Original Article

Ophthalmology and Allied Sciences
Volume 5 Number 2, May - August 2019
DOI: http://dx.doi.org/10.21088/oas.2454.7816.5219.10

Penetrating Keratoplasty : A Boon in Different Corneal Diseases to Improve Social Life

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Abstract

Introduction: Corneal Opacity is common cause of ocular morbidity. Occurrence of Corneal blindness alters from nation to nation and from population to population. There is even variation within the developing countries like India. *Aims:* To study the efficacy of penetrating keratoplasty in various corneal disorders which resulted in corneal blindness in my geographical area as well as to improve social life in such poor socioeconomic area. *Materials and Methods:* This is a hospital based prospective study. Total seventy patients diagnosed with non- healing corneal ulcer, corneal perforation, bullous keratopathy, autoimmune disease, infectious keratitis, trauma to the eyeball including chemical burns as well as other combined disorders were indicated for total penetrating keratoplasty. *Results:* Total seventy eyes of seventy patients were operated using the technique of total PKP over a period of 2 years. Among all the conditions Non Healing Corneal ulcer was the main indication. The major post-op complication for which the treatment failed was the persistent epithelial defect. *Conclusion:* Full thickness penetrating keratoplasty was found to be surgical boon and effective tool in the management of various corneal disorders. It was also found that it maintain globe integrity and improve visual acuity as well as social life.

Keywords: Corneal Opacity, Corneal blindness, PKP

How to cite this article:
Veeresh Korwar, Shivanand Reddy. Penetrating Keratoplasty : A Boon in Different Corneal Diseases to Improve Social Life. Ophthalmol Allied Sci. 2019;5(2):218-221.

Introduction

Corneal opacity is common cause of ocular morbidity. Occurrence of corneal blindness (CB) alters from nation to nation & from population to population. There is even variation within the developing countries India. In South India, Prevalence of CB in both eyes is 0.11% and in 0.56% in one eye. Corneal blindness remains a liability to the family and community as well. The prevalence ismultifactorial. Frequent etiological factors of corneal opacities such as congenital, trauma, post-surgical, keratitis, developmental, dystrophic and degenerative are avoidable. As the disease is more in rural set up where people are ignorant, often present with complications. Nearly 90% of corneal blindness is avoidable [1]. Corneal transplantation is one of the most common types of human transplant surgery. By replacing a damaged or scarred host cornea and removing it with a clear and clean donor transplant, this technique helps to recover vision in a wide series of corneal diseases. Penetrating keratoplasty (PKP), is a full-thickness corneal transplantation,which is a well-established procedure; however, prolonged identified complications such as post-operative infection, macular and corneal oedema, astigmatism, immune reactions and graft failure remain concerns [2,3]. The main aim of post corneal transplantation is preservation of a clear & clean graft which is maintained with the help of corneal endothelium. PKP will visually rehabilitate lot of patients who were effected from visual impairment due to corneal disorders so the primary objective of this study was to report treatment results of patients,

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Received on 22.05.2019, **Accepted on** 26.06.2019

who received a total penetrating keratoplasty for various corneal diseases. We reviewed the surgical treatment, anatomical and functional results, and complications of treatment in this group of patients at our institution in terms of graft survival and visual acuity.

Materials and Methods

This was a hospital based prospective study done in 70 patientsadmitted in ophthalmology ward, department of Ophthalmology, Basaveshwar teaching general hospital, M.R. Medical college, Kalaburagiover a period of twoyears. Patients diagnosed with non-healing corneal ulcer, corneal perforation, bullous keratopathy, autoimmune disease, infectious keratitis, trauma of the eyeball (chemical burns), and other combined disorders were indicated for total penetrating keratoplasty. The main aim of the surgical treatment was complete removal of infected or damaged cornea and recovery of ocular integrity. After a complete ocular examination, total penetrating keratoplasty (diameter≥10.0 mm) was performed. The surgical procedure involved in dissection of affected tissues with a margin of minimum 1.0 mm of non-affected tissue. The size of the corneal graft ranged from 10.0 to 14.0 mm, depending on the extent of corneal necrosis or melting and infiltration of corneal stroma or adjacent ocular tissues. Great precaution was taken to avoid affecting any structures of the irido-corneal angle while preparing the recipient tissues. Data from the medical records included were demographics, medical history, preoperative and post-operative best spectacle corrected visual acuity (BSCVA) measured using the Snellen visual acuity (VA) chart, cure of the disease,visual outcome, structural globe integrityoutcome and complications of surgery, results of microbial tests, post-operative intra-ocular pressure, graft clarity, graft rejection, graft dehiscence traumatic & other complications. All patients signed the informed consent form before any surgical procedure and permission was taken from institutional ethics committee.

Results

Seventy eyes of seventy patients were operated for a period of 2 years using the total PKP technique. This group consisted of 36 females, whose mean age was 66.13±9.94 (range 39 to 80 years), and 34 males, whose mean age was 63.69±14.48 (range 32 to 92 years). There was no statistically significant difference with respect to gender and age between both groups. All primary causes of corneal opacity requiring PKP are presented in Table 1. The main cause of this condition was non-healing corneal ulcer.

The main reason of surgical treatment failure was persistent epithelial defect, observed in 28 (40%) operated eyes,resulting from decreased corneal sensitivity and defective tear production. Repeated total PKP or corneo-scleral patch graft was performed where the tectonic approach was needed more than twice. Reinfection was observed in 17 (24.28%) of eyes that received total PKP surgery.

Table 1: Showing various causes of the corneal opacity

Causes of the corneal opacity	Total (n=70) 100%	Female (n=36) 51.4%	Male (n=34) 49.6
Non Healing Corneal Ulcer	36	15	21
Infectious Keratitis	14	10	4
Autoimmune Disease	10	6	4
Corneal Perforation	8	4	4
Bullous Keratopathy	2	1	1

Table 2: Post-operative complications of total PKP (% in brackets).

Postoperative complications of total PKP	Non-healing Corneal Ulcer n (%) (n=36)	Infectious Keratitis n(%) (n=14)	Autoimmune Disease n (%) (n=10)	Corneal Perforationn (%) n=8)	Bullous Keratopathy n (%) (n=2)
Persistent epithelial defect	20 (55.5)	2 (14.28)	3 (30)	2 (25)	1 (50)
Reinfection	8 (22.2)	5 (35.71)	1 (10)	3 (37.5)	0 (0)
Graft melting	3 (8.33)	4 (25.57)	3 (30)	1 (12.5)	0 (0)
Graft rejection	3 (8.33)	3 (21.4)	0 (0)	2 (25)	1 (50)
Glaucoma	2 (5.55)	0 (0)	3 (30)	0 (0)	0 (0)

Although regular anti-microbial topical and general treatment and repeat tectonic surgery. Graft melting, reported in 11 eyes (15.7%) and commonly preceded by loosening of the sutures and tissue necrosis resulting from infection or immunological mechanisms, was another significant complication of TPK. Early graft rejection, characterised by a whitish, sterile ring or diffuse infiltrates, was present in 9 eyes (12.85%) and treated for infectious corneal ulcerations. Intensive topical and systemic immune-suppressive and anti-inflammatory treatment was administered, leading to scarring and thinning of the peri-limbal tissue. Subsequent consecutive glaucoma or ocular hypertension occurred despite surgically performed iridectomy during tectonic PKP. Peripheral iridectomy was reported in 5 eyes (7.14%) (Table 2).

Discussion

The purpose of PKP is recovery and maintenance of ocular integrity. Post-operative visual acuity and graft clarity are related to many complex physiological & immunological conditions. Anatomical design of the globe does not clarify improvement of vision. Recent developments in corneal graft technology, including donor tissue retrieval, preserve and surgical procedure, have improved the clinical outcome of corneal grafts. Although these advances, immune-mediated corneal graft rejection remains the common cause of corneal graft failure [4].

In our study, we assessed, like Burk and Joussen *et al.* [5]., that the frequent indication for rapid tectonic treatment was infection. However, despite broad-spectrum medical & surgical multistage treatment, even when repeated, the end outcome remained non-satisfactory and was considered as therapeutic failure. Endophthalmitis refractory to antimicrobial and anti-inflammatory treatment required the final procedure of evisceration [6].

Large grafts are regarded as risk factor for immunologic graft failure [7]. Our results agreed by Ti *et al.* [8]. Corneal graft melting, commonly observed in autoimmune disorders complicated by corneal perforations & preceded by loosening of the sutures, which is comparable with the previous study.

The present study observed that important cause of surgical treatment failure was persistent epithelial defect, observed in 28 (40%) operated eyes, resulting from reduced corneal sensitivity and defect tear production delayed epithelialisation or persistent epithelial defect determined important graft failure rate and contributed to the increased rate of ocular surface complications [6].

Surgical interventions with large corneal perforations commonly result in glaucoma. Our results for this complication present less commonly than in previous studies [9]. Total PKP is still not a standard procedure for the treatment of corneal perforations. PKP, lamellar keratoplasties & corneo-oscleral patch grafts remain the more frequently used surgical approach. Systemic immune-suppression, and often multi-drug therapy, is necessary to reduce the risk of graft rejection and the necessity of repeat tectonic surgical treatment [10].

The serial, frequent multistage & combined surgical approach is necessary to achieve final visual acuity outcome [11]. We showed in our study that results of large corneo-scleral grafts are unpredictable. In our opinion, this is commonly the surgical procedure, PKP can able to restore ocular integrity with simultaneous removal of inflammatory membranes, infectious material, direct drug administration & necrotic tissues. Such approach reduces the risk of endophthalmitis&the spread of disease to the globe, while simultaneously increasing the chance of graft survival and significant improvement of visual acuity.

Conclusion

Our study confirms that Full Thickness Penetrating Keratoplasty : Surgical boon and effective tool in management of chronic non-healing microbial corneal ulcer failed to medical treatment, corneal dystrophy and degenerations and various other corneal diseases at my geographical area. It not only eliminates infection but also maintain globe integrity and improve visual acuity and thus improving social life.

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