

Case Report

Spontaneous Corneal Graft Reattachment Following Descemet Stripping Automated Endothelial Keratoplasty in Prone Position: A Case Report and Literature Review

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Keywords

Descemet stripping automated endothelial keratoplasty · Complication · Air re-bubbling · Prone position · Spontaneous graft reattachment

Abstract

Graft detachment after Descemet stripping automated endothelial keratoplasty (DSAEK) is usually managed with air-bubbling. However, it is an invasive procedure, which can cause corneal endothelial reduction, and requires hospitalization and supine position maintenance. Only few case reports on graft reattachment in the prone position exist, and this is the first report from Japan. An 87-year-old woman presented with sudden pain in her left eye. Examination of her left eye showed a best-corrected vision of 20/50, shallow anterior chamber, cataractous lens, central corneal thickness (CCT) of 630 μm , and corneal endothelial cell count of 467 cells/ mm^2 . She was diagnosed with left-eye bullous keratopathy due to primary angle closure, and DSAEK was performed after cataract surgery. Post-surgery, she touched her left eye due to agitation. Graft adhesion was good until postoperative day 4; however, a partial detachment was observed on day 12. She was instructed to remain in a prone position for as long as possible; on day 22, the graft was reattached, and the CCT improved to 555 μm . Since then, the graft adhesion has been maintained, and her best-corrected vision has improved to 20/30. To date, 5 cases of graft reattachment in the prone position have been reported, with reattachment observed in all cases within 10 days from the onset of detachment, including this case.

Re-bubbling is an effective technique; however, it is invasive and may cause additional corneal endothelial loss. Therefore, it may be beneficial to have the patient initially attempt the prone position for reattachment.

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Introduction

Descemet stripping automated endothelial keratoplasty (DSAEK) is a surgical technique wherein the corneal endothelium with Descemet's membrane and a thin stroma of the donor cornea are transplanted. It has advantages, such as relatively predictable refractive outcomes, faster visual rehabilitation, and fewer risks of postoperative complications, such as wound dehiscence, over other techniques, such as penetrating keratoplasty.

It has been reported that graft detachment is the most common postoperative complication of DSAEK, occurring mostly within a few days after surgery [1, 2]. This complication is commonly managed by repositioning the graft by injection of air, also known as re-bubbling. However, this approach is invasive, may induce corneal endothelial reduction [3, 4], and requires hospitalization and supine position maintenance.

Although graft detachment is commonly treated with re-bubbling, reports describing prone positioning for graft reattachment are limited. Here, we report the case of a patient in whom graft reattachment was observed after she was instructed to maintain a prone position for treatment. Additionally, we reviewed the literature for reports on prone positioning as a treatment approach in such cases.

Case Report

An 87-year-old woman presented with a complaint of sudden sharp pain in her left eye. The patient had a suspected history of glaucoma more than 20 years ago; however, the details are unknown.

Slit-lamp examination showed a shallow anterior chamber, cataractous lens of both eyes, and corneal edema of her left eye (Fig. 1a). The intraocular pressure was 9 mm Hg and 10 mm Hg in the right and left eyes, respectively. Therefore, bullous keratopathy (BK) was considered in the left eye due to an angle-closure glaucoma attack. Left eye examination revealed a best-corrected visual acuity (BCVA) of 20/50, corneal edema with a central corneal thickness (CCT) of 630 μm on anterior segment optical coherence tomography (Fig. 1b, c), and corneal endothelial cell density of 467 cells/ mm^2 (Fig. 1d). The corneal endothelial cell density of her right eye was 738 cells/ mm^2 . A gonioscopy examination showed Shaffer I degree of angle closure in her left eye. Therefore, she was diagnosed with left-eye BK due to primary angle-closure or primary angle-closure glaucoma. Staged cataract surgery and DSAEK were scheduled.

Cataract surgery was performed without complications. Anterior capsule staining and corneal epithelial peeling were used to improve visibility during surgery. The BCVA of the left eye did not improve after surgery because of corneal edema.

Two weeks after the cataract surgery, DSAEK was performed without complications. Slit-lamp examination 2 h after surgery showed a shallow anterior chamber and pupillary block. After removing air from the side port, the pupillary block was relieved, and the intraocular pressure decreased from 54 mm Hg to 5 mm Hg.

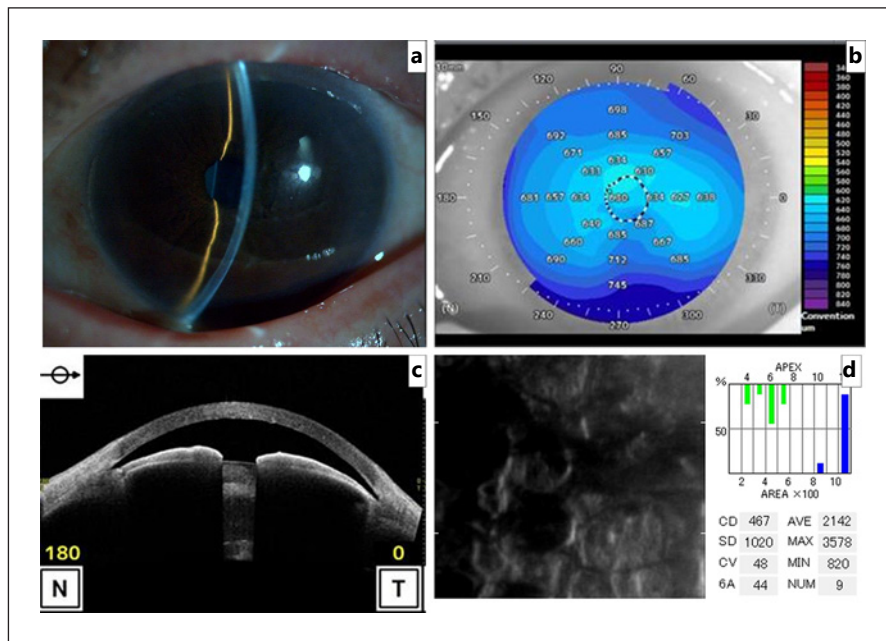


Fig. 1. Examinations of the left eye at the first visit. **a** Slit-lamp findings of the left eye showing a shallow anterior chamber and corneal edema. **b** ASOCT-derived corneal thickness map of the left eye. **c** Horizontal tomography of ASOCT in the left eye showing a shallow anterior chamber and corneal edema. **d** Specular microscopy of the left eye showing enlarged corneal endothelial morphology. ASOCT, anterior segment optical coherence tomography.

The graft adhesion was good until postoperative day 4, and she was discharged as scheduled. However, on day 12, the graft was almost totally detached, except for the upper nasal side (shown in Fig. 2). Her BCVA was 20/400, and the CCT was 805 μm . She requested an outpatient follow-up and was instructed to remain prone for as long as possible, even when sleeping. On day 16, graft detachment had not worsened, and she continued with prone positioning. On day 22, the graft had reattached, and corneal edema had significantly subsided. Her BCVA was 20/40, and the CCT was 555 μm . Since then, graft adhesion has been maintained, and her BCVA improved to 20/30. Four months postoperatively, the corneal endothelial cell density was 1,880 cells/ mm^2 . Her postoperative course is summarized in Figure 3.

Discussion

Graft detachment is the most common postoperative complication of DSAEK, with the reported incidence varying from 3.7% to 80% [1, 2, 5–7]. In BK, its reported incidence is 16.4%, and complicated cataract extraction and aphakic status increase the risk of its occurrence [8]. Re-bubbling is a common method used to treat graft detachment following DSAEK. However, it is invasive and may lead to corneal endothelial cell reduction and require hospitalization and supine position maintenance.

Bhalerao et al. [3] reported the outcomes in 80 eyes, with graft detachment after Descemet's stripping endothelial keratoplasty or DSAEK, that were treated with re-bubbling. Reattachment was observed in 77 eyes; however, 25 eyes had graft failure. Endothelial cell loss was faster and greater in this study than in previous reports. Another study showed that re-bubbling is associated with endothelial cell damage [4].

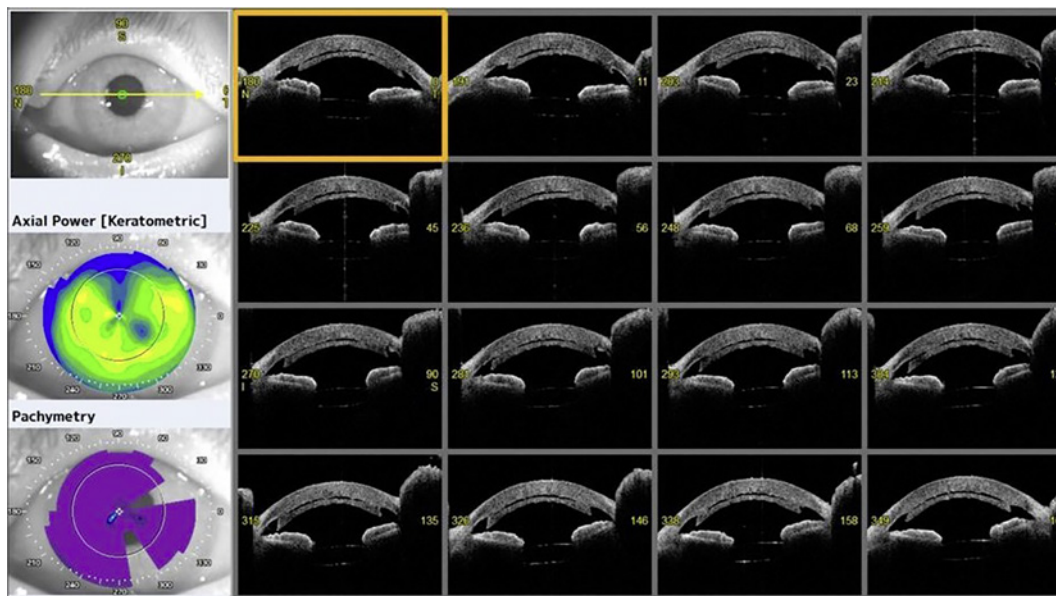


Fig. 2. Sixteen-way cross-sectional images of anterior segment optical coherence tomography on day 12. These images reveal that the graft was almost totally detached, except for the upper nasal side.

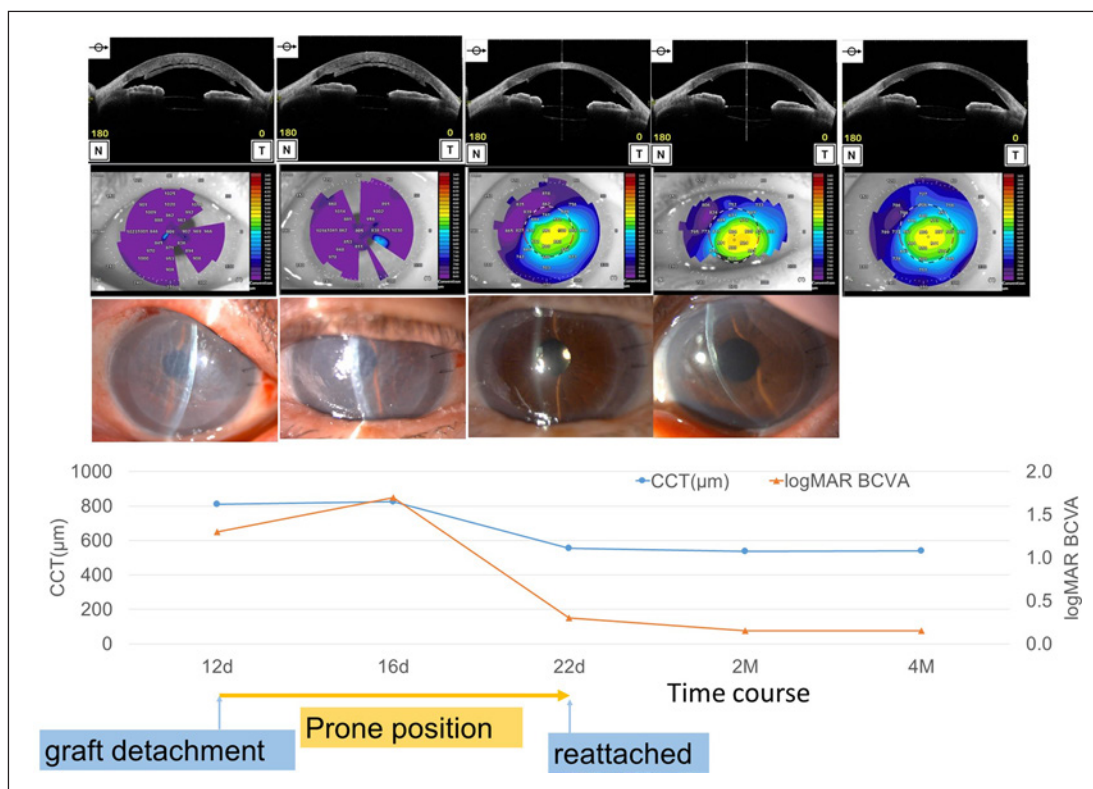


Fig. 3. Postoperative course. The horizontal axis shows the passage of time. Transitions of tomography, pachymetry map, and slit-lamp findings are shown above. The transitive graph shows the decrease in the CCT (circle), and the logMAR BCVA (triangle) improved after graft reattachment. d, days; M, months.

Table 1. Past reports of graft reattachment in the prone position

Case #	Primary disease	Age	Gender	Detachment range	POD of detachment	POD of reattachment	Detachment period
1	BK	31	M	Total	Day 1	Day 3	2 days
2	FECD	45	M	Total	Day 5	Day 9	4 days
3	FECD	45	M	Total	Day 5	Day 7	2 days
4	FECD	67	M	Total	Day 1	Day 5	4 days
5	Failed graft	74	F	Total	Day 10	Day 20	10 days
This case	BK	87	F	Partial	Day 12	Day 22	10 days

POD, postoperative day; FECD, Fuchs endothelial corneal dystrophy.

There are a few reports of spontaneous reattachment. Hayes et al. [9] reviewed 12 cases of spontaneous reattachment, wherein reattachment was observed as early as 5 days and as late as 7 months after surgery. In three of these 12 cases, the patients were treated in the prone position.

A report on cell injection therapy by Kinoshita et al. [10] described the injection of endothelial cells adhering to the posterior surface of the cornea upon lying in the prone position for 3 h. Supposedly, the prone position facilitates contact between the graft and the posterior surface of the host's cornea and promotes adhesion by gravity. Although it is an extremely simple and noninvasive method, it is not yet routinely performed.

To date, only 5 cases of graft reattachment in the prone position have been reported, even though it has been more than a dozen years since Price et al. [11] first reported this technique. In all these cases, including this case, reattachment was observed within 10 days from the onset of graft detachment [9, 11, 12] (Table 1).

Although the number of cases treated with this technique is too small to conclude the role of the prone position in successful reattachment of the graft, the prone position may be considered to aid earlier reattachment. In addition, this technique does not damage the corneal endothelium and is convenient for the patient because it does not require inpatient treatment, unlike re-bubbling. Therefore, graft reattachment could be attempted by first advising patients to lie in a prone position for several days.

Since there is currently insufficient evidence supporting the treatment of graft detachment in the prone position, the reliability of this technique remains unclear. In the future, the significance of this treatment modality could be further elucidated by a large-scale case series study investigating the success rate of graft adhesion and the endothelial reduction rate, among other parameters, or a case-control study comparing the present technique to re-bubbling.

Statement of Ethics

The protocol for this retrospective study was approved, and the need for written informed consent was waived on condition of providing patients with the opportunity to opt out by the Institutional Review Board and Ethics Committee of the University of Tokyo Graduate School of Medicine (approval number NI20200006). All clinical procedures adhered to the tenets of the Declaration of Helsinki. Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

M.T. and T.M. contributed to the design of the work, data analysis, and drafting of the manuscript. T.T., K.K., T.U., S.Y., and M.A. contributed to the data acquisition and supervision of the study. All authors approved the final version.

Data Availability Statement

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

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