

## THERAPEUTIC PENETRATING KERATOPLASTY FOR NONHEALING FUNGAL KERATITIS: A RETROSPECTIVE CLINICAL STUDY AT A TERTIARY EYE CARE CENTRE IN SOUTH INDIA

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**ABSTRACT: PURPOSE:** To study the outcome of therapeutic penetrating keratoplasty (TPK) done for non-healing fungal keratitis. **METHODS:** A retrospective interventional case study done on 25 fungal keratitis cases refractory to medical treatment. The outcome was measured in terms of maintenance of anatomical integrity, control of infection, visual acuity, graft clarity and complications. **RESULTS:** Of the 25 cases studied, the most common indication for keratoplasty in our study was non-healing corneal ulcer [56%] followed by perforated corneal ulcer [28%]. The mean age of presentation was 52 yrs, 52% of patients were males and 48% were females. 9 cases [36%] gave a positive h/o injury with vegetative matter and 8[32%] cases gave h/o entry of foreign body. All patients in our study had pre-operative vision less than 1/60. Post operatively 88% had vision better than preoperative vision. Complications included epithelial defect in 10[40%] cases, 7[28%] cases had a recurrence of infection, 7[28%] had secondary glaucoma which were treated medically, 2[8%] had graft melt, 2[8%] had cataractous lens, 2[8%] had scleral abscess. Anatomical integrity was maintained in 23[92%] of our cases and graft clarity was maintained in 6[24%] cases. **CONCLUSION:** The present study suggests that therapeutic keratoplasty in non-healing fungal ulcers helps in maintaining the anatomical integrity, decreases the infection load, improves vision as a secondary outcome, the patient can undergo an optical keratoplasty in future and prevents devastating complications.

**KEYWORDS:** Keratitis, Fungal Keratitis, therapeutic, penetrating keratoplasty.

**INTRODUCTION:** Fungal keratitis was first described by Leber in 1879. It is one of the major causes of visual loss in developing countries.<sup>1</sup> A major contributing factor for the development of fungal infection is ocular trauma and contamination of corneal lesions by soil and vegetative material, with agriculture being the occupation in most cases. Another factor being widespread use of broadspectrum antibiotics, steroids and contact lens wear. Epidemiological studies suggest that many of these patients live at considerable distances from the reach of an ophthalmological clinic. Many patients hence have a long duration of disease and corneal infection including corneal perforation by the time they are referred to higher centres. Fungal keratitis patients who are diagnosed in the early stages and treated with appropriate antifungals are found to have better outcomes because of the more potent and less toxic antifungal agents available off late. However, refractory fungal keratitis still poses a therapeutic challenge as it may progress to corneal perforation and fungal endophthalmitis. To arrest infectious progress, avoid disastrous complications and preserve the globe integrity, TPK has been advocated for severe fungal

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keratitis. TPK is found to maintain the structural integrity and eradication of sepsis is achieved in 90 % of cases.<sup>2</sup>

**METHODS:** Twenty five inpatients of Minto Ophthalmic Hospital between November 2012 and May 2014 with non-healing fungal keratitis were evaluated based on history, a detailed preoperative examination including visual acuity measurement, slit lamp examination, when fundus could not be visualized patients underwent a posterior segment ultrasonography (B-scan). Intra ocular pressure was recorded with digital estimation.

Patients with pathology involving posterior segment and those with glaucoma which would affect the final visual outcome were not included in the study. Lacrimal syringing was done to check the patency of the lacrimal system.

Diagnosis of fungal keratitis was done with use of wet mount KOH preparation using corneal scrapings. The patients were treated with Natamycin 5% e/d hourly, Moxifloxacin e/d 6 times daily, Atropine e/o tid, Timolol e/d bd, T. Ketoconazole 200mg bd, T. Acetazolamide 250 mg bd, T. Rantac 150mg bd, C. Indomethacin SR 75mg od, and intracameral voriconazole 100microgram/ 0.1ml was given to patients with non-healing ulcer preoperatively. Since there was no improvement with above line of management, they were considered for keratoplasty. Informed consent was taken from all patients. Under local anaesthesia and lid speculum in place, recipient bed preparation made. The recipient bed was marked with a disposable free hand trephine; the size ranging from a minimum of 7mm to a maximum of limbus to limbus depending on the case. The trephine was advanced to mark only the superficial stroma. Anterior chamber was entered with the #11 blade at trephined site, viscoelastics were injected then trephination was continued along the marking using corneal scissor taking care margins are well circumscribed and curvilinear. Whole 360 degree of the diseased corneal button is taken out. Additional surgeries like lens extraction, IOL removal, anterior vitrectomy was done whenever required. Donor button was punched and sutured to recipient bed using 10-0 ethilon monofilament suture. A subconjunctival injection of gentamicin 0.5 ml was given. Eye was examined on first post-operative day under slit lamp to look for any postoperative complications. Continuation of pre-operative topical and systemic anti-fungal drugs on an average for 14 days post operatively was done. During systemic administration of antifungal agents, the levels of hepatic enzymes were monitored every 2 weeks. Patients were followed-up every week for one month and at 6 weeks, there after once in a month for 6 months after discharge.

**Graft clarity was graded as:**

**Clear:** All details of iris clear and visible.

**Hazy:** Corneal haziness that partially obscures iris details.

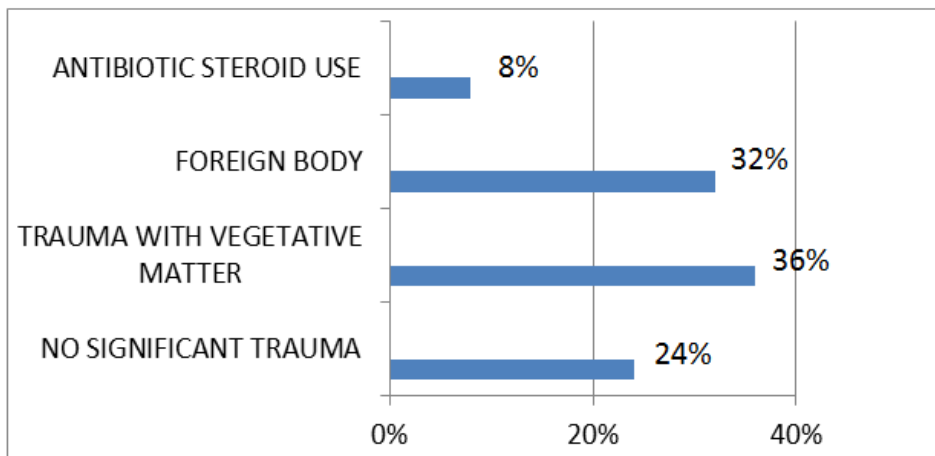
**Opaque:** White totally edematous cornea with or without vascularization, with or without scarring.

Outcome was evaluated in terms of maintenance of anatomical integrity, control of infection, visual acuity, graft clarity, complication.

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**RESULTS:** Of the 25 patients with fungal keratitis patients studied 14[56%] were males and 11[44%] were females with no significant difference in the gender distribution. Elderly patients were affected commonly with maximum number of patients in the age group of 60-70 years [28%] followed by 50-60 years [24%].

A definite history of injury was given in 17 cases [68%] cases either with a vegetative matter or steroids.

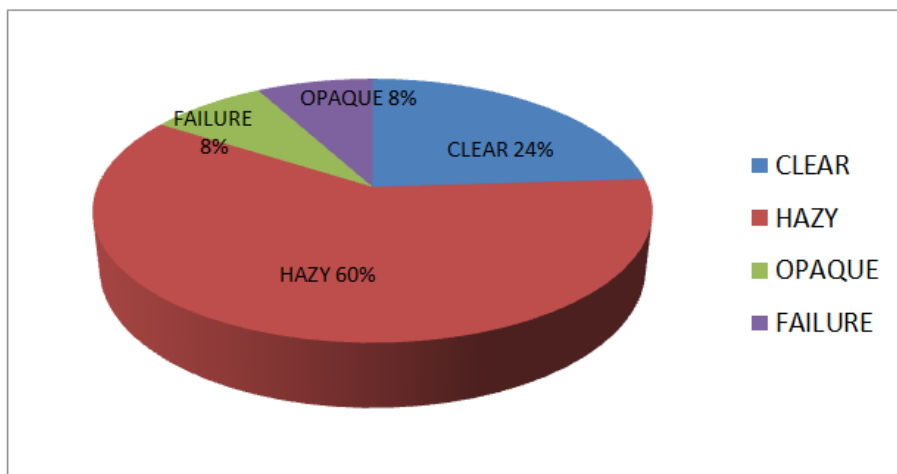


**Chart 1: Distribution of cases based on history**

The most common indication for keratoplasty was non-healing ulcer in 14[56%] cases followed by 7[28%] cases for perforated corneal ulcer.

Preoperative vision in all patients was less than 1/60. Post operatively 88% of the cases had a vision better than preoperative status. Anatomical integrity was maintained in 23[92%] of our cases.

A clear graft was seen in 6[24%] of cases.



**Chart 2: Distribution of cases based on graft clarity**

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Complications that were noted are epithelial defect in 10[40%] cases, recurrence of infection 7[28%] cases, secondary glaucoma 7[28%], regraft 2[8%], cataractous lens 2[8%], scleral abscess 2[8%] cases.

**DISCUSSION:** Patients with a large suppurative corneal ulcer or in the stages of perforation if not treated intensively with therapeutic keratoplasty which decreases the infectious load, maintains the integrity of the globe can lead to severe complications like endophthalmitis, panophthalmitis and loss of eye. To prevent such disastrous course of the disease, importance of early and prompt intervention is mandatory. In our study we found an equal number of male and female patient's undergoing kerpoplasty in contrast to other studies done by L Xie et al where more number of male patients had fungal keratitis compared to females.<sup>3</sup> This could be because of late presentation of our female patients with more advanced disease. Visual loss occurring because of corneal ulcer can be found in any age group but seen more commonly in elderly. In our study mean age group of the patients was 52 years. A primary fungal corneal ulcer occurring without trauma or foreign body is rare. An antecedent history of trauma is therefore contributory to ulcer formation which was seen in 68% of our cases in comparison to study done by V Sharma et al where 91.8% of their cases had history of trauma.<sup>4</sup> Fungal corneal ulcer cases not responding to medical treatment with extension of ulcer into the deeper layers of the cornea were given 2 doses of intracameral voriconazole (100 microgram/0.1ml), since there was no significant improvement, patients were taken up for TPK, 4 out of 7 cases with perforation and 2 out of 3 cases with impending perforation were treated with tissue adhesive glue before surgery.

A non-healing ulcer in 56% and perforation in 28% of our cases was noted. In a study done by Y.F Yao et al in 2003, 15 cases [33%] had perforation out of 45 cases undergoing keratoplasty.<sup>5</sup> Intraoperatively extrusion of lens occurred in 3[12%] cases because of posterior vitreous pressure. Mature cataract extraction was done in 2 [8%] cases because of intumescence and iris lens diaphragm being pushed up. Vitreous loss was seen in 2[8%] cases with perforated ulcer for which open sky vitrectomy was done. Though TPK was done mainly to decrease the infection load, the secondary function of it was to improve the vision. A vision better than preoperative vision was seen in 88% of our cases in comparison to study done by Xie LX, Zi HC on 40 patients where visual acuity improved in 38 eyes [95.5%].<sup>6</sup> Maximum number had a vision of 1/60 in 8[32%] of cases, the cause for decreased vision could be inflammation, graft haze, recurrence of infection, secondary glaucoma, complicated cataract and others.

In our study anatomical success was maintained in 23[92%] of cases in comparison to other studies by Sonika gupta<sup>7</sup> and Xie LX<sup>6</sup> where anatomical success was seen in 95.4% and 97.5% respectively. Graft clarity was maintained in 6[24%] cases and graft failure occurred in 2[8%] cases. Grafts in 40.9% eyes remained clear in study by Sonika gupta<sup>7</sup>. In another study clear grafts was obtained in 13 (50%) of cases. Lower number of clear grafts in our study could be due to late presentation with more advanced stage of disease, lack of good quality donor tissue, recurrence of infection, secondary glaucoma and inadequate compliance with follow-up.

Postoperative complications that were noted are epithelial defect 10[40%], recurrence of infection 7[28%], secondary glaucoma 7[28%], graft. These cases were treated with lubricants, anti fungals and antiglaucoma medications respectively. Graft rejection was seen in 2[8%] of

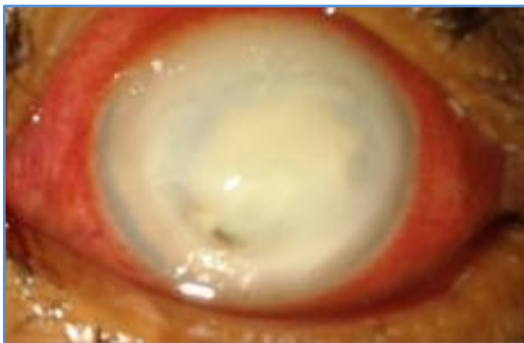
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cases, the risk factor for which could be preoperative and postoperative inflammatory reaction, preoperative corneal neovascularization, large graft size, synechia of iris and secondary glaucoma. A study by S gupta<sup>7</sup> noted persistent epithelial defect in 12 eyes (27.2%), reinfection 5 (11.3%), glaucoma 4 (9%), rejection 3 (6.8%), primary graft failure 2 (4.5%) eyes out of 44 cases.

**CONCLUSION:** Our study confirms that therapeutic penetrating keratoplasty is an effective means of management of fungal keratitis refractory to medical therapy and maintains the structural integrity of the globe, helps in improving vision as a secondary outcome. Prompt timing of surgical intervention is needed to increase the chances of cure. Prevention of ulcer is important as it is difficult to treat once begun. Need on prevention, early diagnosis and treatment of this potentially blinding disease should be emphasized to lead a qualitatively better life.

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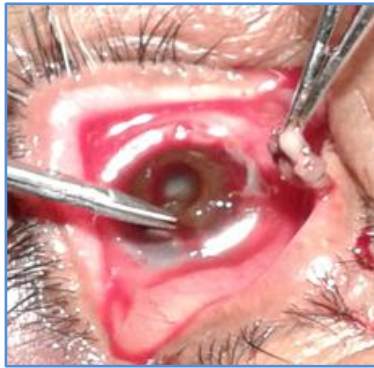


**Fig. 1: Sloughing fungal corneal ulcer**

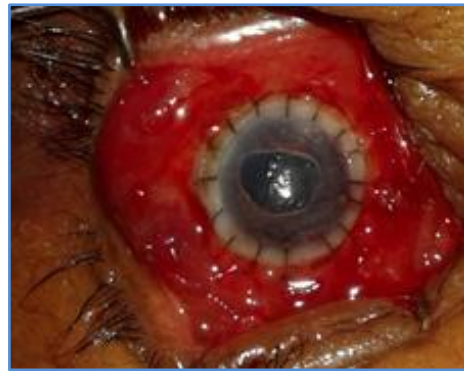


**Fig. 2: Perforated corneal ulcer**

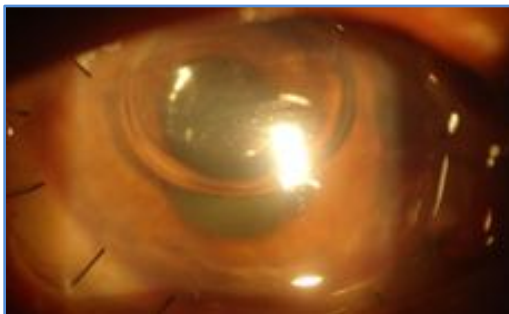




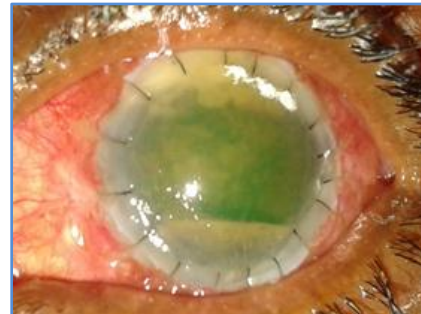
**Fig. 3: Keratoplasty procedure  
Removal of infective membranes**



**Fig. 4: Placement of sutures**



**Fig. 5: Postoperative: Day 1**



**Fig. 6: Complication: Epithelial  
defect with hypopyon**

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