

## Role of Penetrating Keratoplasty in Infectious Keratitis

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### Original Research Article

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**Abstract:** Infectious keratitis is one of the major causes of avoidable blindness. It's an ocular emergency. Appropriate and timely management can reduce the incidence of severe visual loss and restrict corneal damage. Medical management according to clinical diagnosis is the first line of treatment. For refractory cases, impending perforation or patients presenting with corneal perforation penetrating keratoplasty is needed. A therapeutic keratoplasty offers a surgical debridement of an infectious process thereby decreasing the organisms in the cornea to a level at which exogenous anti-infective/anti-inflammatory agents and the patients' endogenous host defense mechanisms can be effective. This study was undertaken with the aim to study etiological analysis of cases presenting with infectious keratitis and role of penetrating keratoplasty in management of corneal ulcer/abscess.

**Keyword:** corneal ulcer, keratitis, keratoplasty.

### INTRODUCTION

Corneal blindness is a major public health problem in India and infections constitute the most predominant cause. Infectious corneal ulcer/abscess has for long been the Achilles' heel of most ophthalmic surgeons. Therapeutic keratoplasty is indicated when inflammatory or infectious corneal disease is advancing despite maximum medical therapy, and the integrity of the globe is compromised. A therapeutic keratoplasty offers a surgical debridement of an infectious process thereby decreasing the organisms in the cornea to a level at which exogenous anti-infective/anti-inflammatory agents and the patients' endogenous host defense mechanisms can be effective.

This study was undertaken with the aim to study etiological analysis of cases presenting with infectious keratitis and role of penetrating keratoplasty in management of corneal ulcer/abscess.

### MATERIALS AND METHODS

This is a prospective interventional study conducted on 206 patients with corneal ulcer attending Ophthalmic OPD of tertiary eye care hospital during the year 2008-2013. All the patients were subjected to thorough ocular examination and findings were noted in detail. USG B scan was done to rule out possibility of endophthalmitis. Corneal scraping specimens were collected for all patients (for patients under medical therapy, topical drops were discontinued for 48 hours before taking corneal scraping) under slit lamp using a 26 G needle and smears were prepared (for gram staining and KOH mount). All the preparations were sent for examination under the microscope for the presence of bacterial and fungal elements. Three more specimens were obtained for inoculation of Blood agar, Mac Conkey Agar and Sabourauds Dextrose Agar for culture of bacterial and fungal elements. All patients underwent initial medical management with a

combination of fortified antibiotic drops comprising cephazoline sodium (5%) and tobramycin sulphate (1.3%) at hourly intervals round the clock in all cases. In cases where there was clinical suspicion of fungal or viral infection, topical antifungal or antiviral given. Cycloplegia was produced by Atropine (1%) once or homatropine (2%) eye drops. Chemical cautery with 100% carbolic acid was done as and when required. Supportive treatment included antiglaucoma medications, acetazolamide, artificial tears, and vitamins in all cases. Systemic Antibiotics included Cefotaxime and Metronidazole. If there was no response or deterioration with the medical treatment for 15 days, Therapeutic Penetrating Keratoplasty was considered.

Penetrating keratoplasty was performed using standard microsurgical technique. Donor corneal graft was taken with help of trephine, 0.5 mm larger than recipient's bed. The donor corneal graft was sutured with 4 primary interrupted 8-0 sutures and then 12 interrupted 10-0 nylon sutures applied.

Intensive antimicrobial therapy was continued postoperatively whenever required, otherwise, medications consisted of steroid eye drops (initiated at 6 hourly intervals and gradually tapered), antibiotic drops 6 hourly, tear supplements, and antiglaucoma medications where required. Lubricants or tear supplements were given for early re-epithelization. Cycloplegics were given routinely in all cases to prevent the pupillary block ciliary spasm & peripheral anterior synechiae. Topical cyclosporine (0.1%) was used prophylactically in all the cases to reduce the chances of graft rejection. Most of the Patients were discharged after 2 weeks of hospitalization on stabilization. Follow up schedule was every week for 1 month & every fortnight for 2 months, then every month till at least for 1 year.

**RESULTS**

We studied prospectively 206 patients of infectious keratitis. These patients underwent thorough ocular examination and optimum medical/surgical management. Time of presentation of patient at our institute ranged from 10 days to 2 months

from onset of complaints. There were 123 males & 83 female patients. Age range from 32–70 years. Maximum Patient was of the age group (41–60) years (table 1). Majority of the cases were that of bacterial keratitis (76.7%) followed by fungal keratitis (15.5%) (Table 2). Corneal scraping was positive in 38.34% of the cases. (Table 3). Medical management was successful in 4 (15.4%) cases, surgical 20 (76.9%) cases, evisceration (due to endophthalmitis) 2 (7.5%) cases (table 4). Out of 206 cases, 31 cases responded to medical management, 2 underwent evisceration due to endophthalmitis and 173 were taken for penetrating keratoplasty. Out of 173 cases, anatomical success was achieved in 93.06% while 12 had to be eviscerated due to recurrence of graft infection leading to panophthalmitis (table 5). Post-operative vision (table 6) of greater than counting figure at 3 feet was achieved in 86.70% of cases (150). Graft was clear in 41.05% cases (table 7). The most common complication noted was epithelial defect followed by suture related complication (table 8). There was graft failure in 11 cases (6.35%)

**Table-1 Age and Sex Distribution**

Age	male	female	total
0-20 years	-	-	-
21-40 years	37	16	53
41-60 years	69	58	127
61-80 years	17	9	26
> 80 years	-	-	-
Total	123	83	206

**Table-2: Etiology of infectious keratitis**

Clinical diagnosis	Microbiological Diagnosis	
	No. (x)	% (a/x)
Bacterial ulcer	158	76.7%
Fungal ulcer	32	15.5%
Viral Ulcer	16	7.7%
Total	206	100%

**Table-3: Etiology of corneal ulcer on the basis of corneal scraping and culture**

Bacteria	30.58%
<ul style="list-style-type: none"> <li>• Gram positive cocci 17.47%</li> <li>• Gram negative bacilli (E Coli) 5.8%</li> <li>• Pseudomonas 3.88%</li> <li>• Klebsella 3.39%</li> </ul>	
Fungal	7.76%
Total	38.34%

**Table-4: Treatment modality**

Medical management	31
Surgical Management (Therapeutic PK)	173
Eviscerated (during medical management due to endophthalmitis)	2
Total	206

**Table-5: Anatomical Outcome of penetrating keratoplasty at 6-12 months follow-up**

Anatomical outcome	Total		Eviscerated		Successful	
	No.	%	No.	%	No.	%
6-12 months	173	83.98%	12	6.93%	161	93.06%

**Table-6: Visual outcome at 6 months postop**

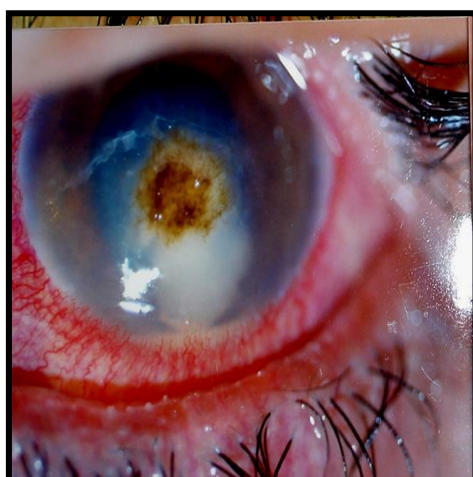
VA	Preop		Postop	
	No.	%	No.	%
HM+ or less	135	78.03%	11	6.3%
CF -3FT	38	21.96%	13	7.5%
1/60			14	8.09%
3/60	-	-	56	32.36%
6/60	-	-	67	38.73%
Lost (Eviscerated)	-	-	12	6.93%
Total	173		173	

**Table-7: Graft clarity**

Graft	No. of cases	percentage
Clear	71	41.04%
Hazy	79	45.56%
Opaque	11	6.35%
Eviscerated	12	6.93%

**Table-8: Post-operative complications**

Complications	Total	Percentage
Suture Related Complications	51	29.4%
Raised IOP	18	10.40%
Epithelial Defect	58	33.52%
Anterior Uveitis	17	9.8%
Recurrence of infection	12	6.93%
Graft failure	11	6.35%



**DISCUSSION**

The present study comprised of 206 cases of infectious keratitis. In which 31 cases improved by medical management, 2 cases eviscerated (due to endophthamitis) & 173 cases underwent Therapeutic PK. The results of the surgery were studied with follow-up for 6 months to 1 year. Attempt was made to evaluate

the efficacy of PK as therapeutic procedure in treating corneal ulcers in terms of anatomical outcome, graft outcome, visual outcome, complications and correlating them with results in other studies. Achievement of anatomical success was the primary goal of TPK which implies maintenance of the globe integrity. At the end of 3 months, anatomical success was achieved in

93.06% cases & 12 cases had to be eviscerated because of reinfection which leads to panophthalmitis.

**Comparison of different studies with our study**

Study	Cases (Eyes)	Success
Sanders	13	84%
Malik and Singh [8]	----	85%
Our Study	26	90%

Graft clarity is the most important factor in deciding the functional outcome of the procedure. In the Study conducted by Bates *et al.* [1], only 23% of cases retained a clear graft. Study conducted by Harris *et al.*

[2], only 40% of the previously clear grafts retained clarity in our study 41.04 % of cases retained clear graft [9].

**Comparison of complications of different studies with our study**

Complications	Sony & colleagues [3]	Panda [4]	Our study
Persistent epithelial defect	10.9 %	25 %	25 %
Raised IOP	19.4 %	----	10 %
Suture related comp.	-----	16%	30 %
Anterior uveitis	-----	40%	5 %
Reinfections	8.9%	----	12 %
Graft failure	---	-----	6.35%

In study of Foster [5], Hill [6] and Rao [7] graft rejection was 14.6-52.1% [10]. Though visual outcome was not our primary goal for therapeutic keratoplasty, we compared the preoperative and postoperative vision at the 3 months follow up [11]. Preoperative vision in majority of patient (78.03%) was hand movement or less [12]. Postoperatively in 38.73% cases vision was greater than 6/60 and 32.36% had vision between 3/60 to 6/60[13].

**CONCLUSION**

Therapeutic P K is safe and effective procedure in management of refractory infectious keratitis. Majority of patients achieve anatomical success and improvement in visual acuity.

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