Ultra-thin Descemet Stripping Automated Endothelial Keratoplasty (UT-DSAEK)
– why I prefer this technique?

prof. Iva Dekaris

University Eye Hospital “Svjetlost”, Zagreb, Medical School, University of Rijeka, Croatia

5th International Conference on Clinical & Experimental Ophthalmology, Valencia, Spain, 2015
**Endothelial Keratoplasty (EK)**

- preferred way to restore vision when the inner cell layer of the cornea stops working properly from:
  - Fuchs´ dystrophy,
  - bullous keratopathy,
  - or other endothelial disorders
Endothelial keratoplasty: is there more techniques then diseases itself?

- DLEK
- UT-DSAEK
- DMEK
- DSAEK
- DSEK
- DMET
- DMAEK
Which is the best technique for visual rehabilitation?

DMEK!!! - agreed by almost everybody

- Best and fastest visual recovery
- Near normal anatomical restoration of a cornea
- Much less immune reactions: 1 in a 100 rejection rate
However, DSAEK technique still remains a gold standard:
Only few centers in USA and Europe are regularly performing DMEK – **WHY?**

prof. Kruse, Uni-Klinik Koln
Drawbacks of DMEK:

- Rebubling rate of >50%
- Not feasible in all endothelial diseases: long standing corneal edema, haze or structural alteration from the prior edema
- Currently more time-consuming preoperatively, perioperatively and postoperatively
- there is a higher risk of loosing the tissue during donor preparation
DMEK - when not recommended at all:

- stromal *scarring* and/or NV
- glaucoma tube *shunt*
- iris defect or missing iris, or any sort of opening to the posterior chamber
- too deep anterior chamber, *either due to a previous pars plana vitrectomy or genetics*
- too shallow anterior chambers
Despite all difficulties postoperative visual recovery IS IMPRESSIVE, BETTER THEN WITH DSAEK ....
## DATA ON VISUAL ACUITY

### DMEK
- **Burkhart ZN; J Cataract Refract. Surg. 2014:** In 49 Fuchs eyes CDVA at 1 year is **1.0**
- **Maier P; Dtsch Arztebl Int. 2013:** 0.8 or more in **36-79%** of patients
- **Tourtas; Am J Ophthalmol. 2012:** In 38 Fuchs, BSCVA at 6 mths **0.73**
- **Guerra et al; Cornea 2011:** Fellow 15 eyes BSCVA at 12 mths **0.8**, 85% patients prefere DMEK
- **Price et al; Ophthalmology, 2009:** 60 eyes, Fuchs, PBK, grafts: signif. higher number of **1.0 or 0.8** vision then DSAEK

### DSAEK
- **Ivarsen A; Br Ophthalmol. 2014:** In 125 eyes CDVA after 6 months **0.5-0.8**; after 4 years **0.7-0.8**
- **Maier P, Dtsch Arztebl Int. 2013, review:** VA of **0.8** or more in **23-47%**
- **Tourtas, Am J Ophthalmol. 2012:** In 35 Fuchs eyes BSCVA at 6 mths **0.5**
- **Guerra et al; Cornea 2011:** BSCVA at 12 mths **0.63**
# REPORTED COMPLICATION RATES

**DMEK**

- **Tourtas, JAMA Ophthalmol 2013**
  53 eyes, graft detachment **33-78%** in first 4 days; rebubling rate: **6.7-30.4%**

- **Gorovoy; Cornea 2014**: 75 eyes, Fuchs, PBK, grafts: **97%** successful striping; **2.7%** rebubling rate; **2.7%** grafts failed

- **Price et al; Ophthalmology, 2009**: 60 eyes, Fuchs, PBK, grafts: **83%** successful striping; **63%** rebubling rate; **8%** grafts failed

**Graft rejection:**
- **Maier P, Reinhard T; Dtsch Arzt Int. 2013**, review: **1-3%** of cases
- **Anshu, Price, Ophthalmol 2012, 140 eyes**: **1%** graft rejection in 1, 2 years

**DSAEEK**

- **Nakagawa H et al; Am J Ophthalmol. 2014**, 134 eyes, **8.9%** graft dislocation

- **Foster JB. Cornea 2012**: detachment rate **6.25%**


**Graft rejection:**
- **Nakagawa H et al; Am J Ophthalmol. 2014**: **2.2%** of cases
- **Maier P, Reinhard T; Dtsch Arzt Int.2013**: **0-8%** of cases
- **Anshu, Price, Ophthalmol 2012: 140 eyes**: **8%** and **12%** rejection in 1, 2 years
However, THERE ARE LACKING COMPARISONS WITH ultra-thin DSAEK, ......
DMEK

- Chaurasia S., Price MO. Ophthalmol. 2013: 471 eyes (DMEK and triple DMEK); 6 months BSCVA was 0.8-1.0. 3.3% graft failed; 30% rebubling rate.

- Tourtas, ... Kruse. Am J Ophthalmol. 2012: in 38 Fuchs BSCVA at 6 mths 0.73.

- Dapena, Melles. Arch Esp. Oftalmol. 2011: 75% of cases reaching 0.8 or better within 1-3 months; 63% rebubling rate; 8% grafts failed.


UT-DSAEK

- Busin et al, Ophthalmology 2013, 285 eyes, Fuchs, PBK, other: BSCVA at 3, 6, 12, and 24 months was 0.7, 0.8, 0.84, and 0.95, respectively.

- total graft detachment in 3.9%.

- primary failure in 1.4%.

- probability of a rejection episode at 3, 6, 12, and 24 months was 0%, 0.4%, 2.4%, and 3.3%.
Ultra-thin DSAEK

UT-DSAEK with a **double-pass technique** provides very thin DSAEK grafts!


**One pass** very thin grafts – Gebauer microkeratome.
• Ultra-thin (UT) graft of **100 micrometers and less** is created with two microkeratome passes:
  1. debulking
  2. refinement

Anterior OCT image of a donor cornea after preparation for UT-DSAEK.
Ultra-thin DSAEK
Indications for EK in our Hospital

- PBK: 90%
- Fuchs: 10%
In our hands:

Evaluation of visual outcome and endothelial cell loss after UT- DSAEK (<100µm) and compare it to conventional DSAEK (lamellas of 100-200 µm) and PK

OCT comparison of UT vs Conventional DSAEK
Patients and Methods

- Pseudophakic bullous keratopathy:
  - 40 DSAEK
  - 15 UT-DSAEK
  - 20 PK grafts

- Grafts thicknesses were measured at the visual axis (VA) by AS-OCT (Zeiss Visante)

- BCVA

- Follow up was 12-36 months
Groups (based on the lamellar thickness on first post-op day):

1. < 100 μm Ultra-thin DSAEK (mean 78±21.3 μm, n=15)
2. ≥ 100< 180 μm (mean: 137.5, n=22)
3. ≥ 180<250 μm (mean: 220, n=12)
4. ≥ 250 μm (mean: 260, n=6)

The only difference in surgical procedure was in donor preparation:
DSAEK: one cut with microkeratome
UT-DSAEK: “double pass” of microkeratome

-same surgeon
BCVA: UT- DSAEK, DSAEK and PK

BCVA: UT- DSAEK, DSAEK and PK

BCVA (logMAR)

P<0,05
DSAEK on the right eye and UT- DSAEK on the left eye

<table>
<thead>
<tr>
<th></th>
<th>DSAEK</th>
<th>UT DSAEK</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCVA after 1 week</td>
<td>0,4</td>
<td>0,5</td>
</tr>
<tr>
<td>3 months</td>
<td>0,75</td>
<td>0,9</td>
</tr>
<tr>
<td>6 months</td>
<td>0,8</td>
<td>0,95</td>
</tr>
</tbody>
</table>
Comparison - same patient:
PK right and UT- DSAEK left eye

<table>
<thead>
<tr>
<th></th>
<th>PK</th>
<th>UT DSAEK</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCVA after 1 week</td>
<td>0.15</td>
<td>0.55</td>
</tr>
<tr>
<td>3 months</td>
<td>0.35</td>
<td>0.95</td>
</tr>
<tr>
<td>6 months</td>
<td>0.65</td>
<td>1.00</td>
</tr>
</tbody>
</table>
UT- DSAEK

1. day

1. week
UT-DSAEK

Preoperative  1. month
Change of lamellar thickness over 36 postoperative months measured at visual axis by AS-OCT

Dekaris et al. DSAEK – Is a Thinner Donor Lamella the Better Choice?
Endothelial Cell Density Loss

- Ultra thin = 41.72%*
- <180 = 43.83%
- 180-250 = 41.92%
- ≥250 = 42.63%
- PK = 37.64%

* data for 12 mths, other for 3 years
OUR EXPERIENCE WITH UT-DSAEK

- UT-DSAEK provides faster and more complete visual rehabilitation as compared to conventional DSAEK

- UT-DSAEK grafts enable visual acuity values comparable to DMEK results from the literature
DISCUSSION – UT DSAEK

• Visual outcomes of UT DSAEK are comparable with those published for DMEK and better than those reported after DSAEK in terms of both speed of visual recovery and percentage of patients with 20/20 final visual acuity.
• Ultra-thin DSAEK provides visual recovery advantages of DMEK plus the ease of DSAEK without increasing endothelial cell loss.


• DSAEK with corneal lamellar thickness < 120 µm is an interesting therapeutic alternative to DMEK

Maier AK et al. Ophthalmologe, 2013 Apr 12.[Influence of donor lamella thickness on visual acuity after Descemet's stripping automated endothelial keratoplasty (DSAEK).][Article in German]
When selecting a surgical technique....

- indication profile of your patients
- duration of the disease in your cases
- equipment available to you
- availability of “back-up” cornea
- your own surgical experience
- possibility of close follow-up of your patients
Fuch’s dystrophy ▶ DMEK
PBK ▶ DMEK/UT-DSAEK
Complicated AC situations ▶ (UT)-DSAEK
Eyes with corneal scarring and neovascularisations ▶ PKP

Nonetheless, randomized controlled trials are needed to determine which operative method is best in each stage of corneal disease!
If you end up with (UT)-DSAEK as a choice, always try to keep your grafts AS THIN AS POSSIBLE ....
Chapter 7

Ultra-Thin Descemet's Stripping Automated Endothelial Keratoplasty (UT-DSAEK)

Iva Dekaris
University Eye Hospital „Svjetlost“, Zagreb, Croatia
Thank you!