

Modified Deep Anterior Lamellar Keratoplasty in the Management of Small and Large Epithelialized Descemetoceles

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Purpose: Descemetocoele is a severe complication of corneal ulceration associated with a high risk of perforation. We describe a modified air-assisted deep anterior lamellar keratoplasty (DALK) technique for the surgical management of small and large epithelialized descemetoceles.

Methods: Two representative cases are presented, one with a small (2 mm) and one with a large (4 mm) descemetocoele. In both cases, the air-assisted lamellar dissection allowed a superficial keratectomy and access to the Descemet membrane. Viscoelastic was then directly injected through the stromal hole to separate the Descemet membrane from the posterior stroma, thereby allowing its complete removal.

Results: DALK was successfully performed using this modified air-assisted DALK technique. Visual acuity improved from counting fingers and hand motion to 20/40 and was maintained for at least 1 year after surgery.

Conclusions: These cases demonstrate that the modified air-assisted DALK technique may be proposed for the management of small and large descemetoceles, allowing both tectonic and visual rehabilitation.

Key Words: lamellar keratoplasty, descemetocoele ulceration

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Descemetocoele is a severe complication of corneal ulceration characterized by an important thinning of the corneal stroma to such an extent that the Descemet membrane is the only layer maintaining the eyeball integrity. Although the Descemet membrane is only 8 to 10 μm thick, it

is relatively resistant to proteolysis and to biomechanical stress. Small descemetoceles associated with corneal ulceration may be successfully repaired with multilayer amniotic membrane grafting; however, surgical management of large or epithelialized descemetoceles may be particularly difficult. Hence, when stromal melt is too large, inlay amniotic membranes are inadequate and tectonic penetrating or lamellar keratoplasty may be required. Additionally, treatment of epithelialized descemetoceles is associated with a high risk of corneal perforation, particularly during the first step of epithelial removal. We describe herein the surgical management of small and large epithelialized descemetoceles using a modified air-assisted deep anterior lamellar keratoplasty (DALK) technique.¹ We present 2 representative cases, one with a large and one with a small descemetocoele. In both cases, descemetoceles were epithelialized and DALK was proposed for tectonic and visual rehabilitation.

TECHNIQUE

Small Epithelialized Descemetocoele: Case Report 1

A 53-year-old man with a history of recurrent herpetic keratitis was referred to the cornea department with postherpetic neurotrophic ulceration. After withdrawal of topical treatments, including aminoglycosides and acyclovir, the epithelium healed within 5 days, leaving a 2-mm central epithelialized descemetocoele (Fig. 1). A circumferential superficial corneal neovascularization preserving only the central 3 mm was detected, and central corneal hypoesthesia was diagnosed by touching the patient's central corneal zone with the tip of a cotton swab. Lamellar keratoplasty was performed (Fig. 2; see **Video, Supplemental Digital Content 1**, <http://links.lww.com/ICO/A19>).

Deep lamellar keratoplasty "on air" technique was modified to perform the lamellar keratectomy. After central corneal delineation, a Hanna trephine (Moria, Antony, France) was used to perform a 150- μm keratotomy. A 25-gauge needle was then introduced obliquely into the midperipheral stroma, and air was injected until the stroma became insufflated and the deep stromal fibers were separated from the Descemet membrane. A "big bubble" was immediately observed, indicating the detachment of the Descemet membrane from the remaining stroma. Superficial keratectomy was then

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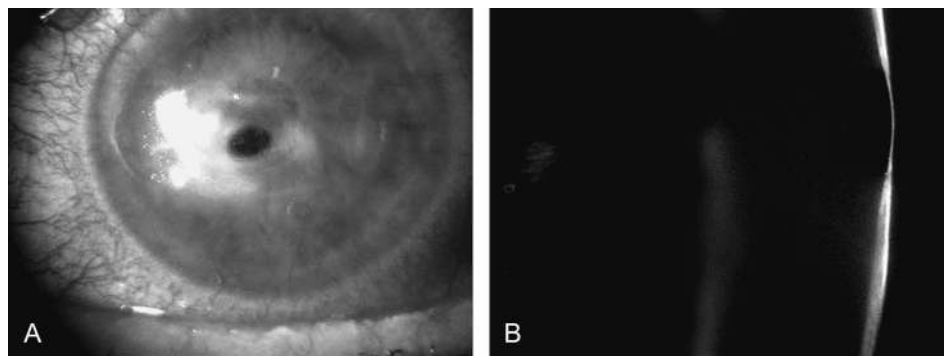
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FIGURE 1. Descemetocoele after postherpetic neurotrophic keratitis. A, Slit-lamp examination with diffuse illumination. B, Optic section of the descemetocoele.



performed using a 45-degree knife contouring the descemetocoele, allowing direct access to the Descemet membrane.

Stromal dissection was carefully performed, avoiding the descemetocoele's area, by gently lifting the superficial stroma and by sectioning the whitened stretched stromal fibers around the stromal opening. At the end of the dissection,

viscoelastic was injected through the posterior stromal breach to separate the Descemet membrane from the remaining stroma. This separation was achieved without resistance. Deep lamellar keratectomy was performed using Katzen microscissors. Remaining viscoelastic agent was rinsed off the Descemet membrane, and a full-thickness donor cornea was

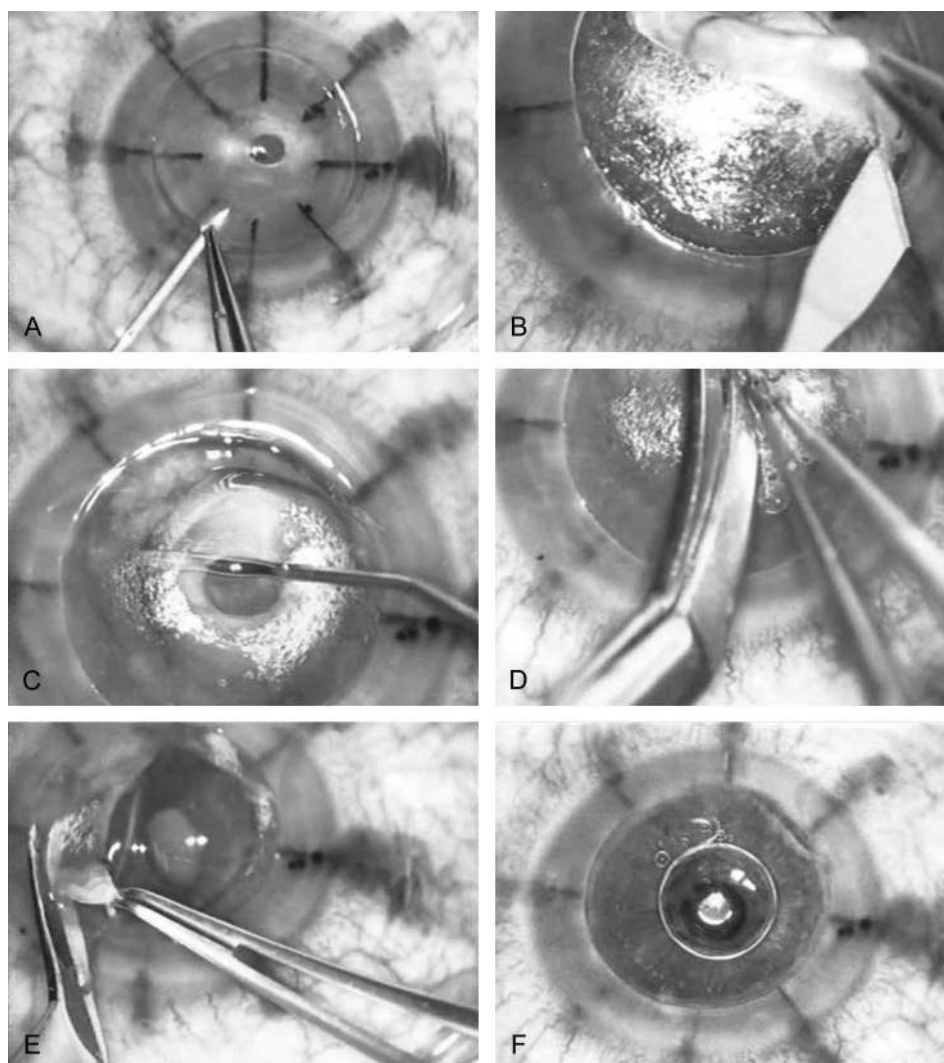


FIGURE 2. DALK technique in the treatment of small epithelialized descemetocoele. A, Air injection. B, Lamellar dissection. C, Viscoelastic injection through the stromal breach. D–E, Stromal removal using Katzen corneal scissors. F, Bare Descemet membrane at the end of the dissection.

placed with a 16-bite single-running 10/0 nylon suture after endothelial cells were removed. Postoperative care included topical 0.1 dexamethasone 4 times per day (Dexafree; Théa, Clermont-Ferrand, France), progressively tapered during the first 6 months, and systemic 500 mg valacyclovir preventive treatment. Preoperative visual acuity was counting fingers at 30 cm and best-corrected visual acuity was 20/40 at 2 years after this procedure.

Large Epithelialized Descemetocoele: Case Report 2

A 40-year-old man with severe ocular rosacea was referred to the cornea department with extensive superficial neovascularization associated with a 4-mm epithelialized descemetocoele. DALK was proposed as a tectonic procedure (Fig. 3; see **Video, Supplemental Digital Content 2**, <http://links.lww.com/ICO/A20>). Centered partial-thickness trephination (150 μ m) was performed using Hanna trephine. A 25-gauge needle mounted on a 3-mL syringe was used for intrastromal air injection. In this case, a “big bubble” could

not be achieved; the large size of the descemetocoele probably did not allow the air to remain trapped between the stroma and the Descemet membrane. Meticulous lamellar dissection using a 45-degree knife allowed a superficial keratectomy and direct access to the Descemet membrane. Viscoelastic was then injected through the stromal opening, effecting the separation of the Descemet membrane from the posterior stroma. Viscoelastic was used to protect the Descemet membrane while the stroma was removed using Katzen corneal scissors. Endothelial cells were scraped from the donor cornea before grafting. Interrupted sutures (10/0 nylon) were then placed. Topical 2% cyclosporine twice daily and topical 0.1% dexamethasone 4 times per day (Dexafree; Théa) were administered postoperatively. Preoperative visual acuity was hand motion, and best-corrected visual acuity was 20/40 at 1 year after the surgery.

DISCUSSION

Lamellar corneal surgery recently has gained attention among anterior segment surgeons and cornea specialists.²

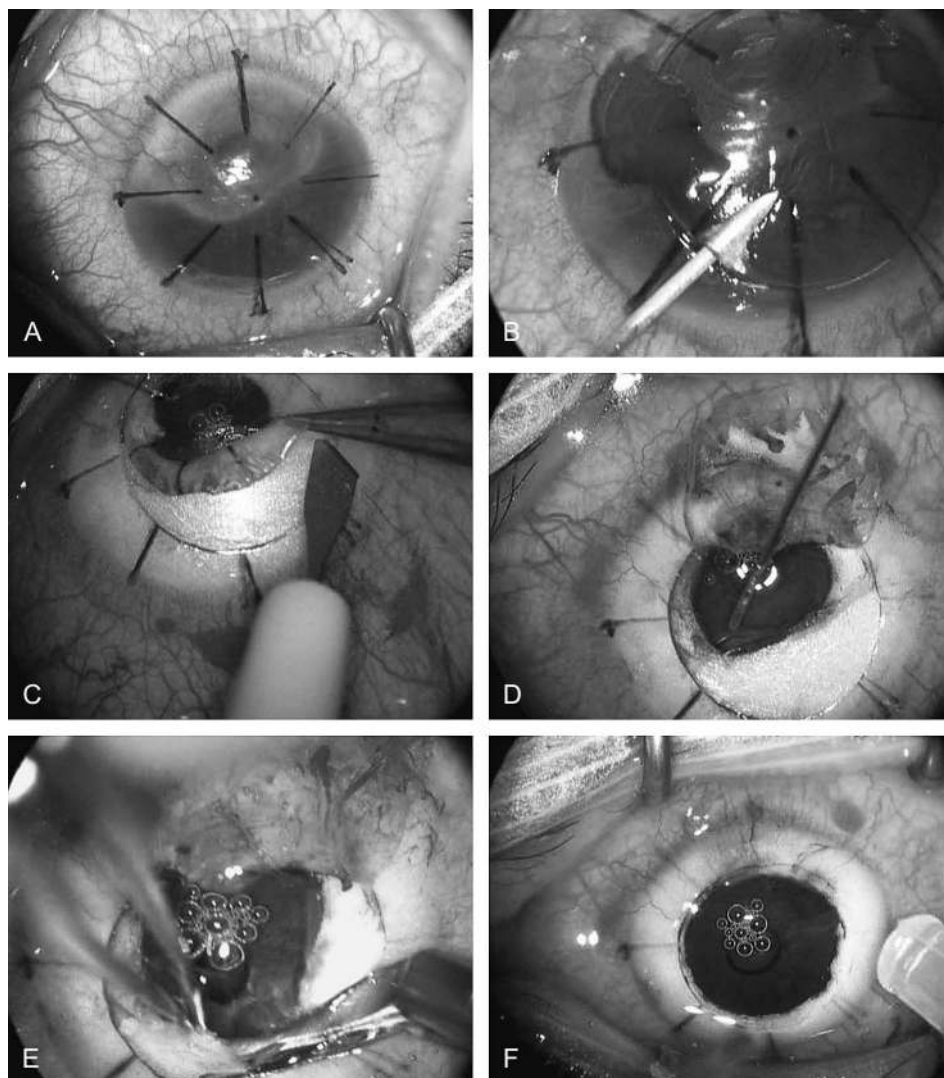


FIGURE 3. DALK technique in the treatment of large epithelialized descemetocoele. A, Surgeon view of the large epithelialized descemetocoele. B, Air injection. C, Lamellar dissection. D, Viscoelastic injection through the stromal breach. E, Stromal removal using Katzen corneal scissors. F, Bare Descemet membrane at the end of the dissection.

Reducing the risk of endothelial rejection, DALK is of particular interest in inflammatory corneal disorders. Although rarely proposed as the treatment for descemetoceles, DALK could be appropriate in this situation. Air injection in the corneal stroma and superficial manual keratectomy, followed by viscodissection, are safe and efficient for separation of the Descemet membrane from the underlying residual stroma.³ Interestingly, the Descemet membrane is easily separated from the posterior stroma using viscoelastic agent, even in the absence of a “big bubble” after air injection. Superficial keratectomy performed around, but not above, the thinnest area completed with gentle corneal stripping allows easy access to the stromal opening and the Descemet membrane.

The presence of a descemetocele allows rapid, direct, and widespread access to the Descemet membrane. Stromal dissection is performed, avoiding the descemetocele's area, by gently lifting the superficial stroma and by sectioning the whitened stretched stromal fibers around the stromal hole, without any dissection in the vicinity of the Descemet membrane. The deep stroma then may be easily detached from the Descemet membrane over a large surface after viscoelastic injection. Recently, Tong et al⁴ reported performing DALK in a patient with descemetocele after gonococcal keratitis. Using the hydrodissection technique, the authors managed to separate the Descemet membrane from the stroma in a small area. With our technique, injecting the viscoelastic material

directly through the descemetocele, an 8 × 8-mm central bare Descemet membrane could be obtained.

Prevention of Descemet membrane puncture is achieved by viscodissection between the Descemet membrane and the stroma, by gentle surgical stromal following the contour of the descemetocele's area, and by carefully monitoring the anterior chamber pressure (high pressure may favor Descemet rupture and low pressure may favor Descemet folds and inadvertent puncture during dissection). In the absence of central break, the occurrence of a microperforation may be managed by decreasing the anterior chamber pressure and by the injection of viscoelastic material though the descemetocele at a distance from the perforated area. In conclusion, DALK may be proposed for the management of small and large descemetoceles.

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