HINTERGRUND

Corneal transplantation is the most frequently performed and most successful organ transplantation in medicine. Each layer of the cornea can develop its own disease. For example, the inner layer of the cornea (endothelium) can become cloudy after cataract surgery or in the case of Fuchs’ corneal endothelial dystrophy. The pathological inner layer – consisting of the Descemeto membrane and endothelium – is replaced within an operation called DMEK (Descemet Membrane Endothelial Keratoplasty). During the process the layer is introduced into the front chamber of the patient’s eye in a coiled status by means of a so-called DMEK-shooter. A problem is that the Descemeto membrane has the tendency to automatically wind itself up to form a single-axis winding. The membrane must therefore be unwound manually by the surgeon after insertion into the front chamber of the eye, partly with the aid of further instruments and/or by air bubble or pressure on the cornea. This surgical technique is time-consuming, can damage the graft and is stressful for the eye.

LÖSUNG

Ophthalmologists at the University Hospital of Cologne have developed DMEK-shooters that significantly make the operation easier by unrolling the membrane in the eye faster, safer and more standardized already during the process of implantation. Tubes used so far have a cylindrical form with a round profile. An oval profile and a novel shape of the inner architecture characterize the inventive shooters. This shape allows uncoiling of the Descemeto Membrane already during release from the shooter. Thereby, the number of subsequent surgical steps and the likelihood of complications is reduced and consequently the success rate of this surgical method is increased. In addition, the ophthalmologic surgeons have developed a device for completely contactless and easy preparation and transfer of the transplant into a storage box or injection cartridge.
Novel design of DMEK shooters as compared to the state-of-the-art (SdT; Fig. 1).

VORTEILE

Operation more rapid, safer, more standardised and simpler:

- better and faster uncoiling of the transplanted Descemet membrane
- reduced risk of complications
- increased success rate
- reduced duration of surgery

Innovative device for simplified Descemet membrane-endothelium graft preparation and loading of a storage/cultivation box or an injection cartridge:

- one operation for two steps with one device
- no touching of the transplant incl. endothelium
ANWENDUNGSBEREICHE

In Germany alone every year 6,000 donor corneas are transplanted. Approximately 185,000 transplantations were performed worldwide in 2012. The number of DMEKs in Germany increased 8-fold from 2011 to 2016.

SERVICE

The invention is offered for licensing and further co development in collaboration with the researchers. Transparent and Luer-Lock compatible prototypes of the DMEK-shooters have been produced by 3D-printing and successfully tested with human Descemet´s membranes. A prototype of the DMEK-preparation and loading system is also available.