

To Study the Visual Outcome of Therapeutic Penetrating Keratoplasty in a Tertiary Care Center

Sachin Daigavane¹, Madhumita Prasad², Vishal Kalode³

¹Professor & Head, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi, Wardha

²Senior Resident, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi, Wardha

³Senior Resident, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi, Wardha

Abstract: ***Introduction:** Corneal ulcer is the major cause of visual impairment and blindness. Lack of accessibility of eye care, delayed or inappropriate treatment, and microbes not responding to antimicrobial therapy may result in a large or perforated ulcer which will necessitate therapeutic penetrating keratoplasty (TPK). The procedure is meant to terminate or reduce an actively infectious corneal disease or repair an anatomic defect in the cornea. Penetrating keratoplasty constitutes a significant proportion of keratoplasty performed in developing countries. **Objective:** To find out the visual outcome of therapeutic penetrating keratoplasty for infective keratitis. **Materials and Methods:** A hospital based interventional study, carried out in department of Ophthalmology for 1 year and penetrating keratoplasty was performed in cases of recalcitrant microbial keratitis with impending perforation and outcome was noted. **Results:** In the present study 10 cases were enrolled. The maximum number of patients that is 7 patients were in the age group of 51-60 year (70%) whereas the least cases found in 41-50 years of age group. Out of 10 cases, 60 % were male and 40 % were female. Active keratitis were maximum trauma in 6 cases (60 %) which was a major risk factor. Culture positive was seen maximum for fungus in 6 (60 %) case. Preoperative UCVA was PL+ PR accurate in maximum 5 (50 %) cases. Postoperative BCVA was seen maximum in 6 (60 %) i.e. <6/60 with p value = 0.0001, which was significant. **Conclusion:** Therapeutic keratoplasty has a definite role in the management of perforated and/or severe infective keratitis. TPK provides structural stability, ambulatory vision, and can preserve potentiality of vision. Presence of infection and inflammatory status of the eye at the time of TPK makes the postoperative course challenging. Bacterial ulcers undergoing TPK have a better outcome in comparison to fungal ulcers.*

Keywords: keratoplasty, ulcer, graft

1. Introduction

In developing countries, a corneal ulcer is the major cause of visual impairment and blindness. Lack of eye care, delayed or improper treatment, and microbes not responding to antimicrobial therapy may lead to large or perforated ulcer which will require therapeutic penetrating keratoplasty (TPK). The procedure is meant to terminate or reduce an actively infectious corneal disease or repair an anatomic defect in the cornea.¹

It is generally performed in an emergency or semi-emergency basis. Visual rehabilitation is a secondary consideration. Therapeutic penetrating keratoplasty constitutes a significant proportion of keratoplasty performed in Asian and other developing countries. Therapeutic penetrating keratoplasty have a risk of recurrence of infection and also has a high risk of graft rejection and graft failure as compared to optical keratoplasty.² It has a high rate of postoperative uveitis, glaucoma, synechiae formation, and development of cataract. This study is intended to find out the outcome of therapeutic penetrating keratoplasty. This will provide baseline information for further prospective studies which in turn will help to identify the changes that need to be done to improve the outcome. Therapeutic penetrating keratoplasty (PK) retains the structural integrity of the eye and treats infectious or inflammatory keratitis that are not controlled by conventional medical therapy.

Penetrating keratoplasty is the final therapeutic option in the management of refractory corneal disease after conventional

medical therapy fails to prevent corneal perforation. In previous years, therapeutic PK was discouraged in cases with corneal perforation, because of the many complications. On the other hand, in cases treated by tissue adhesives, repeated applications may be required, and infectious keratitis can occur at the site where adhesives are applied. With the better outcome in surgical techniques for penetrating keratoplasty in recent years, therapeutic penetrating keratoplasty has become an ideal method to deal with corneal perforation and refractory corneal inflammation.

Scarring and astigmatism are often seen after corneal ulcers, and significant loss of vision is a common consequence. Endophthalmitis, involvement of sclera, perforation can be seen in severe cases. Major causes of blindness in developing countries are corneal ulcer associated with ocular trauma. Different types of ulcers result from different pathological processes and require different management approaches. Keratitis is usually caused by bacteria and fungi. Recently, soft contact lens users are increasing associated with fungal causation. Chemical burns with strong acids or alkalis are comparably prevalent among young patients. If corneal perforation are noticed, immediate management is required, as corneal perforation has high morbidity, and keratoplasty is commonly done. Amniotic membrane transplantation has been successful justified for corneal re-epithelization, but has not replaced keratoplasty, partly because of availability of donor tissue. Penetrating keratoplasty (PK) is a very good technique; however, complications such as postoperative infection, corneal as well as macular edema, corneal astigmatism, retinal

detachment, immune reactions and graft failure are of great concerns.

Aims and Objectives

To find out the visual outcome of therapeutic penetrating keratoplasty for infective keratitis.

2. Material and Methods

The study was adhered to the tenets of the declaration of Helsinki, and it was approved by an institutional ethic committee. Informed consent was obtained from all subjects after the nature and possible consequences of the study were explained to them.

Sample size:

A total of 10 eyes of 10 patients presenting with infective keratitis attending the OPD of department of ophthalmology were selected.

Inclusion Criteria:

- 1) Corneal perforation/ thinning
- 2) Non-healing corneal ulcer (infective keratitis)

Exclusion Criteria:

- 1) Abnormalities of the eyelids (blepharitis, ectropion, entropion and trichiasis).
- 2) Recurrent ocular infection
- 3) Certain systemic infections such as HIV, viral hepatitis, syphilis, congenital rubella, tuberculosis, septicaemia and active malaria.
- 4) Uveitis,
- 5) Uncontrolled glaucoma
- 6) Ocular disease such as inflammation and malignancies (e.g. retinoblastoma)

Methods

General Examination

General vital data like pulse, blood pressure, peripheral pulses was noted, higher function status also was noted. Examination of cranial nerves was done.

Ocular Examination

Pre op evaluation:

- Evaluation of visual potential.
- Ocular surface disease – must be recognized and treated prior to penetrating keratoplasty e.g. ectropion, and entropion, dry eyes, blepharitis, trichiasis, exposure keratopathy,
- IOP was controlled prior to surgery.
- Ocular inflammation – recognized and treated.
- Prior corneal diseases and vascularisation.
- Decompression of globe was ensured.
- Miotics were used preoperatively to protect the lens during surgery.
- Graft size determination was based on three main factors: the size of the recipient cornea, the targeted disease, and the known increased risk of rejection with increasing graft size.
- An ideal size is 7.5 mm, grafts smaller than this may give rise to high astigmatism.

- Grafts of diameter 8.5 mm or more are prone to postoperative anterior synechiae formation, vascularization and increased intraocular pressure.

Excision of donor corneal button

The size of the donor corneal button should be 0.50 mm large as compare to recipient cornea, care must be taken that the endothelium should not be damage in order to facilitate watertight closure, it will reduce the chances of postoperative flattening and reduce the possibility of postoperative glaucoma.

Excision of recipient corneal button –

- Iris and lens should not be damaged
- Recipient trephining can be performed freehand or with suction trephine systems which stabilize the globe and ensure that the angle of trephination is perpendicular to the surface.

Surgical technique and postoperative management:

The therapeutic penetrating keratoplasty was performed under peribulbar block. In all cases, the donor size was more than 0.5 mm. The recipient cornea was incised with the help of handheld trephine. Adequate steps were followed to avoid pressure on the globe. Freehand dissection of the host bed was performed in case of a large perforation and sloughing ulcer, after primary marking with a trephine. The infiltrated area with 1mm of healthy corneal tissue was removed except when complete corneal infiltrate was present.

Microbial investigations was done for excised corneal specimen.

Anterior chamber (AC) was washout containing purulent material. The inflammatory membranes over the iris and pupil were removed with the help of forceps. Anterior and posterior synechiae were removed. In order to prevent pupillary block glaucoma one or two peripheral button iridectomy was done.

Suspected cases of endophthalmitis Intravitreal injection of antimicrobial where given. Graft host junction was closed with the help of interrupted 10-0 nylon suture.

The duration as well as frequency of antimicrobial and steroids were titrated depending upon the grade of infection, type of infection, epithelial defect, and postoperative inflammation.

Bacterial keratitis requires shorter treatment as compare to fungal.

Use of steroids were delayed by 1 to 2 weeks where as it was immediately given in bacterial keratitis postoperatively.

Statistical Analysis

By using convenient random sampling, we included 10 eyes of patient in the study.

Statistical analysis was done with the help of descriptive and inferential statistics using Chi square test. Software used in the analysis was SPSS 17.0 and Graph Pad 6.0 and $p < 0.05$ was considered as level of significance.

3. Observations and Results

Table 1: Age wise distribution

Age (years)	No. of patients	Percentage (%)
41-50 years	1	10%
51-60 years	7	70%
61-70 years	2	20%
Total	10	100 %

The maximum number of patients were in the age group of 51-60 year (70%) whereas the least cases found in 41-50 years of age group.

Table 2: Gender wise distribution

Gender	No. of patients	Percentage (%)
Male	6	60 %
Female	4	40 %
Total	10	100 %

Out of 10 cases, 60 % were male and 40 % were female.

Table 3: Major risk factors for active keratitis

Risk Factors	No. of patients	Percentage (%)
Trauma	6	60 %
Chemical burn	2	20 %
Malnutrition	0	0 %
Dry eye	2	20 %

Active keratitis were maximum trauma in 6 cases (60 %) which was a major risk factor.

Table 4: Culture-positive

Organisms	No. of patients	Percentage (%)
Bacterial	4	40 %
Fungal	6	60 %

Culture positive was seen for maximum for fungus in 6 (60 %) cases

Table 5: Preoperative UCVA

UCVA	No. of patients	Percentage (%)
PL+ PR ACCURATE	5	50 %
HMCF	3	30 %
FCCF	2	20 %
< 6/60	0	0 %
6/60 -6/24	0	0 %
6/24-6/9	0	0 %

Preoperative UCVA was PL+ PR accurate in maximum 5 (50 %) cases.

Table 6: Postoperative BCVA

BCVA	No. of patients	Percentage (%)
PL+ PR ACCURATE	0	0 %
HMCF	0	0 %
FCCF	1	10 %
< 6/60	6	60 %
6/60 -6/24	3	30 %

Postoperative BCVA was seen maximum in 6 (60 %) i.e. <6/60 with p value = 0.0001, which was significant.

4. Discussion

In the present prospective clinical study, we studied visual outcome of therapeutic penetrating keratoplasty for infective keratitis. The study was done for the period of 1 year. We studied the result of therapeutic penetrating keratoplasty for infective keratitis in 10 cases.

Age, gender-wise, distribution of therapeutic penetrating keratoplasty for infective keratitis

Table 1. show the maximum number of patients were in the age group of 51-60 year (70%) whereas the least cases found in 41-50 years of age group.

Table 2. show out of 10 cases, 60 % were male and 40 % were female.

Table 3. showed that active keratitis were maximum trauma in 6 cases (60 %) which was a major risk factor.

Table 4. show Culture positive was seen for maximum for fungus in 6 (60 %) cases

Table 5. show Preoperative UCVA was PL+ PR accurate in maximum 5 (50 %) cases.

Table 6. show Postoperative BCVA was seen maximum in 6 (60 %) i.e. <6/60 with p value = 0.0001, which was significant.

In a study by Sharma N et al 3, found that Th PK has a definitive role in the management of severe and refractory keratitis with a high success in restoring anatomical integrity and providing useful vision.

Sedhipour MR et al 4, concluded that, there are practical reasons for continuing the use of PK in centers, with due attention to the requirement for topical immunosuppression to diminish the rate of graft rejection and antimicrobial treatment to prevent postoperative infection.

Bajracharya L et al 5, concluded that Therapeutic keratoplasty is an important procedure to save the eye and preserve vision in severe infective keratitis.

In a study by Chen et al 6, found that Therapeutic PKP is valuable in the management of microbial keratitis that is unresponsive to medical therapy. Surgical results are worse for patients with fungal keratitis, regardless of graft clarity, anatomical success, or infection eradication rate.

Ti Se et al 7, found that Therapeutic keratoplasty may treat severe, refractory infectious keratitis effectively. High cure rates are achievable, although infection recurrence despite of prolonged treatment remains a significant problem in fungal keratitis.

Nubile M et al 8, in a study found that Penetrating keratoplasty, at high risk for failure in the acute settings of an infected and inflamed eye, can be delayed until the cornea is healed. Amniotic membrane transplantation may be an alternative surgical option to achieve this goal.

Systemic immunosuppressants are not required for penetrating keratoplasty patients, but in order to reduce

allograft reduction rates topical steroids supplemented with agents such as cyclosporine was given.

5. Conclusion

Therapeutic keratoplasty has an important role in the management of perforated or severe infective keratitis. Therapeutic penetrating keratoplasty provides structural stability, preserve vision.

At the time of surgery presence of infection and inflammatory status of eye play a major role in outcome.

Fungal ulcers have a lesser outcome as compare to bacterial ulcers undergoing Therapeutic penetrating keratoplasty.

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