

# Role of Therapeutic Keratoplasty in Unresponsive Microbial Keratitis: A Retrospective Study in a Tertiary Referral Center in Eastern India.

Rajkumar Victor<sup>1</sup>, Monica Karam<sup>1</sup>, H. Kulabidhu Singh<sup>2</sup>, K. Naresh Kumar Singh<sup>4</sup>

<sup>1</sup>Senior Resident, Dept. of Ophthalmology, JN Institute of Medical Sciences, Imphal, Manipur, India.

<sup>2</sup>Senior Resident, Dept. of Otorhinolaryngology, JN Institute of Medical Sciences, Imphal, Manipur, India.

<sup>3</sup>Associate Prof., Dept. of Community medicine, JN Institute of Medical Sciences, Imphal, Manipur, India.

<sup>4</sup>Professor, Dept. of Ophthalmology, JN Institute of Medical Sciences, Imphal, Manipur, India.

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## ABSTRACT

**Background:** Corneal blindness is a major public health problem in India as it constitutes 20-30% of all blindness in the developing countries including this country. Of them, microbial keratitis which is a serious disease and needs immediate, appropriate and intensive treatment tops the list. When corneal infection does not respond to appropriate medical treatment, the other therapeutic options include conjunctival flap, tissue adhesive, patch graft and lamellar keratoplasty. However, for extensive infection or impending perforation the only procedure remaining is the surgical excision of the infective tissue and replacement with corneal transplant. Studies done to evaluate the effectiveness of this procedure gave varying results. Hence, it was felt necessary to re-evaluate the effectiveness of this therapeutic procedure in terms of anatomical restoration of the tissue defect, control of infection and post operative visual acuity. **Methods:** A retrospective analysis of data from records maintained of 60 patients who underwent therapeutic penetrating keratoplasty between April 2015 and March 2017 in Jawaharlal Nehru Institute of Medical Sciences, Imphal, a tertiary care eye institute in the eastern India, was done. Keratitis other than bacterial and fungal or repeat therapeutic penetrating keratoplasty, were excluded from the study. The pre-operative data were obtained regarding patients' socio-demography and extent of ulcer, type of infection, history of ocular trauma, previous diagnosis, wearing of contact lens and visual acuity at the time of presentation. The parameters used for anatomical integrity were globe contour, IOP and graft integrity. Infections were considered to be controlled if there was no evidence of corneal infiltration and anterior chamber reaction suggestive of infection for  $\geq$  one month after the surgery. **Results & Conclusion:** In the early post-operative phase anatomical integrity was achieved in all the 60 cases operated. When the anatomical integrity was evaluated according to the last clinical examination at 3 months' follow-up, the anatomical integrity was preserved in 51 (85%) cases (21 bacterial + 30 fungal). The overall cure rate in terms of eradication of infection was 76.9%. It was found to be significantly better among the bacterial keratitis group than among the fungal keratitis group ( $P < 0.05$ ). Regarding visual prognosis, some of them gained better visual status including one who regained a best corrected visual acuity of 6/12.

**Keywords:** Corneal perforation, Fungal keratitis, Non-responsive microbial keratitis, Therapeutic penetrating keratoplasty

## INTRODUCTION

Corneal blindness is a major public health problem in India as it constitutes 20-30% of all blindness in the developing countries including this country.<sup>[1]</sup> Of them, microbial keratitis which is a serious disease and needs immediate, appropriate and intensive treatment tops the list.

Over the last few decades early diagnosis and a better understanding of its pathophysiology coupled with the availability of potent antimicrobial drugs have partially improved its medical control. Yet,

virulent and resistant forms of infectious bacteriae, fungi, Acanthoma spp. and Pseudomonas aeruginosa still continue to cause keratitis to progress with eminent blindness in spite of maximal medical therapy.<sup>[2-5]</sup> In addition, Acanthoma spp. may be unresponsive to anti-amoebic medication and some rare cases of herpes simplex stromal keratitis do not respond to antiviral medications with or without corticosteroids.<sup>[6]</sup>

When corneal infection does not respond to appropriate medical treatment, the other therapeutic options include conjunctival flap, tissue adhesive, patch graft and lamellar keratoplasty. However, for extensive infection or impending perforation the only procedure remaining is the surgical excision of the infective tissue and replacement with corneal transplant. Studies done to evaluate the effectiveness of this procedure gave varying results.<sup>[7,8]</sup> Hence, it

### Name & Address of Corresponding Author

Dr. Monica karam  
Langol Lamkhai,  
Near Shija hospital  
Imphal,  
Manipur 795004.

was felt necessary to re-evaluate the effectiveness of this therapeutic procedure.

**Objectives**

The objective of the present study was to evaluate the success of therapeutic penetrating keratoplasty in terms of anatomical restoration of the tissue defect, control of infection and post operative visual acuity

**MATERIALS AND METHODS**

A retrospective analysis of data from records maintained of all patients who underwent therapeutic penetrating keratoplasty between April 2015 and March 2017 in Jawaharlal Nehru Institute of Medical Sciences, Imphal, a tertiary care eye institute in the eastern India, was done. All cases which underwent therapeutic penetrating keratoplasty for bacterial or fungal corneal ulcers which were progressive in spite of medical treatment, sloughing, large perforations, thinning and profound anterior chamber reaction and who could be followed up for a minimum period of three months from the date of surgery were included. Keratitis other than bacterial and fungal (typical or suspected viral ulcer, marginal keratitis, interstitial keratitis, atheromatous ulcer, neutrophilic keratitis and any ulcer associated with systemic or autoimmune disease) or repeat therapeutic penetrating keratoplasty were excluded from the study.

60 eligible patients were thus included for the study. Their pre-operative data were obtained regarding patients' age, sex, duration, type and extent of ulcer, type of infection, history of ocular trauma, previous diagnosis, wearing of contact lens and visual acuity at the time of presentation. Pre-operative data included details on size of donor button and recipient bed, grade of tissue, suturing, presence of infection and complications of surgery or any other necessary procedure. The post-operative data included date and indications of surgery, length of follow-up, final post-operative visual acuity, post-operative complications, signs of infection and posterior segment evaluation by USG.

The parameters used for anatomical integrity were globe contour, intra-ocular pressure (IOP) and graft integrity. Infections were considered to be controlled if there was no evidence of corneal infiltration and anterior chamber reaction suggestive of infection for ≥ one month after the surgery.

Both descriptive analysis (mean, SD, percentages) and analytical statistics (chi-square for comparing proportions) were used for data analysis. A p-value of less than 0.05 was considered statistically significant.

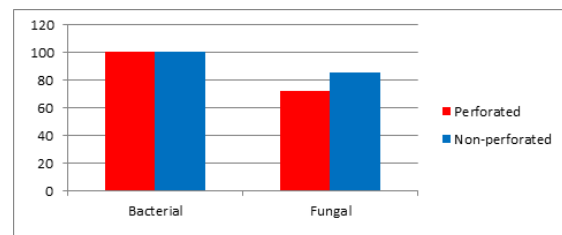
**RESULTS**

Out of the 60 eligible study-subjects, 47 (78.3%) were males, the remaining 13 (21.7%) being

females. The mean (SD) age of the patients was 51.5 (± 14.57) years. Maximum number of cases (29; 48%) were aged 41-60 years. 81.6% of the patients were from rural areas. More than half of the cases (31; 51.6%) were agricultural workers. A recent history of corneal injury could be seen in almost all cases (55; 91.6%).

Non-responsive fungal corneal ulcer with or without perforation was observed in 39 cases (65%) whereas the remaining 21 cases (35%) were of bacterial origin. Out of all the 60 cases who underwent therapeutic keratoplasty, 35 eyes (58.3%) already had perforation at the time of operation. For the remaining 25 eyes, the initial indications for the therapeutic keratoplasty were descemetocoele (10; 16.6%), thinning of corneal stroma (6; 10%), uncontrolled progression of the ulcer (6; 10%) and severe anterior chamber reaction (3; 5%).

In the early post-operative phase anatomical integrity was achieved in all the 60 cases operated. 12 of them (20%) needed a second graft because of recurrence of infection. When the anatomical integrity was evaluated according to the last clinical examination at 3 months' follow-up, the anatomical integrity was preserved in 51 (85%) cases (21 bacterial + 30 fungal). The results were better in the bacterial keratitis group when compared to the fungal keratitis group [Figure 1].



**Figure 1: Anatomical success rate after therapeutic keratoplasty.**

The overall cure rate in terms of eradication of infection was 76.9%. It was found to be significantly better among the bacterial keratitis group than among the fungal keratitis group. [Table 1].

**Table 1: Cure rate after therapeutic keratoplasty**

Type of ulcer	Group (n)	No. cured (%)	p-value
Bacterial	Perforated (10)	10 (100)	< 0.05
	Non-perforated (11)	11 (100)	
Fungal	Perforated (25)	16 (64)	
	Non-perforated (14)	12 (85.7)	

Regarding visual prognosis, the pre-operative and the post-operative visual acuity of the 60 patients treated with the procedure are illustrated in [Table 2]. Although the percentage figures were not so heartening, some of them gained better visual status including one who regained a best corrected visual acuity of 6/12.

**Table 2: Pre-operative and post-operative visual status of affected eye.**

Visual acuity	No. on pre-operative period (%)	No. in post-operative period (%)
PL	36 (60)	32 (53.3)
FC CF - FC 3ft	15 (25)	13 (21.6)
FC 4ft - 5/60	5 (8.3)	4 (6.6)
6/60 - 6/36	4 (6.6)	6 (10.0)
6/24 - 6/18	-	4 (6.6)
6/12 - 6/6	-	1 (1.6)

Optical keratoplasty was subsequently performed in six eyes after the therapeutic keratoplasty. Following that one eye had a best corrected visual acuity of 6/12 vision and three eyes had improved visual acuity. But the visual acuity of two eyes which developed graft decompensation remained unchanged.

## DISCUSSION

A majority of the patients who had corneal ulcer in the present study (48%) was in the age-range of 41-60 years. Earlier studies done by Jones DB et al, Reddy PS et al, Dasgupta LR et al, Forster et al, Srivastava OP et al and Dutta LC et al in other states of the country and abroad also reported that corneal ulcers occur most commonly within this age group.<sup>[3,8-12]</sup> Male patients were predominant in the earlier studies mentioned above. The present study found more than two-thirds of the patients to be males. The probable reason might be that males are more exposed to injuries to their eyes as they are more actively engaged in works, particularly agricultural. In the present study more than half of the study-subjects were agricultural workers. Earlier studies done elsewhere in the country also found the disease to be more common among agricultural workers.<sup>[9,10,12,13]</sup>

Injury of the cornea plays a very important role in causing corneal ulcer which may become infected. History of injury was present in 92% of the patients in the present study. Injury as a predisposing factor for or association with bacterial or fungal corneal ulcers were pointed out of earlier studies done by Forster RK Dasgupta LR et al, Ley AP et al and Ormerod et al.<sup>[3,10,14,15]</sup>

In the present study, anatomical integrity could be obtained in all the patients initially which declined to 85% at the last follow-up examination at three months' post-operatively. This finding is comparable with earlier study findings made by various researchers from inside and outside the country.<sup>[4,16-20]</sup>

The cure rate in more than three-fourths of the cases as found out from the present study is comparable with the study-findings made by Du Nz et al, Malik SRK et al, Killingsworth et al and Polack FM.<sup>[4,17,19,21]</sup> The lower cure rate among the fungal

keratitis group might have been because of severe and extensive disease at the time of presentation and also the tendency to recur more for fungal keratitis.

## CONCLUSION

The overall improvement in the visual acuity after the surgical procedure was not found to be very marked. But, keeping in mind that the primary aim of the procedure was to re-establish the integrity of the globe and to control the infection process, therapeutic keratoplasty has a definite role in the management of non-responsive microbial corneal ulcers. Visual rehabilitation, if necessary can always be accomplished later under more controlled circumstances. Overall, therapeutic penetrating keratoplasty appears to be a valuable option in the treatment of non-responsive microbial keratitis.

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