TECHNIQUE

Modified dagger-tip Sheets glide to facilitate 2-point fixation across the anterior chamber in aniridic aphakic eyes

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Presented is a modified technique for removing a failed endothelial allograft in an aniridic aphakic eye that reduces the risk of posterior dislocation. This technique involves the creation of an artificial iris plane using a Sheets glide by trimming it into the shape of a dagger so that it can be pulled through the anterior chamber and fixated by both its passage through a paracentesis incision and the main incision. The Sheets glide then acts as a physical barrier, or scaffold, to allow safe removal of the failed endothelial allograft and subsequent repeat endothelial keratoplasty while avoiding posterior dislocation of the tissue into the vitreous cavity.

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Online Video

Since its introduction in the late 1990s and its evolution throughout the early 2000s, endothelial keratoplasty has become the most widely performed type of corneal transplant surgery. Descemet-stripping automated endothelial keratoplasty (DSAEK) and Descemet membrane endothelial keratoplasty are preferred over full-thickness penetrating keratoplasty, particularly for diseases such as Fuchs endothelial dystrophy and pseudophakic bullous keratopathy, due to their lower rejection rates, superior postoperative refractive outcomes, and speedier visual recovery.

One limitation of endothelial keratoplasty, however, is that it becomes technically challenging in eyes with abnormal anterior segment or vitreous anatomy; these anatomic abnormalities also make removal of failed endothelial allograft tissue more difficult because of the risk of posterior dislocation. This study describes a modified technique in which a Sheets glide is trimmed into a dagger-tip shape to facilitate 2-point fixation across the anterior chamber so that it can function as a highly stable artificial iris plane in an aniridic aphakic eye.

SURGICAL TECHNIQUE

The Sheets glide is trimmed to approximately 4 mm in width. The distal end of the Sheets glide is tapered into a dagger-tip shape by cutting wedges from each side of the glide’s distal end until the tip is no more than 1 mm in width (Figure 1). A 4.5 to 5.0 mm clear corneal or corneoscleral incision is made, and a paracentesis incision is made 180 degrees directly opposite to the main wound. Using microforceps placed through the paracentesis incision, the dagger-tip is grasped, and the Sheets glide is pulled through the main incision, across the anterior chamber, and through the paracentesis incision (Figure 2). The paracentesis used to anchor the dagger-tip should be made just posterior to the conventional position of a clear corneal paracentesis (Video 1, available at http://links.lww.com/JRS/A165). This allows the Sheets glide to occupy a more posterior position and avoid crowding of the anterior chamber. When the maneuver is complete, the Sheets glide is fixated distally by the 1.0 mm dagger-tip in the paracentesis incision and fixated proximally by the 4 mm side of the Sheets glide in the main incision (Figure 3).

The dagger-tip shape—narrow at its distal end and wider at its proximal end—maintains the stability of the Sheets glide within the paracentesis. If only the narrowest portion of the dagger-tip is placed into paracentesis, the Sheets glide might slide within the incisions as the surgeon enters and exits the main wound. It is necessary, therefore, to pull the dagger-tip far enough through the paracentesis to wedge its widening profile into the walls of the incision.
This will allow the Sheets glide to serve as a stable anchor point in both the anterior–posterior axis to avoid posterior graft dislocation and the nasal–temporal axis, preventing movement of the Sheets glide as the failed endothelial graft is removed.

With a temporary iris plane now in place, the failed endothelial keratoplasty graft can be removed with a much greater degree of security for the surgeon, who can feel free to grasp and regrasp the tissue without imminent concern for the tissue dislocating into the posterior segment every time it is released from the forceps. An endothelial keratoplasty technique of the surgeon’s preference can then be performed to complete the case, with or without the Sheets glide in place, depending on the surgical approach used (ie, pull-through techniques for DSAEK and Descemet membrane endothelial keratoplasty might not require the Sheets glide, but forceps and needle-push techniques might benefit from the glide).²

DISCUSSION

Traumatic aniridia and aphakia can make anterior segment surgery foreboding for even the most experienced surgeon because of the unicameral status of the eye. Removal of a failed endothelial keratoplasty graft, for example, presents the very real risk of posterior dislocation of the tissue into the posterior segment.

Previously described techniques for creating a temporary safety net between the anterior and posterior segments, such as the safety-basket suture, which can be placed before repositioning a dislocated posterior chamber intraocular lens, are an alternative to this technique. The safety-basket technique was originally described using 10-0 suture passed in a horizontal mattress through the pars plana, but it could theoretically be passed in the anterior chamber, so that the suture is closer to the cornea. Newman and Rosenwasser described such an approach for fixing DSAEK tissue; theoretically, the same suture could be passed under a failed allograft to prevent it from dislocating during the process of dissecting it from the recipient stromal bed.³

The advantages of the Sheets glide dagger-tip over sutured techniques are that it does not require multiple passes across the eye with a needle and suture and it provides a solid, much wider platform to prevent the tissue from dislocating posteriorly. If desired, it can also be used during donor lenticule insertion without the potential pitfalls of snagging or tangling sutures in the anterior chamber. An added benefit of this dagger-tip technique over inserting a Sheets glide across the anterior chamber through a single main incision alone is that this method does not rely on any underlying anatomic structures (residual iris, posterior capsular remnants, crystalline lens, or intraocular lens) to hold the Sheets glide in place. Furthermore, this technique avoids damage to any residual angle or iris stub structures across the eye, minimizing the risk of intraoperative bleeding.

We have also used this modified dagger-tip technique when implanting a donor lenticule in an aphakic eye. In the case described, we used a standard pull-through maneuver with microforceps in conjunction with this technique, to

Figure 1. Creation of a dagger-tip shape Sheets glide. The Sheets glide is trimmed to a width of 4 mm, and the distal end is tapered to create a dagger-shaped tip no more than 1 mm wide: (A) schematic drawing. (B) Intraoperative appearance.

Figure 2. Positioning of the dagger-tip shaped Sheets glide. A: Microforceps are inserted through the paracentesis and used to grasp the tapered dagger-tip distal end of the Sheets glide (yellow arrowhead). B: The microforceps are used to pull the Sheets glide through the main incision and across the anterior chamber. C: The dagger-tip of the Sheets glide (white arrowhead) is pulled through the paracentesis incision.
insert the replacement endothelial graft. With this particular technique, the Sheets glide is removed simultaneously as the donor tissue is pulled across the anterior chamber, and the tissue is not released from the forceps until a supportive bubble is placed. Thus, we do not feel that the modified dagger-tip provides any additional protection against posterior dislocation of the donor graft in the setting of pull-through techniques because the forceps adequately stabilize the graft.

The dagger-tip modification does, however, stabilize the Sheets glide and prevents anterior–posterior seesawing of the glide onto the conjunctival surface under the weight of the allograft. This allows safe and efficient movements when placing the graft onto the Sheets glide, passing the microforceps across the anterior chamber and grasping the graft prior to the pull-through step, while minimizing unpredictable movements of the Sheets glide that could potentially damage the donor tissue. Furthermore, the posterior location of the anchoring paracentesis ensures that the Sheets glide does not crowd the anterior chamber. This allows the surgeon to make a standard anterior clear corneal paracentesis through which the microforceps can be passed to grasp the donor tissue, without being hindered by the position of the Sheets glide. If used in conjunction with endothelial keratoplasty techniques such as needle-push or forceps insertion, the posterior position of the dagger-tip might also provide better chamber depth for tissue unfolding, compared with a standard Sheets glide.

**WHAT WAS KNOWN**
- Anatomic abnormalities of the lens–iris diaphragm such as aniridia and aphakia not only decrease the chance of successful primary endothelial keratoplasty but can also make the removal of a failed donor lenticule challenging due to the risk of posterior dislocation of the tissue.
- Several techniques have been described to circumvent the anatomic challenges of aniridic or aphakic eyes, including a safety-basket suture and a Sheets glide to serve as a scaffold. In addition to preventing posterior dislocation of the donor lenticule, the use of a Sheets glide during endothelial keratoplasty in complex eyes can also help to prevent iris trauma.

**WHAT THIS PAPER ADDS**
- A modified Sheets glide was trimmed into a dagger-tip shape to prevent posterior dislocation of a failed endothelial allograft during its surgical removal.
- Fixating the tapered end of the Sheets glide within a paracentesis while maintaining the wider portion in the main incision allowed for 2-point fixation of the Sheets glide during surgical maneuvering and prevented the Sheets glide from damaging angle or residual iris structures.

**REFERENCES**

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