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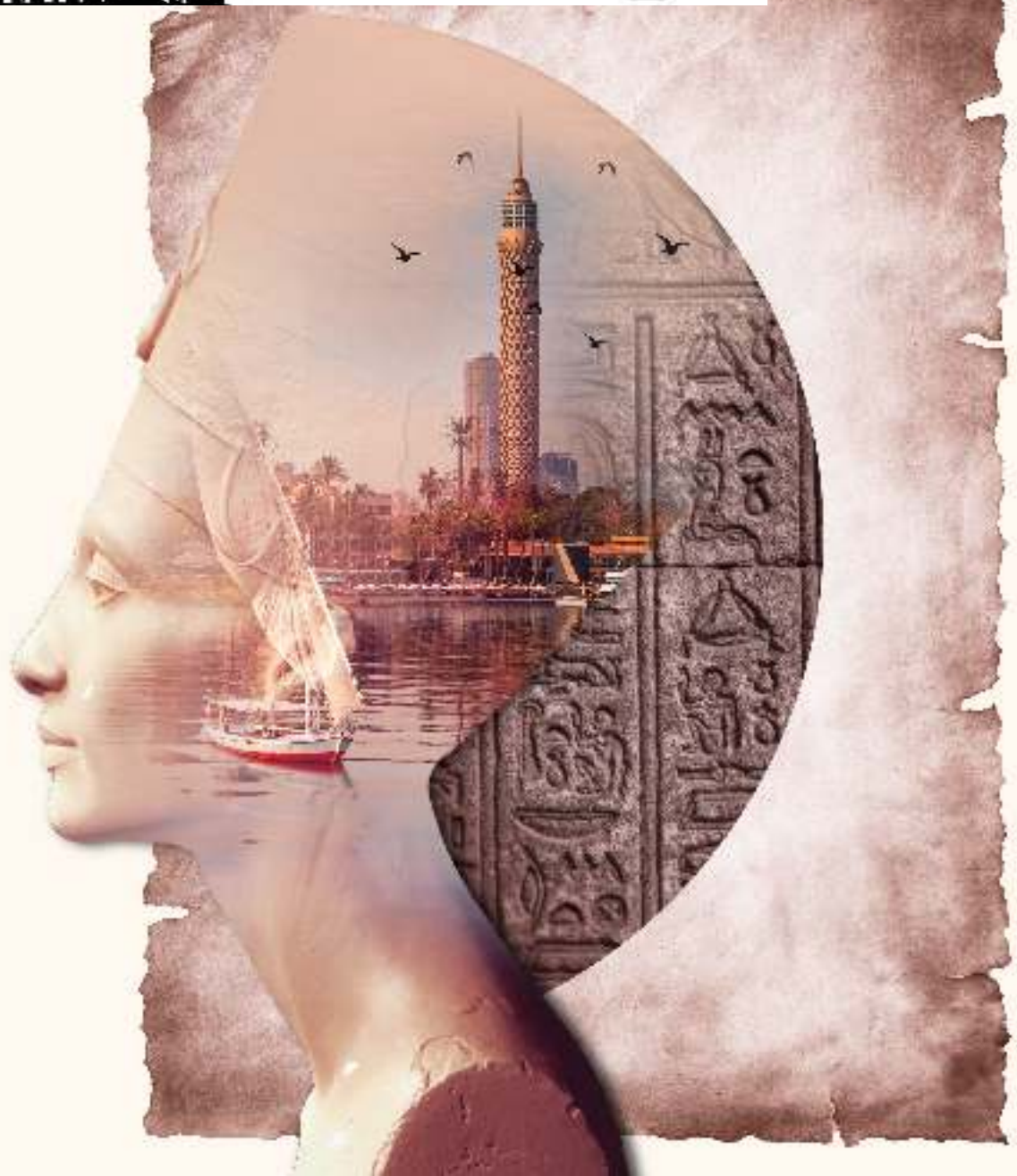
Therapeutic DALK in microbial keratitis



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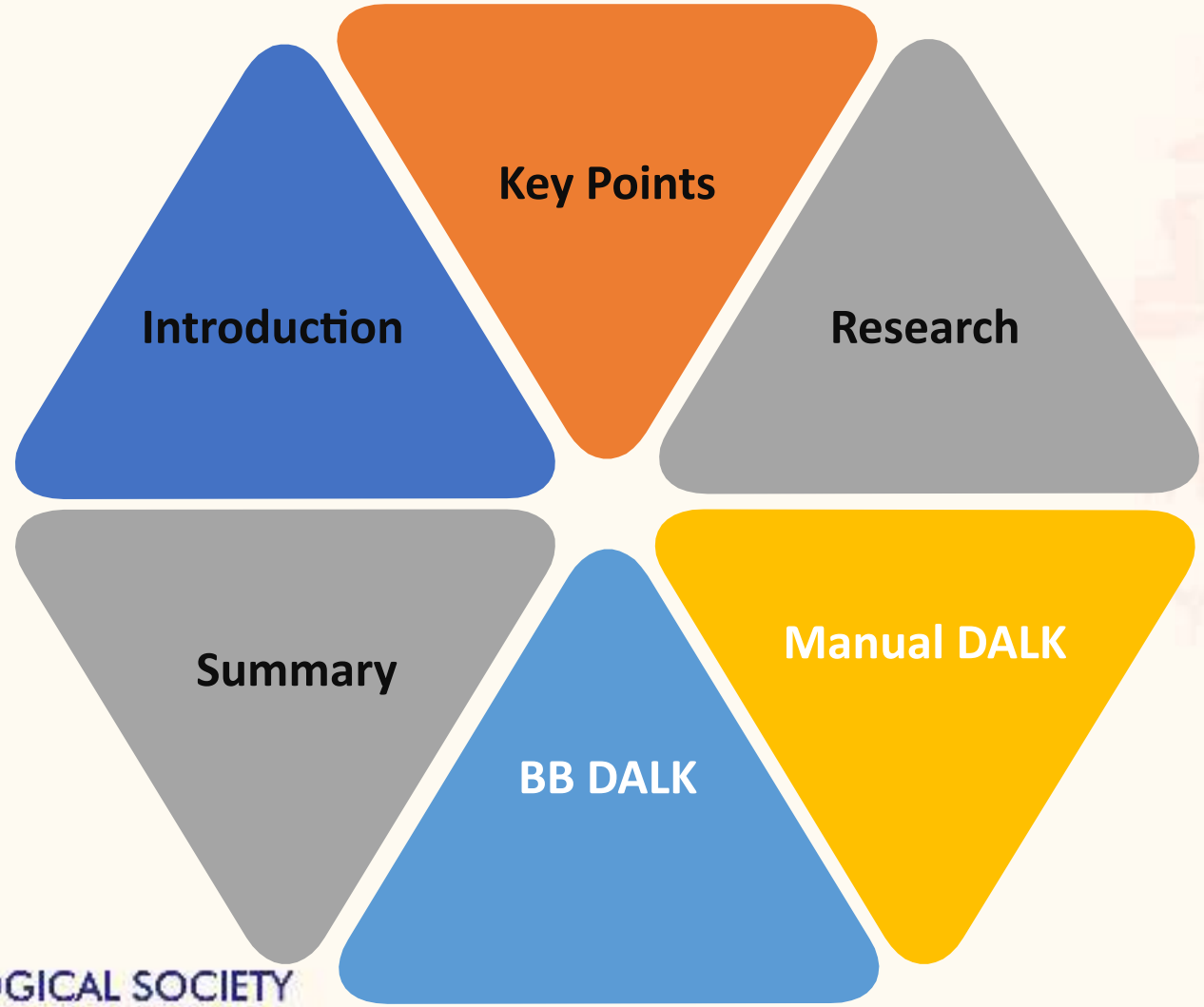
No financial interests to disclose

Therapeutic DALK in microbial keratitis



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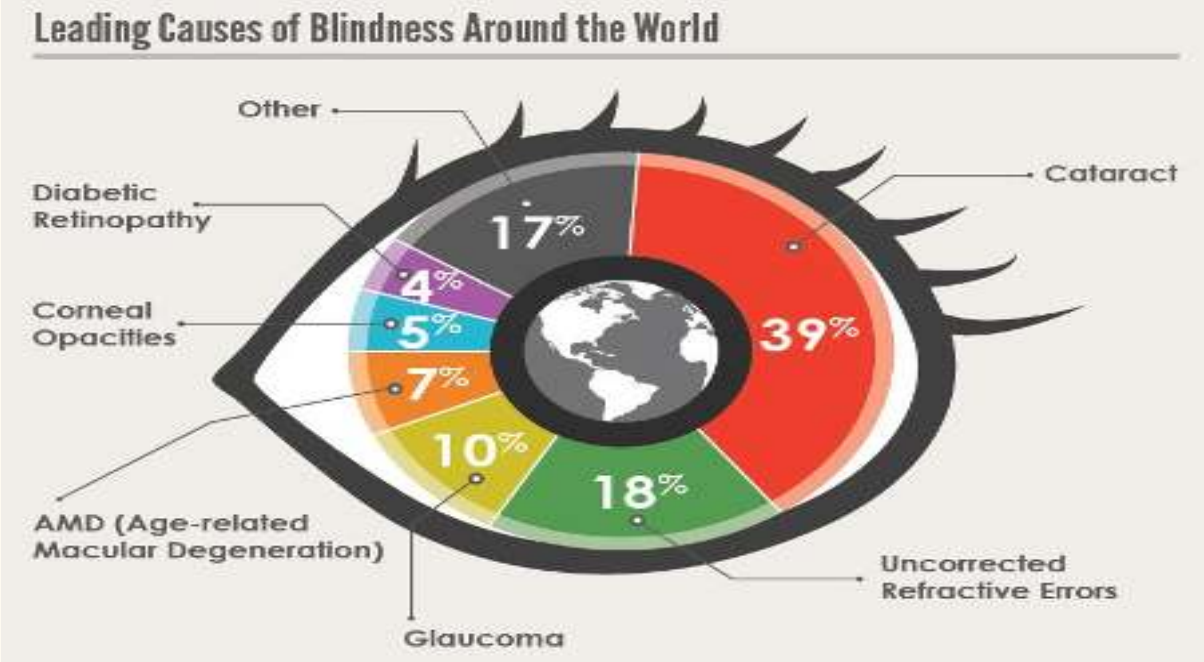


- An estimate of 1.5 to 2 million cases of microbial keratitis occur annually.
- The prognosis is poor if an appropriate and aggressive therapy is not initiated immediately.
- Theraputic keratoplasty essential to eradicate infection and maintain globe intergraty in refractory microbial keratitis
- However, therapeutic grafts are considered at high risk for subsequent failure due to multiple factors like recurrence of infection, severe vascularization which lead to subsequent endothelial rejection and failure.

Key Points
Introduction
Summary

Why therapeutic deep lamellar keratoplasty?

- Tissue suitable more readily available than for PKP.
- Lower risk of endophthalmitis
- Extraocular surgery, more tectonic stability
- Shorter length of time of steroid use
- No risk of endothelial rejection
- Less risk of intraoperative suprachoroidal hemorrhage

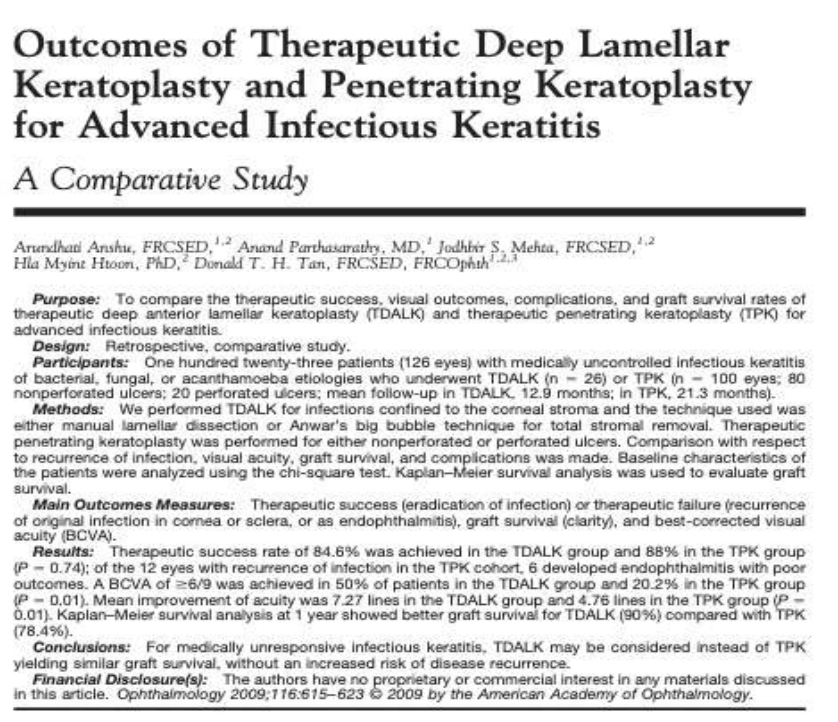
Keep in mind

- Increased surgical time and skill required
- Higher risk of recurrence of infection not only from peripheral cornea but also from the underlying stroma descemet membrane complex
- Higher rate of DM detachment

Key points about surgical intervention

- The primary goal of such a surgical procedure is the eradication of infection and tectonic support in case of descemetocele or corneal thinning , Restoration of vision is secondary objective
- Timing of surgery.
- Corneal scraping is mandatory as success rate.

Ophthalmology 2009;116:615-623



Outcomes of Therapeutic Deep Lamellar Keratoplasty and Penetrating Keratoplasty for Advanced Infectious Keratitis

A Comparative Study

Arundhati Anshu, FRCSED,[1,2] Anand Parthasarathy, MD,[1] Jodhbir S. Mehta, FRCSED,[1,2] Hla Myint Htoon, PhD,[2] Donald T. H. Tan, FRCSED, FRCOphth[1,2,3]

Purpose: To compare the therapeutic success, visual outcomes, complications, and graft survival rates of therapeutic deep anterior lamellar keratoplasty (TDALK) and therapeutic penetrating keratoplasty (TPK) for advanced infectious keratitis.

Design: Retrospective, comparative study.

Participants: One hundred twenty-three patients (126 eyes) with medically uncontrolled infectious keratitis of bacterial, fungal, or acanthamoeba etiologies who underwent TDALK (n = 26) or TPK (n = 100 eyes; 80 nonperforated ulcers; 20 perforated ulcers; mean follow-up in TDALK, 12.9 months; in TPK, 21.3 months).

Methods: We performed TDALK for infections confined to the corneal stroma and the technique used was either manual lamellar dissection or Anwar's big bubble technique for total stromal removal. Therapeutic penetrating keratoplasty was performed for either nonperforated or perforated ulcers. Comparison with respect to recurrence of infection, visual acuity, graft survival, and complications was made. Baseline characteristics of the patients were analyzed using the chi-square test. Kaplan–Meier survival analysis was used to evaluate graft survival.

Main Outcomes Measures: Therapeutic success (eradication of infection) or therapeutic failure (recurrence of original infection in cornea or sclera, or as endophthalmitis), graft survival (clarity), and best-corrected visual acuity (BCVA).

Results: Therapeutic success rate of 84.6% was achieved in the TDALK group and 88% in the TPK group ($P = 0.74$); of the 12 eyes with recurrence of infection in the TPK cohort, 6 developed endophthalmitis with poor outcomes. A BCVA of ≥6/9 was achieved in 50% of patients in the TDALK group and 20.2% in the TPK group ($P = 0.01$). Mean improvement of acuity was 7.27 lines in the TDALK group and 4.76 lines in the TPK group ($P = 0.01$). Kaplan–Meier survival analysis at 1 year showed better graft survival for TDALK (90%) compared with TPK (78.4%).

Conclusions: For medically unresponsive infectious keratitis, TDALK may be considered instead of TPK yielding similar graft survival, without an increased risk of disease recurrence.

Financial Disclosure(s): The authors have no proprietary or commercial interest in any materials discussed in this article. *Ophthalmology 2009;116:615–623*

- 126 eyes with uncontrolled bacterial, fungal or acanthamoeba keratitis
- TDALK 26 eyes, TPKP 100eyes
- Theraputic success 84.6% in TDALK, 88% TPKP
- Out of 12 eyes with recurrences in TPKP, 6 developed endophthalmitis with poor outcomes
- Bcva of 6/9 in 50% TDALK group vs 20.2% TPKP group
- Kaplan-meier survival analysis at one year TDALK (90%), TPKP (78.4%)

CORNEA 2002 Jan;21:33-7

Lamellar Keratoplasty for the Treatment of Fungal Keratitis

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Purpose. To determine the therapeutic value of lamellar keratoplasty (LKP) in the treatment of fungal keratitis not curable by antifungal chemotherapy. Methods. Fifty-five patients, in whom a diagnosis of fungal keratitis was confirmed by microscopic analysis of corneal scrapings or confocal microscopy, and who were not cured by topical and oral antifungal medication, were given LKP. After LKP, topical antifungal treatment was continued for 2 weeks with gradual tapering of the drugs. The excised recipient lamella was used for microbial culture and histopathologic examination. Results. Therapeutically beneficial results were achieved in 51 cases (92.7%) of the 55 LKPs that were performed. In these 51 cases, there was no recurrence of infection, and the resulting visual acuity ranged from 20/60 to 20/20. Patient follow-up ranged from 6 to 18 months. In four cases (7.3%), there was a recurrence of the fungal infection within 2 weeks of LKP. In these four patients, the infection was cured by performing a penetrating keratoplasty (PKP). Forty-six of the excised lamellae were culture positive for fungi. Thirty-three of these cultures were identified as *Fusarium* sp. or *Aspergillus*, three as *Candida*, one as *Penicillium* species, and in the other three cases, unidentified septate hyphae were noted. In the four cases of recurrent infection, microbiologic culture revealed three cases with *Fusarium* species and one case with *Aspergillus* species. Histopathologic analysis of periodic acid-Schiff (PAS)-stained tissue sections of donor lamellae revealed fungal filaments in all samples. Immune reactions to the lamellar grafts were not observed and the donor lamellae remained clear for the duration of follow-up. Conclusion. Lamellar keratoplasty can be effective for treating fungal keratitis that is not cured by antifungal therapeutics. In addition, LKP can provide useful vision with few complications. Furthermore, corneal tissue used in LKP may be obtained more easily than healthy tissue used in PKP.

Key Words: Lamellar keratoplasty—Fungal keratitis—Antifungal therapy—Penetrating keratoplasty.

enabled ophthalmologists to visualize fungal morphology in vivo. Unfortunately, the confocal microscope is not widely available for the diagnosis of microbial keratitis in China. Often, fungal infection is identified only from histopathologic specimens obtained after penetrating keratoplasty (PKP). Several studies have shown that early diagnosis and immediate use of antifungal chemotherapy were crucial to the control of fungal keratitis.[3–6] In some patients, PKP was found to be the only way to preserve the patient's eye and restore useful vision in the infected eye. This is especially true when antifungal therapy fails to cure the infection. In some studies, lamellar keratoplasty (LKP) was thought to be a contraindication to the treatment of fungal keratitis.[3–5] There are complications subsequent to PKP, including allograft rejection, especially when the donor graft is greater than 8.5 mm in diameter. In addition, refractive errors and other visual problems may occur in these patients. Recently, the advent of new ophthalmic surgical procedures and the availability of instruments used to perform corneal surgery, including LKP, have significantly enhanced our ability to achieve good visual rehabilitation. Consequently, we decided to investigate the value of LKP as a treatment of fungal keratitis in patients not cured by antifungal chemotherapy. In this study, the clinical features, laboratory tests, treatment, and outcome of LKP for fungal keratitis were analyzed. The details of the cases in which LKP failed also are discussed.

MATERIALS AND METHODS

Patients

From January 1988 to August 1999, 358 cases of fungal keratitis

- 55 cases of LKP for fungal keratitis not responding to medical therapy (more than 7 days)
- Filametous fungi (33 Fusarium , 6 Aspergillus)
- 92.7% of favorable outcome (BCVA 20/60-20/20)
- 4 cases had recurrence requied PKP

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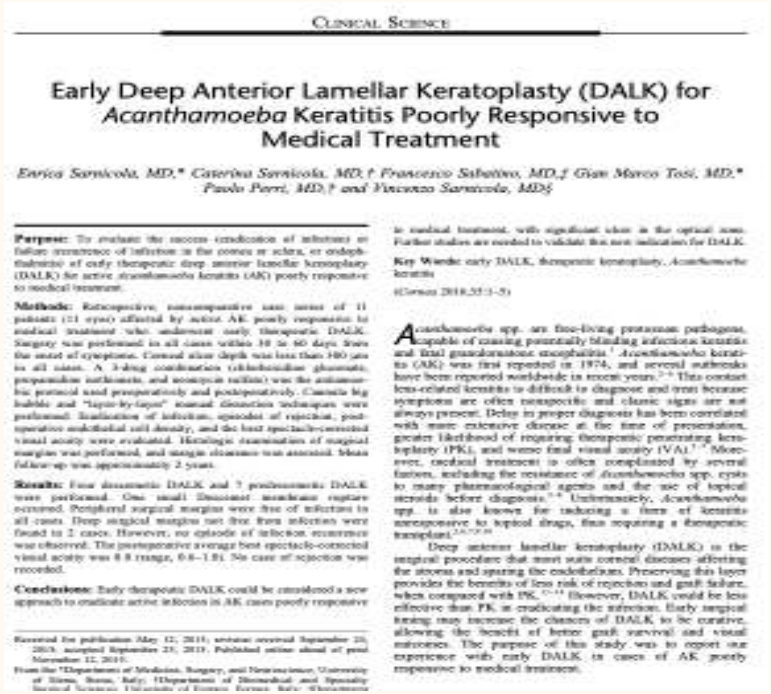
Cornea 2016 Jan;35(1):1-5



CLINICAL SCIENCE

Early Deep Anterior Lamellar Keratoplasty (DALK) for *Acanthamoeba* Keratitis Poorly Responsive to Medical Treatment

Enrico Sarnicola, MD, Caterina Sarnicola, MD,† Francesco Sabatino, MD,‡ Gian Marco Tosi, MD,* Paolo Perri, MD,† and Vincenzo Sarnicola, MD§*

Purpose: To evaluate the success eradication of infections or failure recurrence of infection in the cornea or sclera, or endophthalmitis of early therapeutic deep anterior lamellar keratoplasty (DALK) for active *Acanthamoeba* keratitis (AK) poorly responsive to medical treatment.

Methods: Retrospective, noncomparative case series of 11 patients (11 eyes) affected by active AK poorly responsive to medical treatment who underwent early therapeutic DALK. Surgery was performed in all cases within 30 to 60 days from the onset of symptoms. Corneal ulcer depth was less than 180 μm in all cases. A 3-drug combination (chlorhexidine gluconate, propamidine isethionate, and neomycin sulfate) was the antiamoebic protocol used preoperatively and postoperatively. Cataracts big bubble and "layer-by-layer" manual dissection techniques were performed. Eradication of infection, episodes of rejection, postoperative endothelial cell density, and the best spectacle-corrected visual acuity were evaluated. Histologic examination of surgical margins was performed, and margin clearance was assessed. Mean follow-up was approximately 2 years.

Results: Four deceptive DALK and 7 predescemetic DALK were performed. One small Descemet membrane rupture occurred. Peripheral surgical margins were free of infection in all cases. Deep surgical margins not free from infection were found in 2 cases. However, no episode of infection recurrence was observed. The postoperative average best spectacle-corrected visual acuity was 8 8 (range, 0.6–1.0). No case of rejection was recorded.

Conclusions: Early therapeutic DALK could be considered a new approach to eradicate active infection in AK cases poorly responsive to medical treatment, with significant ulcer in the optical zone. Further studies are needed to validate this new indication for DALK.

Key Words: early DALK, therapeutic keratoplasty, *Acanthamoeba* keratitis

(*Cornea* 2016;35:1–5)

Acanthamoeba spp. are free-living protozoan pathogens, capable of causing potentially blinding infectious keratitis and fatal granulomatous encephalitis.[1] *Acanthamoeba* keratitis (AK) was first reported in 1974, and several outbreaks have been reported worldwide in recent years.[2–4] This contact lens–related keratitis is difficult to diagnose and treat because symptoms are often nonspecific and classic signs are not always present. Delay in proper diagnosis has been correlated with more extensive disease at the time of presentation, greater likelihood of requiring therapeutic penetrating keratoplasty (PK), and worse final visual acuity (VA).[5–8] Moreover, medical treatment is often complicated by several factors, including the resistance of *Acanthamoeba* spp. cysts to many pharmacological agents and the use of topical steroids before diagnosis.[9,10] Unfortunately, *Acanthamoeba* spp. is also known for inducing a form of keratitis unresponsive to topical drugs, thus requiring a therapeutic transplant.[5,6,7,9,10]

Deep anterior lamellar keratoplasty (DALK) is the surgical procedure that must suite corneal diseases affecting the stroma and sparing the endothelium. Preserving this layer provides the benefits of less risk of rejection and graft failure, when compared with PK.[11–14] However, DALK could be less effective than PK in eradicating the infection. Early surgical timing may increase the chances of DALK to be curative, allowing the benefit of better graft survival and visual outcomes. The purpose of this study was to report our experience with early DALK in cases of AK poorly responsive to medical treatment.

Received for publication May 12, 2015; revision received September 23, 2015; accepted September 23, 2015. Published online ahead of print November 12, 2015.

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- Retrospective, noncomparative case series of 11 patients (11 eyes)
- DALK outcome in acanthamoeba keratitis
- All cases within 30 to 60 days from the onset of symptoms
- Early therapeutic BBDALK could be considered a new approach to eradicate active infection in AK cases poorly responsive to medical treatment, with significant ulcer in the optical zone
- No recurrence
- The probability of one-year graft survival and eradication of infection was 32% and 74.1%, respectively, in advanced cases compared to 91.6% and 83.9% in less severe cases.

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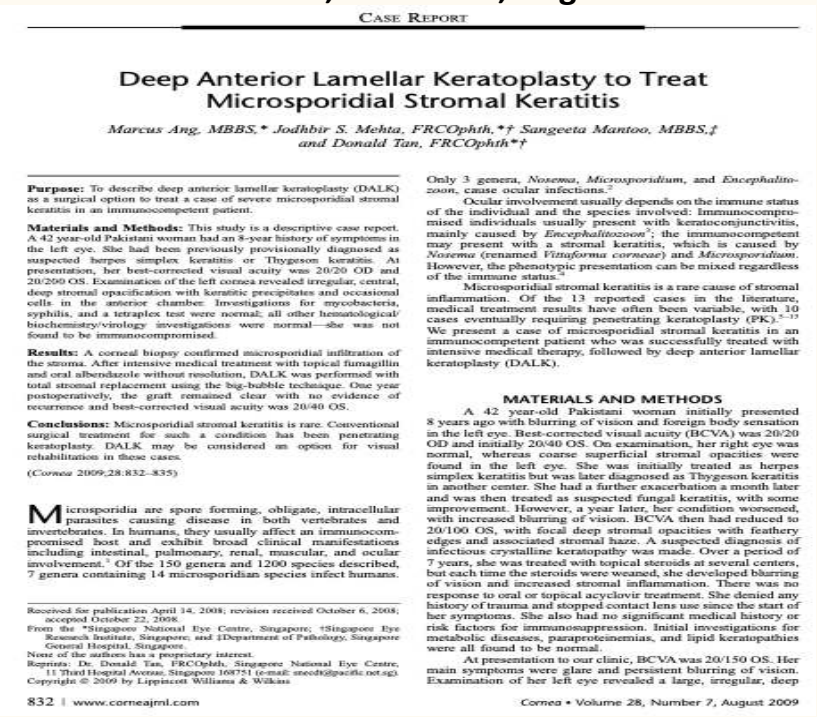
Cornea Volume 28, Number 7, August 2009



CASE REPORT

Deep Anterior Lamellar Keratoplasty to Treat Microsporidial Stromal Keratitis

Marcus Ang, MBBS, Jodhbir S. Mehta, FRCOphth,*† Sangeeta Mantoo, MBBS,‡ and Donald Tan, FRCOphth*†*

Purpose: To describe deep anterior lamellar keratoplasty (DALK) as a surgical option to treat a case of severe microsporidial stromal keratitis in an immunocompetent patient.

Materials and Methods: This study is a descriptive case report. A 42 year-old Pakistani woman had an 8-year history of symptoms in the left eye. She had been previously provisionally diagnosed as suspected herpes simplex keratitis or Thygeson keratitis. At presentation, her best-corrected visual acuity was 20/20 OD and 20/200 OS. Examination of the left cornea revealed irregular, central, deep stromal opacification with keratitic precipitates and occasional cells in the anterior chamber. Investigations for mycobacteria, syphilis, and a tetraplex test were normal; all other hematological/biochemistry/virology investigations were normal—she was not found to be immunocompromised.

Results: A corneal biopsy confirmed microsporidial infiltration of the stroma. After intensive medical treatment with topical fumagillin and oral albendazole without resolution, DALK was performed with total stromal replacement using the big-bubble technique. One year postoperatively, the graft remained clear with no evidence of recurrence and best-corrected visual acuity was 20/40 OS.

Conclusions: Microsporidial stromal keratitis is rare. Conventional surgical treatment for such a condition has been penetrating keratoplasty. DALK may be considered an option for visual rehabilitation in these cases.

(*Cornea* 2009;28:832–835)

Microsporidia are spore forming, obligate, intracellular parasites causing disease in both vertebrates and invertebrates. In humans, they usually affect an immunocompromised host and exhibit broad clinical manifestations including intestinal, pulmonary, renal, muscular, and ocular involvement.[1] Of the 150 genera and 1200 species described, 7 genera containing 14 microsporidian species infect humans. Only 3 genera, *Nosema*, *Microsporidium*, and *Encephalitozoon*, cause ocular infections.[2]

Ocular involvement usually depends on the immune status of the individual and the species involved: Immunocompromised individuals usually present with keratoconjunctivitis, mainly caused by *Encephalitozoon*[3]; the immunocompetent may present with a stromal keratitis, which is caused by *Nosema* (renamed *Vittaforma corneae*) and *Microsporidium*. However, the phenotypic presentation can be mixed regardless of the immune status.[4]

Microsporidial stromal keratitis is a rare cause of stromal inflammation. Of the 13 reported cases in the literature, medical treatment results have often been variable, with 10 cases eventually requiring penetrating keratoplasty (PK).[5–13] We present a case of microsporidial stromal keratitis in an immunocompetent patient who was successfully treated with intensive medical therapy, followed by deep anterior lamellar keratoplasty (DALK).

MATERIALS AND METHODS

A 42 year-old Pakistani woman initially presented 8 years ago with blurring of vision and foreign body sensation in the left eye. Best-corrected visual acuity (BCVA) was 20/20 OD and initially 20/40 OS. On examination, her right eye was normal, whereas coarse superficial stromal opacities were found in the left eye. She was initially treated as herpes simplex keratitis but was later diagnosed as Thygeson keratitis in another center. She had a further exacerbation a month later and was then treated as suspected fungal keratitis, with some improvement. However, a year later, her condition worsened, with increased blurring of vision. BCVA then had reduced to 20/100 OS, with focal deep stromal opacities with feathery edges and associated stromal haze. A suspected diagnosis of infectious crystalline keratopathy was made. Over a period of 7 years, she was treated with topical steroids at several centers, but each time the steroids were weaned, she developed blurring of vision and increased stromal inflammation. There was no response to oral or topical acyclovir treatment. She denied any history of trauma and stopped contact lens use since the start of her symptoms. She also had no significant medical history or risk factors for immunosuppression. Initial investigations for metabolic diseases, paraproteinemias, and lipid keratopathies were all found to be normal.

At presentation to our clinic, BCVA was 20/150 OS. Her main symptoms were glare and persistent blurring of vision. Examination of her left eye revealed a large, irregular, deep

Received for publication April 14, 2008; revision received October 6, 2008; accepted October 22, 2008.
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None of the authors has a proprietary interest.
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- 42 year old woman
- VA 20/200
- Examination revealed irregullar, central, deep stromal opacification with keratic precipitates & occasional cells in AC
- Corneal biopsy confirmed microsporidial of the stroma
- After intensive medical treatment with topical fumagillin and oral albendazole without resolution
- BB DALK was performed
- 1 year postop clear graft BCVA 20/40

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BB DALK

Manual DALK

Research

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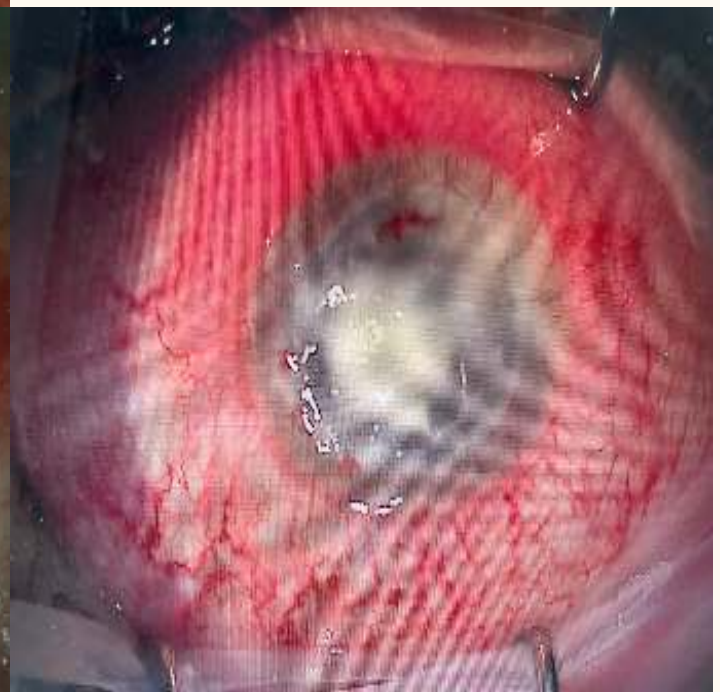
Summary

In

BB DALK

Results
&
Discussion



BB DALK

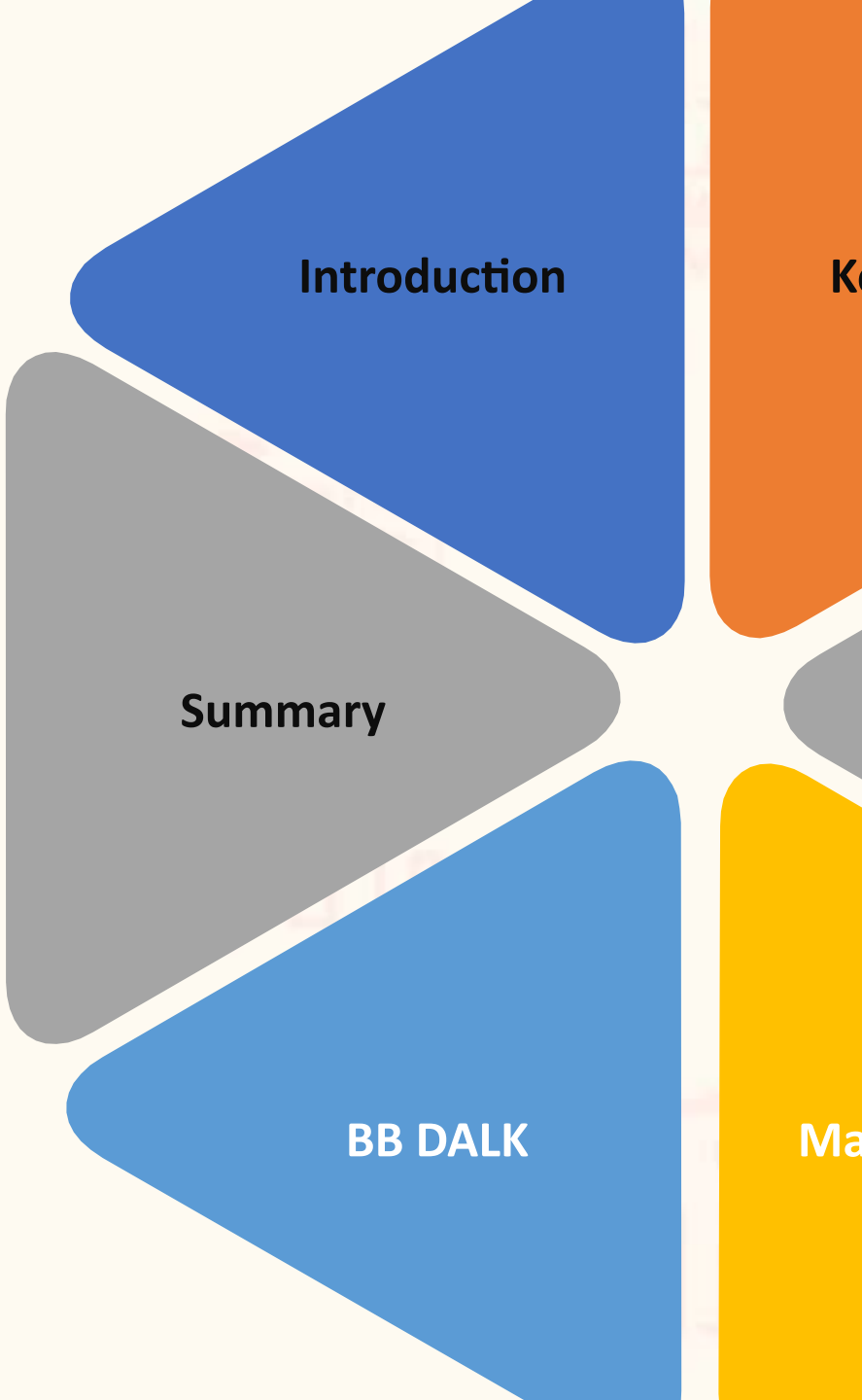
reDALK

Research

S

K

- Corneal scraping is manadatory
- Timing of surgery is critical
- Surgical planning depend on extend of involvement
- Master both big bubble technique and manual dissection to achieve better success rate
- Pre, Peri and post-operative antimicrobial is necessary to prevent recurrence
- Therapeutic deep lamellar keratoplasty plays an important role in the management of nonperforated refractory progressive microbial keratitis



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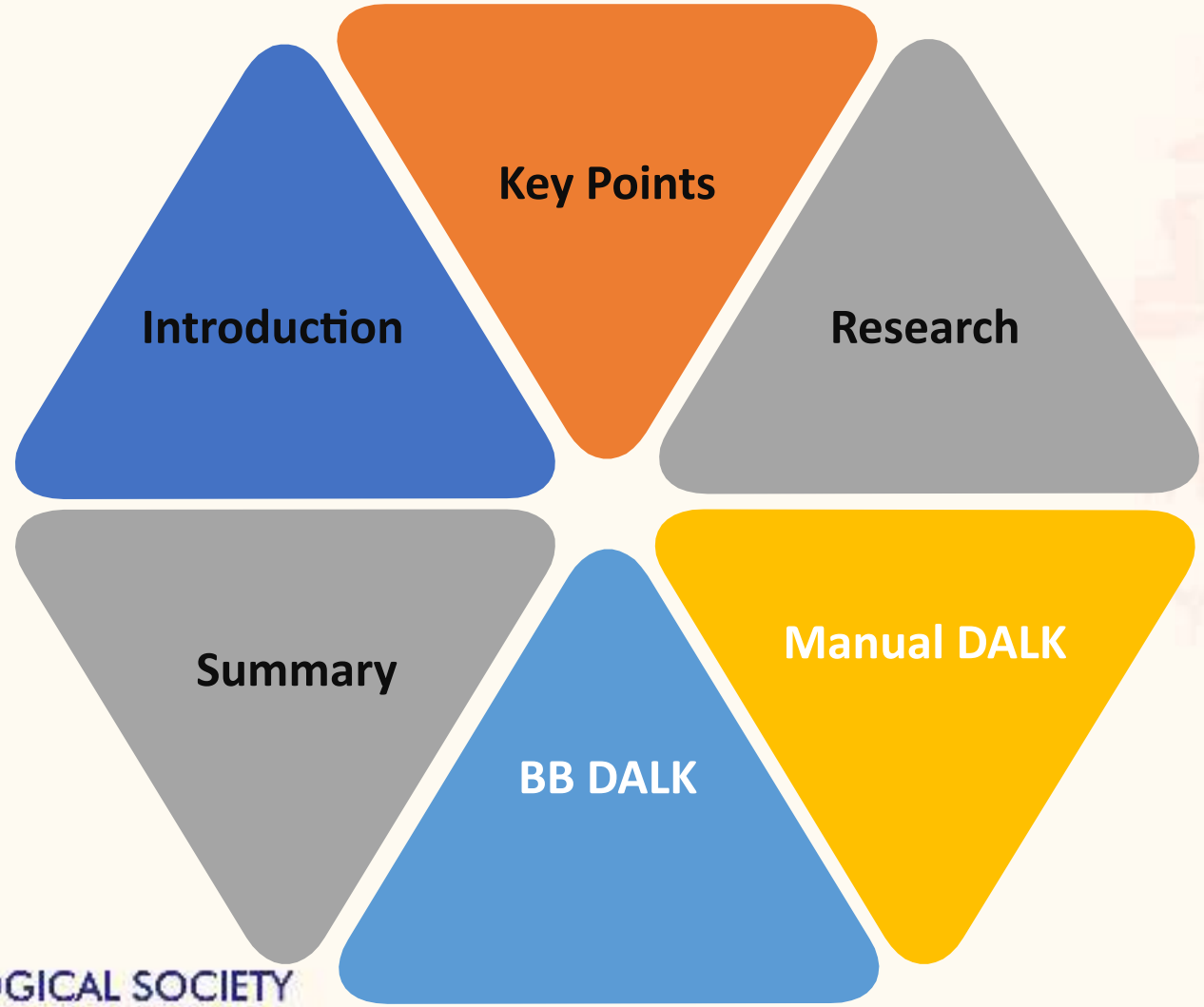

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Key Points

Introduction

Research

Thank You

Summary

Manual DALK

BB DALK