DMEK Tissue Preparation-
The first 33 consecutive tissues prepared for transplant at one eye bank

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Purpose
To track the tissue wastage of a newly implemented tissue processing technique

Descemets Membrane Endothelial Keratoplasty (DMEK)

- First described by Melles, et al. in 2006 in Cornea
- Provides faster visual recovery, better visual outcomes\(^1\), and lower rejection\(^2,3\) than DSAEK
- Higher tissue wastage?, more detachment, higher regraft rate\(^1\)

Background

- We first reported our results on DMEK tissue preparation in a laboratory setting
- 2008 Cornea Society/EBAA Fall Education Symposium: Terry et al., reported on tissue wastage rates and endothelial cell loss (73% success rate)

Conclusion: While DMEK surgery can be successful, techniques currently taught for preparing donor Descemet’s have such a high rate of tissue wastage (~27%) that widespread use of DMEK to replace DSEK would likely overwhelm the supply system of the EBAA. A more consistently safe and easily acquired technique for DMEK donor preparation is needed.
Background

2009 Cornea Society/EBAA Fall Education Symposium

Calcein AM staining showing cell viability post DMEK tissue preparation.

Procedure Overview

• We use a modified SCUBA technique
• The graft is lifted about 75-80% leaving a hinge
• Tissue is evaluated post-preparation with slit lamp microscopy and specular microscopy
• Tissue is deemed unsuitable if tears >1mm penetrate the graft zone or if there is too much trauma observed in the graft
• Tears are the biggest concern

DMEK prep video

Results

• 31/33 success rate (94%)
  – Experienced technician success rate: 30/30
  – New technician: 1/3
  – Age range of tissue: 35-75
  – 1 pseudophakic donor: resulted in 8 mm graft
  – Average useable graft diameter: 9.0 mm
Specular Data

- Pre-preparation cell count average: $2729/mm^2$
  - Range 2358-3401/mm²
- Post-preparation cell count average: $2727/mm^2$
  - Range 2410-3175/mm²
- Paired samples t-test shows no statistical difference ($T=.096$, $p=.924$)

Discussion

- Reported success rates from other centers:

<table>
<thead>
<tr>
<th>Group Reporting</th>
<th>Attempts</th>
<th>Successes</th>
<th>Success Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price 2012¹</td>
<td>566</td>
<td>566</td>
<td>100%</td>
</tr>
<tr>
<td>Krause 2013¹</td>
<td>80</td>
<td>80</td>
<td>100%</td>
</tr>
<tr>
<td>Melles 2012²</td>
<td>62</td>
<td>62</td>
<td>100%</td>
</tr>
<tr>
<td>Lions VisionGift 2012</td>
<td>33</td>
<td>31</td>
<td>94%</td>
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- Zero tears in last 96 after technique modified
- One tissue used with central tear
- Comparison of two techniques (31 in each group)
- One technician had zero failures

Complications

- Time loss during preparation. In 4 donor corneas (4.2%), DM could not be stripped successfully because the thin tissue tore and it could not be subgitter. All of these unsuccessful attempts were in the first 50 dry eye cases and the latter 30 dry eye cases. The experienced 19 tissue strips in the first 50 cases and 40 tissue strips in the latter 50 cases.

Summary/Conclusion

- DMEK tissue preparation methods have improved substantially with tissue waste rates that are approaching DSAEK rates
- Eye bank technicians can prepare DMEK tissue on par with reported surgeon results
- Training program needs to be more robust and codified in order to achieve uniform results across all technicians

References


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