

Corneal Transplantation: the procedures of today and tomorrow

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Outline

- I. Different types of Corneal Transplants
 - A. PKP (Penetrating Keratoplasty)
 - B. DSAEK (Descemet Stripping Automated Endothelial Keratoplasty)
 - C. DMEK (Descemet Membrane Endothelial Keratoplasty)
 - D. DMET (Descemet Endothelial Transfer)
 - E. DSO (Descemet Stripping Only)
 - F. DALK (Deep Anterior Lamellar Keratoplasty)
 - G. CTAK (Corneal Tissue Addition for Keratoconus)
 - H. Keratoprosthesis

- II. History of Corneal Transplantation
 - A. First successful corneal transplant in 1905 by Eduard Zirm
 - B. Why is Corneal Transplantation so successful?
 - C. The evolution of Corneal Transplant Surgery

- III. PKP (Penetrating Keratoplasty)
 - A. All six layers of the cornea replaced
 - B. Indications/Contraindications/Advantages/Disadvantages
 - C. Post-Surgical Co-Management
 - 1. Immediate post-op complications
 - a) Wound leak
 - b) Delayed re-epithelialization
 - c) Flat chamber/iris incarceration
 - d) Choroidal detachment or hemorrhage
 - e) Glaucoma/IOP issues
 - f) Endophthalmitis
 - g) Primary donor failure
 - 2. Early post-op care vs long term care
 - 3. Selective suture removal

- a) Indications

- b) Selection process

- (1) Case example: topographical shift following suture removal

- c) Follow up care

- 4. Long-term complications/management

- a) Glaucoma

- b) Recurrence of primary disease

- c) Microbial keratitis

- d) Suture-related problems

- e) Wound dehiscence

- f) Graft failure – early vs late

- g) Refractive error, astigmatism, anisometropia

- h) Corneal graft rejection – early vs late

- (1) Types:

- (a) Epithelial

- (b) Stromal

- (c) Endothelial

- D. COVID-19 and its effects

- IV. DMEK (Descemet Membrane Endothelial Keratoplasty)

- A. Indications

- B. Contraindications

- C. When to refer for surgery?

- 1. DSAEK success for FECD as outlined by the Cornea Preservation Time Study

- D. Overview of surgical technique

- 1. Peripheral Iridotomy needed pre op or at time of surgery

- 2. Video

- E. Early Post-Surgical Management

- 1. Medications and typical follow up care

- 2. Patient instructions, specifically positioning

- F. Complications

- 1. Graft detachment

- 2. Graft failure

a) Early vs late

3. Damage to donor tissue during preparation
4. Pupillary block
5. Secondary Glaucoma
6. Graft rejection
7. Infection

a) Donor rim culture (patient example)

G. Advantages/Disadvantages

1. Partial transplant (DSAEK/DMEK) vs penetrating keratoplasty
2. DSAEK vs DMEK

H. Descemet Endothelial Transfer (DMET)

1. Only a small island of descemet membrane/endothelial complex is transplanted
2. One donor, multiple recipients

I. DSO (Descemet Stripping Only) or DWEK (Descemetorhexis Without Endothelial Keratoplasty)

1. Indications/Advantages/Disadvantages

J. Pharmaceutical Treatments for Fuch's Dystrophy

1. Rock Inhibitor

K. Case examples (ie patient with DSAEK in one eye and DMEK in other, PK patient with secondary DSAEK)

V. DALK (Deep Anterior Lamellar Keratoplasty)

A. All tissue anterior to Descemet's membrane is transplanted leaving the healthy endothelium intact

B. Indications

C. Contraindications

D. Overview of surgical technique

E. Post-Surgical Management

1. Medications and typical follow up schedule
2. Complications
 - a) Intraoperative complications
 - b) Postoperative complications

(1) Persistent epithelial defects (\approx PK)

- (2) Pseudoanterior chamber/Double anterior chambers
- (3) Pupillary block and fixed dilated pupil (Urrets-Zavalía syndrome)
- (4) Interface wrinkling
- (5) Suture-related problems
- (6) Graft rejection reaction (<PK) - NO ENDOTHELIAL REJECTION!
- (7) Infectious keratitis
- (8) Glaucoma (<PK)

3. Visual Rehabilitation – similar to that of PK

F. Advantages/Disadvantages vs. PK

G. Case Examples (e.g. DALK patient with Descemet's detachment)

VI. Corneal Tissue Inlay for Keratoconus (CTAK)

- A. Uses allogenic, preserved corneal stromal tissue that is shaped into a crescent with femtosecond laser and then placed in a channel created by the laser to thicken and reshape the cornea
 - 1. Decreases corneal irregularity and improves vision

VII. Keratoprosthesis

- A. Artificial cornea: Boston KPro most common
- B. Indications/advantages/disadvantages

VIII. Long Term Postoperative Care and Visual Considerations

- A. Graft Preservation – need to monitor these patients closely
 - 1. Catching rejection and treating early & aggressively
 - 2. Monitoring IOP and treating to avoid steroid induced glaucoma
 - 3. Neurotrophic features
 - 4. Infection
- B. Visual Rehabilitation After Keratoplasty
 - 1. How soon after surgery can a patient be fit with contact lenses?
 - a) Patient/surgeon dependent
 - b) Dependent on type of procedure