



# Partial Graft Detachment During Gonioscopy-Assisted Transluminal Trabeculotomy in a Patient Who Underwent Descemet Membrane Endothelial Keratoplasty

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## Dear Editor,

Microinvasive glaucoma surgeries (MIGS) are surgical techniques that utilize an ab-interno approach, cause minimal tissue disruption with little to no scleral dissection, involve limited conjunctival manipulation, and are characterized by a favorable safety profile and quick postoperative recovery.<sup>1</sup> Gonioscopy-assisted transluminal trabeculotomy (GATT) is a recently developed conjunctiva-sparing technique that enables circumferential trabeculotomy. It is considered an innovative MIGS method with a favorable safety profile and proven effectiveness in lowering intraocular pressure (IOP) in patients with open-

angle glaucoma.<sup>2</sup> However, like all surgical procedures, GATT is associated with potential complications. Reported adverse events include transient hyphema, steroid-induced IOP elevation, cystoid macular edema, Descemet's membrane detachment (including hemorrhagic forms), corneal edema, inadvertent iridodialysis or cyclodialysis, partial separation of Schlemm's canal, trabecular meshwork, and Descemet's membrane, choroidal detachment, and hypotony maculopathy.<sup>3,4</sup>

GATT surgery has been reported to be safe and effective in eyes that have undergone various corneal procedures, including Descemet membrane endothelial keratoplasty (DMEK).<sup>5</sup> This study reports a newly identified complication of GATT surgery observed in a patient with a history of DMEK.

A 38-year-old male patient underwent cataract surgery in the left eye 18 years ago following a bullet injury. Due to subsequent persistent corneal edema despite medical treatment, he was referred to our clinic for corneal transplantation. The patient underwent DMEK in the left eye 2.5 years ago, followed by repeat DMEK 4 months later due to graft rejection. Following the second DMEK surgery, the patient was diagnosed with Irvine-Gass syndrome and received a sub-Tenon triamcinolone injection. The spherical equivalent was -1.00 diopter (D) in the right eye and -6.00 D in the left eye. The best corrected visual acuity (BCVA) in the right eye was 20/20, with unremarkable anterior and posterior segment examinations. The BCVA in his left eye was 20/40, and despite maximum topical medical therapy and oral acetazolamide, IOP remained uncontrolled at 24 mmHg. On slit-lamp biomicroscopy of the left eye, the corneal graft was well-apposed, the cornea was mildly edematous, and the eye was pseudophakic. Fundus

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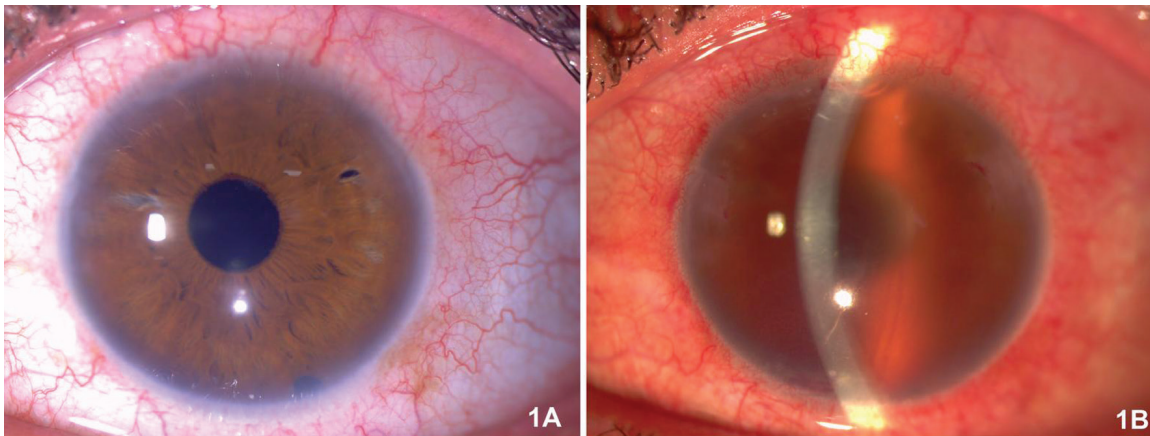
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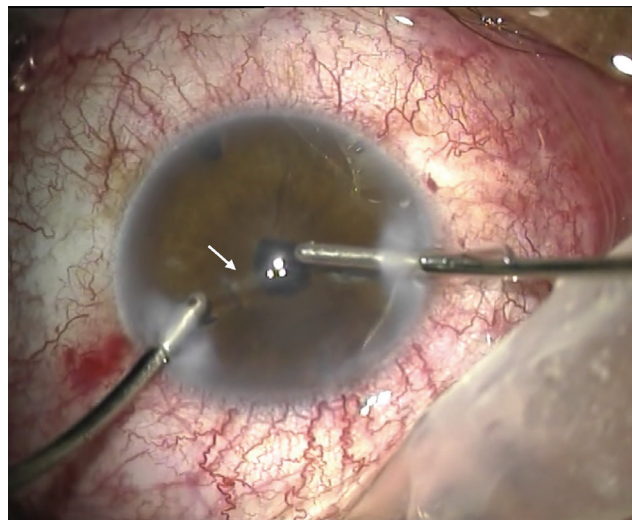
examination revealed a cup-to-disc ratio of 0.3 in the right eye and 0.6 in the left eye. The retinal nerve fiber layer thickness was 103  $\mu\text{m}$  in the right eye and 100  $\mu\text{m}$  in the left eye. Central corneal thickness was 550  $\mu\text{m}$  in the right eye and 610  $\mu\text{m}$  in the left eye. As the angle structures were clearly identifiable on gonioscopic examination, GATT surgery was chosen to achieve IOP control. One year after re-DMEK, the patient underwent GATT surgery. [Figure 1A](#) shows the anterior segment image before GATT surgery.

During GATT, a partial graft detachment was noted after completing the 360-degree procedure, when a semi-transparent horizontal line appeared on the superior cornea ([Figure 2](#)) during viscoelastic removal via irrigation/aspiration (I/A). The graft was successfully repositioned by injecting air into the anterior chamber through an inferior corneal incision. Postoperative management included topical

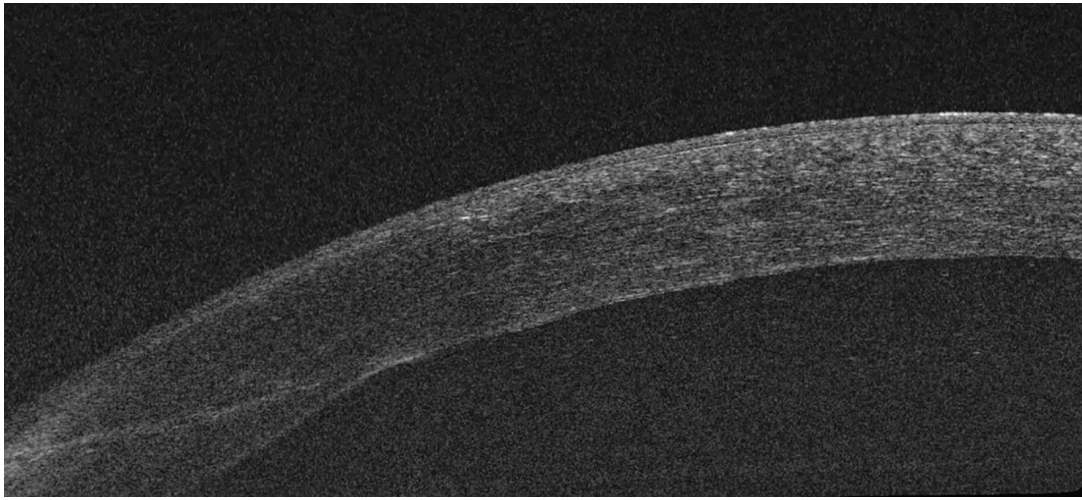
moxifloxacin (Moxai® 0.5%; Abdi İbrahim Pharmaceuticals, İstanbul, Türkiye) administered five times daily for ten days. Dexamethasone drops (Maxidex® 0.1%; Alcon Laboratories, Inc., Fort Worth, TX, USA) were prescribed every two hours and tapered according to the level of inflammation observed during follow-up, with complete discontinuation within 14 days. At the two-week postoperative visit, the corticosteroid regimen was transitioned to loteprednol drops (Lotemax® 0.5%; Bausch & Lomb Incorporated, Rochester, NY, USA), administered twice daily. Nepafenac (Apfector® 0.3%; World Medicine Pharmaceuticals, İstanbul, Türkiye) was also given once daily for one month. Early postoperative evaluation with clinical examination and anterior segment optical coherence tomography confirmed proper graft adherence. [Figure 1B](#) presents the anterior segment image on postoperative day 2, while [Figure 3](#) demonstrates anterior segment optical



**Figure 1.** A) Preoperative anterior segment image before gonioscopy-assisted transluminal trabeculotomy (GATT) surgery. B) Postoperative day-2 anterior segment image after GATT



**Figure 2.** Partial graft detachment (arrow)



**Figure 3.** Anterior segment optical coherence tomography confirming graft reattachment in the area of intraoperative detachment

coherence tomography confirming graft reattachment in the region of intraoperative detachment. At postoperative week 1, the patient's IOP was well-controlled at 15 mmHg without medication. However, on postoperative day 19, routine follow-up revealed an IOP spike (31 mmHg), prompting initiation of antiglaucoma therapy, which successfully stabilized the pressure. Dorzolamide hydrochloride + timolol maleate (Tomec® eye drops; Abdi İbrahim Pharmaceuticals, İstanbul, Türkiye) and brimonidine tartrate (Alphagan P® eye drops; AbbVie, North Chicago, IL, USA) were administered twice daily. In addition, oral acetazolamide (Diazomid® tablets; Sanofi, Türkiye) were prescribed at a dose of half a tablet four times daily, together with potassium citrate (Kalinor® tablets; Farma-Tek Pharmaceuticals, Türkiye) once daily. At 6 months after GATT surgery, the patient's IOP was 17 mmHg with medical treatment. The patient remains under follow-up.

Glaucoma develops in approximately 30% of patients following endothelial or penetrating keratoplasty, making it a serious postoperative complication that can adversely affect graft survival and long-term visual outcomes.<sup>6,7</sup> Patients may have pre-existing glaucoma prior to DMEK; however, *de novo* IOP elevation can also occur postoperatively. This postoperative IOP rise may result from air bubble-induced mechanical angle closure, steroid response, peripheral anterior synechiae, or sometimes without identifiable cause.<sup>8</sup> In our patient, the likely mechanism was steroid-induced response following sub-Tenon triamcinolone injection for Irvine-Gass syndrome after DMEK surgery. The patient was already receiving topical corticosteroid therapy following DMEK.

Reports of GATT surgery in patients with DMEK history are limited. Smith et al.<sup>5</sup> performed GATT surgery

in patients with corneal transplantation history. In their study of 39 eyes, only one patient (2.6%) had previously undergone DMEK before GATT. They reported no intraoperative complications. In our case, two prior DMEK procedures may have led to weak graft attachment, while factors such as a potentially long temporal incision or the I/A cannula could have contributed to graft detachment during I/A. Although anterior segment OCT confirmed proper graft attachment before GATT surgery, distinguishing pathologically weak adhesion may not always be possible. Moreover, although we noticed the graft detachment during I/A, we cannot be certain exactly when it began. Considering both GATT and DMEK are *ab interno* procedures, all potential complications related to previous intraocular surgeries should be anticipated when planning GATT in eyes with such history. As demonstrated in our case, graft detachment risk may be higher in patients who have undergone repeated DMEK procedures, warranting greater caution during surgery. Another precaution when planning GATT surgery in patients with DMEK history is avoiding excessively long incisions. However, despite all precautions, if graft detachment occurs during GATT surgery in an eye with DMEK history, it can be successfully managed, as in our case, by injecting an air bubble into the anterior chamber to reposition the graft.

In conclusion, in eyes with a history of DMEK surgery, GATT can successfully achieve IOP control. However, there is a risk of graft detachment. Keeping this risk in mind throughout the procedure and monitoring the graft during surgery is advisable. In the event of detachment, the graft can be repositioned by injecting air into the anterior chamber.



## Ethics

**Informed Consent:** Written informed consent was obtained from the patient.

## Declarations

### Authorship Contributions

Surgical and Medical Practices: R.D.G., Concept: R.D.G., Design: R.D.G., Data Collection or Processing: R.D.G., B.T., E.K., M.T., Analysis or Interpretation: R.D.G., B.T., E.K., M.T., Literature Search: R.D.G., Writing: R.D.G.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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