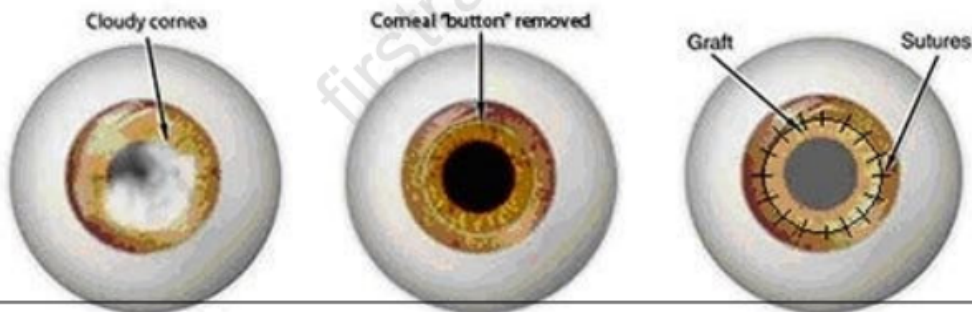


KERATOPLASTY

Keratoplasty, also known as corneal grafting or corneal transplantation, is an operation in which the patient's diseased cornea is replaced by the healthy clear cornea.



TYPES OF KERATOPLASTY

A. Autokeratoplasty

1. *Rotational keratoplasty :*

Here patient's own cornea is trephined and rotated to the periphery to transfer the pupillary area having a small corneal opacity .

2. *Contralateral keratoplasty:*

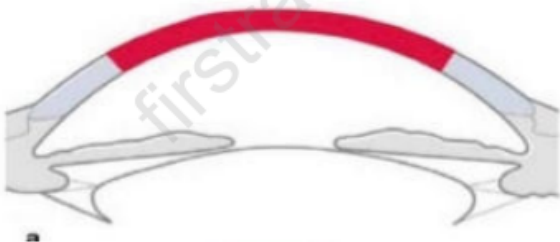
Cornea of the two eyes are exchanged with each other. It is indicated when cornea of one eye of the patient is opaque and the other eye is blind due to posterior segment disease with clear cornea.

B. Allografting or Allo-keratoplasty

Patient's diseased cornea is replaced by the donor's healthy cornea.

It can be of following types:

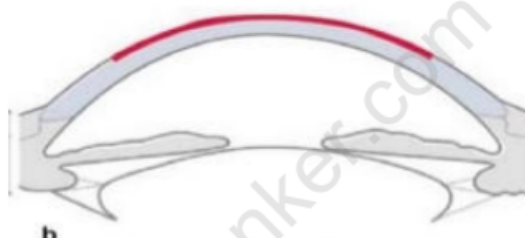
1. Penetrating Keratoplasty (PK) (full-thickness grafting)



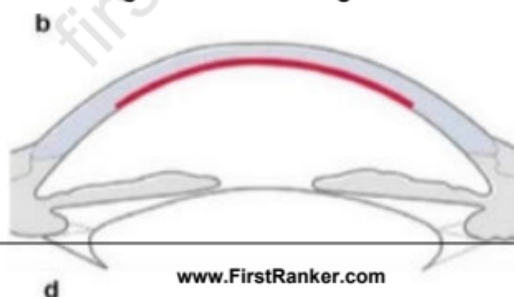
2. *Lamellar keratoplasty* (partial-thickness grafting) which may be:

- Deep anterior lamellar keratoplasty (DALK) : It is performed when endothelium and Descemet's membrane are normal

e.g. keratoconus.



- Descemet's stripping endothelial keratoplasty (DSEK) : It is performed when only endothelium is defective e.g. after the surgical trauma during phacoemulsification.



3. *Small patch graft* (for small defects), which may be full thickness or partial thickness.



INDICATIONS

1. Optical, to improve vision

eg: corneal opacity, bullous keratopathy, corneal dystrophies, advanced keratoconus.

2. Therapeutic, to replace inflamed cornea not responding to conventional therapy, corneal ulcer not responding to treatment, perforated corneal ulcer, irregular irreparable corneal lacerations with tissue loss, anterior staphyloma.

3. Tectonic graft, to restore integrity of eyeball.

e.g. after corneal perforation and in marked corneal thinning.

4. Cosmetic, to improve the appearance.

DONOR TISSUE

The donor eye are harvested from cadavers within 6 hours of death , somtimes upto 12 hours in countries with colder climates .

Eyes are taken by trained doctors.

It should be stored under sterile conditions.

Biomicroscopic examination of the whole globe.

Processing the tissue for media storage.

The donor corneal tissue is graded into excellent, very good, good, fair, and poor depending upon the condition of corneal epithelium, stroma, Descemet's membrane and endothelium.

Parameter	Grade I (Excellent)	Grade II (Very good)	Grade III (Good)	Grade IV (Fair)	Grade V (Poor)
Epithelial defects and haze	None	Slight epithelial haze or defects	Obvious moderate epithelial defects		
Corneal stromal clarity	Crystal clear	Clear	Slight cloudiness	Moderate cloudiness	Marked cloudiness
Arcus senilis	None	Slight	Moderate (<2.5 mm)	Heavy (>2.5 mm – 4 mm)	Very heavy (>4 mm)
Descemet's membrane	No folds	Few shallow folds	Numerous shallow folds	Numerous deep folds	Marked deep folds
Endothelium	No defect	No defect	Few vacuolated cells	Moderate guttate	Marked guttate

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METHODS OF CORNEAL PRESERVATION

1. Short-term storage (up to 48 hours) :

The whole globe is preserved at 4°C in a moist chamber.

2. Intermediate storage:

Donor cornea can be stored in McCarey-Kaufman (MK) medium and various chondroitin sulfate enriched media such as optisol medium (up to 2 weeks)

By organ culture method using eagle's medium (up to 35 days)

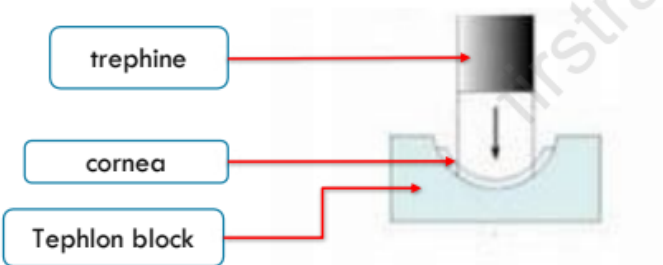
3. Long-term storage (up to 1 year) :

By cryopreservation at -70°C in liquid nitrogen or glycerol. But due to loss of transparency of cornea, it is used only for tectonic purpose.

SURGICAL TECHNIQUE OF PENETRATING KERATOPLASTY

1. Excision of donor corneal button

The donor corneal button should be cut 0.25 mm larger than the recipient, taking care not to damage the endothelium. Donor cornea is placed in a tephlon block and the button is cut with the help of a trephine from the endothelial side.

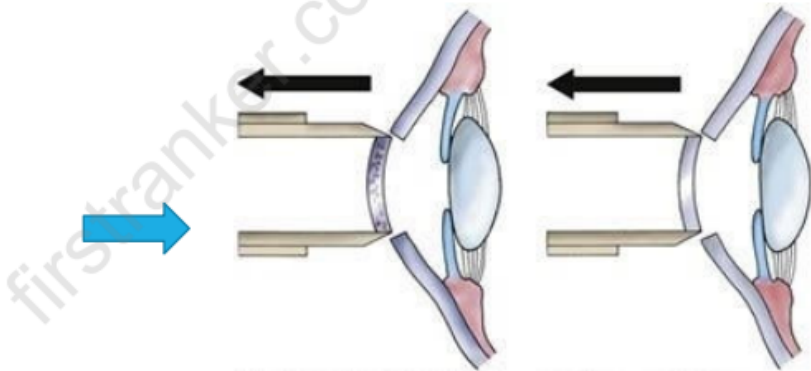


2. *Excision of recipient corneal button*

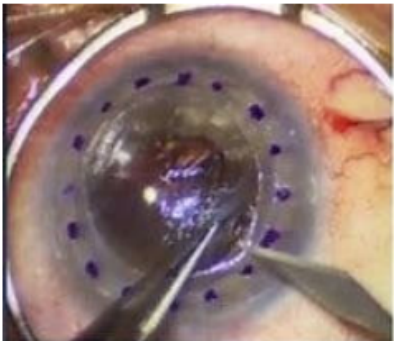
With the help of a corneal trephine (7.5 mm to 8 mm in size) a partial thickness incision is made in the host cornea. Then, anterior chamber is entered with the help of a razor blade knife and excision is completed using corneoscleral scissors.



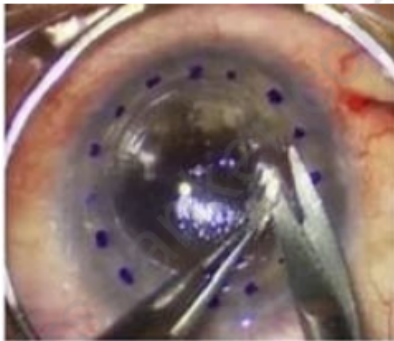
Standard corneal trephine



Removal of diseased corneal button from recipient



Entering through razor blade knife



Cutting using corneoscleral scissors



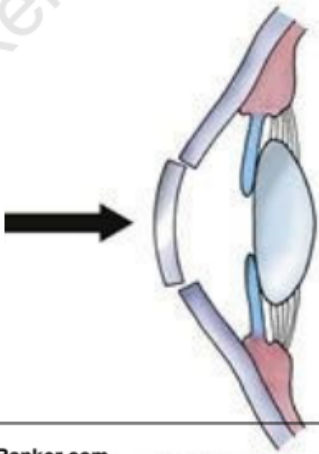
Diseased part of cornea removed

3. *Placing donor graft and suturing*

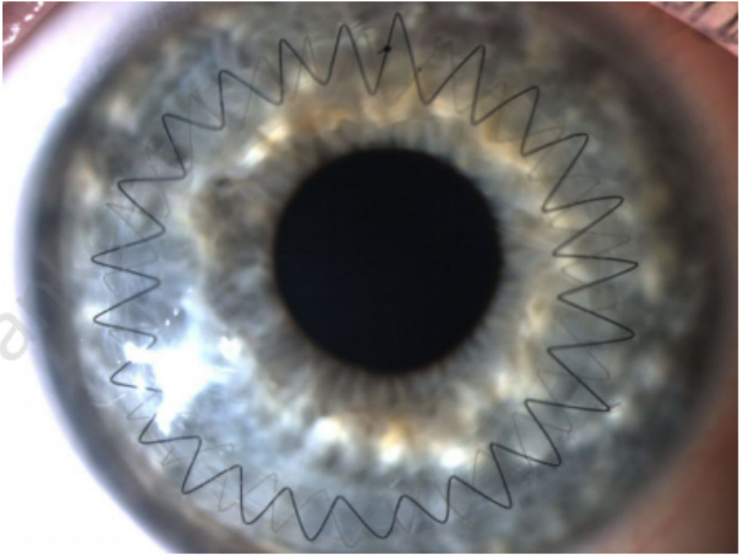
After injecting the viscoelastic material to fill the anterior chamber, the donor cornea is placed in the host bed and sutured.

There are 3 types of suture; 16 interrupted sutures or continuous suture or combination of interrupted and continuous suture of 10 – 0 nylon.

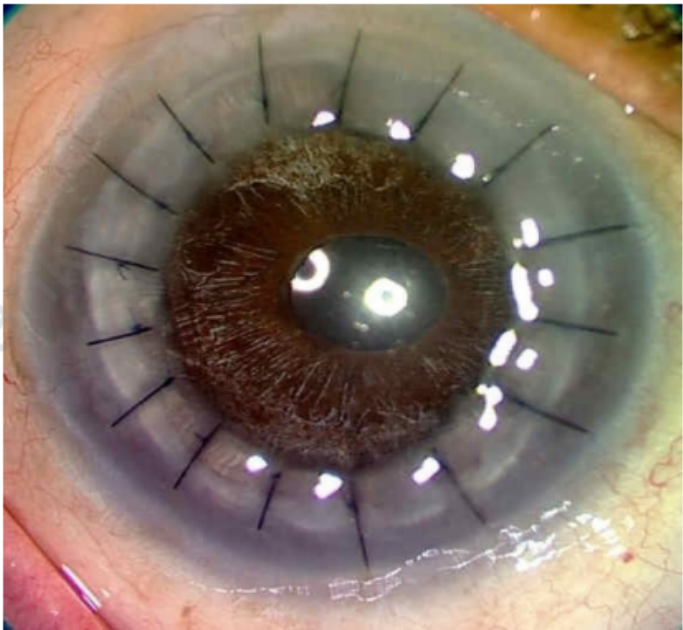
Placing donor graft on recipient



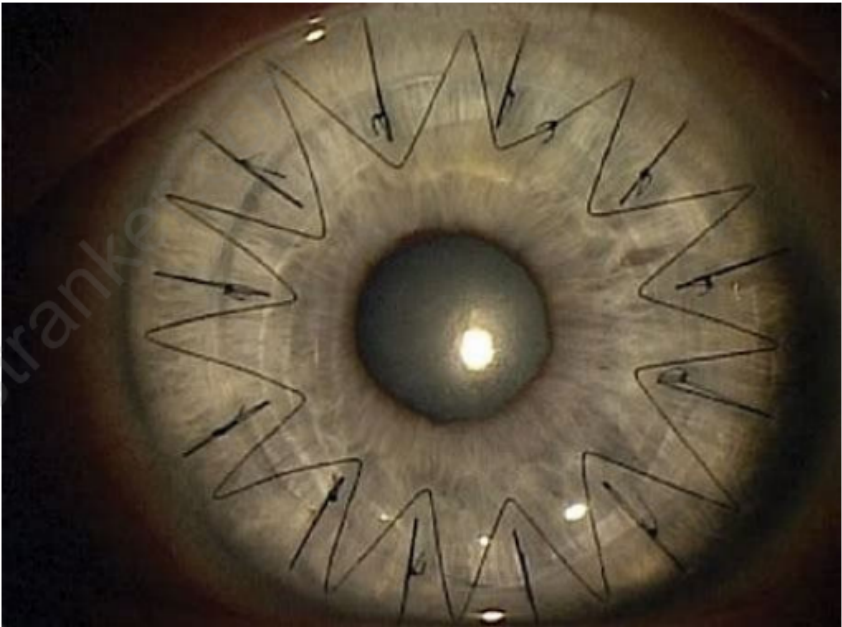
Continuous
suture



Interrupted
suture



Combined



FOLLOW UP

VISUAL RECOVER : could be immediate or in few months due to initial graft oedema and astigmatism.

Follow up :

Weekly or fortnight for the 1st 3 months

Monthly for 6 months.

Every 2 months for 1 year

Yearly after that.

COMPLICATIONS

1. Early complications :

- Wound leak
- Flat /shallow anterior chamber
- Iris prolapse
- Uvitits
- Graft Infection
- Secondary glaucoma
- Inflammatory sterile suture infiltrate
- Primary graft failure.

2. Late complications (after 3 weeks)

- Graft rejection
- Secondary glaucoma
- Loose sutures
- Astigmatism

3. Very late complications(after 1 year)

- Graft rejection
- Wound dehiscence from primary trauma
- Recurrence of primary disease

GRAFT REJECTION

It refers to the immunological response of the host to the donor corneal tissue.

It can occur as early as 2 weeks and upto several years after grafting.

Rejection could be epithelial, stromal ,or endothelial. Or a combination of all 3.

Graft rejection is classically believed to be a delayed type of hypersensitivity response.

Risk factors include younger age of recipient, previous graft failure, corneal vascularization, larger graft size, donor epithelium and massive blood transfusion.

Clinical presentations:

Symptoms :

- Diminution of vision
- Photophobia
- Mild pain
- Redness

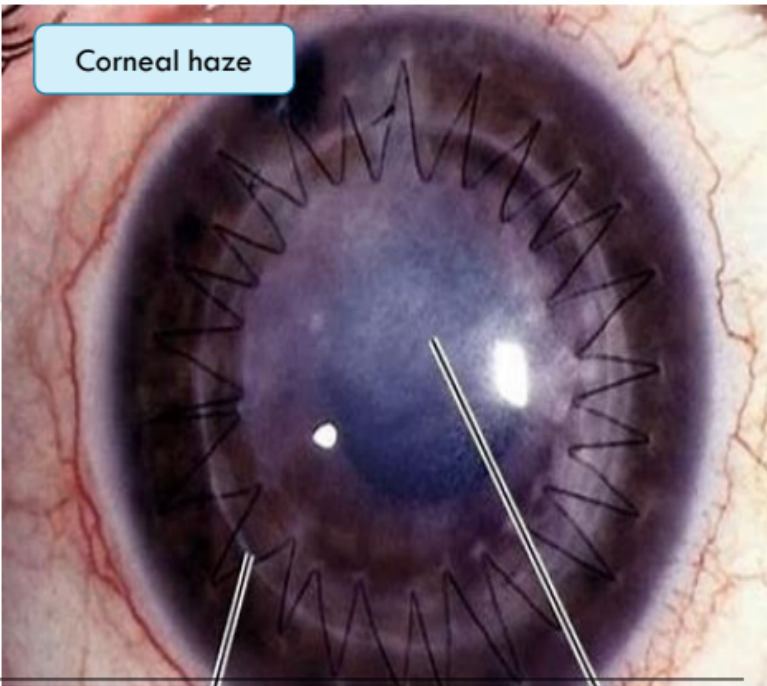
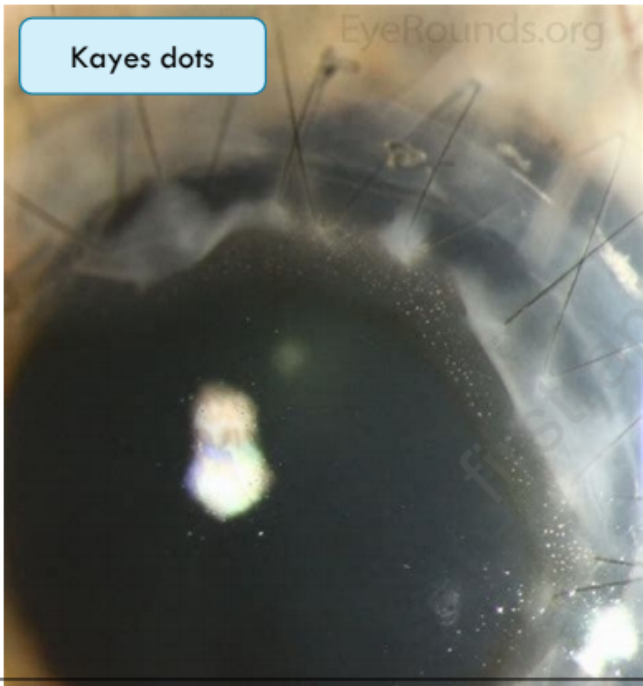
- Epithelial rejection characterized by an elevated epithelial rejection line which stains with fluorescein.

- Subepithelial infiltrates known as Kayes dots

They are white punctate epithelial opacities representing epithelial cells at various stages of degeneration.

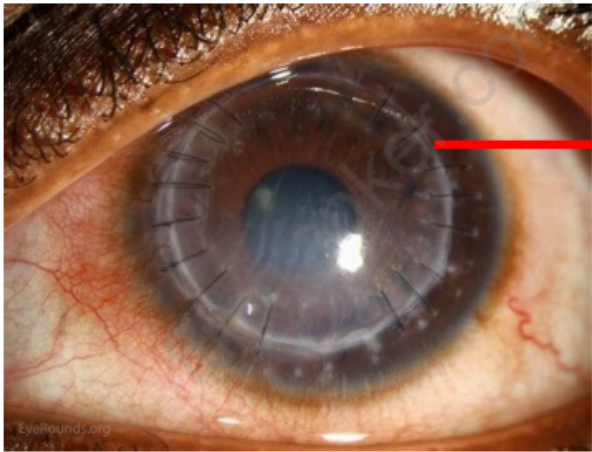
Due to epithelial immune response to area of angulation.

- Stromal rejection is characterized by sudden onset of full thickness stromal haze in a previously clear graft.



■ Endothelial rejection may present as:

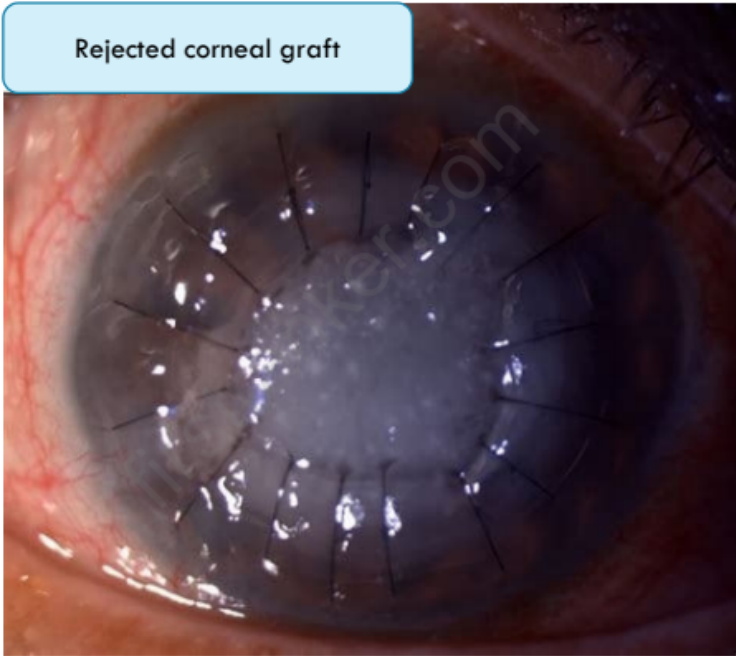
- Khodadaust line demarcating healthy and damaged endothelium. The rejection line consist of monomuclear white cellsthat damage endothilial cells.



Khodadaust line

- Diffuse endothelial rejection with lot of Keratic precipitates.

Rejected corneal graft



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