

Therapeutic Deep anterior lamellar keratoplasty for a case of non-resolving microbial keratitis

Dr. Anushri Agrawal¹, Dr. Jagadeesh Kumar Reddy¹, Dr. K. S. Siddharthan¹,

Dr. Pooja CM¹, Dr. Vandhana Sundaram¹

¹(Cornea, Sankara eye hospital, Coimbatore, India)

Abstract: Microbial keratitis is a potentially vision threatening condition that requires prompt diagnosis and treatment to prevent untoward outcomes. Here we describe the successful outcome of DALK performed for a case of fungal keratitis unresponsive to medical treatment. A 38 years old man who presented to us with fungal keratitis was started on topical antifungal treatment. There was no significant improvement after 1 month of treatment. Since the infiltrate was extending upto deep corneal stroma but not upto Descemet's membrane, he underwent Deep lamellar keratoplasty (DALK) as a surgical alternative to penetrating keratoplasty in the management of non-healing fungal keratitis. Our patient had fast postoperative recovery with no evidence of recurrence of infection till with the lamellar graft remaining clear. At last follow-up, 6 months after surgery, the graft remained clear with a BCVA of 6/24. Hence, therapeutic DALK with total removal of infected stromal tissue down to Descemet membrane may be performed in cases of severe, unresponsive microbial keratitis as a viable alternative to conventional penetrating keratoplasty.

Key Words: Deep anterior lamellar keratoplasty, Fungal keratitis, Therapeutic keratoplasty, Microbial keratitis

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I. Introduction

An estimate of 1.5 to 2 million cases of corneal ulcers occur annually in the developing countries. (1) The severity of microbial keratitis usually depends on the underlying condition of the cornea and the virulence of the infecting microbes. The prognosis is poor if an appropriate and aggressive therapy is not initiated immediately. (2) Advanced ulcers which do not respond to medical treatment require surgical intervention. However, therapeutic grafts are considered at high risk for subsequent failure due to multiple factors like recurrence of infection, severe vascularization and stromal inflammation in the graft bed, leading to subsequent endothelial rejection and failure. (3) However, recently, attempts have been made to perform lamellar keratoplasty in cases of nonperforated bacterial and fungal keratitis. DALK has several advantages over penetrating keratoplasty since the endothelium is retained, obviating the risk of endothelial rejection. (4-6) Here we describe the successful outcome of DALK performed for a case of fungal keratitis unresponsive to medical treatment.

II. Case Report

The 38 years old man presented to the Cornea services outpatient department with complaints of redness in the right eye for 5 days; accompanied with eye pain, photophobia, and blurred vision. He gave history of injury with a stone 5 days back. On examination, his best corrected visual acuity (BCVA) was HM+ with accurate projection of rays in right eye and 6/6 in left eye. Slit-lamp biomicroscopic examination revealed a central 4.0*4.0 mm deep corneal stromal infiltrate with ill-defined margins covering the pupillary area. A hypopyon of 1 mm was also noted. Corneal smear was performed, and the scrapings were sent for bacterial and fungal cultures. KOH mount came positive for fungal hyphae. Patient was diagnosed with Fungal keratitis and admitted in the hospital. He was started on 5% Natamycin eyedrops hourly, 1% Ketoconazole eyedrops 2-hourly and cycloplegics. There was slight improvement in the infiltrate size with healing margins. The culture report showed growth of *Aspergillus flavus*. After careful observation over a week, the patient was discharged and kept on weekly reviews. Despite this aggressive combination therapy, there was no significant improvement in his condition with persistence of ulceration covering the visual axis and intense stromal inflammation. At the end of 1 month, no further improvement in infiltrate was noted and the hypopyon increased to 2mm (Fig. 1). In view of the poor response after 4 weeks of intensive treatment, we decided to intervene surgically.

The patient was planned for a therapeutic DALK. Superficial trephination of 7.0mm was done followed by manual dissection of host stroma. Infiltrate could be removed completely with clear margins with the use of blunt-tipped corneal scissors, without Descemet perforation. Inspection of Descemet membrane confirmed its

integrity and clarity, confirming that infection had not involved Descemet layer. However, there is a risk of intraoperative perforation occurring during surgery, which 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.

A full-thickness donor cornea of 7.25 mm was trephined from the endothelial side and Descemet membrane was stripped away by using Kelman–McPherson forceps. The donor was sutured in place with 16 10-0 nylon interrupted sutures. Eye was patched for 12 hours. Postoperatively, graft was well opposed with minimal inflammatory hypopyon (Fig. 2). He was given topical and oral antifungals along with NSAIDs and cycloplegics and the graft became clear with resolution of hypopyon in 4 days. No recurrence of infection was noted and we added topical corticosteroids 1 month post-surgery (Fig. 3). At the last follow-up, 6 months after surgery, the lamellar graft remained clear and he had a BCVA of 6/24.

Figure 1: Preoperative slit-lamp photograph of the patient at presentation showing non-healing fungal corneal ulcer with hypopyon

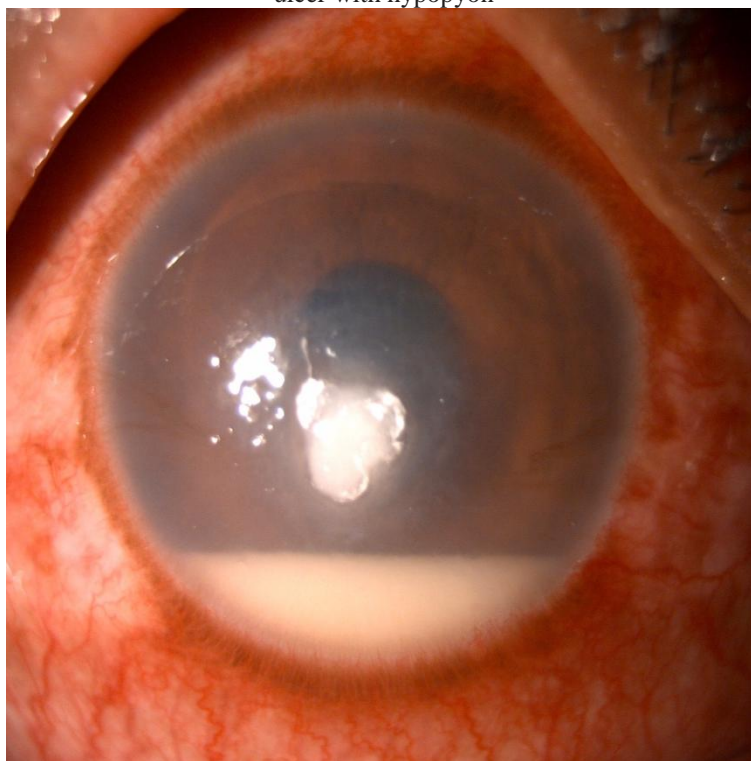


Figure 2: Postoperative day 1 photograph following Therapeutic DALK

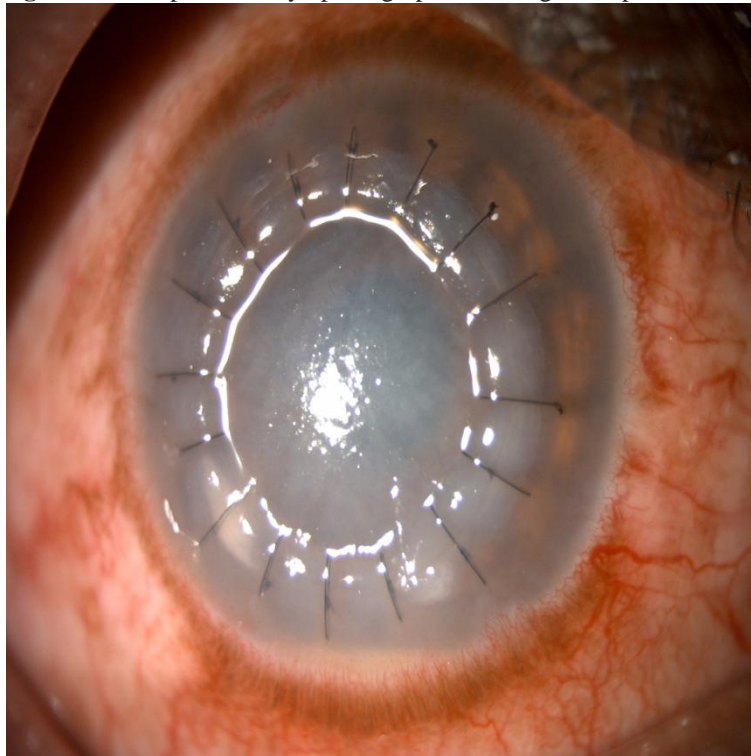
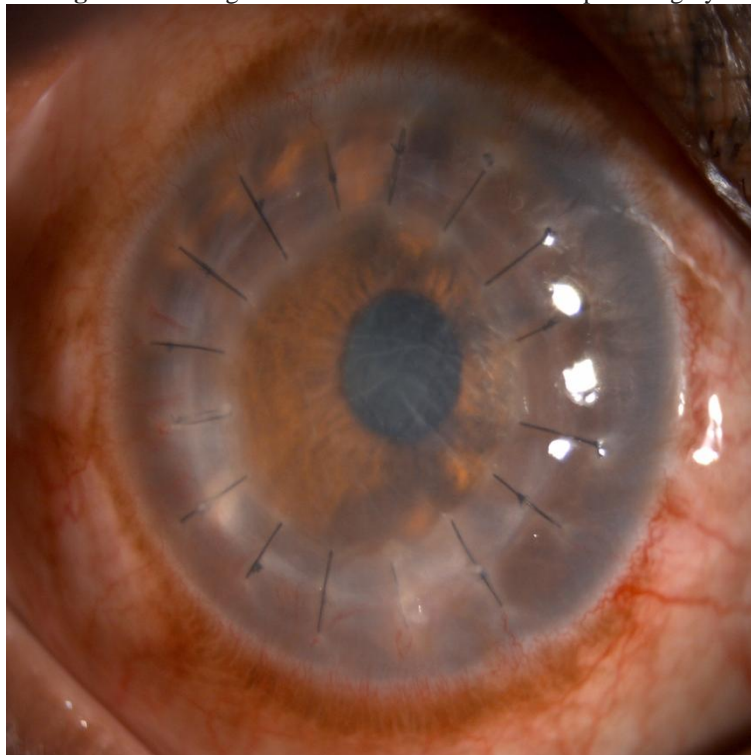


Figure 3: Clear graft with no recurrence 1 month post-surgery



III. Discussion

This study shows the viability of therapeutic anterior lamellar keratoplasty as an alternative to PK in cases of progressive microbial keratitis unresponsive to topical medication. The decision to perform anterior lamellar keratoplasty (ALK) in eyes with infective keratitis has several advantages and disadvantages.(7) In a lamellar corneal transplant, subsequent endothelial rejection does not occur, and provided the entire stromal infiltrate is removed meticulously, the chances of re-infection are minimal. The avoidance of entry into the

anterior chamber also prevents further spread of infection. Earlier intervention also reduces the risk of corneal perforation before surgery, as well as endothelial damage from excessive deep stromal and reactive anterior-chamber inflammation, which is common in severe infection.

Traditionally, the surgical procedure for management of infectious keratitis is comprised of full-thickness excision of cornea and replacing it appropriate sized full-thickness healthy corneal tissue (penetrating keratoplasty). However, the procedure is associated with many complications, especially because the procedure is carried out in inflamed eyes. DALK is a closed globe procedure and has been shown to be effective in eyes with active infection.

In a study done by Bagga et al, they found that prognosis of therapeutic DALK is better in less severe cases of microbial keratitis. The advanced cases have higher risk of complications like recurrence of infection, DM detachment and persistent epithelial defects.(8) A similar conclusion was drawn in a study by Sarnicola et al where they found that early therapeutic DALK could be considered a new approach to eradicate active infection in Acanthamoeba Keratitis cases poorly responsive to medical treatment, with significant ulcer in the optical zone.(9)

In another study, DALK in a medically unresponsive case of Acanthamoeba keratitis was done. No recurrence of Acanthamoeba infection occurred after surgery. Re-epithelialization after the amniotic membrane patch graft was successful, and full visual recovery occurred, resulting in a best- corrected visual acuity of 20/20.(10)

Since our patient had an infiltrate in the visual axis which did not extend beyond the deep stroma, we felt therapeutic DALK would be the best approach in terms of therapeutic and visual success. Our patient had fast postoperative recovery with no evidence of recurrence of infection till with the lamellar graft remaining clear. At last follow-up, 6 months after surgery, the graft remained clear with a BCVA of 6/24.

IV. Conclusion

Therapeutic DALK with total removal of infected stromal tissue down to Descemet membrane may be performed in cases of severe, unresponsive microbial keratitis as a viable alternative to conventional penetrating keratoplasty. The advantages of an anterior lamellar procedure include nonentry into the anterior chamber, total removal of infected stroma while maintaining an intact Descemet membrane as an infective barrier, and avoidance of late endothelial rejection and failure despite the presence of recipient bed vascularization and inflammation. However, one of the most important factors affecting the prognosis of such cases is the timing of surgery. Intervention at an early stage of the disease process avoids peripheral spread and secondary endothelial damage, thus enhancing graft survival and a good visual outcome in this difficult disease state.

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