Deep Anterior Lamellar Keratoplasty
Big Bubble…No Trouble

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Financial Disclosures
No Financial Interest

DALK - Indications
All stromal pathologies sparing the endothelium:
- Keratoconus and Ectatic corneal diseases
- Stromal scarring
- Corneal stromal dystrophies
- Others.

I. Why DALK?
### DALK vs PK

<table>
<thead>
<tr>
<th>Criteria for tissue selection</th>
<th>PK</th>
<th>DALK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent endothelium</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Less rigid</td>
<td>Less rigid</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Graft Failure</th>
<th>PK</th>
<th>DALK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<table>
<thead>
<tr>
<th>Acute Endothelial rejection</th>
<th>PK</th>
<th>DALK</th>
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<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<table>
<thead>
<tr>
<th>Late Endothelial failure</th>
<th>PK</th>
<th>DALK</th>
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<tbody>
<tr>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<table>
<thead>
<tr>
<th>Suture related complications</th>
<th>PK</th>
<th>DALK</th>
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<tbody>
<tr>
<td>More</td>
<td>Less</td>
<td>Less</td>
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</table>

<table>
<thead>
<tr>
<th>Rehabilitation</th>
<th>PK</th>
<th>DALK</th>
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<tbody>
<tr>
<td>Slower</td>
<td>Faster</td>
<td>Fastest</td>
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</table>

<table>
<thead>
<tr>
<th>Interface complications</th>
<th>PK</th>
<th>DALK</th>
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</thead>
<tbody>
<tr>
<td>NO</td>
<td>Yes</td>
<td>NO</td>
</tr>
</tbody>
</table>

### Endothelial cell density after PK

![Graph showing endothelial cell density over time](image)


### Less Rigid Criteria for Tissue Selection – No Graft Failure

- Excellent endothelium
- Less rigid

### Why BB-DALK?

- Fastest rehabilitation
- No suture-related complications
**BB- DALK vs other DALK Techniques**

- Near Full Thickness
- Residual Stroma
- BB- Technique
- No Residual Stroma

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**Advantages of BB DALK over other DALK Procedures:**

- Most Reproducible
- Highest chance to expose Descemet’s membrane
- Least risk of perforation
- No Stromal interface

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**Surgical Technique – Hanna Reusable**

**Surgical Technique – SU Trephine**
Adjustable SU Trephine
Tips for successful BB- DALK

Trephination

- Objectives:
  - Partial
  - Deep
  - Centered
  - Parallel to visual axis
  - Include all, or most of the ectatic cornea

Trephination

- Stabilizes the Globe
- Uniform support over cornea
- Obturator
- No Parallax
- Vertical cut angle
- Can predetermine cut depth

Bubble Injection

Do not stop when you see air in stroma!
Air Injection – Bloopers
Failed 1st Injection

II- HYDRATION CAN HELP AFTER DEBULKING

III- BIG BUBBLE
Bubble Augmentation

PUNCTURE
IV- RECOGNIZE SPLIT

Microperforation – Fibrin Glue

Amsterdam, 2013
Descemet’s Detachment...  
Failed air-injection

Day 1 after Surgery  

Descemet’s folds

Amsterdam, 2013
SAVE ENDO for DMEK!!

Amsterdam, 2013
- Peeling with Forceps

Mark Both Donor & Recipient

Amsterdam, 2013
- Marking both Donor & Recipient

Donor Preparation

Amsterdam, 2013
- Vertical Donor Trephination

Vertical Donor Trephination
**10 Tips for Successful BB-DALK**

1. Deep vertical trephination
2. Do not stop every time you see air in stroma
3. Hydration after debulking
4. Aim at large bubble; Bubble Augmentation
5. Recognize Descemet’s split
6. Large Puncture
7. Use Glue if needed
8. Refrain from using viscoelastics
9. Mark both donor and recipient
10. Patience, persistence, perseverance, endurance…. 

**Intraoperative data**

- Microperforation rate: 7/105 eyes (6.7%).
- Descemet’s exposure: 100/105 eyes (95.2%).
- Near Descemet’s Dissection: 5/105 eyes (4.8%)
- None was converted to PKP

**BB-DALK: Clinical Results**

**Rate of Successful Bubble Injection & Number of trials**

- 105 Consecutive DALK cases:
  - 95 successful bbls (90.5%)
  - 10 Failed bbls (9.5%)
  - Conversion to PK (0%)

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**BB-DALK: Clinical Results**

**CDVA over Time. All Eyes**

- Mean Decimal VA
- Time after surgery
- CDVA over Time. All Eyes
- 0.0
- 0.2
- 0.4
- 0.6
- 0.8
- 1.0
- 1.2
- 1.4
- 1.6

- 0.15
- 0.48
- 0.56
- 0.67
- 0.71
- 0.80

- n=105
- n=72
- n=76
- n=84
- n=95
- n=80

- pre op
- 1 m
- 3 m
- 6 m
- 1 y
- 1.5 y

Amsterdam, 2013
Cumulative CDVA at 1 year (Sutures in)

Suture Removal after 1 year
Indications:
- High Astigmatism (>4.0 D)
- Anisometropia
- Spectacle intolerance
- Scheduled secondary procedure
- Loose / broken sutures…

BB-DALK; Refractive Cylinder
All eyes, sutures in

Suture-out Group
Summary

- DALK is superior to PK in cases with healthy endothelium
- BBT has many advantages over other DALK procedures:
  - Enables planned exposure of Descemet’s membrane.
  - No host-donor stromal interface.
  - More options for secondary Refractive Surgery

Summary

- Surgical technique is reproducible and can be easily mastered
- Complications are relatively low
- Unsuccessful cases → Near Descemet’s Dissection
- Worst case scenario can be converted to PKP