

Keratophakia for treatment of keratoconus or corneal ectasia.

Keratophakia is an operation in which a partial-thickness corneal tissue graft is inserted into the cornea. The graft or 'lenticule' helps to restore the cornea to a normal thickness, and may also cause a change in the corneal surface profile, and so alter the cornea's refractive power.

Indications

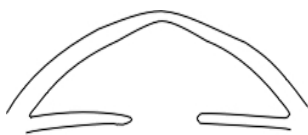
Keratophakia was originally conceived over fifty years ago by Dr José Barraquer as a treatment for the correction of hypermetropia (long-sightedness). It has also been used as a treatment for myopia, and more recently for the management of keratoconus and corneal ectasia. In these latter conditions, the lenticule may be designed primarily to restore the corneal thickness to normal, rather than to change the corneal surface profile.

Anaesthesia

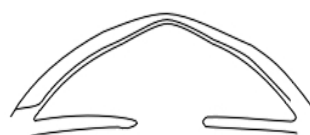
Because the surgery is entirely within the cornea, the operation can be carried out with topical anaesthesia (eye drops) alone. However, it can also be carried out with a local anaesthetic injection, or alternatively under general anaesthesia.

Surgery

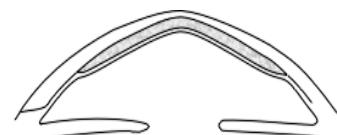
The insertion of the lenticule can be accomplished in a number of different ways. One method is to dissect a pocket in the deep layers of the patient's cornea, and insert the lenticule into the pocket. Sutures are then placed to seal the entrance to the corneal pocket. Alternatively, a motorised microkeratome similar to that used for LASIK surgery can be used to cut a thin flap across the surface of the cornea, or a femto-second laser used to cut the pocket.



A cornea with ectasia is thin and irregular.



A lamellar dissection is made in the cornea.



The lenticule restores normal corneal thickness.

Corneal tissue lenticules

When the keratophakia implant is made from donated human corneal tissue, the surgery is a type of corneal transplant operation. All donors of corneal grafts are screened to exclude transmissible diseases such as hepatitis, syphilis, and HIV. However, because of the very small risk of onward disease transmission, any patient who has a corneal graft is no longer acceptable as a blood or tissue donor themselves.

When the donor corneal tissue is processed into a lenticule for keratophakia, it may be cryo-lathed or freeze-dried. Both of these processes kill the cells in the tissue, which means that there is no longer any risk that the tissue can be rejected. When the tissue is implanted into the patient's cornea, it becomes repopulated by the patient's own cells, and thus becomes unrecognisable from their own tissue.

Complications

During the formation of the pocket in the cornea there is a small risk that there might be perforation of the anterior chamber. This could mean that the surgery has to be abandoned, or may cause delayed visual recovery. Interface debris trapped in the pocket may cause corneal inflammation, and trapped epithelial cells may require surgical removal if persistent. Keratophakia surgery is however potentially reversible and the lenticule may be simply removed if necessary.

Post-operative

The operation is generally carried out as a day-case, and does not require overnight stay in hospital. Antibiotic and anti-inflammatory eye drops are used for a month or two to settle the eye down. There is generally little pain or restriction of activity as a result of the surgery, but it is important not to rub the eye, and a protective shield should be worn at night for a couple of weeks. The corneal sutures are removed under topical anaesthetic during a routine follow-up visit a few weeks after the surgery.

Visual recovery

The refraction of the eye may take a month or two to stabilise. Although the keratophakia lenticule may restore the corneal thickness to normal, it is unlikely to restore the corneal contour to exactly the correct shape to give a good focus. If there is irregularity in the corneal shape, or significant residual optical defect, further surgery such as corneal collagen cross-linking (C3R), and excimer laser treatment, may be required to fine-tune the outcome.

Although keratophakia has been performed for many years, current techniques are still in a state of experimental evolution.