

Case Report

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# Spontaneous Reattachment of a Detached Sutured Descemet-Stripping Automated Endothelial Keratoplasty Graft

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## Keywords

Descemet-stripping automated endothelial keratoplasty · Graft detachment · Graft reattachment · Sutured Descemet-stripping automated endothelial keratoplasty graft

## Abstract

**Introduction:** This is a case report of a spontaneous reattachment of Descemet-stripping automated endothelial keratoplasty (DSAEK). This graft was primarily sutured, and 20% sulfur hexafluoride (SF<sub>6</sub>) was injected into the anterior chamber, followed by graft detachment and spontaneous reattachment, 3 months later. **Case Presentation:** A 78-year-old male presented with DSAEK graft detachment, which was the patient's second DSAEK (the first also did not adhere). During the second surgery, the DSAEK graft was sutured and 20% SF<sub>6</sub> was injected intraoperatively. Graft reattachment occurred without any intervention or repositioning 3 months after the 2nd DSAEK surgery. **Conclusion:** Spontaneous DSEAK late graft reattachment is possible, particularly in the setting of an anchoring suture. In some patients, waiting can be an option that can spare the patient the possible risks of graft repositioning, rebubbling, or repeating the DSAEK. Suturing the DSAEK graft primarily may have served as an anchor to keep the graft approximate and aid in attachment. A graft suture can be considered in the setting of a previously failed DSAEK due to DSAEK graft detachment.

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## Introduction

Descemet-stripping automated endothelial keratoplasty (DSAEK) is a surgical treatment for corneal edema caused by reduced endothelial cell function. It offers more structural integrity than penetrating keratoplasty and hence a lower chance of wound-related complications such as wound dehiscence, infections, or high astigmatism [1].

Some authors reported that graft detachment is the most common complication after DSAEK, occurring in approximately 14–23% of eyes [2, 3]. A few case series and case reports have reported spontaneous reattachment of detached DSAEK grafts [3–5]. One study reported that spontaneous reattachment occurred in 3.7% (1 out of 27) of detached grafts [3].

Graft adherence can be optimized by achieving a good air fill in the anterior chamber (AC) and maintaining a supine position postoperatively [6]. Even with optimal positioning, some patients are at high risk of graft detachment. A previous study reported that patients with a history of trabeculectomy and previous failed penetrating keratoplasty were at a higher risk of graft detachment [7]. Another study reported that eyes that had an anterior chamber intraocular lens (ACIOL) present at the time of DSAEK were at a higher risk of graft dislocations and failure compared to those who had secondary implantation of a PCIOL (posterior chamber intraocular lens) [8].

Detached grafts can be managed postoperatively by graft repositioning and/or reinjecting air into the AC “rebubbling” [2]. If air or gas migrates posteriorly, maintaining a supine position and dilating the pupil can bring gas forward and help with graft adherence.

This case report highlights the spontaneous reattachment of a DSAEK graft more than 3 months after surgery. The graft was sutured during DSAEK, and no interventions (e.g., rebubbling) were performed.

## Case Report

A 78-year-old male patient presented for a second opinion, with bullous keratopathy and a detached DSAEK graft in the presence of an ACIOL in his left eye. The patient had history of diabetes mellitus for 35 years. DSAEK surgery was performed 7 weeks prior to his presentation. This was the second DSAEK procedure. The first DSAEK was performed 1 month prior to the second one (11 weeks prior to the presentation). The indication for DSAEK was pseudophakic bullous keratopathy in the setting of an AC lens. The patient had a history of congenital cataract surgery. The first graft was complicated by graft detachment. The patient was brought back to the operating room, where the original graft was repositioned, sutured to the host cornea, and rebubbled. However, the graft failed to adhere. Owing to the detachment and failure of the first DSAEK graft, the referring surgeon chose to add two steps in the second DSAEK surgery: suturing the second DSAEK graft superiorly during the primary procedure and injecting 20% filtered SF6 intracamerally as air was injected in the first DSAEK.

The endothelial cell count of the second DSAEK graft was 2,946 pre-cut and 2,941 post-cut. A 7.75 mm graft was prepared using a Barron corneal punch. The previously failed corneal graft was mobilized and removed using a reverse Sinsky hook. Healon was placed in a bed on the temporal conjunctival surface. The endothelial graft was separated using a Paton spatula and then transferred, endothelium side down, to the temporal bed of Healon. The graft was then pushed into the AC using a previously bent 30-gauge needle on a 3-cc syringe. The incision was closed using interrupted 10-0 nylon sutures. Air on a cannula was used to inflate the AC and support the endothelial graft in position. A single 10-0 nylon was passed through the endothelial button via the superior paracentesis to attach it to the host cornea; the knot was rotated and buried. Twenty% filtered SF6 gas was injected into the AC using a 30G needle.

Postoperatively, the second DSAEK also detached. The graft approximated the cornea at the superior suture site; otherwise, it was detached. The gas did not remain in the AC, migrated posteriorly in the setting of the ACIOL and the iridectomy and the patient had a poor gas fill on post-operative day 1.

At the patient's first visit to us, his visual acuity was counting fingers at two feet in the left eye. Figure 1 shows a Scheimpflug picture of a partially detached graft. The right eye also had an ACIOL, but the cornea was clear and the best-corrected visual acuity was 20/60.

The patient elected to proceed with IOL exchange (ACIOL would be exchanged for a scleral fixed IOL), pars plana vitrectomy, and repeat DSAEK. The patient was prescribed prednisolone acetate eye drops four times a day, sodium chloride 5% eye drops four times a day, and sodium chloride 5% eye ointment at bedtime.

The patient was evaluated by a vitreoretinal surgeon before proceeding with the ACIOL to PCIOL exchange. He had a known history of mild to moderate non-proliferative diabetic retinopathy in both eyes. On retina exam, he was found to have mild macular edema and inner retinal thinning by optical coherence tomography in both eyes.

He was scheduled for surgery, but approximately 3 months after his second DSAEK, he called stating that he noticed a spontaneous improvement in his visual acuity. He was re-examined, and his vision improved to 20/125 in the left eye. On slit-lamp examination, the graft was attached, a little decentered but clearing, as shown in Figure 2. The surgery was canceled.

Five months after DSAEK surgery, the graft remained attached and clear. At that time, the suture passing through the graft was removed, as shown in Figure 3. The graft remained attached at subsequent follow-up visits. The graft remained attached and clear, with a visual acuity of 20/70 8 months after DSAEK surgery.

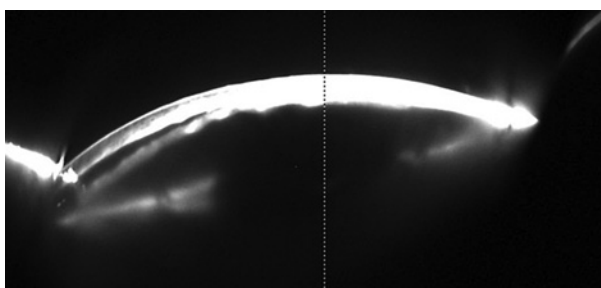
## Discussion

To our knowledge, this is the first case report in the literature in which spontaneous graft reattachment occurred in a DSAEK graft that was primarily sutured during DSAEK surgery. Both graft suturing and 20% SF<sub>6</sub> injection were performed simultaneously and primarily during DSAEK surgery, followed by graft detachment and reattachment. Graft reattachment occurred 3 months after DSAEK surgery without rebubbling, graft repositioning, or positioning of the patient. Although this is considered spontaneous reattachment, as no intervention was performed after the detachment, we suggest that the suture placed primarily before the detachment maintained some approximation of the detached corneal graft to the host, aiding late reattachment. Suturing the graft may have also resulted in decreased graft-ACIOL contact. This contact was proposed by Woo et al. [8] to be responsible for the potential endothelial damage and poor graft survival in patients receiving a DSAEK graft with an ACIOL already in place. Hence, in our patient, the preliminary decision was ACIOL explant and secondary PCIOL implantation.

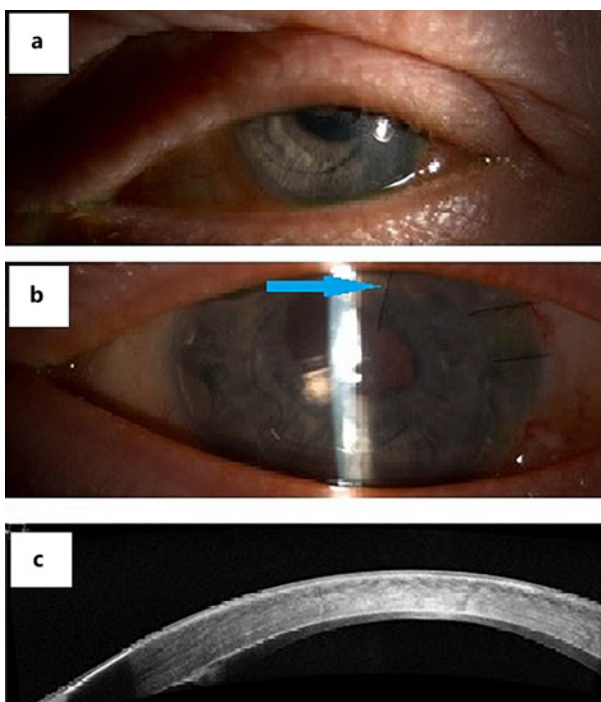
This is because when the detachment occurred, the only point of attachment was superiorly at the site of the suture, which maintained a fixed point of attachment of the graft against the cornea. Most likely, anchoring the graft allowed the AC fluidics to push the graft into position.

It is interesting that the slight differences in the technique between the first and second DSAEK in this patient caused a significant difference in the outcome. In the first DSAEK, air was injected intracamerally during DSAEK surgery, and the graft was not sutured, except after the detachment occurred. In contrast, during the second surgery, 20% SF<sub>6</sub> was injected intracamerally and the graft was sutured. Besides, the first detached graft was replaced by another one only 1 month after DSAEK surgery, while reattachment of the second detached graft occurred 3 months after DSAEK surgery. These differences raise the question of whether the primary suturing of the second graft or the time the second sutured graft was given to reattach was responsible for its reattachment.

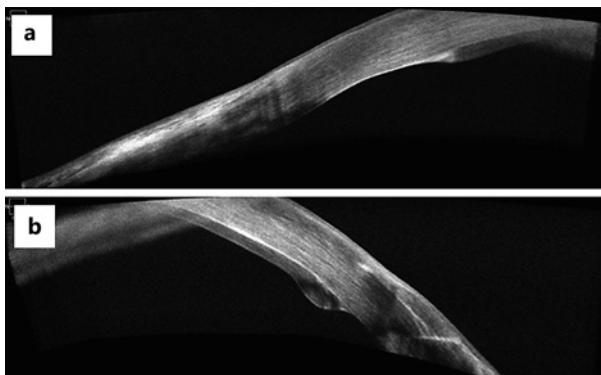
**Fig. 1.** Scheimpflug image showing a partially detached lower part of the DSAEK graft (left-hand side), 7 weeks after DSAEK.



**Fig. 2.** Photo slit-lamp images 13 weeks after DSAEK surgery. **a** DSAEK graft is re-attached and cleared. **b** Suture in the graft at 1 o'clock (blue arrow). **c** Anterior segment OCT showing attached DSAEK graft 13 weeks after DSAEK surgery.



**Fig. 3.** Anterior segment OCT 5 months after DSAEK surgery showing that the graft is still attached. **a** is a scan in the lower nasal quadrant and **b** is in the lower temporal quadrant.



Studies reported different ways to suture DSAEK grafts. “Pull through” or “lifeline” sutures were described to facilitate DSAEK graft insertion [9] without the need for inserting instruments into the AC in phakic eyes [10] or to prevent migration of the DSAEK graft to the posterior chamber in eyes with an absent iris-lens diaphragm [11]. A study reported using 4

fixation sutures when performing phacoemulsification 1 year after DSAEK to prevent graft detachment [12]. These sutures are removed at the end of surgery [13]. Suturing a dislocated DSAEK graft was used in addition to graft repositioning and rebubbling and was found to be effective and sutures were removed 6 weeks after graft repositioning and suturing [14, 15].

SF6 stays in the AC longer than air. However, it unfortunately migrated posteriorly through the iridectomy in our patient; therefore, it was ineffective. Mearza et al. [16] reported that DSAEK graft dislocation still occurs when the 20% SF6 gas fill is inadequate.

However, complete filling of the AC with gas can cause serious elevation of intraocular pressure. The only report we found to use both graft suturing and SF6 was by Ellis and Cohen [17] in 1995. However, their report differs from ours because they used graft suturing and SF6 injection consecutively and for an already detached graft. In their report, suturing the graft after it had already detached was not effective in graft reattachment, an outcome similar to that of the first detached graft in our patient, where the graft was also sutured after its detachment.

After failure of graft suturing, Ellis and Cohen [17] consequently filled the AC completely with SF6, and although this was effective in graft reattachment, they reported that it raised the intraocular pressure to 56 mm Hg and they had to remove some of it. In our case, there was a delay in intervening on the second detached graft because the patient was to have a retinal evaluation in the setting of scheduled lens exchange.

This case report confirms that spontaneous reattachment can occur after a long time, in this case, 3 months. In a case series of detached DSAEK grafts by Hayes et al. [4], spontaneous reattachment mostly happened during the first month; the longest spontaneous reattachment with no aiding techniques happened at 3 months and with rebubbling happened at 7 months. Our patient has one of the longest spontaneous reattachments of a detached DSAEK graft in literature.

We conclude that DSAEK graft suturing was helpful in graft reattachment, although it was not effective in preventing detachment. We suggest that, without suturing, it would have been very unlikely that the graft would reattach. In certain high-risk cases with partially detached sutured grafts, it may be worth waiting for the graft to reattach spontaneously without traumatic intervention or repeating DSAEK. We recommend that future prospective studies analyze the long-term effects of suturing DSAEK grafts on endothelial cell count and graft survival and compare the effects of primary graft suturing versus suturing after detachment. The CARE Checklist has been completed by the authors for this case report, attached as online supplementary material (for all online suppl. material, see <https://doi.org/10.1159/000535402>).

## Statement of Ethics

Written informed consent was obtained from the patient for publication of the details of their medical case and any accompanying images. This case report does not contain any personal identifying information. Ethical approval is not required for this study in accordance with local guidelines.

## Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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### Author Contributions

The authors confirm sole responsibility for the following: case report conception, data collection, interpretation, and manuscript preparation. Dr. Danielle Trief contributed to patient follow-up, data collection, and manuscript conceptualization and preparation. Dr. Jonathan Kahn contributed to patient follow-up and data collection. Dr. Rania Gad contributed to data collection and manuscript preparation. All the authors fulfill the ICMJE criteria and approved the final version.

### Data Availability Statement

All data generated or analyzed during this study are included in this article and its online supplementary material. Further inquiries can be directed to the corresponding author.

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