

CLINICAL STUDY OF DALK IN HETEROGENEOUS CORNEAL DISEASES

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ABSTRACT

The present study aims to characterize the varied indications and outcomes of deep anterior Lamellar Keratoplasty. The prospective observational case series of 22 eyes of 22 patients with various anterior corneal pathologies was considered for the study, in whom deep anterior lamellar Keratoplasty was performed for optical and tectonic indications in a Regional Institute of Ophthalmology from Oct 2010 to May 2012, thorough evaluation by clinical examination and necessary investigations. The follow up period ranged from three months to one year. The main outcome measures were documented, and which was Visual acuity, graft survival and its complications. Of the 22 cases, corneal ectasia (45.44%) and corneal dystrophy (45.44%) constituted about (90.88%). among the ectasia group, keratoconus comprises (22.27%) of cases, keratoglobus (9.09%), Pellucid marginal degeneration (4.54%), macular dystrophy 22.27%, lattice dystrophy 18.18%, Gelatinousdystrophy (4.54%). The mean pre operative visual acuity was 1.936 -logmar 0.664 and logmar in the postoperative period .It was found to be statistically significant ($P < 0.0001$). The Post operative BCVA in the ectatic group was in the range of 6/12 (0.30-logmar) to 6/36 (0.778 logmar). In case of dystrophy group, it was ranged from 6/12 (0.30logmar) to 6/60 (1.00 logmar). Three cases apparently had intraoperative micro perforation and one cases was converted to penetrating keratoplasty. Only single case has developed significant interface haze, which was dropped in the visual acuity by two line of intersection. One more complications was included in suture related infections, which was managed clinically and vascularisation of the graft system, and which was managed with topical bevacizumab. Only one case has developed graft opacification and who underwent a PK as an accounted 95.46%

The study suggest that ,the lamellar keratoplasty is an evolving option for both optical and tectonic indications though without any curb and which was need to be identified.

KEYWORDS: Deep Anterior Lamellar Keratoplasty, Indications, Optical, Tectonic, BCVA

INTRODUCTION

Deep anterior lamellar keratoplasty (DALK) is a surgical procedure for removing the corneal stroma down to Descemet's membrane. It is most useful for the treatment of corneal disease in the setting of a normally functioning endothelium. Traditionally, penetrating keratoplasty (PK), which involves a full-thickness corneal graft, has been the treatment of choice for corneal stromal diseases. But PK can be complicated by graft rejection, irregular astigmatism and corneal opacification, thus resulting in visual impairment. DALK offers an alternative procedure that may lessen those risks because the recipient Descemet's membrane and endothelium are preserved⁽¹⁾. The endothelium of the cornea is the first tissue to die after extinction of life and that explains that graft from an eye removed more than 6-8 hrs after death or stored more than 4-6 days even far below ice temperature develops an endothelial edema and is not likely to remain clear if grafted to a recipient. It explains the larger incidence of successes in lamellar keratoplasty where endothelium does not form a part of the donor material⁽²⁾. DALK removes and replaces the pathologic corneal stroma while preserving host

healthy endothelium, which eliminates the risk of endothelial graft rejection and has a reduced effect on the endothelial cell count⁽³⁾. In comparison to PK, DALK avoids most complications associated with an open system surgery, such as anterior synechia, expulsive hemorrhage and endophthalmitis. The criteria for donor cornea tissue selection are less stringent in DALK when compared to PK.

The most common indication for DALK is keratoconus because the patients benefit the most from preserving their own endothelium. The good outcomes in keratoconic patients have led corneal surgeons to apply this technique for other pathologies sparing the corneal endothelium. Therefore, the indications for DALK have expanded to other pathologies like, corneal ectasia (pellucid marginal degeneration and post-LASIK ectasia), stromal dystrophies (lattice, macular and granular), stromal opacities, scars, active corneal ulcer and perforations⁽⁴⁾. Along with the advances in surgical instrumentation, improvements in surgical techniques and imaging technology have contributed to improved visual outcomes obtained with DALK. DALK is now seen as a viable alternative to penetrating keratoplasty with equivalent visual results and better long-term graft survival. The present aims to know the indications for deep anterior lamellar keratoplasty (DALK) evaluate the different surgical techniques of Deep Anterior Lamellar Keratoplasty (DALK), evaluate the outcomes after Deep Anterior Lamellar Keratoplasty (DALK) in terms of; Best corrected visual acuity (BCVA), Graft survival & Complications.

MATERIALS METHODS

Deep anterior keratoplasty was attempted at Regional Institute of Ophthalmology Minto eye hospital, BMCRI in 22 eyes of 22 patients between November 2010 and May 2012. Patients were attending Minto Ophthalmology hospitals were screened. 22 eyes of 22 patients with various anterior corneal pathologies and who had a best corrected visual acuity of less than 6/60 and not improving beyond it were included in the study. All patients included in the study were asked about their history was asked regarding history eye rubbing and contact lens wear. The patients underwent a detailed preoperative examination including visual acuity measurement with snellen's chart, retinopathy and subjective condition; slit lamp examination with a special consideration to depth of corneal pathology, location severity and extent of corneal thinning and ectasia. Endothelium was assessed by specular reflection under slit lamp under high magnification in all possible cases. Patients were subjected to a detailed examination to rule out any ocular surface disorder tear film instability with schirmer's test. Intra ocular pressure was recorded with schiotztonometer or non contact tonometer whichever method was possible. Patient underwent a detailed fundus evaluation and patients with hazy media in whom the fundus could not be visualized, underwent a posterior segments ultrasonography, b-scan with pathology involving the endothelium and those with glaucoma and any posterior segments pathology which would effect the final visual outcomes were not included in the study. Patients with ectatic disorder underwent corneal topography using shin Nippon system. Corneal ultrasound pachymetry was done in selected cases. Lacimal syringing was done to rule out systemic illness like diabetics and hypertension. Informed consent was obtained from all the patients and in cases of patients younger than 18 years, it was taken from their parents. Donor eyes were obtained from the eye bank, Minto Ophthalmic hospital and they were graded according to kishinchand chellaram eye bank donor corneal grading. The donor eyes were stored in moist chamber at four-degree centigrade and where the surgery was deferred for more than 24 hours after procurement and it was stored in M-K medium and used within seventy-two hours. The patients were follow up on preoperative and postoperative period. Standard post operative management was maintained

RESULTS

The study included twenty-two eyes of twenty –two patients .One case was converted to a full thickness graft and excluded from the study. Of the patients seventeen were males and five were females. The mean age of patients was 32.50 years. The mean age in the keratoconous group was 16.33 years and the mean age in the dystrophy group was 35.60 years Study includes with nine different indications of which nineteen were optical and three were tectonic cases

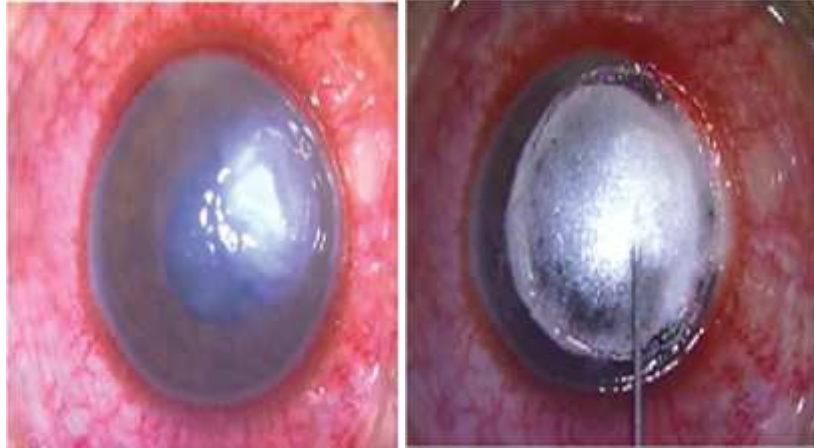


Figure 1

Figure 2

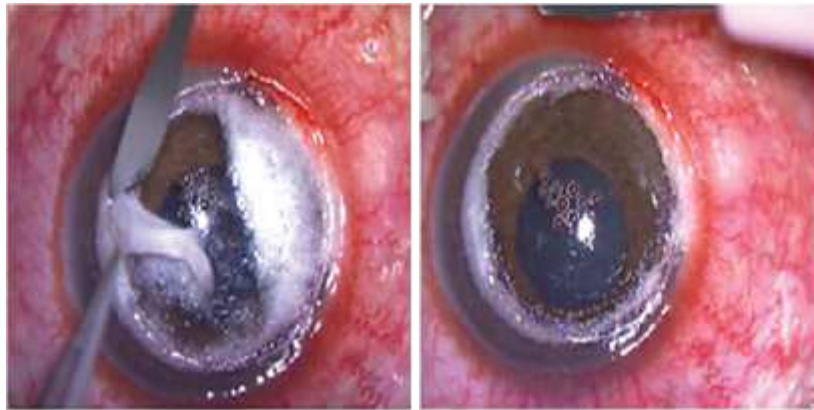


Figure 3

Figure 4

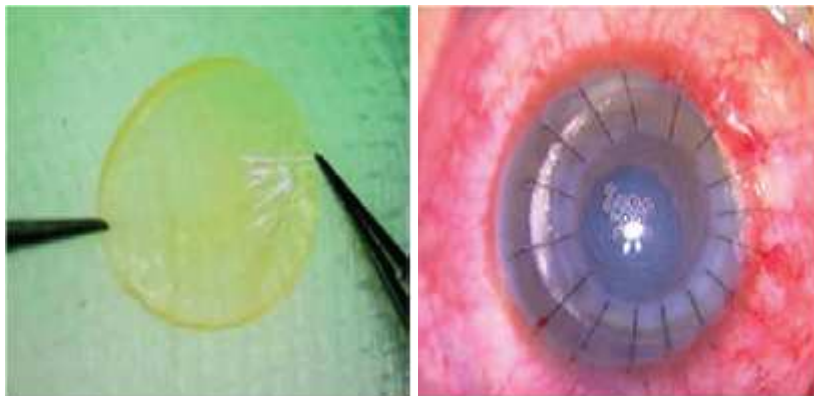


Figure 5

Figure 6

Figure 1 Deep fungal ulceration with hypopyonbefore surgery. (2) A big bubble formed after 1.5mL sterilized air

is injected into the posterior stroma. (3) Debulking of the posterior stroma is performed with a 45° micro knife. (4) Descemet membrane is bared after the diseased stroma was cut off. (5) The donor Descemet membrane and endothelium are stripped off using 0.12mm untoothed forceps. (6) The donor cornea is sutured to the recipient with 16 interrupted 10/0 nylon sutures.

DISCUSSIONS

According to the World Health Organization, infectious corneal diseases are a major cause of blindness worldwide, second only to cataract in overall prevalence. Among severe infective corneal ulcers, FK is most common in many developing countries like China, India, Ghana, and Nepal [2, 16, 17]. Due to limited options of commercially available antifungal drugs and low drug sensitivity in some patients, surgical treatment is required to preserve the patient's eyeball and restore useful vision in severe cases. This is especially true when antifungal therapy fails to control the infection [4, 18]. In the early stage, most ophthalmologists thought that fungal hyphae in the stroma grew perpendicular to the corneal stromal collagen, and penetration of the hyphae to the corneal endothelium may result in perforation. In such instances, LK is not adequate to completely remove the infected tissue, and PK may be the only option to control the fungal infection. Sedghipour et al. [19] and Said et al. [7] reported satisfactory results after PK for the treatment of FK, but the postoperative immune rejection was high (27.2%–29.6%), and the long-term outcomes were not favourable [19, 20]. With further understanding of FK and advances in microsurgical techniques, LK has been found to be effective in the treatment of FK before the hyphae penetrate the full thickness. DALK procedures have been performed to treat corneal stromal diseases like corneal dystrophies, corneal ectasia, corneal scar [13–15, 25], and even infectious keratitis [12]. Anshu and his colleagues compared the therapeutic effects of DALK and PK for advanced bacterial, fungal, and *Acanthamoeba* keratitis, finding that DALK can result in better graft survival and visual outcomes [12]. Considering the advantages of DALK surgery, we used it in the management of deep FK unresponsive to antifungal treatment in this study. Although the infection or infiltration in outpatients was very deep and 8 (34.8%) of them even had hypopyon, we found that the density of the hyphae and spores was much lower in the posterior stroma than that in the anterior stroma, and no hyphae or spores were detected in the posterior stroma near the DM by the histology examination after surgery. Therefore, DALK procedure had the potential to clear the hyphae and spores, even in patients with deep infectious keratitis. Moreover, theoretically this procedure might decrease fungal recurrence more significantly than traditional LK. According to preoperative slit-lamp and confocal microscopic examinations, as well as clear intraoperative observation of the recipient, surgeons can better determine if the hyphae spread in the full thickness of the cornea and if the patient should receive DALK. cornea, with a decreased risk of immune rejection and graft dehiscence [8]. But for deep infection, LK may increase the risk of recurrence after surgery if the excision of the ulcer is not complete [21]. Moreover, fiber formation in the irregular interface can affect the postoperative visual recovery [10]. Therefore, an approach of dissecting the whole corneal stroma may be helpful in these kinds of patients. Big bubble DALK was first introduced by Anwar and Teichmann in 2002 [22]. Intraoperative perforation of DM is one of the most common complications during DALK surgery, with a rate of 9% to 23% [27, 28]. In cases with FK, the stroma usually has edema, which allows more adequate intraoperative stromal dissection compared to patients with stromal scarring [29]. Therefore, perforation in such patients is not common. Management of DM perforation depends on the size and location of the perforation. Macro perforations may require conversion to a full-thickness keratoplasty, but micro perforations allow completion of DALK or LK in the majority of cases [27]. Although intraoperative perforation of the DM occurred in 2 (8.7%) eyes in our series.

CONCLUSIONS

The major limiting factors is affecting visual outcome are graft host interface haze and irregular astigmatism .The Innovative techniques of lamellar Keratoplasty gives an encouraging result dealt with challenging cases , which were not manageable to surgery till.

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