

臺北醫學大學 50 週年慶

眼科學最近之發展 國際學術研討會

International Symposium on Current Ophthalmology

May 1st 2010 Shuang Ho Hospital

New Concepts of Lamellar Keratoplasty

Yi- Yu Tsai, M.D. PhD 蔡宜佑

層狀角膜移植

Lamellar keratoplasty

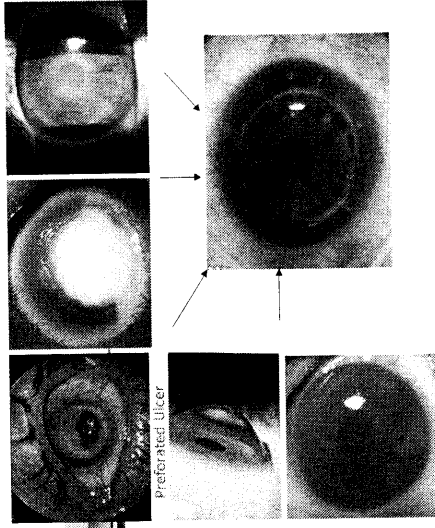
中國醫藥大學附設醫院
眼科部 蔡宜佑 北醫學號 741088
Yi-Yu Tsai, MD, PhD, Associate Professor
Department of Ophthalmology,
China Medical University Hospital, Taiwan

Corneal transplantation

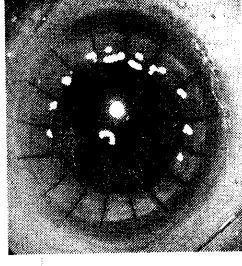


- Penetrating keratoplasty (PKP)
全層角膜移植

1906 Edward Konrad Zirm
first successful penetrating
keratoplasty in a human



Penetrating keratoplasty



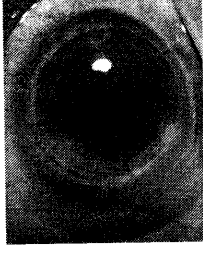
- However, PK 不是角膜疾病的結束, 常是另一種開始.
- Though vision recovers...
- New problem happens....

- Integrity
- Nerve
- Ocular surface
- Endothelium



Ocular surface complication

Graft failure



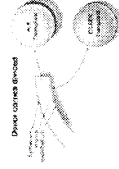
Endothelial decompensation

PK 5-year survival rate is around 60%
2.5-year survival rate is around 6%

better way?

lamellar keratoplasty

- Stromal disorder --- anterior lamellar keratoplasty (ALK)
- Endothelial disorder--- endothelial keratoplasty (EK)



1-1

Anterior lamellar keratoplasty (ALK)

Indication:

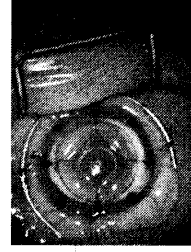
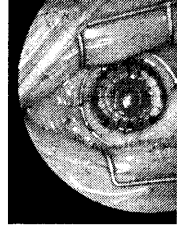
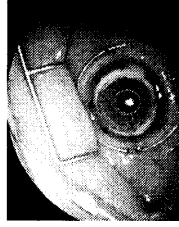
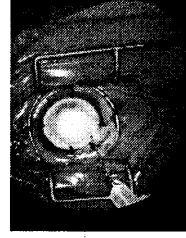
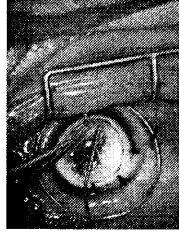
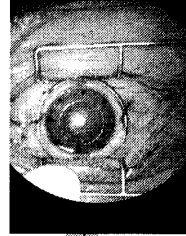
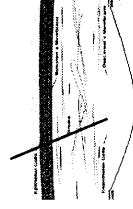
- Stromal disorders:
 1. anterior stromal scarring following infectious keratitis
 2. corneal stromal dystrophies
 3. corneal ectasias such as keratoconus
- the corneal endothelium is unaffected and essentially healthy.

Techniques of ALK

1. Microkeratome: automated anterior lamellar keratoplasty
2. Femtosecond laser: laser assisted anterior lamellar keratoplasty
3. Manual: Deep anterior lamellar keratoplasty (DALK) by big-bubble technique

Deep Anterior Lamellar Keratoplasty (DALK)

- Anwar's big bubble technique
- Forceful intrastromal air injection to split DM
- **Total stromal** removal down to DM

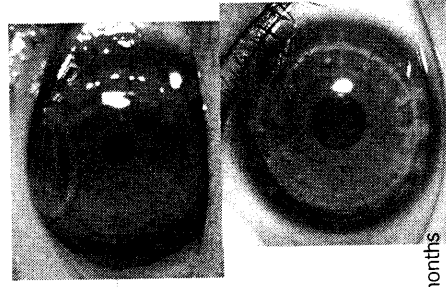
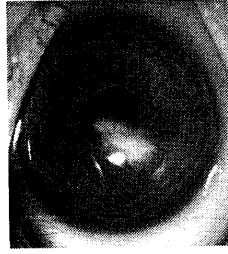


ALK vs PKP

- the risk of graft rejection is minimal following an ALK procedure
- graft survival at 台中中國附醫 3 years (ALK, 100% vs PK, 69.2%)

DALK outcomes and complications

李XX keratoconus with central scar



Post DALK 6 months

1-2 Posterior Lamellar Keratoplasty Endothelial Keratoplasty

- In 1998, Melles et al first described the surgical technique of posterior lamellar keratoplasty or PLK.
 - Terry et al modified PLK as DLEK (deep lamellar endothelial keratoplasty)
- Melles et al developed a new procedure DSEK (Descemet's stripping endothelial keratoplasty)
 - Gorovoy modified DSEK as DSAEK (Descemet's Stripping Automated Endothelial Keratoplasty)
- Melles developed a new procedure DMLEK (Descemet's Membrane Endothelial Keratoplasty)
 - Price modified as DMLEK (Descemet's Membrane Automated Endothelial Keratoplasty)

Descemet's Stripping Automated Endothelial Keratoplasty(DSAEK)

- DSAEK is synonymous with EK and is currently the gold standard in posterior lamellar keratoplasty procedures.

USA 2003
Taiwan 2009



DSAEK indication

- Pathology affecting the corneal endothelium
e.g. Fuchs' endothelial dystrophy, postsurgical endothelial decompensation.
- EK suitable only for relatively early forms (around 1 year) of endothelial decompensation

Corneal endothelial transplantation

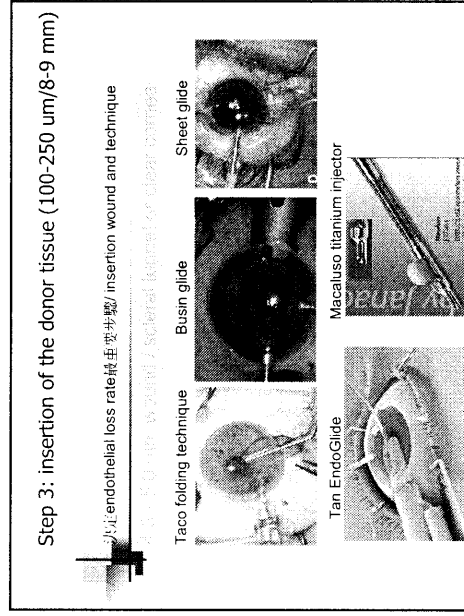
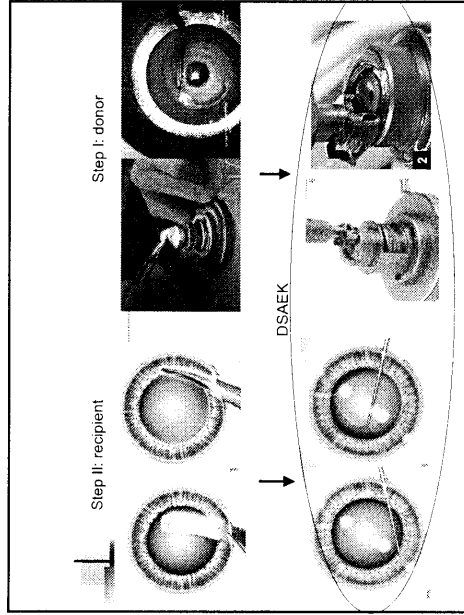
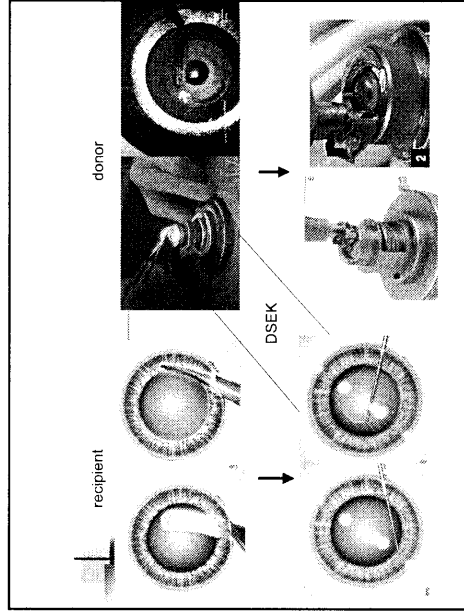
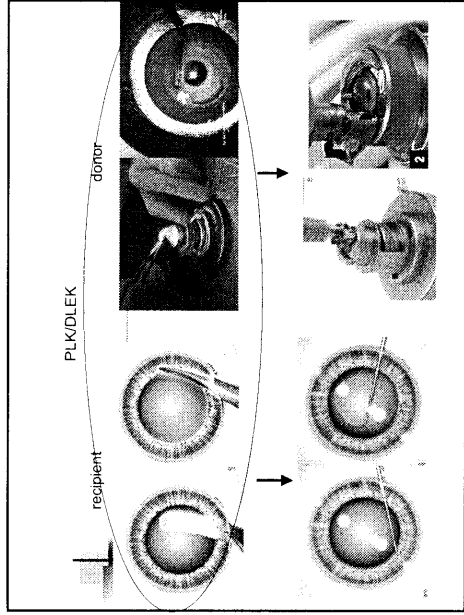
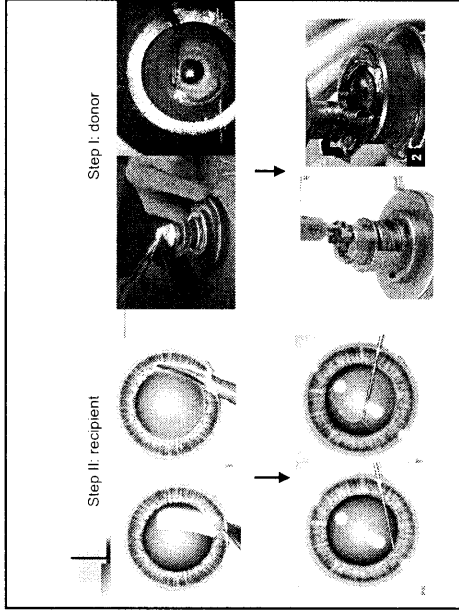
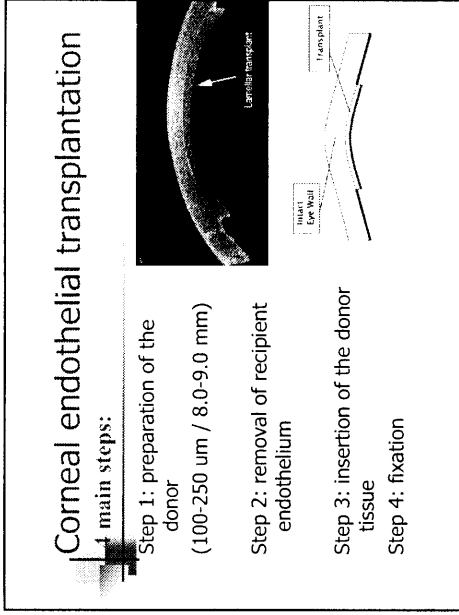
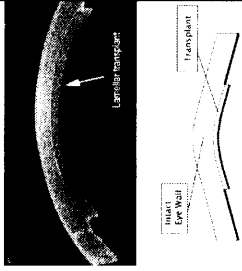
1 main steps:

Step 1: preparation of the donor
(100-250 μm / 8.0-9.0 mm)

Step 2: removal of recipient endothelium

Step 3: insertion of the donor tissue

Step 4: fixation



Step 3: insertion of the donor tissue (100-250 μm /8-9 mm)

防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

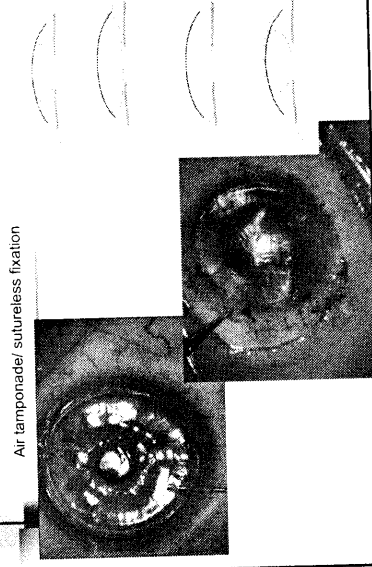
防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

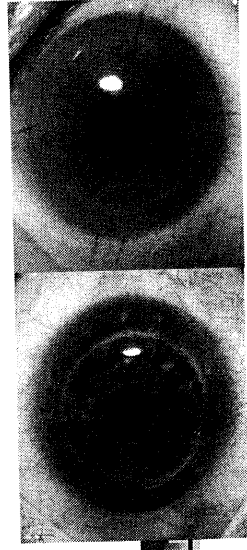
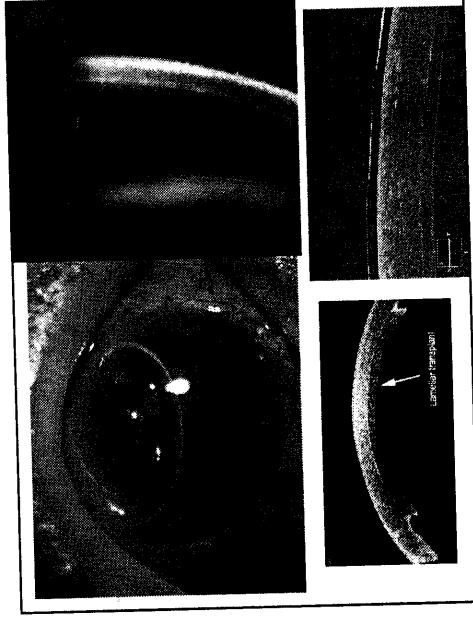
防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

防止 endothelial loss rate 防止 避免步驟 / insertion wound and technique

Step 4: fixation of the donor tissue in DSAEK



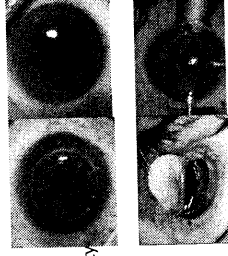
Air tamponade/ sutureless fixation



Part II The difference between DSAEK and PK

Advantages of DSAEK compared with PK in bullous keratopathy

1. Small incision
2. Closed chamber surgery
3. Sutureless (less suture)
4. Eye retains more structural integrity to resist minor trauma
5. Less refractive change
6. Faster and more predictable visual recovery
7. Reduced risk of ocular surface complications (corneal innervation maintained, no long-standing sutures)
8. Ease of repeat transplants



Disadvantages of DSAEK

- more procedures, technically difficult, steep learning curve
- (sutureless) Donor dislocation
- more endothelial cell damage: primary graft failure
- Only for mild or early BK, residual stromal haze
- unsuitable for hypotonic eyes → PK

DSAEK outcomes

1. astigmatism, 2. spherical equivalent,
3. VA, 4. endothelial cell loss, 5. graft survival

DSAEK complications

Step 4: fixation

Step 3: insertion

Step 4: fixation/ airtampnade

Step3: insertion

5. Interface scars and irregularities
6. Epithelial ingrowth
7. IOL displacement
8. endophthalmitis

Thanks for your attention