Safety in Learning DMEK:
Complications, Endothelial Cell Loss, and Visual Outcomes in a Comparative Case Series of Fellows vs. Attendings

Christopher S. Sales, MD, MPH;
Peter B. Veldman, MD; Mark A. Terry, MD;
Zachary M. Mayko, MS; Michael D. Straiko, MD

Devers Eye Institute

ASCRS, 2015
San Diego, CA
• The authors have no pertinent financial conflicts of interest to disclose.
Purpose

• Compare **Fellow vs. Attending DMEK** outcomes:
  – Early postoperative complications
  – 6-month endothelial cell loss
  – 6-month visual acuity
Fellows vs. Attendings
Learning DMEK: Study Design

100 Consecutive DMEK Cases for Fuchs’

62 Attending
- 32 Triple
- 30 Non-Triple

38 Fellow
- 18 Triple
- 20 Non-Triple
Methods

Devers Standardized DMEK technique

- Pre-stripped tissue from the Lions VisionGift
- S-Stamp
- Overstripping of the recipient
- Straiko glass injector
- No-touch tap technique
- 20% SF6 bubble
### Patient and Donor Parameters

<table>
<thead>
<tr>
<th></th>
<th>Attending</th>
<th>Fellow</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient Age, yrs</strong></td>
<td>67.2</td>
<td>69.6</td>
<td>0.29</td>
</tr>
<tr>
<td><strong>Pre-Op CCT, um</strong></td>
<td>650.5</td>
<td>622.8</td>
<td>0.20</td>
</tr>
<tr>
<td><strong>% Triple</strong></td>
<td>51%</td>
<td>51%</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>% Female</strong></td>
<td>81%</td>
<td>61%</td>
<td>0.83</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Attending</th>
<th>Fellow</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Donor Age, yrs</strong></td>
<td>65.9</td>
<td>64.8</td>
<td>0.43</td>
</tr>
<tr>
<td><strong>Donor ECD, cells/mm²</strong></td>
<td>2772</td>
<td>2682</td>
<td>0.15</td>
</tr>
<tr>
<td><strong>Graft Size, mm</strong></td>
<td>7.59</td>
<td>7.53</td>
<td>0.19</td>
</tr>
</tbody>
</table>
DMEK Visual Acuity Outcomes

**Pre-Op BSCVA, all P>0.05**

- >20/40: 63%, P=0.52
- >20/25: 35%, P=0.57
- >20/20: 8%, P=1.00

- Attending: 70%
- Fellow: 22%

**6-Month BSCVA, all P>0.05**

- >20/40: 100%, P=0.39
- >20/25: 67%, P=0.80
- >20/20: 47%, P=1.00

- Attending: 97%
- Fellow: 71%

All comparisons are made with P-values greater than 0.05.
DMEK Endothelial Outcomes

**Endothelial Cell Density**

- Pre-Op: Attendings, n=46
- 6-months: Attendings, n=46

**6-month ECL**

- Endothelial Cell Loss
  - Attendings, n=46
  - Fellow, n=28

- P<0.01
DMEK Post-Op Complications

**Incidence of Rebubble**
- Attending, n=62: 5%
- Fellow, n=38: 11%
- P=0.42

**Incidence of I-PGF**
- Attending, n=62: 3%
- Fellow, n=38: 5%
- P=0.63

**Incidence of Pupillary Block**
- 0%

Notes:
- The charts indicate the percentage of rebubble and I-PGF complications post-DMEK operation.
- The P values suggest no significant difference between the attending and fellow groups for rebubble (P=0.42) and I-PGF (P=0.63).
Fellow vs. Attending *Prequel*
Safety in Learning DSAEK?

Endothelial Keratoplasty: Vision, Endothelial Survival, and Complications in a Comparative Case Series of Fellows vs Attending Surgeons

EDWIN S. CHEN, MARK A. TERRY, NEDA SHAMIE, KAREN L. HOAR, PAUL M. PHILLIPS, AND DANIEL J. FRIEND

BSCVA: DSAEK vs. DMEK

**DSAEEK: BSCVA**

- Pre-Op
- 6-months

- Attending
- Fellow

All P > 0.05

**DMEK: BSCVA**

- Pre-Op
- 6-months

- Attending
- Fellow

All P > 0.05
ECD: DSAEK vs. DMEK

**DSAEK: ECD**
- Pre-Op
- 6-months

**DMEK: ECD**
- Pre-Op
- 6-months

- Attending, n=114
- Fellow, n=48

- Attending, n=46
- Fellow, n=28

P-values:
- DSAEK: P=0.1
- DMEK: P=0.6
ECL: DSAEK vs. DMEK

**DSAEK: 6-month ECL**
- 32% Attending, n=114
- 35% Fellow, n=48

**DMEK: 6-month ECL**
- 30% Attending, n=46
- 29% Fellow, n=28

P=0.35 (DSAEK vs. Attending)
P<0.01 (DMEK vs. Attending)
Rebubble: DSAEK vs. DMEK

**Rebubble: DSAEK**
- Attending, n=235
- Fellow, n=92

**Rebubble: DMEK**
- Attending, n=62
- Fellow, n=38

P=0.42

P unpublished
I-PGF: DSAEK vs. DMEK

**DSAEK: I-PGF**
- Attending, n=235
- Fellow, n=92

**DMEK: I-PGF**
- Attending, n=62
- Fellow, n=38

P=0.63
DMEK Post-Op Complications

**DSAEK: Pupillary Block**
- Attending, n=235
- Fellow, n=92

**DMEK: Pupillary Block**
- Attending, n=62
- Fellow, n=38
Fellows & Attendings, United
Devers DMEK Learning Curve

Attending vs. Fellow Case Load Over Time

Cases 1-50
- Attending: 72%
- Fellow: 28%

Cases 51-100
- Attending: 46%
- Fellow: 54%
Devers Learning Curve

6-month ECL

Endothelial Cell Loss

30% 30%

Incidence of Rebubble

Rebubble

1st 50 Cases
2nd 50 Cases

All P > 0.05

Incidence of I-PGF

8% 0%
Is it the Technique or the Fellow?
Or Something in the Water?
Conclusions

• DMEK is **safe** for novice surgeons to learn from experts in a fellowship training program

• The Devers experience **may not** directly correlate with what surgeons experience when learning DMEK after fellowship
Postulates

- **Equivalent** fellow vs. attending outcomes after DSAEK *and* DMEK reflect simplified, teachable techniques

- The Devers experience exemplifies what is possible when a simplified technique is followed meticulously, to exacting detail
DMEK BSCVA

**BSCVA**

- Pre-Op: 20/44 (n=62)
- 6-months: 20/26 (n=30) and 20/36 (n=46)

All P > 0.05