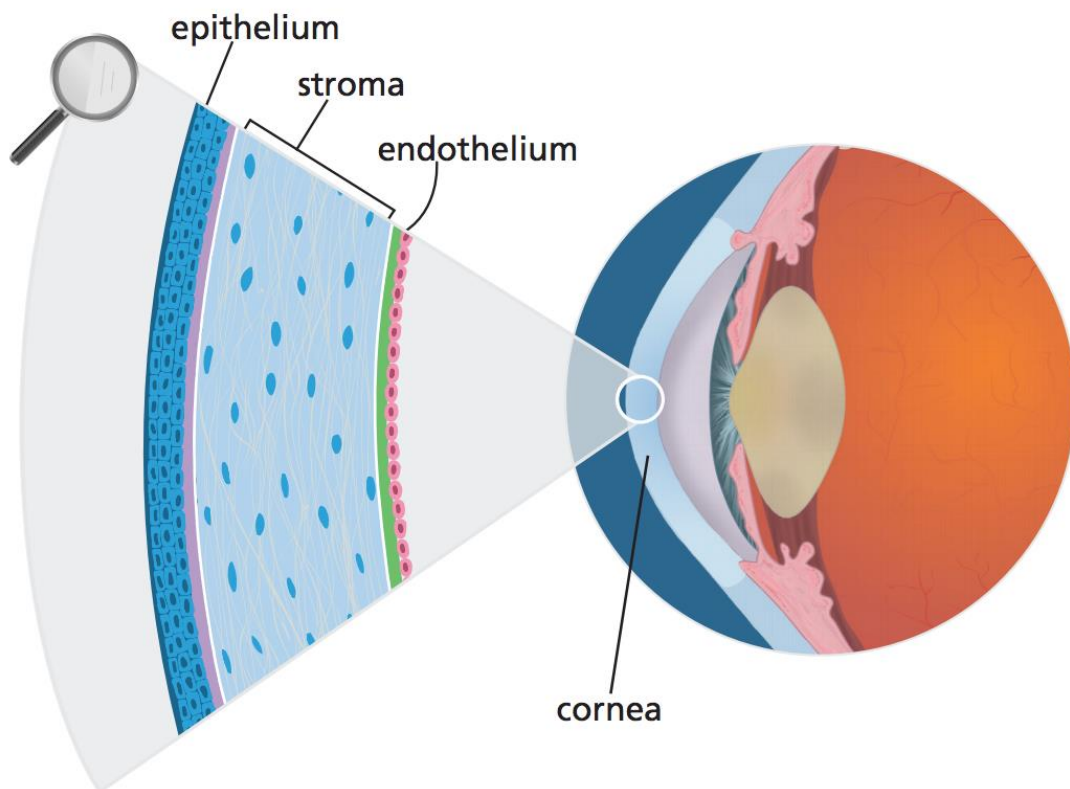


Figure 1B
A magnified view of the layers in the cornea

Figure 1A
Cross section through the human eye

Modern surgical techniques allow your surgeon to replace only the middle and outermost layers of your cornea, in order to improve your vision. This holds several advantages over more traditional “full-thickness” corneal transplant surgery. Other forms of corneal transplant are possible to replace the different layers, but are not discussed here.

What is the name of this operation?

Deep anterior lamellar keratoplasty (DALK) is the general name given to this operation, commonly known as a “partial-thickness” corneal transplant surgery.

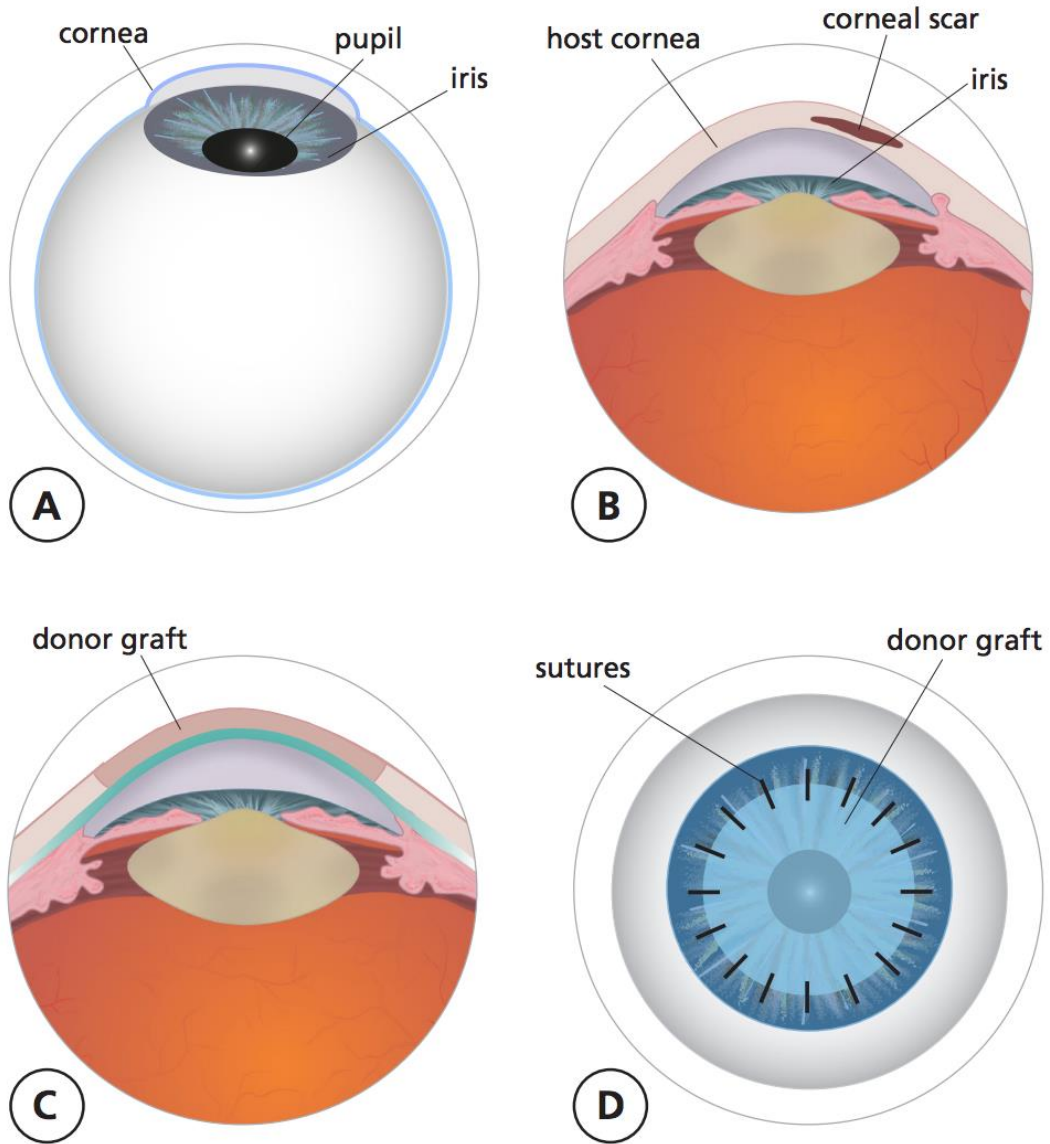
Some reasons for patients to require DALK include:

- ❖ Keratoconus – progressive thinning and bulging of the cornea
- ❖ Trauma resulting in corneal scarring
- ❖ Corneal dystrophies – a group of genetic and often progressive disorders causing clouding of the cornea

How is the operation performed?

The operation is usually performed under general anaesthesia as a day case procedure, in an operating theatre. A partial-thickness circular opening in your (host) cornea will be cut, the outer two layers of the cornea removed and replaced by a donor corneal graft (the transplant tissue), which will be cut to a similar size (Figure 2C). The donor graft has been generously donated by a patient that has died. Several stitches (sutures) are used to hold the transplant tissue in place Figure 2D. The sutures are non-dissolvable, and remain in place, unless removed by your eye specialist. Sutures do not always have to be removed, and usually stay in place for many months after surgery.

Figure 2.



A. The human eye.

B. Cross-section of the eye showing scarring in the cornea.

C. The donor graft replaces the damaged outer layers of the cornea.

D. The graft is held in place by several stitches (sutures).

What are the pros and cons of a partial-thickness over a full-thickness corneal transplant?

Pros

- ❖ Lower risk of serious graft rejection by keeping your healthy inner corneal layer: the endothelium.
- ❖ Maintenance of the “integrity” of the eyeball (see Graft Dehiscence in risks section below)
- ❖ Lower rates of leakage from the wound after surgery, which may require a return to theatre for more suturing, for the same reasons outlined above.
- ❖ Lower risk of pressure-related problems (glaucoma) in the eye following surgery.

Cons

- ❖ DALK is technically more challenging than full-thickness corneal transplant surgery, meaning that a certain amount of experience by the surgeon is likely to achieve better results.
- ❖ Interface-related problems (see below).
- ❖ Lower chance of achieving “20/20 vision” in the long term, but overall similar visual results between partial- and full-thickness surgery.

What are the risks of DALK?

The operation is generally safe and has a good success rate, however it is important that you understand the risks below. Rare but serious complications:

- ❖ Sight-threatening infection
- ❖ Severe haemorrhage (bleeding) causing loss of vision
- ❖ Retinal detachment
- ❖ Loss of eye

Perforation of inner membrane in the cornea

Although there have been numerous advances in surgical techniques involved in DALK surgery, it may not be possible to keep the inner corneal layer intact during the operation. In this situation, it may be necessary to convert to a traditional full-thickness corneal transplant.

Corneal transplant rejection

Your body (it's immune system) may try to "reject" the graft, as it recognises that it has come from another person. Early treatment with steroid drops can often reverse the rejection. Steroids may occasionally need to be given as tablets or as an injection.

Inflammation

This sometimes occurs after the surgery. The steroid drops given to you will help to control this and should be used as directed by your eye specialist. Occasionally inflammation can be difficult to control with eye drops and may require steroid tablets.

Graft failure

With time, or following a severe rejection episode, your graft may fail. If the graft fails then your vision will become cloudy/blurry. Occasionally, a graft may never clear after surgery, and the vision may remain cloudy from the outset. If your graft fails, it is usually possible to repeat the corneal transplantation surgery.

Suture-related complications

Sutures may loosen or break, causing an irritable or gritty sensation in the eye, and may cause the cornea to become infected. Loose and broken sutures need to be promptly removed in the clinic.

Astigmatism

A normal cornea is round like a football or slightly rugby ball-shaped (astigmatism). One of the main issues after DALK and full-thickness corneal transplant surgery is that the cornea can have an irregular shape and this can affect vision. There are a number of ways of overcoming this including spectacles, contact lenses, removing or placing more stitches, or making cuts into the cornea.

Transmission of disease

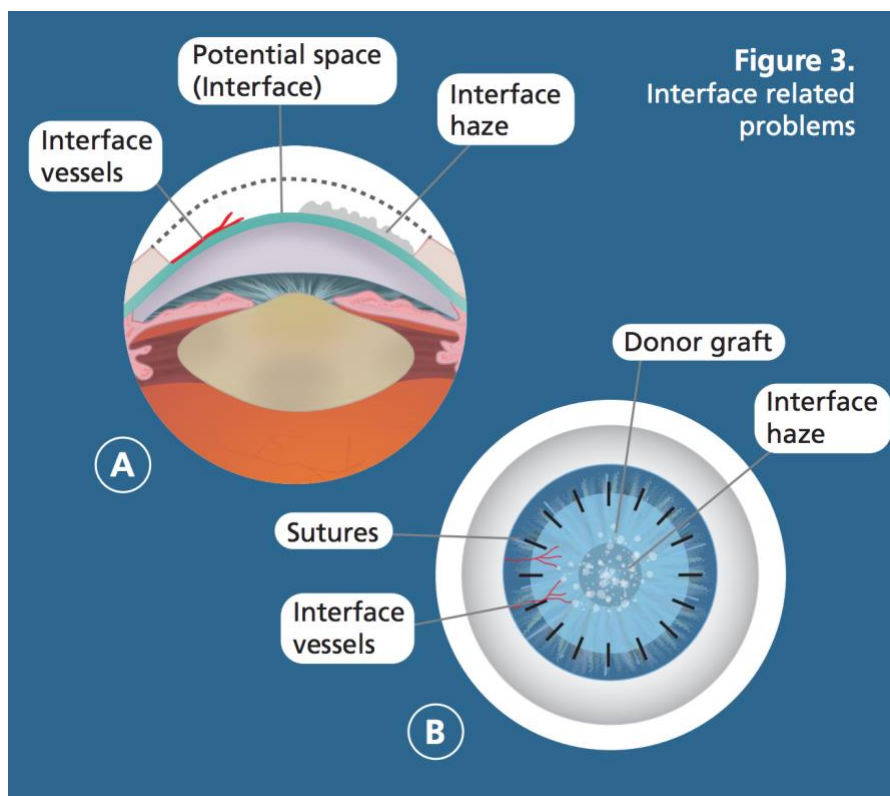
Whilst it is impossible to exclude the possibility of certain communicable disease, the donor cornea and donor blood has been rigorously tested, and the chances of contracting a communicable disease are exceedingly low.

Recurrence of original condition

Some eye conditions such as corneal dystrophies are known to sometimes recur in the donor graft.

Interface-related problems

- ❖ Leaving the inner layer of your cornea in place creates a potential space between the host and donor corneas (Figure 3A). Various problems can arise due to this space, such as:
 - ◆ Haze. Opacification can develop at the interface between your innermost layer and the donor graft causing some clouding of vision (Figure 3). This may reduce the chance of “20/20 vision”, but vision is still likely to be significantly improved compared to what it was prior to surgery.
 - ◆ Growth of blood vessels at the interface can threaten the survival of the graft (Figure 3).
 - ◆ Epithelial ingrowth. Cells from the surface layer – the epithelium – can spread along the interface causing blurred vision.
 - ◆ Double chamber. Failure of the two layers to attach may result in failure of the graft to clear from the outset.



Graft dehiscence

After a full-thickness corneal transplant, the eyeball is inherently weaker. Direct trauma to the eyeball can cause the interface (the boundary between the graft and what remains of your cornea) to open up or “dehiscence”, necessitating a return to the operating theatre to urgently repair the opening with sutures. The risk of this is significantly less with DALK since the inner layer has not been breached, however it is still possible for there to be some separation of the wound edges, particularly if sutures are removed early.

Raised intraocular pressure

This can occur in the early hours after surgery if air or gas has been purposely left in the eye, causing a sudden high pressure in the eye. This can usually be managed by releasing some gas from the eye in the clinic. Long-term high pressure in the eye is less common than with full-thickness transplant surgery, and can usually be managed with drops, and less commonly surgery.

Cataract

You may develop an early cataract. This can be removed if necessary.

What can I expect after the operation?

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.

Your vision will be blurry initially, and will take several months to around a year to improve and stabilise. Even then, you will still need glasses or contact lenses to achieve the best vision possible. It is usual for the eye to feel uncomfortable for the first one to two weeks after surgery, however this should improve with time and usually responds well to regular painkillers. You may feel that wearing sunglasses can make your eye(s) feel more comfortable following surgery.

You will be sent home with a shield over the eye. It is recommended that you keep this shield on overnight, and remove it the next morning, when you should start using your eye drops. You should continue to use the shield at night for the first 2 weeks, or when near young children and pets unless otherwise indicated.

NEVER stop your drops without consulting your eye specialist. You will be prescribed both antibiotic and steroid drops after the surgery. Your steroid drops are your anti-rejection medication and need to be used regularly for several months. They will be reduced gradually as instructed by your eye specialist, but often continued indefinitely.

After about 12 months, individual sutures may be selectively removed from your eye in clinic. This is to adjust the shape of the cornea to make it as round and regular as possible, in order to give you the best possible vision. Sometimes all sutures are removed in one sitting.

What about driving immediately after the operation?

You will require some rest after the operation. You may be able to resume driving after surgery if you meet the minimum driving standards (being able to read a number plate at 20m, with no other reasons for not being able to drive) and you feel comfortable to do so. If you are unsure whether you meet the standards, please check the DVLA guidance or check with your eye specialist at your next visit.

When can I return to playing sport?

Avoid strenuous exercise, especially contact sports for at least 1 month. Beyond this, your doctor will guide you, depending on your progress. Contact sports are best avoided altogether following corneal transplant surgery, as they will always pose a risk to the eye.

What should I avoid after the operation?

- ❖ Do not rub or poke your eye
- ❖ Avoid any heavy lifting or bending forward strenuously
- ❖ Avoid wetting the eye for the first 2 weeks after surgery
- ❖ Eye make-up should be avoided for at least 4 weeks
- ❖ Consult your eye doctor before flying

What are the symptoms of graft rejection?

- ❖ Red eye
- ❖ Sensitivity to light
- ❖ Loss of Vision
- ❖ Pain

These can be remembered using the acronym **RSVP**