

Automated Lamellar Therapeutic Keratoplasty – ALTK

ALTK is a type of partial-thickness (lamellar) corneal graft in which the surface layers of the cornea are removed with a mechanical cutting device, and replaced with a graft of donor tissue that has been prepared in a similar way.

Who is suitable for ALTK?

Since only the front half of the cornea is replaced, the technique is particularly suited to those patients who have problems on, or near the surface of, the cornea. Such conditions include corneal scarring from old trachoma, Herpes simplex, and other types of infections, and scars from old corneal injuries. Corneal stromal dystrophies such as granular, macular, and lattice dystrophies are also indications.

How is the operation performed?

The surgery can be performed under local anaesthesia with the application of anaesthetic drops to the eye. Alternatively the patient can be put to sleep with a general anaesthetic if they prefer.

The eyelids are held open with a special clip so that the patient cannot blink. A suction-ring is placed around the cornea and connected to a vacuum pump, which creates suction that holds the ring on the eye. The microkeratome (motorised cutting device) is mounted on the suction-ring, which stabilises the eye whilst the cut is being made. The procedure is completely painless, but the patient feels some pressure on the eye, and the vision is temporarily blanked out by the machine whilst it is being used (approximately 30 seconds).

The donor cornea is then cut with the same machine, and the donor tissue is stitched onto the surface of the patient's cornea. Finally a bandage contact lens is placed, and the eye closed with a pad and a shield.

What are the advantages of ALTK?

The procedure is much quicker and simpler using the ALTK mechanical cutting device compare to performing a lamellar graft by hand. Lamellar grafts are safer than conventional full-thickness corneal grafts (penetrating keratoplasty) because the procedure does not penetrate completely through the protective coats of the eyeball, so there is a reduced risk of damage to structures inside the eye.

Although lamellar grafts can occasionally be affected by rejection, this can usually be easily treated, and there is not the risk of complete corneal failure which can occur when a penetrating graft is rejected.

What are the disadvantages of ALTK?

A normal cornea is about 530 μ thick, and typically the outermost 250 μ are replaced in the ALTK procedure. If this removes all of the corneal scarring or opacity, then the vision can potentially be fully restored, but any opacity remaining in the deep cornea may otherwise limit the quality of the visual recovery. The surface of the cornea is an extremely important component of the optical system of the eye, so any irregularity in the corneal shape can have a major effect on visual performance. After ALTK there will always be some residual irregularity and optical defect, but this can usually be corrected by spectacles, contact lenses, or excimer laser treatment (e.g. LASIK, Epi-LASIK).

What are the risks of ALTK?

The donor cornea used in ALTK is initially preserved in an eye bank before distribution. Corneal donors are screened for infectious diseases including HIV, Hepatitis B and C, HTLV, and syphilis. Because of the very small potential risk of transmission of diseases such as CJD (Creutzfeldt-Jakob Disease), patients having a corneal transplant of any sort are no longer eligible to be blood or tissue donors themselves.

Very occasionally, technical problems with the ALTK equipment may mean that the shape or size of the cut made by the microkeratome is not ideal, and very rarely this may mean that the procedure has to be abandoned. However, in this case it is generally possible for the operation to be repeated on another occasion. Sometimes cells or debris can be trapped beneath the graft, and very rarely these may need to be removed by a second procedure.

What happens post-operatively?

The eye will be a little red, sore and watery for a week or two. Normal day-to-day activities can generally be resumed straight away. Eye drops are used for several months to settle the eye down. The bandage contact lens is typically removed after a week or two, and the sutures removed after some months. If laser treatment is required to correct a residual optical defect this is usually only performed a year or more after the graft has been done.