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VISUAL OUTCOME IN LAMELLAR KERATOPLASTY: PROSPECTIVE STUDY AT SAROJINI DEVI EYE HOSPITAL, HYDERABAD

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ABSTRACT: AIM: To evaluate visual outcome in lamellar keratoplasty. **STUDY DESIGN:** This is a prospective, non-comparative, interventional case study series. **METHODS:** Patients admitted for corneal dystrophies and scars and pseudophakic bullous keratopathy and undergone lamellar keratoplasty at corneal services of Sarojini Devi Eye Hospital for period of 1½ year from October 2011 to March 2013. **RESULTS:** Graft clarity was achieved in 96.66% of the patients and 3% of the patients had complications like DM perforation in DALK due to which the procedure was converted to penetrating keratoplasty **CONCLUSION:** Lamellar keratoplasty is a novel technique which is undergoing fast revolution promising better post-operative outcomes in terms of visual acuity.

KEYWORDS: Keratoplasty, Lamellar Visual Outcome, Graft.

INTRODUCTION: Corneal opacity is a common cause of ocular morbidity in developing countries. In southern Indian population prevalence of corneal blindness in BE -0.10% and 0.50% in one eye.¹ Common causes of corneal opacities are microbial keratitis followed by corneal scars, pseudophakic bullous keratopathy and corneal dystrophies and degenerations. Though they (Corneal scars, pseudophakic bullous keratopathy and corneal dystrophies and degenerations) are not the bulk of corneal blindness but still contribute to significant visual loss and discomfort to the patients.

Lamellar keratoplasty is done where in only diseased layer of cornea is replaced by donor without involving the other layers in order to promote vision. Treatment of corneal opacities secondary to PBK, dystrophies and scars usually require surgical intervention which used to be PK which is now largely replaced by LKP in recent times.

This study is undertaken to evaluate various aspects of lamellar keratoplasty like indications, surgical techniques, post op management, graft clarity, complications and visual outcome. This procedure is done to give vision and symptomatic relief to the patient. Keratoplasty is considered as the most frequently performed and the most successful organ transplantation technique worldwide.

In 1886 Von Hippel reported 1st lamellar corneal grafting.² In 1974, Anwar described the use of big air bubble for deep dissection under direct visualization in potential natural cleavage plane between Descemet's membrane and stromal layers.³ Sugita also described hydro delamination of stroma from Descemet's membrane.⁴

In 2002 Anwar and Teichmann described the big bubble technique in which separation of Descemet's membrane from stroma is achieved with injection of air.⁵ In 2001, Terry and Ousley reported successful results in patients using similar procedure, which they named as Deep lamellar endothelial keratoplasty (DLEK).⁶ Price and Price made the endothelial keratoplasty more popular and it was known as Descemet's stripping endothelial keratoplasty (DSEK).⁷

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CLASSIFICATION OF KERATOPLASTY.⁸:

Based on Indications:

1. Optical keratoplasty: When the graft is done for visual rehabilitation.
2. Tectonic keratoplasty: For restoring the altered corneal structure.
3. Therapeutic keratoplasty: Tissue rehabilitation for refractory corneal diseases.
4. Cosmetic keratoplasty: for cosmetic purposes.

Based on the Morphologic and Anatomic Factors:

1. Lamellar keratoplasty which is removal and replacement of partial thickness of cornea
2. Penetrating keratoplasty which is removal of full thickness of cornea and replacing it by a graft.

Based on the Donor Material Employed:

1. Auto keratoplasty when the graft is obtained from the same patient.
2. Homo or Allo-keratoplasty when the graft is taken from the same species.
3. Hetero or Xeno-keratoplasty when the graft is taken from another species.

Indications of Lamellar Keratoplasty: Corneal dystrophies, Corneal Degenerations, Corneal scars, Pseudophakic bullous keratopathy.

Intraoperative Complications in Dalk.^{9,10}: These include full thickness corneal trephination, perforation of DM with needle, failure of formation of big bubble.

Postoperative Complications: Formation of double anterior chamber, Corneal stromal graft rejection, Recurrence of the original pathology, Graft dehiscence, Interface haze, Descemet's membrane folds.

Complications in Dsek.¹¹: Donor detachment and dislocation, Raised intraocular pressure and glaucoma, Epithelial ingrowth, Interface haze, Infectious keratitis, Graft rejection, Primary graft failure.

OUTCOMES IN LAMELLAR KERATOPLASTY:

Dalk.¹²: Graft clarity, Visual acuity, Endothelial cell count, Stromal graft rejection.

Dsek: Graft clarity, Primary graft failure, Secondary graft failure, Visual acuity.

MATERIAL AND METHODS:

Source of Data: Patients admitted for corneal dystrophies and scars and pseudophakic bullous keratopathy and undergone lamellar keratoplasty at corneal services of Sarojini Devi Eye Hospital for period of 1½ year from October 2011 to March 2013.

Methods of Collection of Data: This is a hospital based clinical study of 30 eyes of 30 patients, who underwent lamellar keratoplasty. This study included 30 cases of prospective analysis who underwent lamellar ketatoplasty during the study period from October 2011 to March 2013 and attending follow up at corneal services of Sarojini Devi Eye Hospital.

The schedule of postoperative examination for prospective analysis included examination on post-operative day 1, every week for 1st one month, every 2 weeks of 2nd month and every month for six months.

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A standard case proforma was maintained and study documented under the following important headings. Bio data, operative details, post-operative course.

Biodata: It included patients name, age, sex, address, occupation, I.P. No.

Inclusion Criteria: Corneal dystrophies, Corneal degenerations, Corneal scars, Pseudophakic bullous keratopathy.

Exclusion Criteria: Infective keratitis, Failed grafts.

SURGICAL PROCEDURE: All the patients having the pathology involving anterior layers of cornea like, Corneal dystrophies, corneal scars underwent DALK.

Preparation: Peribulbar local anaesthesia is given. Painting and draping with 5% povidone iodine done and draped with sterile towel. Exposure obtained with lid speculum and superior rectus suture. Trephination of recipient cornea- Partial trephination done up to the level of 300 μ and lamellar dissection carried out with lamellar dissectors. After debulking the anterior stromal layers, bare descemet's is obtained. Preparation of donor button done by staining the endothelium with trypan blue and peeling the descemet's and endothelium with forceps. The donor button is placed on the recipient bed of bare descemet's and sutured with 10-0 nylon interrupted suturing.

Post-Operative Management: Topical steroids, topical antibiotics and cycloplegic given to patients.

Post-Operative Follow Up: Patients followed up for a period of six months, timing being every week for the 1st month, every two weeks for second month and every month for six months. Outcome measured in terms of graft clarity and visual acuity. Patients with endothelial dysfunction entities like fuch's endothelial dystrophies and pseudophakic bullous keratopathy underwent DSEK.

Surgical Procedure: Peribulbar block given, painting and draping done with 5% povidone iodine and sterile drape done. Globe exposure obtained with lid speculum and superior rectus stitch.

Donor Cornea Preparation: Donor cornea prepared by mounting it on an artificial anterior chamber and lamellar dissection carried out with lamellar dissectors. The donor cornea is then removed from artificial chamber and punched with trephine on Teflon block with endothelium side up. Now the anterior lamellar cap is peeled off resulting in a posterior graft consisting of part of stroma, descemet's and endothelium.

Preparation of Recipient: Epithelium is marked with trypan blue to the required size as a template for DM stripping. A 5mm corneoscleral tunnel is made as in for SICS. Now DM is scored and stripped with the help of reverse Sinskey's hook and removed. Now the donor button is folded endothelium to endothelium with visco in between like a taco with 60-40 ratio.

This graft is inserted into AC with the help of forceps or glide. Air is injected to facilitate unfolding of the graft and adhesion of the graft to the recipient bed. Now the tunnel is closed with 10-0 nylon suture.

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Post-operative Treatment: Topical steroid, topical antibiotics, topical anti-glaucoma medication (0.5% timolol maleate), topical cycloplegic started from day 1 and steroids gradually tapered over a period of 6 months.

Post-operative Follow Up: Patients followed up for a period of six months, timing being every week for the 1st month, every two weeks for second month and every month for six months. Outcome measured in terms of graft clarity and visual acuity.

RESULTS:

PATIENT DEMOGRAPHICS	VALUES
Age range	20-75 years
Gender male	18(60%)
Female	12(40%)
Mean+SD follow up	6+2 Months
Table 1: Patient Demographics

Figure 1

OUTCOME	VALUES
Corneal clarity	29(96.66%)
Complications	1 (3%)
Table 2: Post-Operative Outcomes	

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Figure 2

BCVA	NO. OF PATIENTS
6/18	8 (15%)
6/24 to 6/36	17 (60%)
6/60	5 (25%)

Table 3: Visual Outcome

Figure 3

DISCUSSION: Lamellar keratoplasty is a procedure where in only the diseased layer of the cornea is replaced by a healthy donor graft giving vision and symptomatic relief to the patients. In our study out of 30 patients, 18(60%) were males, 12(40%) and were female. There were more male patients and this trend is seen in most of the hospitals and developing countries due to various socio-economic factors and comparatively easy accessibility of males to health care centers.

In our study graft clarity was achieved in 96.66 % of the patients and 3% of the patients had complications like DM perforation in DALK due to which the procedure was converted to penetrating keratoplasty.

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These results are in line with the study done by Noble BA, Agrawal A, Collins C, in 80 eyes of 68 patients to evaluate visual outcome and complications for heterogenous group of corneal pathologies following lamellar keratoplasty have shown BCVA of 6/6 or better in 24.7%, 6/9 or better in 69.9% and 6/12 better in 84.9%.

Our study results are in accordance with a study done by Rasik B. Vajpayee, Jaideep Tyagi, Namrata Sharma, Navneet Kumar, Vishal Jhanji, Jeewan S. Titiyal, in evaluating efficacy of DALK with no intra operative or post-operative complications 80 % of the patients achieved BCVA of 6/12 or better at the end of six months and with a study done by Mark A. Terry, MD, Paula J. Ousley, on 100 eyes of 88 patients with corneal edema from fuch's dystrophy and Pseudophakia bullous keratopathy to evaluate visual acuity, 98% corneas were clear and grafts were healed in good position.

The mean BCVA was 6/12 with range between 6/6 to 6/60. From the above results it is obvious that lamellar keratoplasty has a significant role in providing visual restoration and symptomatic relief to patients without being an open sky surgery and preventing the consequent complications as was seen with penetrating keratoplasty incorporating its advantages and eliminating the complications.

CONCLUSION: Our study confirms that lamellar keratoplasty is an effective procedure in giving patients good vision and symptomatic relief with less complications. Though it gives good vision and early rehabilitation, it has complications like, interface keratitis, interface haze, DM folds and wrinkling and altered corneal topography in DALK and graft dislocation and risk of graft rejection in DSEK which can be overcome by meticulous surgery and post-operative management and careful follow up. Lamellar keratoplasty is a novel technique which is undergoing fast revolution promising better post-operative outcomes in terms of visual acuity.

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