

Traumatic Wound Dehiscence Associated with Graft Loss Following Deep Anterior Lamellar Keratoplasty

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Abstract

We report two unusual cases of wound dehiscence associated with graft loss following Deep Anterior Lamellar Keratoplasty (DALK). The first case was a 41-year-old man who had DALK for keratoconus, resulting in visual recovery. The patient returned 14 months later, after being struck with a fist on his left eye, resulting in complete loss of the graft and a tear in the Descemet's Membrane (DM). Grafting with a preserved cornea resulted in gradual recovery in both graft clarity and visual acuity. The second case was a 46-year-old man who had undergone uneventful DALK for keratoconus. Running suture removal was performed at 21 months postoperatively. When he returned 6 days later, the graft was lost and intact DM exposed. Securing a preserved corneal graft over the DM resulted in gradual recovery. These results indicate that wound dehiscence associated with complete graft loss can occur following uneventful DALK. Presence of a recipient DM may act as a physical barrier to other ocular tissues.

Keywords: Wound dehiscence; Corneal transplantation; Deep anterior lamellar keratoplasty; Descemet's membrane

Introduction

Deep Anterior Lamellar Keratoplasty (DALK) is a procedure in which opaque of distorted corneal stroma is replaced with donor cornea. As recipient corneal endothelium is maintained, no endothelial rejection occurs. Therefore, risk of postoperative complications related to the prolong use of steroid eye drops such as glaucoma and infectious keratitis is less than that with penetrating keratoplasty (PKP). Another advantage of DALK over PKP is the maintenance of better globe integrity, leaving the eyes less susceptible to trauma [1]. In fact, only few cases of traumatic wound dehiscence have been reported following DALK [2-7]. Here, we report two unusual cases of wound dehiscence associated with graft loss following uneventful DALK.

Case 1

A 41-year-old man with keratoconus was referred to our hospital in March 2007. His best spectacle-corrected visual acuity (BSCVA) in the left eye was 20/200. We performed DALK on his left eye in October 2007 with no complications, including Descemet's membrane (DM) perforation. Corneal endothelial density was 2,700/mm² at 7 months postoperatively. At 12 months postoperatively, his spectacle-corrected visual acuity recovered to 20/15.

In December 2008, the patient visited our emergency facility, complaining of a sudden decrease in vision following being struck by a fist on his left eye. Slit-lamp examination revealed complete loss of corneal graft and a tear in the DM from 10 to 2 o'clock over the iris and lens (Figure 1A). No other intraocular damage was noted. We performed emergency surgery, placing a preserved corneal graft over the DM and applying multiple 10-0 nylon sutures. Air was injected into the anterior chamber in an attempt to stretch the DM.

On the first postoperative day, the anterior chamber was deep and showed no aqueous humor leakage. Although the DM was still attached to the reverse side of the graft on that day, it became detached and rolled as the volume of air diminished (Figure 1B). Repeated air injection was ineffective, so we performed DM suturing. After stretching the DM by air injection in the anterior chamber, 10-0 nylon sutures were placed from recipient side of the cornea, passing to the graft through DM. The DM was well positioned after the surgery, and graft edema was

gradually resolved. At 6 months postoperatively, the graft regained its clarity and BSCVA was 20/60 (Figure 1C). Endothelial density was 670/mm² and central corneal thickness was 525 μm.

Case 2

A 46-year-old man with keratoconus visited our hospital in June 2008 for decreased vision in his left eye. He had undergone PKP in the right eye 6 years previously at another hospital. His BSCVA was 20/25 in the right eye and 20/1000 in the left. Endothelial densities were 623/mm² in the right eye and 2,277/mm² in the left. He underwent uneventful DALK using the double-bubble technique [8] in the left eye in December 2008 and BSCVA recovered to 20/20, with +4.5 cyl -4.0D Ax180 correction at 20 months postoperatively. Running suture removal was performed without complications at 21 months after DALK in order to reduce astigmatism. He complained of foreign body sensation and decreased visual acuity after suture removal. The patient denied either having trauma or rubbing his eye. When the patient was seen by us at 6 days following suture removal, BSCVA in his left eye was decreased to counting fingers. Complete loss of transplanted graft and exposure of intact DM were found (Figure 2A).

We performed emergency surgery, transplanting a preserved cornea onto the DM. The graft promptly attached to the DM, and epithelialization was completed in 10 days. The graft gradually regained its clarity, and his BSCVA was 20/40 at 8 months following the second DALK. Endothelial density was 956/mm².

Discussion

Wound dehiscence is a severe postoperative complication following

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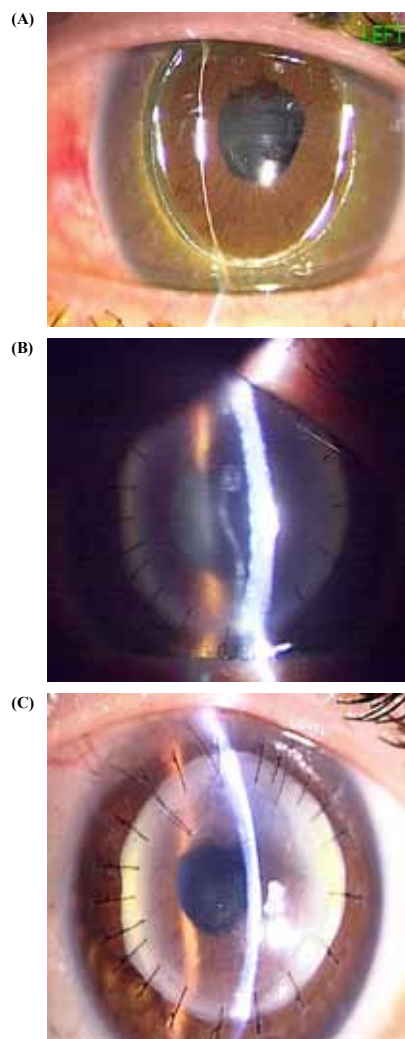


Figure 1: (A) Graft loss and DM tearing following trauma in Case 1. Note that anterior chamber was flat. Iris and crystalline lens remained intact. (B) After therapeutic lamellar keratoplasty using preserved corneal graft, Descemet's membrane detached from posterior surface of graft. Note superior edge of membrane was rolled. (C) Graft regained its clarity after successful repositioning of detached DM by direct suturing combined with air injection.

PKP, and occurs in approximately 0.6-5.8% of such patients [1,7-13]. Visual outcome after this complication is variable, and may result in loss of eye in some cases [1,9-13]. Our group has demonstrated that traumatized eyes showing lens damage were associated with poor visual acuity [1]. Although there have been several reports of traumatic wound dehiscence following DALK, the incidence seems to be much less than that in PKP. A retrospective analysis in our series demonstrated that traumatic wound dehiscence following DALK was significantly less than that following PKP (0.54% vs. 2.0%) [1].

To our knowledge, six cases have been reported, and we herein added two more cases (Table 1). In both of our cases, wound dehiscence associated with complete graft loss occurred following uneventful DALK, and only one such case has been reported [3]. While Case 1 involved direct trauma to the eye, no such clear cause was evident in Case 2. Although removal of running sutures may cause mild injury to the corneal epithelium at the host-graft junction, no damage to either the corneal stroma or the DM was observed here. Similar case

was reported recently by Mannan et al. [6]. While suture removal was performed relatively early in postoperative period in their case, we removed the suture after 21 months following DALK. This suggests that adhesion between the DALK graft and host cornea remains weak even long after surgery. Although rare, it should be noted that wound dehiscence can occur after DALK. The wearing of a protective eye device may be advisable in such high risk cases, as is suggested in PKP.

Repair of the eye was challenging in Case 1. We decided to preserve the recipient DM, believing that the corneal endothelium might still be functional. We believe that this decision was correct, as the grafted preserved cornea regained its transparency. As we were unable to reattach the DM by air injection alone, we had to use direct suturing. Similar technique has been used for the repair of the DM detachment following cataract surgery [14,15]. It should be noted that all of the previous cases regained clear graft following either resuturing or repeated DALK, suggesting that recipient endothelium is relatively resistant to traumatic injury (Table 1).

The other intriguing observation was that the presence of a recipient DM seemed to reduce the severity of globe injury. Although the trauma seemed to be severe enough to detach the graft in Case 1, there were no other consequences in the posterior ocular segments, and the eye later showed some visual recovery. In our previous report regarding traumatic wound dehiscence following PKP, we suggested that poor visual prognosis was related to involvement of the posterior segment of the eye [1]. The presence of the DM probably acted as a barrier to the transmission of traumatic force posterior to the globe, and similar observation was reported by others [3-5,7]. This was also the case in Case 2, which demonstrated well preserved ocular integrity with remaining intact DM. There are four previous case reports of graft dehiscence without DM perforation after anterior lamellar keratoplasty with excellent visual prognoses [3-6].

In summary, we experienced two unusual cases of graft loss following DALK. Although wound dehiscence with loss of graft can occur after uneventful DALK, the presence of a recipient DM may act as a physical barrier to other ocular tissues.

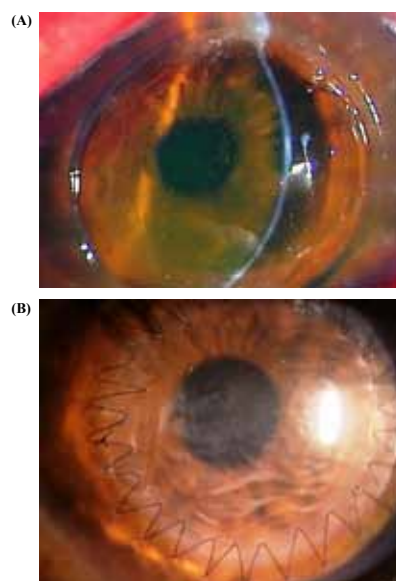


Figure 2: (A) Graft loss after suture removal in Case 2. Note that intact DM was exposed. (B) Cornea regained its clarity after securing preserved corneal graft.

Case (year)	Age, sex	Original disease	Surgery to trauma duration (month)	Cause of trauma	DM rupture/ other damage	Graft loss	Treatment	Graft clarity
Kalantan (2007)	20M	KC	NA	Blunt trauma	Y iris,lens,vitreous prolapse	N	Resuture, Vitrectomy	Clear
Prasher (2009)	64M	Scar	2	Fall	N	Y	Repeated DALK	Clear
Lee (2009)	12M	KC	0.5	Blunt trauma	N	N	Resuture	Clear
Zarei-Ghanavati (2009)	31M	KC	3	Blunt trauma	N	N	Resuture	Clear
Mannan (2011)	47M	Macular dystrophy	5	Suture removal	N	N	Resuture	Clear
Chaurasia (2011)	5M	Scar	8	Rubber ball injury	Y Iris prolapsed, hyphema	N	Resuture	Clear
Shimazaki Case1	41M	KC	14	Fist assault	Y	Y	Repeated DALK	Clear
Shimazaki Case2	46M	KC	21	Suture removal	N	Y	Repeated DALK	Clear

DALK; Deep Anterior Lamellar Keratoplasty, KC; Keratoconus, M; Male, N; No, NA; Not Available, Y; Yes

Table 1: Summary of the Previous Reports on Traumatic Wound Dehiscence Following DALK.

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