Preliminary results of Quarter-DMEK: A next step in endothelial keratoplasty?

Early postoperative outcomes seem to mimic those of conventional DMEK

Conventional Descemet membrane endothelial keratoplasty (DMEK), ie. a technique designed by NIIOS for the transplantation of an isolated 8.0 to 9.5mm circular donor Descemet graft carrying viable endothelium, may be the most advanced corneal transplantation technique currently available in the treatment of corneal endothelial disorders like Fuchs endothelial dystrophy and bullous keratopathy. Although the technique may be slightly more challenging than Descemet stripping endothelial keratoplasty (DSEK), a technique previously designed by NIIOS, corneal surgeons around the world are now converting from DSEK to DMEK. Making the switch seems worthwhile because of the better visual outcomes in DMEK while the surgical technique feels more elegant and better controlled in comparison with DSEK.

At the same time, evidence is mounting that host peripheral endothelial cells may still have potential in re-populating the cornea. A first indication for this regenerative capability came from the clinical observation that virtually all Fuchs dystrophy eyes that suffered from a subtotal graft detachment after DMEK, surprisingly showed near complete restoration of corneal transparency, with - despite persistent detachment - visual recovery up to 20/20 (1.0). Since clearance did not occur with detachments in post-DMEK eyes operated on for bullous keratopathy, we introduced the concept of Descemet membrane endothelial transfer (DMET) and we questioned whether Fuchs endothelial disease is a ‘dystrophy’, because the latter

Quarter-DMEK: a new hybrid technique between DMEK and DMET

Slit-lamp, pachymetry and specular microscopy images of an eye before and at 1 and 6 months after Quarter-DMEK. The cornea shows a clearance pattern similar to that after conventional DMEK.
term implies an irreversible tissue condition that would not agree with nearly complete endothelial wound healing.

In 2009, most scientific ophthalmic journals were not yet open for the idea to reconsider a well-established disease entity like Fuchs endothelial dystrophy. However, since then investigators independently from each other started to report similar observations of spontaneous corneal clearance after detached DSEK and DMEK, and more recently, several groups have described endothelial repopulation of the host cornea after ‘descemetorhexis only’, which may be indicative that in a percentage of Fuchs dystrophy eyes, host endothelial cells may have regenerative capacity, rendering the term ‘dystrophy’ questionable, if not obsolete. From a clinical point of view, however, endothelial repopulation may occur at a rather slower rate, and although effective, the sometimes long standing corneal edema proved difficult to manage for both corneal surgeons and their patients.

Entertaining the idea that the endothelial cells in Fuchs eyes are not dystrophic, NIIOS R&D expanded on this concept by modifying our conventional DMEK technique such that both the advantage of conventional, large diameter, circular DMEK (visual recovery within weeks) and that of DMEK (slower host peripheral endothelial wound healing) were combined. By transplanting only a quarter of a full-diameter donor Descemet membrane - with a graft surface area similar to that of a 6.0mm circular graft - the central cornea may show deturgescence with the corneal thickness quickly returning to normal, while the paracentral corneal area may be repopulated with host endothelial cells. As such, the antigen load may be reduced, potentially further minimizing the risk of graft rejection after Quarter-DMEK (compared to conventional DMEK). Furthermore, with Quarter-DMEK the yield of the transplant from the same donor pool would potentially quadruple.
“A disease like this ruins more than just your eyesight”

Mr. Thierry Stern wanted treatment ‘from the best’

Blind in one eye, vision failing in the other... it’s a true nightmare. A nightmare that was to become reality for Mr. Thierry Stern from Switzerland this year. Mr. Stern is the president of an international company and his eyesight affected his work. “It’s very hard to run a large corporation when you can’t read! But most of all I felt terrible for my children. ‘Want to play ball, dad?’ I couldn’t even see the ball anymore!” An operation at the Melles Cornea Clinic improved his ability to see and stabilized his situation.

Mr. Stern has had poor eyesight all his life. He was born with glaucoma and developed buphthalmos, a condition that causes the eye to enlarge. “I was the first baby in the world to have laser surgery—the machine they used had just been built! If I’d been born a week earlier, I’d be blind.” In short, Mr. Stern was used to seeing poorly. “I’d learned to live with it; I didn’t know any better, and life marches on either way.” That changed at age 43, when his sight began to worsen. “I’d gotten a little lazy with my eye drops. I really want to warn people about that: use your eye drops! Even if you only have ten percent of your sight left. That ten percent makes a world of difference.” His right eye could be saved; his left was lost.
Advanced keratoplasty wetlab courses in Rotterdam, The Netherlands

Bowman layer transplantation for advanced keratoconus & Descemet membrane endothelial keratoplasty (DMEK)

DMEK course are scheduled on a Tuesday & Wednesday. On Tuesdays, the course participants join live surgery sessions; on Wednesday, various techniques are practised during educational wetlab sessions and patient demonstrations are given. Bowman layer wetlabs are given on Thursday.

Further information and applications: dekort@niios.com

- Bowman layer surgical course: February 9, 2017
- Beginner DMEK surgical course: April 11/12, 2017
- Advanced DMEK surgical course: April 13, 2017
- Beginner DMEK surgical course: May 16/17, 2017
- Bowman layer surgical course: June 29, 2017
- Beginner DMEK surgical course: September 5/6, 2017
- Advanced DMEK surgical course: September 7, 2017

Course level: Corneal fellows and surgeons

Two-day DMEK wetlab course at the Callahan Eye Hospital in Birmingham, United States

&

One-day DMEK wetlab course at the Wilmer Eye Institute in Baltimore, United States

Descemet membrane endothelial keratoplasty (DMEK)

In Birmingham, each course is scheduled on a Thursday & Friday or Friday & Saturday. On the first course day, the course participants join live surgery sessions; on the second day, various techniques are practised during educational wetlab sessions and patient demonstrations are given.

Further information and applications: dekort@niios.com

- Birmingham DMEK surgical course: February 23/24, 2017
- Birmingham DMEK surgical course: February 24/25, 2017
- Baltimore DMEK surgical course: June 16/17, 2017

During wetlab courses in the United States, NIIOS surgeons as well as eye bank professionals from Amnitrans Eye Bank Rotterdam will be present for teaching purposes.

Course level: Corneal fellows and surgeons

Live-video streaming of DMEK surgeries performed in Rotterdam

Sessions are scheduled on Thursdays from 9 am thru 4 pm (+1h Greenwich Time). Participants receive live images of the surgical microscope and side tables, and can chat (verbally or by typing) with the surgical staff during surgery.

Further information and applications: info@niios.com

Level: Corneal fellows and surgeons

NIIOS-USA Cornea Evening on Friday May 5TH, 2017; 7-11 pm (before ASCRS)

Venue: Courtyard Los Angeles L.A. LIVE, 901 West Olympic Boulevard, Los Angeles, California 90015, USA

After the successful NIIOS Cornea Evenings preceding the ESCRS in Europe, a NIIOS-USA meeting on the latest topics in keratoplasty surgery is organized on the Friday evening before the 2017 ASCRS in Los Angeles. Among the speakers are Drs. Mark Terry, Friedrich Kruse, Kathryn Colby, Oganes Oganesyan, and NIIOS staff members and fellows. Topics include: ‘Descemetorhexis only’ for Fuchs dystrophy, 10 year DMEK outcomes, DMEK complication management, and Bowman layer transplantation for advanced keratoconus. Free entrance tickets are available through info@niios.com or register at www.niios.com/CorneaEvening2017.

SIGOTT for updated info on advanced keratoplasty techniques

‘Special Interest Group’ for advanced keratoplasty techniques

In recent years, there has been a growing interest in keratoplasty surgical techniques developed by the Netherlands Institute for Innovative Ocular Surgery (NIIOS), like DALK, DLEK, DSEK, DMEK, and Bowman layer transplantation. To accommodate all requests for information, a Special Interest Group for Ocular Tissue Transplantation was founded for all eye professionals with an interest in corneal surgery or eye banking techniques. Membership is free of charge; applications can be submitted via info@sigott.com.

For more information: www.sigott.com

Our textbook on DMEK is available through info@niios.com