

Hospital Based Clinical and Outcome Assessment of Penetrating Keratoplasty: An Observational Study

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Abstract

Aim: The aim of the present study to evaluate the visual outcome of Penetrating Keratoplasty (PK) clinically in NMCH, in Bihar.

Material & Methods: The study was carried out in a Department of Ophthalmology. A total of 50 patients who were willing to give informed consent and fulfilling the specified inclusion and exclusion criteria were included in the study.

Results: Out of the total 50 cases, males were 32 (64%) and females were 18 (36%). Maximum numbers of cases were in the age group of 40-60 years, that is, 32 cases (64%). Out of 50 cases, maximum number of eyes had very low visual acuity as, 20 cases had VA as perception of light, and 7 eyes had VA as hand movement, 16 cases had visual acuity as Finger count close to face and only 7 cases had VA as Counting Fingers 1-2 metres. Out of 50 cases, 41 patients had clear grafts at the final, 6th month follow up, 32 were in the age group of 41-60 years, 10 were in the age group of 20-40 years and 8 were in the bracket of 61-80 years. The visual acuity at the final follow up, was good in patient with pseudophakic bullous keratopathy, as 12 cases had visual acuity >6/60. 6 cases of leucomatous opacity had visual acuity >6/60. 8 cases of adherent leucomatous opacity had final visual acuity of >6/60.

Conclusion: Infective keratitis either active or healed was the major indication for keratoplasty. The visual outcome following corneal transplantation was encouraging particularly in cases of optical keratoplasty.

Keywords: Corneal Blindness, Penetrating Keratoplasty, Optical Therapeutic.

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Introduction

Corneal diseases are the major cause of visual impairment and blindness in developing world. [1] The transparency of the cornea is affected by various infectious and inflammatory conditions which cause corneal blindness and add substantial burden to the community and health care resources all over the world. According to WHO, there are approximately 6.8 million people who have corneal blindness with vision less than 6/60 in at least one eye and of these about 1 million have bilateral corneal blindness. If the present trend continues, it is expected that the number of corneal blind individuals in India will increase to 10.6 million by 2020. [2]

The cornea requires being transparent to transmit light to the retina to achieve the good quality of

vision. Cornea distributes the maximum dioptric power to converge the light to focus on retina. [3] Nowadays, many options are available to the corneal transplant surgeon for the treatment of corneal disorders. Various abnormal conditions of cornea, like congenital abnormalities, injury, infection, or inflammation, ultimately ends up with an area and density of opacity which can be seen with naked eye or with a torch light or slit lamp examination. Corneal opacity is the fourth leading cause of blindness worldwide. [4]

Full thickness penetrating keratoplasty is a full thickness corneal transplant procedure, in which a trephine of an appropriate diameter is used to make a full thickness resection of the patient's cornea, followed by a placement of a full-thickness donor

corneal graft. Although PK, in which the full corneal thickness is replaced, remains the gold standard, [5] current keratoplasty procedures focus on replacing only the essential amount of tissue (also known as “selective keratoplasty”) The keratoplasty surgical procedure has been modified to improve drawbacks associated with penetrating keratoplasty (PK), including delayed wound healing, major vulnerability to trauma, risk of immune rejection, unpredictable refractive outcomes, prolonged visual rehabilitation and high or irregular astigmatism. [6,7]

Hence the aim of the study was to evaluate the visual outcome of Penetrating Keratoplasty (PK) clinically in NMCH, in Bihar.

Material & Methods

The study was carried out in a Department of Ophthalmology, Nalanda Medical College and Hospital, Patna, Bihar for 12 months. A total of 50 patients who were willing to give informed consent and fulfilling the specified inclusion and exclusion criteria were included in the study.

Inclusion Criteria:

- Age of 20 to 80 years and were cases of keratoconus, traumatic leucoma, lattice corneal dystrophy, Fuchs endothelial corneal dystrophy, granular corneal dystrophy, bullous keratopathy, interstitial keratitis, minimal to moderate vascularised scars, healed bacterial keratitis, and herpes simplex keratitis.

Exclusion Criteria

- Immunocompromised or cases of retinal detachment, posterior segment diseases with corneal scar, divergent squint, patients with dry eye, chemical burns, congenital glaucoma, fungal keratitis and uncooperative or psychiatric patients.

Methodology

Pre-operative preparation

After explaining the procedure and possible risks to the patient, consent was taken. Eyelashes were cut and local antibiotic drops were instilled. Systemic antibiotics were administered and IOP was lowered with tablet acetazolamide/ intravenous mannitol drip.

Operative Procedure

For obtaining the graft, Donor button was taken out from storage media, put on teflon block and was marked with a marker and graft was taken with the help of a trephine of appropriate size and a drop of viscoelastic substance was put on it.

Procedure on Recipient's Eye

After painting the recipient eye with betadine and draping it, Speculum and Flieringa ring were put. The trephine with sharp cutting edges of different size, according to the need was used. After marking the diseased area the trephine was rotated in clockwise and anticlockwise direction and after the trephine made partial entry into the anterior chamber, it was withdrawn and the recipient corneal button was lifted with corneal forceps and cut with corneal scissors.

The Operative Details

The anterior synechiae were broken up if present and iris incarceration was removed from the inner surface of scarred cornea followed by a peripheral iridectomy. The graft is then placed over the recipient corneal frill. The first four cardinal sutures were taken in the graft host junction. All the four sutures were tied followed by passage of interrupted sutures. The sutures were passed through half thickness of the cornea and the knots were buried in cornea. Sub-conjunctival antibiotic and dexamethasone injection was administered. Pad and bandage was done with antibiotic and atropine ointment.

Post operative care and follow up

First dressing was done after 48 hours and then daily dressing was done till patient was discharged. Systemic antibiotics and corticosteroid were given to all cases. Topical antibiotics and steroids were administered. Slit lamp examination, visual assessment and keratometry was done at the follow-ups.

Statistical Analysis

Data was analysed using Microsoft excel 2010 and SPSS version 22. BCVA were converted from the snellen units to the logarithm of minimal angle of resolution (logMAR). Paired student's t-test were used for hypothesis testing of grouped values of preoperative and last follow-up BCVA in cases of optical and therapeutic grafts. A p-value < 0.05 was considered statistically significant.

Results

Table 1: Patient details

| Gender | N% |
|--------------|---------|
| Male | 32 (64) |
| Female | 18 (36) |
| Age in years | |
| 20-40 | 10 (20) |
| 41-60 | 32 (64) |

| | |
|--------------------------------------|---------|
| 61-80 | 8 (16) |
| Visual acuity | |
| VA as perception of light | 20 (40) |
| VA as hand movement | 7 (14) |
| VA as Finger count close to face | 16 (32) |
| VA as Counting Fingers at 1-2 metres | 7 (14) |

Out of the total 50 cases, males were 32 (64%) and females were 18 (36%). Maximum numbers of cases were in the age group of 40-60 years, that is, 32 cases (64%). Out of 50 cases, maximum number of eyes had very low visual acuity as, 20 cases had VA as perception of light, and 7 eyes had VA as hand movement, 16 cases had visual acuity as Finger count close to face and only 7 cases had VA as Counting Fingers at 1-2 metres.

Table 2: Graft clarity (At the 6th month follow up mark)

| Graft Clarity | Frequency | Percent |
|---------------|-----------|------------|
| Clear | 41 | 82 |
| Hazy | 6 | 12 |
| Opaque | 3 | 6 |
| Total | 50 | 100 |

Out of 50 cases, 41 patients had clear grafts at the final, 6th month follow up.

Table 3: Relation between recipient age and graft outcome at 6 months

| Recipient's Age | Outcome | | |
|-----------------|-----------|----------|----------|
| | Clear | Hazy | Opaque |
| 20-40 | 7 | 2 | 1 |
| 41-60 | 26 | 4 | 2 |
| 61-80 | 8 | 0 | 0 |
| Total | 41 | 6 | 3 |

32 were in the age group of 41-60 years, 10 were in the age group of 20-40 years and 8 were in the bracket of 61-80 years.

Table 4: Relation between final visual acuity clinical diagnosis

| Visual Acuity | AL | LO | NCU | PBK |
|---------------|----|----|-----|-----|
| >6/60 | 8 | 6 | 2 | 12 |
| <6/60 | 4 | 2 | 4 | 1 |
| CF 1-3 metres | 2 | 2 | 4 | 1 |
| HM PL+ PR + | 0 | 0 | 2 | 0 |

The visual acuity at the final follow up, was good in patient with pseudophakic bullous keratopathy, as 12 cases had visual acuity >6/60. 6 cases of leucomatous opacity had visual acuity >6/60. 8 cases of adherent leucomatous opacity had final visual acuity of >6/60.

Discussion

Nowadays, many options are available to the corneal transplant surgeon for the treatment of corneal dis-orders. The keratoplasty surgical procedure has been modified to improve drawbacks associated with penetrating keratoplasty (PK), including delayed wound healing, major vulnerability to trauma, risk of immune rejection, unpredictable refractive outcomes, prolonged visual rehabilitation and high or irregular astigmatism. [8,9] Although PK, in which the full corneal thickness is replaced, remains the gold standard, [10] current keratoplasty procedures focus on replacing only the essential amount of tissue (also known as “selective keratoplasty”). Thus, in deep anterior lamellar keratoplasty (DALK), [11] the whole corneal tissue is replaced

with the exception of Descemet membrane and endothelium; in Descemet membrane endothelial keratoplasty (DMEK), [12,13] the Descemet membrane and endothelium are replaced by the corresponding layers from the donor cornea; and in Descemet stripping (automated) endothelial keratoplasty (DSEK or DSAEK) [14,15] the Descemet membrane and endothelium are replaced by a thin layer of donor stroma, Descemet membrane and endothelium. Lamellar corneal grafts have proved superior in terms of fast visual rehabilitation and more predictable refractive outcomes, requiring only partial rather than full-thickness incisions. [16]

Out of the total 50 cases, males were 32 (64%) and females were 18 (36%). Similar results were seen in other studies like, Donald TH, et al [17] (2008) in his study recorded the mean age of presentation as 56.65 years in his study on penetrating keratoplasty. Maximum numbers of cases were in the age group of 40-60 years, that is, 32 cases (64%). Out of 50 cases, maximum number of eyes had very low visual acuity as, 20 cases had VA as

perception of light, and 7 eyes had VA as hand movement, 16 cases had visual acuity as Finger count close to face and only 7 cases had VA as Counting fingers 1-2 metres. Out of 50 cases, 41 patients had clear grafts at the final, 6th month follow-up, 32 were in the age group of 41-60 years, 10 were in the age group of 20-40 years and 8 were in the bracket of 61-80 years. The visual acuity at the final follow-up, was good in patient with pseudophakic bullous keratopathy, as 12 cases had visual acuity >6/60. 6 cases of leucomatous opacity had visual acuity >6/60. 8 cases of adherent leucomatous opacity had final visual acuity of >6/60. Kamal Dodia et al [18] (2014) conducted a study in which the most common complications seen were persistent epithelial defects, graft rejection mainly endothelial type late graft rejection and secondary glaucoma. Varley GA et al [19] (1991) stated that microbial infection of a corneal transplant is a complication that is a bane to all corneal surgeons, the sequelae of which can be devastating. Identified risk factors include exposed, loose, or broken sutures, persistent epithelial defects or severe punctate keratopathy. Stephen et al [20] (2000) and Dandona et al [17] (1998) concluded that early complications include wound leak, persistent epithelial defects, suture problems, filamentary keratopathy, elevated intra-ocular pressure, choroidal haemorrhage, hyphaema, microbial keratitis, endophthalmitis, whereas late complications were epithelial down growth, refractive error, graft rejection and glaucoma.

The success of TPK lies in eradication of the primary infection and salvagability of the globe. The patients may lose their sight and possibly their eye due to severe infection and inflammation. Poor prognosis is expected in patients receiving emergency therapeutic transplantation for severe infectious keratitis. Following stabilization of the eye, repeat keratoplasty can be performed on an elective basis for optical purposes.

Conclusion

Infective keratitis either active or healed was the major indication for keratoplasty. The visual outcome following corneal transplantation was encouraging particularly in cases of optical keratoplasty.

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