Deep Anterior Lamellar Keratoplasty (DALK) after Bilateral Acanthamoeba Keratitis in an Orthokeratology Lens Wearer: A Case Report

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Abstract

Diagnosis of Acanthamoeba keratitis is challenging, and the available treatments are lengthy and not fully effective against all strains. It takes a lot of time to make a correct diagnosis and after a successful medical treatment, significant corneal opacity which reduces vision are remained. A 19-year-old female orthokeratology lens wearer presented with a persistent bilateral corneal ulcer. There was a total corneal infiltration with circumferential neovascularization. The patient was started on intensive anti-acanthamoeba therapy with topical polyhexamidine methylene biguanide (0.02%) and chlorhexidine (0.02%) eye drops after confirmation of Acanthamoeba growth on the non-nutrient agar. Despite this combination therapy, her condition failed to improve, oral voriconazole (200 mg twice daily) and topical bevacizumab (8 mg/ml thrice daily) were started after admission. After 4 months of treatment, her cornea was healed with neovascularization and bilateral Deep Anterior Lamellar Keratoplasty (DALK) was performed one year after the onset of symptoms. Clinicians should be mindful of Acanthamoeba keratitis in all contact lens wearers. Patients with Acanthamoeba keratitis with visually significant stromal opacification can achieve excellent visual outcomes and realize a significant improvement in corneal transparency by undergoing DALK.

Keywords: Deep anterior lamellar keratoplasty; Acanthamoeba keratitis; Orthokeratology

Case Presentation

The management of Acanthamoeba keratitis remains challenging because of difficulties in diagnosis and the relative lack of highly efficacious antimicrobial medications, which also cause ocular surface toxicity. Moreover, in most cases corneal opacity and visual reduction remained despite proper treatment.

Institutional review board approval was obtained from Asan Medical Center. This study was conducted in accordance with the tenets of the Helsinki Declaration, and written informed consent was obtained from all the patients.

A 19-year-old female patient was referred to our cornea service with a persistent bilateral corneal ulcer. She was a myope using orthokeratology lens since she was 10 years old. She had a pain, redness and decreased vision in both eyes a month ago. She was treated with topical fortified gentamicin (14 mg/mL) and levofloxacin (0.5%) in the tertiary hospital, but there was no improvement. Upon presentation to our clinic, visual acuity in the both eye was light perception, and slit-lamp examination revealed marked conjunctival injection and deep stromal infiltration with circumferential (360°) neovascularization in both corneas (Figure 1A). Acanthamoeba cysts could be detected by in vivo confocal microscopy (Confoscan 3, Nidek Technologies America, Inc, Greensboro, NC, USA). Corneal scrapings were collected for microscopic examination and microbiological culture, but did not reveal any organisms. Microbiological culture of orthokeratology lens revealed growth of Acanthamoeba on the non-nutrient agar. She was started on intensive anti-acanthamoeba therapy with hourly application of topical Polyhexamidine Methylene Biguanide (PHMB) (0.02%) and chlorhexidine (0.02%) eye drops. Despite 4 days of combination therapy, her condition failed to improve. Oral voriconazole (200 mg twice daily) and topical bevacizumab (8 mg/ml thrice daily) were added after admission. Because visual hallucination had occurred 3 days after the voriconazole administration, voriconazole was temporarily stopped until the visual hallucination disappeared. After 4 months of treatment, her cornea was healed with neovascularization (Figure 1B). She was followed up for 7 months after...
discharge and there was no recurrence of infection. Sequential bilateral DALK was performed nearly one year after the onset of symptoms. A cannula big bubble technique was used to try and perform descemetic DALK. When the big bubble failed, layer-by-layer manual dissection was used [1]. A successful DALK was performed in the right eye. But microperforation of Descemet's membrane occurred in the left eye. And intracameral air was injected two times at the end of the surgery and the 2 days after the surgery in the left eye. There was no episode of rejection in both eyes during 2 years of follow-up. At last follow-up, 26 months after surgery, a visual acuity of 20/25 was achieved with rejection in both eyes during 2 years of follow-up. At last follow-up, 24 months of follow-up showing a clear lamella graft. The number of reported cases of Acanthamoeba keratitis is increasing worldwide every year, due to increasing contact lens use for vision correction and cosmetic purposes [2]. As in our case, the bilateral Acanthamoeba keratitis after orthokeratology has been previously reported [3].

Corneal infection with Acanthamoeba is often initially misdiagnosed, thereby complicating and delaying proper management. Timely recognition of this clinical entity is crucial in minimizing the sight threatening sequelae. As in our case, the effects of oral voriconazole in resistant Acanthamoeba keratitis and topical bevacizumab as an adjunctive therapy for corneal neovascularization have been reported [4,5]. Hallucinations associated with voriconazole use are not uncommon. Doctors should be aware of this complication, and the recipients of the drug should be reassured that the hallucinations are an effect of the drug [6].

Reports in previous studies on keratoplasty in Acanthamoeba keratitis, even in quiescent eyes, suggested that graft failure rates are 30% [7]. A recent report indicated a better outcome, although the prevalence of cataract and glaucoma in those patients was high, probably because of prolonged inflammation in these patients [8].

DALK involves selective stromal replacement while preserving the healthy host endothelium. Thus, this technique eliminates the risk of irreversible endothelial failure due to allograft rejection despite the presence of recipient bed vascularization and long-term steroid use-related complications [9]. And the avoidance of entry into the anterior chamber, coupled with the ability to remove the entire stroma down to Descemet's membrane, greatly reduces the risk of reinfection in the cornea or in the anterior chamber. Recently, there was also a report of favorable results with early therapeutic DALK for Acanthamoeba keratitis with poorly responsive to medical treatment [10].

Descemet's membrane separation is an important prerequisite for successful DALK. It is technically difficult to achieve a consistent big bubble particularly in thin opaque cornea as in cases of Acanthamoeba keratitis. Al-Torbak et al. [11] showed that the perforation rate of the Descemet's membrane is significantly higher in eyes with deep corneal scars. They hypothesize that scarring leads to tight junction formation between deep stromal lamellae and the Descemet's membrane, which causes perforation during deep dissection. One attempt of big bubble formation led to diffuse stromal opacification. Hence, manual dissection technique was considered in order to reach pre descemet membrane plane.

The micro perforation of the Descemet's membrane is often salvaged by intracameral injection of sterile air at the end of the surgery, which might prevent the Descemet's membrane detachment postoperatively. However, use of intracameral air could increase the risk of further loss of endothelial cells as shown in our case [12]. The risk of intraoperative perforation of the Descemet's membrane should be explained to patients before surgery, and a corneal donor of good endothelial quality should be available if conversion to penetrating keratoplasty is needed in the event of Descemet perforation.

Conclusion

Clinicians should be mindful of Acanthamoeba keratitis in all contact lens wearers. Patients with Acanthamoeba keratitis with visually significant stromal opacification can achieve excellent visual outcomes and realize a significant improvement in corneal transparency by undergoing DALK.

References


