ULTRATHIN DSAEK: THE PRESENT STATUS

Massimo Busin, MD
FORLI’ - ITALY
GOLD STANDARD
FOR THE SURGICAL TREATMENT OF ENDOTHELIAL DECOMPENSATION
BSCVA ≥ 20/40
38% to 100%
at 3-6 months
72.96% at 1 month*
81.13% at 3 mos*

*Personal Data, Excluding Co-Morbidities
SUTURELESS POSTERIOR ONLAY LK

(D)escemet (M)embrane
(E)ndothelial (K)eratoplasty

DMEK (Melles, 2006)
Patients with BSCVA \( \geq 20/20 \)

**DSAEK** = 0\% to 33\%*

**DMEK** = 20\% to 45\%*

*DSAEK Personal Data*
Graft Rejection Rate in Fuchs’

**DSAEK vs DMEK**

- **DSAEK** = 2% - 18%
- **DMEK** = < 1% (13%)
POOR VISUALIZATION
POSTERIOR SURFACE IRREGULARITIES

DSAEEK vs DMEK
POSTERIOR LUXATION
DSAEK vs DMEK

GRAFT MIGRATION
DSAEK vs DMEK

DSAEK & ACIOL
DSAEK vs DMEK

DSAEK & IOL EXCHANGE
DSAEK vs DMEK

DSAEK & ACIOL in PC
DMEK CONS

- Waste of Tissue up to 16%
- Detachment Rate up to 63%
- Primary Graft Failure up to 8%
DMEK CONS

NOT FOR EVERY SURGEON !!!

NOT FOR EVERY EYE !!!
EK IN THE USA

In 2011:

DSAEK  n ± 21,000

DMEK  n = 343
55-Year Old Patient with Fuchs’ Dystrophy + Cataract

BSCVA preop: 20/100

UCVA 1 m postop: 20/20 !!!
IDEAL GRAFT FOR EK

- Thin Endothelial Grafts (DMEK-Like)
- Ease of Preparation (Microkeratome)
- Ease of Delivery (DSAEEK-Like)
LESS THAN 50% OF DMEK PATIENTS WITH 20/20 POTENTIAL SEE 20/20 !!!

IS THE INTERFACE THE TRUE PROBLEM ???
DSAEK vs LASIK

SAME:
- Microkeratome-Dissected Surface

DIFFERENT:
- Donor vs Same Tissue
- Thickness of Lamella?
- Orientation of Collagen Fibers
RECENT

DSAEK Grafts Thinner Than 131 µm Lead to Improved Visual Outcomes (Neff et al. 2010)
MORE RECENT
THICKNESS DOES NOT
MATTER!!!, but……..

> 200 µm (↓↓↓ BSCVA)

< 100 µm (↑↑↑↑ BSCVA)

(Terry et al. Ophthalmology 2012)
SUTURELESS POSTERIOR ONLAY LK

U(ltra)T(thin)-DSAEK (Busin, 2009)
UT-DSAEK (Double-Pass)

OUR SETUP

- Controlled Pressure (120 cm H$_2$O)
- Closed System (Clamp at 50 cm)
- Organ Culture (550 – 620 µm)
UT-DSAEK (Double-Pass)

PRE CUT

1st CUT

2nd CUT

315  251
92   95
RESULTS
Prospective Study
(Ophthalmology in Press)
PURPOSE

To evaluate the outcomes of Ultra-Thin (UT) DSAEK performed in eyes with 20/20 visual potential
UT-DSAEK (Double-Pass) Prospective Evaluation:

✓ 04/2012 = 285 Surgeries
✓ 1, 3, 6, 12, 24 Months Exams
✓ Visual Potential (History, Postop OCT, HRT-II, etc.)
✓ 12-Month Data for 163/292
DEMOGRAPHICS

- 285 Eyes of 279 Patients
- M/F = 154/96
- Age $67.9 \pm 13.5$ (range 14-92)
- F/U = $\geq 6$ months
INDICATIONS

- Fuchs: 174 (62%)
- PBK/ABK: 63 (22%)
- Repeat EK: 22 (8%)
- Decomp PK: 15 (6%)
- Other: 9 (3%)
UT-DSAEK & LENS
PREOPERATIVE

- PC-IOL  \( n = 152 \)
- Phakic  \( n = 124 \)
- Aphakic  \( n = 12 \)
- AC-IOL  \( n = 3 \)
- Phakic IOL  \( n = 1 \)
UT-DSAEK & LENS

POSTOPERATIVE

- PC-IOL  \( n = 248 \)
- Phakic  \( n = 24 \)
- Aphakic  \( n = 7 \)
- AC-IOL  \( n = 0 \)
- Phakic IOL  \( n = 0 \)
UT-DSAEK & LENS

IOL/LENS MANAGEMENT

❖ PC-IOL
   Always Left in Place
UT-DSAEEK & LENS

IOL/LENS MANAGEMENT

➢ AC-IOL

  Kelman

  Removed/

  Exchanged

  Iris-Claw Left in

  Place
UT-DSAEK & LENS
IOL/LENS MANAGEMENT

- Natural Lens:
  Age > 60 DSAEK + Phaco
  Age < 60 DSAEK Only
UT-DSAEK & LENS

IOL/LENS MANAGEMENT

- Aphakia
  DSAEK + PCIOL if Appropriate
  (Other Eye !!!)
UT-DSEK (Double Pass)

Busin et al. OPHTHALMOLOGY (in press)

264 UT-DSAEK Grafts

CGT < 151 µm = 260 (98.5%)
CGT < 131 µm = 233 (89.0%)
CGT < 101 µm = 182 (69.0%)
ISSUE # 1

BSCVA ≥ 20/20 in Eyes with 20/20 Potential
BSCVA post UT-DSAEK in Eyes with 20/20 Potential

![Bar chart showing percentage of eyes achieving specified visual acuity at different time points: 20/20 or better, 20/25 or better, 20/40 or better. The percentages at 3 months (n=179), 6 months (n=160), 12 months (n=119), and 24 months (n=41).]
ISSUE # 2

Why not 100% BSCVA of 20/20 ???
POSSIBLE CAUSES

- INTERFACE ?
- GRAFT THICKNESS ?
- HOA ?
- RECIPIENT CORNEA !
DSAEK/UT-DSAEK/DMEK

INTERFACE/THICKNESS

6 mos Postop
UT-DSAEK

BSCVA = 20/22.5
CGT= 61 µm
DSAEK/UT-DSAEK/DMEK

INTERFACE/THICKNESS

12 mos Postop

DSAEK

BSCVA = 20/50

CGT= 127 μm
3 mos Postop re-DSAEK (UT-DSAEK)

BSCVA = 20/25
CGT = 61 µm
High Order Aberrations

UT-DSAEK = Planar Graft !!!

315 251
92 95
DIFFERENT PREOPERATIVE CONDITION !!!
ISSUE # 3
SPEED OF VISUAL RECOVERY
Descemet’s Membrane Endothelial Keratoplasty

Prospective Study of 1-Year Visual Outcomes, Graft Survival, and Endothelial Cell Loss

Frederico P. Guerra, MD, Arundhati Anshu, MD, Marianne O. Price, PhD, Arthur W. Giebel, MD, Francis W. Price, MD

Ophthalmology Volume 118, Number 12, December 2011
Conventional DSAEK

Three-Year Visual Acuity Outcomes after Descemet’s Stripping Automated Endothelial Keratoplasty

Jennifer Y. Li, MD,1 Mark A. Terry, MD,1,2 Jeffrey Goshe, MD,1 David Davis-Boozer, MPH,2 Neda Shamie, MD3
BSCVA preop
DMEK
0.51± 0.44
table
20/65

BSCVA preop
UT-DSAEK
0.76 ± 0.49
logmar
20/115
ENDOTHELIAL CELL LOSS
# UT-DSAEEK ECL (Overall)

<table>
<thead>
<tr>
<th>F/U (mos)</th>
<th>ECL (% Eye Bank)</th>
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<tbody>
<tr>
<td>6</td>
<td>29.10%</td>
</tr>
<tr>
<td>12</td>
<td>32.58%</td>
</tr>
<tr>
<td>18</td>
<td>36.15%</td>
</tr>
<tr>
<td>24</td>
<td>36.35%</td>
</tr>
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</table>
ECL Higher in Eyes Operated on (Shunts/Trab.) !!!
ISSUE # 5

IMMUNOLOGIC REJECTION
UT-DSAEK Imm. Rej.

IMMUNOLOGIC REJECTION

Low-Risk Eyes \( n = 237 \)

High-Risk Eyes \( n = 48 \)

Previous Graft(s) \( n = 39 \)

Corneal Vascul. \( n = 6 \)

Herpetic Endothelit. \( N = 3 \)
POSTOPERATIVE TREATMENT

Topical Dexamethasone 0.1%

✓ Tapered off over a 5-month Period
   (from 2-Hourly to qd)
✓ qd Lifelong
   (unless Contraindicated)

For Eyes at High Risk 1.0-1.5 mg/Kg Prednisone p.o.
Tapered off over a 2-month Period
Endothelial Rejection in 4/162 Eyes (2.47%)

- Low Risk n=3/142 (2.1%)
- High Risk n=1/21 (4.8%)

All Cases Resolved with Steroidal Treatment !!!
Immunologic Rejection

Risk of Corneal Transplant Rejection Significantly Reduced with Descemet’s Membrane Endothelial Keratoplasty

Arundhati Anshu, MD,1,2 Marianne O. Price, PhD, MBA,1 Francis W. Price Jr, MD2

Ophthalmology 2012;119:536–540

DMEK
Immunologic Rejection

Graft Rejection After Descemet’s Stripping Automated Endothelial Keratoplasty

Graft Survival and Endothelial Cell Loss

Jennifer Y. Li, MD,¹ Mark A. Terry, MD,¹,² Jeffrey Goshe, MD,¹ Neda Shamie, MD,¹ David Davis-Boozer, MPH²

Ophthalmology 2012;119:90–94

CONVENTIONAL DSAEK
Kaplan-Meier Probability of Rejection Episode
1 year = 2.5%
2 years = 2.5%
<table>
<thead>
<tr>
<th></th>
<th>DSAEK*</th>
<th>UT</th>
<th>DMEK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 Year</strong></td>
<td>6%</td>
<td>2.5%</td>
<td>1%</td>
</tr>
<tr>
<td><strong>2 Years</strong></td>
<td>10%</td>
<td>2.5%</td>
<td>1%</td>
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</table>

*Fuchs Indications Only*
<table>
<thead>
<tr>
<th></th>
<th>UT-DSAEK</th>
<th>DMEK*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Re-injection</td>
<td>3%</td>
<td>17-77%</td>
</tr>
<tr>
<td>Primary Failure</td>
<td>1%</td>
<td>9%</td>
</tr>
<tr>
<td>Rejection_{1yr}</td>
<td>2.5%</td>
<td>0-13%</td>
</tr>
<tr>
<td>Tissue Loss</td>
<td>1%</td>
<td>0-13%</td>
</tr>
</tbody>
</table>

Data for Fuchs or PBK indications only
CONCLUSIONS

Outcomes of UT-DSAEK Compare Favorably with Those of Conventional DSAEK and Do Not Differ Substantially from Those of DMEK
MICROKERATOMING TECHNOLOGIES COURSE
FORLI’ (ITALY)