TRANSITIONING FROM DSEK TO DMEK

DR. JAMES LEHMANN

- Private Practice— Focal Point Vision
- Associate Instructor, University of Texas Health San Antonio
- Cataract / Cornea / Refractive
  - 101 transplants last year
  - 70% DMEK, 5% DSEK, 25% PK/DALK

San Antonio, Texas
TRANSITIONING FROM DSEK TO DMEK

TRAINING PROGRAMS WITH SIGHTLIFE AND ORBIS

- Jerusalem
- Peru
- Jamaica
- India
- China
DMEK – DECEMET’S MEMBRANE ENDOTHELIAL KERATOPLASTY

- Background
- Donor Selection
- Preoperative Evaluation
- Preparation of the Donor
- Instruments
- Preoperative Evaluation
- Loading the Donor
- Surgery Steps
- Postoperative Care
PRELIMINARY QUESTIONS
TRANSITIONING FROM DSEK TO DMEK

HOW MANY DSEKS HAVE YOU PERFORMED?

A. None
B. 1-20
C. 21-50
D. 51-200
E. 201+
TRANSITIONING FROM DSEK TO DMEK

HOW MANY DMEKS HAVE YOU PERFORMED?

A. None
B. 1-20
C. 21-50
D. 51-200
E. 201+
I HAVE ACCESS TO PREPARED DSEK TISSUE

A. Yes
B. No
TRANSITIONING FROM DSEK TO DMEK

I HAVE ACCESS TO PREPARED DMEK TISSUE

A. Yes

B. No
WHICH OF THE FOLLOWING IS A CONTRAINDICATION TO DMEK?

A. Ahmed Tube
B. Aphakia
C. Poor View
D. Iris Defect
E. Peripheral Anterior Synechiae
TRANSITIONING FROM DSEK TO DMEK

A CORNEA PRESERVED IN OPTISOL CAN BE PRESERVED FOR..

A. 5 days
B. 10 days
C. 14 days
D. 18 days
TRANSITIONING FROM DSEK TO DMEK

IN DMEK / PHACO, WHAT SHOULD BE REFRACTIVE TARGET FOR PLANO RESULT?

A. -2.00
B. -1.00
C. Plano
D. +1.00
E. +2.00
BACKGROUND

DONOR SELECTION

PREOPERATIVE EVALUATION

PREPARATION OF THE DONOR

IMPORTANT INSTRUMENTS

PREOPERATIVE EVALUATION

LOADING THE DONOR AND STEPS OF SURGERY

POSTOPERATIVE CARE
KERATOPLASTY IN THE 40S
ONE SIZE FITS ALL UNTIL...
BRIEF HISTORY OF ENDOTHELIAL KERATOPLASTY

- 1998 – Melles
  - PLK (1st air bubble)
- 1999 – Terry
  - DLEK (difficult technique)
- 2004 – Price y Gorovoy
  - DSAEK (microkeratome)
- 2007 – Melles
  - DMEK
TRANSITIONING FROM DSEK TO DMEK

DMEK IS PRECISE ANATOMIC REPLACEMENT

- Better Vision
- Less Refractive Shift
- Learning Curve
- Fewer Candidates
- Requires mostly normal anterior segment
TRANSITIONING FROM DSEK TO DMEK

EBAA STATISTICS 2013 - 2017

2013-2017 Domestic DMEK Trend - U.S. Eye Banks
# EBAA Statistics 2013 - 2017

## Table 4: Domestic Endothelial Keratoplasty Numbers Annual Comparison 2012 – 2017

<table>
<thead>
<tr>
<th>Domestic Surgery Use</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Endothelial Keratoplasty Procedures</td>
<td>24,987</td>
<td>25,965</td>
<td>27,208</td>
<td>28,327</td>
<td>28,991</td>
</tr>
<tr>
<td>DSEK, DSAEK, DLEK Procedures</td>
<td>23,465</td>
<td>23,100</td>
<td>22,514</td>
<td>21,868</td>
<td>21,337</td>
</tr>
<tr>
<td>DMEK or DMAEK Procedures</td>
<td>1,522</td>
<td>2,865</td>
<td>4,694</td>
<td>6,459</td>
<td>7,628</td>
</tr>
<tr>
<td>PDEK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>Other EK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

6% 26%
AM I READY TO START DMEK?

- Experience
  - PK 25+
  - DSEK 25+
- Wet Lab
  - Donor Preparation
  - Donor Loading
  - Graft Manipulation
BACKGROUND

DONOR SELECTION

PREOPERATIVE EVALUATION

PREPARATION OF THE DONOR

IMPORTANT INSTRUMENTS

PREOPERATIVE EVALUATION

LOADING THE DONOR AND STEPS OF SURGERY

POSTOPERATIVE CARE
TRANSITIONING FROM DSEK TO DMEK

DONOR SELECTION FOR DSEK AND/OR PK

- Important Parameters
  - Age of Decedent (15-65)
  - Days since Death
    - <12 days
  - D to P / Refrigeration
    - 10/20 hours
- Cell Count and Photo
  - 2500 cells/mm²
  - Assessment of stress lines, cell size, etc.
- Clear Zone
TRANSITIONING FROM DSEK TO DMEK

SELECTION FOR DMEK IS DIFFERENT

- Older is better! (45-65)
- No pseudophakes
  - Why? Prep issues
- No diabetic donors
TRANSITIONING FROM DSEK TO DMEK

IMPORTANT STUDIES

- Cornea Donor Study
  - Donor Age
    - 1000+ patients
    - Was no difference under age 70
  - Corneal Preservation Time Study
    - 0-7 days vs. 8-14 days
    - No significant difference up to 12 days
    - 90% success in both groups
TRANSITIONING FROM DSEK TO DMEK

**PRESERVATION SOLUTIONS**

- **SHORT TERM (0-48 HOURS)**
  - 4°C MOIST CHAMBER
  - M-K MEDIUM

- **INTERMEDIATE TERM (0-14 DAYS)**
  - K-SOL, CSM, DEXSOL, OPTISOL, CORNISOL MEDIA
    - CHONDROITIN SULFATE
    - AMPHOTERICIN B
  - EUSOL-C
  - LIFE4C°

- **LONG TERM (> 14 DAYS)**
  - CRYOPRESERVATION
  - ORGAN CULTURE AT 34°C
  - GAMMA IRRADIATION
BACKGROUND

DONOR SELECTION

PREOPERATIVE EVALUATION

PREPARATION OF THE DONOR

IMPORTANT INSTRUMENTS

PREOPERATIVE EVALUATION

LOADING THE DONOR AND STEPS OF SURGERY

POSTOPERATIVE CARE
TRANSITIONING FROM DSEK TO DMEK

PREOPERATIVE CONSIDERATIONS IN ENDOTHERAEL IAL KERATOPLASTY

- DSEK or DMEK?
- Type of Anesthesia?
- How well does the patient cooperate?
  - Can they lie face up after the surgery?
How difficult is the case? Complexity of the anterior chamber? Clarity of the Cornea? Ability to maintain and control a bubble?

For me main contraindication to DMEK would be ACIOL.

Never forget DSEK is good option.
TRANSITIONING FROM DSEK TO DMEK

HOW TO DECIDE BETWEEN DMEK AND DSEK

- Must determine
  - Complexity of Anterior Chamber
    - PAS, shallow chamber, valve, angle closure, small eye, vitreous prolapse, and ACIOL
  - Corneal Clarity
    - Scarring, edema, haze
    - Assess depth, consider SK
  - Bubble Management
    - Iris defects, PAS, ACIOL, Hypotony
  - Lens Status
    - Combined Phaco, IOL Exchange
TRANSITIONING FROM DSEK TO DMEK

COMPLEX CASES

Photos courtesy of A Aldave
PRE OP OCT IS HELPFUL IN COMPLICATED EYES!

- Determine A/C morphology
- Find retrocorneal membrane
TRANSITIONING FROM DSEK TO DMEK

LENS MANAGEMENT IN ENDOTHELIAL KERATOPLASTY

- Combo Case
  - Difficult phaco b/c of poor view
- Pseudophakia
  - Verify the stability of the IOL preoperatively through a dilated pupil
- ACIOL
  - Remove and Replace
  - DSEK an option
- Aphakia
  - Secondary IOL then 1M later DMEK or DSEK

Photo courtesy of A Aldave
TRANSITIONING FROM DSEK TO DMEK

LENS MANAGEMENT — IOL CALCULATIONS

- Some Hyperopic Shift
  - Aim for -0.5 to -1.00
- Hydrophobic Acrylic or Silicone IOL
- Potential Change in Axis / Magnitude of Astigmatism
  - More Against-the-rule Astigmatism?
  - Hence Difficulties with Toric and Multifocal IOL
COMBINATION OF PHACOEMULSIFICATION AND DMEK

- Cataract can be more difficult than the DMEK
  - Cornea clarity worsens during case
- Must avoid complications
  - No tear in anterior capsule
  - No tear in posterior capsule
  - No residual cortex or nucleus
  - No iris damage
TRANSITIONING FROM DSEK TO DMEK

**FAILED PK**

- Possibly DMEK!
- Historically DSEK or PK
  - Difficulty stripping endo/descemet’s
  - Must measure graft diameter preoperatively
- Historical Best Va
  - Specs / CTL / RGP
TRANSITIONING FROM DSEK TO DMEK

GLAUCOMA SURGERY AND PSEUDOPHAKIC BULLOUS

- DMEK AN OPTION!!!
- Harder cases, need experience...
- Assess iris / anterior segment
- DSEK may be easier
- Visual Potential?
TRANSITIONING FROM DSEK TO DMEK

SUMMARY OF PREOPERATIVE PLANNING — DMEK CHECKLIST?

- Anesthesia – Peribulbar
- Pt must be able to lie flat / undergo rebubble
- Easiest? Fuch’s Dystrophy
- At first avoid eyes complex anterior segment pathology
- Perform Peripheral Iridotomy with YAG 1 week pre op (if view good enough)
ANESTHESIA

- Goals
  - Anesthesia
  - Akinesia
- Types
  - Local
  - General
TRANSITIONING FROM DSEK TO DMEK

PATIENT COOPERATION

- Ability to sleep in supine position
- Ability to tolerate rebubble with topical anesthesia in office if necessary
Can I leave an ACIOL in place?

- Yes with DSEK, no with DMEK... Consider:
  - Is the eye quiet?
  - Iris morphology
  - IOP
  - Patient age
  - Status of other eye
  - Anticoagulation status
TRANSITIONING FROM DSEK TO DMEK

STYLES OF OLD ACIOLS

Strampelli Tripod AC-IOL (1953)
Choyce Mark I AC-IOL (1956)
Dannheim AC-IOL with closed haptics (1952)
Ridley Tripod AC-IOL (1957–60)
TRANSITIONING FROM DSEK TO DMEK

A BIT MORE ABOUT IOLS

- ACIOL in poor position
- Dislocated PCIOL
- Better to do 2 surgeries
  - IOL Exchange
  - Then DSEK or DMEK
- Less bleeding
- Less trauma to eye
- Less IOP manipulation
DSEK PRE OPERATIVE DISCUSSION — PATIENT SELECTION

OTHER ACID SCENARIOS...
APHAKIA: EK OR PK?

- Iris Status?
- Visual Potential?
- Need for IOL?
  - Staged Surgeries
TRANSITIONING FROM DSEK TO DMEK

WHEN IS PK BETTER THAN EK?

- Underestimate amount of stromal scarring or haze
  - More common in longstanding edema
- High astigmatism or irregular astigmatism
- Repeat PK
BACKGROUND
DONOR SELECTION
PREOPERATIVE EVALUATION
PREPARATION OF THE DONOR
IMPORTANT INSTRUMENTS
PREOPERATIVE EVALUATION
LOADING THE DONOR AND STEPS OF SURGERY
POSTOPERATIVE CARE
EVOLUTION OF DONOR PREPARATION IN THE US

- Surgeon
  - Time
  - Money
  - Risk
- Eye Bank
  - DMEK
    - Stain, mark, load
  - DSEK
    - Microkeratome, S, ultra thin
TRANSITIONING FROM DSEK TO DMEK
BACKGROUND

DONOR SELECTION

PREOPERATIVE EVALUATION

PREPARATION OF THE DONOR

IMPORTANT INSTRUMENTS

PREOPERATIVE EVALUATION

LOADING THE DONOR AND STEPS OF SURGERY

POSTOPERATIVE CARE
INSTRUMENTS

- “Micro-finger” by Moria (20022)
- Tying Forceps
- Vanas Scissors
- Forceps (0.5)
- Bechert Y hook
- S Stamp
HALF TIME
QUESTIONS?
BACKGROUND

DONOR SELECTION

PREOPERATIVE EVALUATION

PREPARATION OF THE DONOR

IMPORTANT INSTRUMENTS

PREOPERATIVE EVALUATION

LOADING THE DONOR AND STEPS OF SURGERY

POSTOPERATIVE CARE
TRANSITIONING FROM DSEK TO DMEK

PATIENT PREPARATION

- Inferior Peripheral Iridotomy
- IOL Calculations
  - 1 piece Acrylic (small incision)
  - Aim for -.75
- White-to-white
- Peri/Retrobulbar Anesthesia
TRANSITIONING FROM DSEK TO DMEK

MAIN INSTRUMENTATION

- Cataract Set
- Plus
  - Reverse Sinskey
  - Blunt 8 mm Trephine
  - 10 cc syringe c BSS
  - TB syringe c 30g needle
- Cohesive Viscoelastic
TRANSITIONING FROM DSEK TO DMEK

CRITICAL INSTRUMENT — HAND HELD SLIT LAMP

- EIDOLON 510L
TRANSITIONING FROM DSEK TO DMEK

INSTRUMENTATION FOR DONOR LOADING

› On Back Table
  › Petri Dish
  › BSS
  › Teflon Block
  › Trypan Blue
TRANSITIONING FROM DSEK TO DMEK

INSTRUMENTS TO LOAD THE GEUDER GLASS CANNULA

- Geuder Glass and Tubing
  - Fragile
  - 2.4 or smaller incision
- Syringes
  - 3 and 5 cc
INSTRUMENTATION FOR DONOR LOADING

- Bausch and Lomb
  - VIS100 Injector
- Medicel AG
- Two sizes
  - 2.8 mm incision best
- Must remove the spring
DON'T FORGET TO CULTURE DONOR RIM!

- Fungal Culture
- Candida
- Interface fungal keratitis can occur years after surgery...
- Very difficult to eradicate
- (+) culture means treatment, close observation, maybe redo graft...
TRANSITIONING FROM DSEK TO DMEK

RECIPIENT EYE PREPARATION SURGICAL STEPS

- Traction Sutures
- Mark the Cornea
- Incisions (better too small)
  - Paracenteses
  - 2.65 mm Main
- Viscoelastic
- Stripping of Descemet’s/Endo
- I/A - Irrigation/Aspiration
TRANSITIONING FROM DSEK TO DMEK

TRACTION SUTURES
TRANSITIONING FROM DSEK TO DMEK

MARKING THE CORNEA
TRANSITIONING FROM DSEK TO DMEK

INCISIONS
TRANSITIONING FROM DSEK TO DMEK

REMOVAL OF RECIPIENT DESCemet’s MEMBRANE
TRANSITIONING FROM DSEK TO DMEK

REMOVAL OF RECIPIENT DESCemet’S MEMBRANE
BACKGROUND
DONOR SELECTION
PREOPERATIVE EVALUATION
PREPARATION OF THE DONOR
IMPORTANT INSTRUMENTS
PREOPERATIVE EVALUATION
LOADING THE DONOR AND STEPS OF SURGERY
POSTOPERATIVE CARE
TRANSITIONING FROM DSEK TO DMEK

LOADING THE DONOR

- Peel the pre-stripped graft
  - Only the central part is adherent
- Dye with trypan blue
- Load into the glass cannula
  - Petri dish needed
LOADING THE DONOR INTO THE GEUDER GLASS CANNULA
TRANSITIONING FROM DSEK TO DMEK

LOADING THE DONOR IN THE IOL INJECTOR
TRANSITIONING FROM DSEK TO DMEK

SURGICAL STEPS OVERVIEW

‣ INJECT AND SUTURE

‣ THE DANCE

‣ THE BUBBLE
TRANSITIONING FROM DSEK TO DMEK

INJECTION OF THE GRAFT
TRANSITIONING FROM DSEK TO DMEK

DELIVERY WITH IOL INJECTOR
TRANSITIONING FROM DSEK TO DMEK

THE DMEK DANCE

▸ FIVE MANEUVERS

▸ FLIP

▸ UNROLL

▸ CONFIRM ORIENTATION

▸ UNFOLD

▸ CENTER
TRANSITIONING FROM DSEK TO DMEK

FLIP: INJECT BSS UNDER THE GRAFT
TRANSITIONING FROM DSEK TO DMEK

UNROLL: TAP THE CORNEA OR RELEASE AQUEOUS
TRANSITIONING FROM DSEK TO DMEK

UNROLL: TAP THE CORNEA OR RELEASE AQUEOUS
TRANSITIONING FROM DSEK TO DMEK

CONFIRMING THE ORIENTATION WITH THE TRICORN HAT CONFIGURATION
TRANSITIONING FROM DSEK TO DMEK

CONFIRM THE ORIENTATION — NO S STAMP NEEDED
TRANSITIONING FROM DSEK TO DMEK

CONFIRM THE ORIENTATION WITH THE TRICORN HAT CONFIGURATION
TRANSITIONING FROM DSEK TO DMEK

AGAIN, CONFIRMING THE ORIENTATION
TRANSITIONING FROM DSEK TO DMEK

SMALL AIR
TRANSITIONING FROM DSEK TO DMEK

UNFOLD THE GRAFT WITH AIR
TRANSITIONING FROM DSEK TO DMEK

HOW TO UNFOLD THE GRAFT

- Point Lock Fold
  - Tap the point

- "Rolled" Fold
  - Use traction sutures to rotate globe
  - So that bubble goes uphill
  - Tap space between fold and bubble, using bubble’s kinetic energy to unfold

- If the graft gets stuck in the angle..
  - Center the graft, if unable, restart process
TRANSITIONING FROM DSEK TO DMEK

UNFOLDING A “ROLLED” FOLD
TRANSITIONING FROM DSEK TO DMEK

ANOTHER “ROLLED FOLD”
TRANSITIONING FROM DSEK TO DMEK

UNFOLDING A POINT LOCK FOLD
TRANSITIONING FROM DSEK TO DMEK

GOLF SWINGS TO CENTER GRAFT

▸ Rotate the globe so graft goes downhill
▸ Smooth, broad strokes
▸ Make sure eye not too firm
TRANSITIONING FROM DSEK TO DMEK

GOLF SWINGS TO CENTER GRAFT
TRANSITIONING FROM DSEK TO DMEK

MORE GOLF SWINGS
TRANSITIONING FROM DSEK TO DMEK

LAST STEP, BIG AIR
TRANSITIONING FROM DSEK TO DMEK

ALL THE STEPS . . .
TRANSITIONING FROM DSEK TO DMEK

THE PATIENT LIES FLAT IN THE POST OP AREA FOR 45 MIN
TRANSITIONING FROM DSEK TO DMEK

RETURN TO OPERATING ROOM TO REMOVE AIR

- 3 cc syringe with 30 gauge needles
  - Inject BSS
  - Remove Bubble To Clear Inferior Paracentesis
- Bandage Lens if Epithelial Defect Present
- Patch and Shield
- See Next Morning
BACKGROUND
DONOR SELECTION
PREOPERATIVE EVALUATION
PREPARATION OF THE DONOR
IMPORTANT INSTRUMENTS
PREOPERATIVE EVALUATION
LOADING THE DONOR AND STEPS OF SURGERY
POSTOPERATIVE CARE
IMMEDIATE POST OPERATIVE CARE

- See on Post Op Days 1, 3, 7
- Use OCT to confirm graft position
- Day 1
  - Vision Poor b/c of Bubble
  - Generally no rebubble
- Day 3
  - Time to Rebubble
TYPICAL REBUBBLE SCENARIO — POST OP DAY 1

Shallow Peripheral Detachment, Position More...
TRANSITIONING FROM DSEK TO DMEK

TYPICAL REBUBBLE SCENARIO — POST OP DAY 3

Detachment Bigger, Attached Centrally, Rebubble!
TRANSITIONING FROM DSEK TO DMEK

TYPICAL REBUBBLE SCENARIO — POST OP DAY 7

All Good!
TRANSITIONING FROM DSEK TO DMEK

MORE ABOUT REBUBBLING

- In Office...
- Sterile Prep
- 30 g needle on TB or 3 cc syringe
- Remove Aqueous, CAREFULLY
- Full Bubble, Lie Flat 40 min, Remove Air
- DON’T GIVE UP
TRANSITIONING FROM DSEK TO DMEK

VARIOUS OTHER OCT FINDINGS...
TRANSITIONING FROM DSEK TO DMEK

LONG TERM POST OPERATIVE CARE

- Taper Steroid
  - Eventually to steroid every other day for life
- Refractive Shift / Stability
  - Mild Hyperopic shift
  - Mild increase in ATR cyl (+)
- Other eye in 1 Month
COMPLEX
CASES
OTHER INSTRUMENTS NEEDED FOR COMPLEX CASES

- MST Instruments
  - Graspers + Tying forceps
  - Microscissors to cut IOLs
TRANSITIONING FROM DSEK TO DMEK

DMEK IN PSEUDOPHAKIC BULLOUS WITH TUBE REVISION
TRANSITIONING FROM DSEK TO DMEK

DMEK + IOL EXCHANGE
ENDING QUESTIONS
WHICH OF THE FOLLOWING IS A CONTRAINDICATION TO DMEK?

A. Ahmed Tube
B. Aphakia
C. Poor View
D. Iris Defect
E. Peripheral Anterior Synechiae
TRANSITIONING FROM DSEK TO DMEK

A CORNEA PRESERVED IN OPTISOL CAN BE PRESERVED FOR..

A. 5 days
B. 10 days
C. 14 days
D. 18 days
IN DMEK / PHACO, WHAT SHOULD BE REFRACTIVE TARGET FOR PLANO RESULT?

A. -2.00
B. -1.00
C. Plano
D. +1.00
E. +2.00
THANK YOU!
QUESTIONS?

LEHMANN@FOCALPOINTVISION.COM