DSAEK: A to Z

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Fuchs’ Dystrophy

- Inherited, often have family history
- More common in postmenopausal women
- Blurred vision, worse in the morning
- With progression, vision is blurry all day
- Can have irritation, pain

Fuchs’ Dystrophy

- Guttata—deposits in endothelial layer
- Decreased cell count
- Polymegathism
- Pleomorphism
- Thickened basement membrane
- Thickened cornea (increased pachymetry)
- Corneal edema and folds
- Can develop bullae and scarring
Pseudophakic Bullous Keratopathy

- Severe corneal edema following intraocular surgery from endothelial damage
- Develop painful bullae (blisters) and scarring
- Used to be very common after cataract surgery
- Now more typical after complicated cataract cases, retinal/glaucoma surgery, ACIOL

Surgical Treatment for Fuchs’ and PBK (Back in the day)—Penetrating Keratoplasty (PKP)

- Treatment of choice for 50 years
- Full-thickness transplant
- Advantages:
  - Removes scarred areas
  - Can be done in aphakic patients or with retinal surgery
- Disadvantages:
  - Long recovery
  - Astigmatism
  - Risk of dehiscence (catastrophic)
  - Glaucoma risk
  - Rejection/Failure
  - Neurotrophic ulcer
  - Risk of suprachoroidal hemorrhage

Surgical Treatment for Fuchs’ and PBK (Then)

- Evolution of Endothelial Keratoplasty
  - Posterior Penetrating Endothelial Keratoplasty (PPEK)
  - Deep Lamellar Endothelial Keratoplasty (DLEK)
  - Descemet’s Stripping Endothelial Keratoplasty (DSEK)
  - Descemet’s Stripping Automated Endothelial Keratoplasty (DSAEK)
  - Ultra-thin DSAEK
  - Descemet’s Membrane Endothelial Keratoplasty

Surgical Treatment of Fuchs’ and PBK (Now)—Descemet’s Stripping Automated Endothelial Keratoplasty (DSAEK)

- Partial-thickness transplant
- Advantages:
  - Quicker recovery (6-8 weeks)
  - Minimal astigmatism
  - Smaller wound (safer)
  - Less glaucoma risk
  - Less rejection risk
  - Easier to repeat
  - Easier to do with standard cataract surgery
- Disadvantages:
  - Trickier surgery
  - Dislocation risk
  - Requires secondary IOL in aphakic patients
  - Does not fix scarring
Who Is the Ideal DSAEK Candidate?

- Endothelial dysfunction only
- No visually significant scarring or thinning
- Relatively normal iris/angle anatomy
- BCVA <20/40
- Preferably no Trabeculectomy or ACIOL (unless surgeon is experienced)

DSAEK Technique

- 3 Stages of Procedure:
  - Recipient Preparation
  - Donor Preparation
  - Donor Insertion and Deployment

- Nearly every step has been debated
- Each surgeon must find his/her most preferred technique

DSAEK Technique – Recipient Preparation

<table>
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<tr>
<th>Clear Cornea</th>
<th>Scleral Tunnel</th>
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<tr>
<td>Shorter operating time</td>
<td>More stable wound</td>
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<tr>
<td>Sutures can be removed</td>
<td>Less astigmatism immediately post-op</td>
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<tr>
<td>Easier to combine with routine phaco</td>
<td>Longer operating time</td>
</tr>
<tr>
<td>Does not disturb conjunctiva</td>
<td>Less familiar technique</td>
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- Place circle on cornea as a guide
- Two 1-mm paracentesis incisions at right angles to main wound
- Intracameral lidocaine if using topical anesthesia
- Miostat/miochol
- Healon in AC (no dispersive visco)
- 2.75 mm self-sealing keratome incision
**DSAEK Technique—Recipient Preparation**

- Score and strip Descemet’s using reverse Sinskey hook
- Scrape peripheral 1 mm of bed using Terry scraper
- Widen wound to 5 mm
- Place inferior PI using Vanass scissors
- Remove Healon with IA (can be done after punching donor)

**Recipient Preparation—Technique Pearls**

- Keep paracentesis wounds relatively parallel to iris for better wound stability and better air control
- Don’t score Descemet’s too deeply to avoid involving stroma
- Try to keep Descemet’s in one piece (if possible)
- Add Healon throughout to keep chamber deep

**DSAEK Technique—Donor Preparation**

- Pre-cut Tissue Criteria:
  - Age: young as possible
  - Date of Death: < 1 week
  - Cause of Death: nothing weird
  - Death-to-Preservation: <20 hours, <12 if possible
  - Endothelial cell count: >2400
  - Optical zone: >8 mm
  - No pseudophakia or prior ocular surgery
  - Serologies: Negative
  - Graft thickness: <150 microns, ideally 100-120
**DSAEK Technique—Donor Preparation**

- Soak donor in BSS plus for about 10 minutes
- Punch same size as stromal bed – Sharpoint punch
- Small amount of viscoelastic on endothelium
- Fold into 60/40 taco
- Load into Charlie forceps

**Donor Preparation—Technique Pearls**

- Use stable surface under operating scope
- Do not use too much Healon to coat endothelium
- Try to grab stromal edge of graft when folding (easier with thicker grafts)
- Use tips of Charlie forceps to capture graft once loaded

**DSAEK Technique—Donor Insertion/Deployment**

- Irrigate interface (outside of taco) with BSS
- Deepen AC with BSS
- Insert graft gently—AC will be flat
- Close wound with 10-0 nylon interrupted sutures
- Deepen AC with BSS from side of fold until flap drops down
- Inject air into taco from other side to deploy
- Recenter with reverse Sinskey
- Fill AC with air, allow to rest 10 mins
- Squeegee with cannula
- Inject BSS to remove air and normalize IOP
- Dilating drops, collagen shield with Antibiotic/steroid
Incision Placement (Left Eye)

- Bottom fold (“40%”)
- Keratome
- Top fold (“60%”)
- Paracentesis

DSAEK Technique—Donor Insertion/Deployment

Donor Insertion—Technique Pearls

- Irrigate graft well prior to insertion to remove excess Healon
- Try to insert in one smooth motion
- Pronate forceps once graft is inserted to get them to release the graft
- Once graft is deployed, use either paracentesis to fill AC with air, depending on which is more air-tight
- Use this same paracentesis to add BSS later to prevent air egress
- Decompression during air removal is a very common cause of dislocation, so start over if necessary

Issues with Standard Insertion Techniques

- Issues with standard insertion:
  - Greater trauma to the graft
  - Less controlled insertion
  - Greater endothelial cell loss
  - Greater difficulty with deployment
  - Higher risk of graft inversion
  - More manipulation of graft
### Other Insertion Techniques

- Numerous glides and insertion devices have been developed for DSAEK
- Attempt to preserve endothelium and make insertion and deployment easier and safer
- Allows controlled insertion of graft in a particular configuration
- Minimizes handling of graft
- Minimizes compression/trauma during insertion
- Particularly helpful for difficult cases: post-Trab, ACIOL
- Cost can be an issue in ASC’s
- Examples: Mini-Busin glide, Endoglide, Endoserter, NCI

### Other Insertion Techniques—Mini-Busin

- Multiple-use glide to coil graft for insertion
- Can be used with Ultrathin grafts
- Allows for smaller wound
- Preserves orientation for easier deployment
- Requires graft to be pulled in from across AC
- Requires use of AC maintainer
- Does not prevent endothelium from touching itself while coiled

### Other Insertion Techniques—Endoglide

- Single-use insertion device for DSAEK
- Developed by Donald Tan
- Loads graft into a “double-coil”
- Endothelium does not touch itself
- Seals wound for more stable chamber
- Requires graft to be pulled in from across AC
- Endoglide-Ultrathin allows for sub-100 micron grafts
- Other insertion devices may be as or more effective
Other Insertion Techniques—Endoglide

Other Insertion Techniques—Endoglide

DSAEK—Post-op Recovery

- Supine for 1 hour in recovery room, then for 2-3 days
- POD #1:
  - Patch/shield come off
  - Antibiotic and Steroid qid
  - Lifting restrictions, shield at night
  - VA typically CF to HM (due to air bubble)
- POD#5-7:
  - VA typically 20/40-20/70
  - Can have dislocation in first week
  - Dislocations are re-bubbled in the procedure room
- 4 weeks post-op:
  - Suture removal to relieve astigmatism, DFE
- 6-7 weeks post-op:
  - Refraction
  - BCVA typically 20/25-20/40
- 6 months post-op:
  - VA typically 20/25-20/30

Combined DSAEK with Phaco

- Standard Phaco is simple to combine with DSAEK
- Do not use cyclogyl or homatropine
- May need to debride epithelium for better view
- Do not use dispersive viscoelastics
- Slightly smaller capsulorhexis is preferable to prevent air from entering capsular bag
- DSAEK typically causes +1.00 to +1.50 shift due to meniscus graft, so target IOL accordingly
- Phaco closer to endothelium
  - Better view through hazy cornea
  - Less chance of posterior capsule rupture
Other Issues with DSAEK

- Problems with DSAEK:
  - Steep learning curve for novice surgeon
  - Risk of graft dislocation
  - Additive procedure—makes cornea thicker
  - Changes refraction to make patient more hyperopic (+1.00 to +1.50)
  - Interface can limit visual acuity
  - Unclear what effect is on IOP measurement in glaucoma
  - Requires cut tissue (either by surgeon or eye bank)—additional time, labor, and cost required compared to PKP
  - Still debate and development for best method of insertion

Summary

- Fuchs’ dystrophy and PBK are relatively common corneal disorders
- DSAEK has revolutionized treatment for these conditions
- Now can have faster recovery, better outcomes, safer surgery
- DSAEK is another step in the refinement of this treatment, and eventually will be replaced by DMEK or another procedure
Charlie Forceps: STORZ ET3121

Sharpoint UltraFit Coronet Donor Punch Set

Mini Busin Spatula: Moria 20007

Tan EndoGlide – Ultrathin: Angiotech 11823