Indications for Penetrating Keratoplasty in Western India

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Research Article

Abstract: **Aim**: To carry out a retrospective study to analyze the indications for penetrating keratoplasty (PK) in Western India. **Materials and Methods**: A retrospective investigational analysis of 311 cases performed between June 2006 and June 2008 was conducted to study the indications for penetrating keratoplasty. **Results**: It was recorded that 'Corneal Opacity' was the most common indication for PK (39.53%) followed by Acute infective Keratitis (AIK) cases (23.47%) and Pseudophakic bullous keratopathy (PBK) cases (17.04%). In 'Regrafts' PK was done in 7.71% and Descemetocele was the indication in 4.18%. Aphakic bullous keratopathy (ABK - 3%) and Keratoconus (3.85%) were uncommon indications for PK in the present study. **Conclusion**: 'Corneal Opacity' was the most common indication for PK followed by AIK cases in western India. Thus it can be concluded from our study that still today high risk cases for penetrating keratoplasty are performed more in the India than in the developed countries and, so effective preventive programmes should be implemented to reduce the incidence of corneal blindness

Keywords: Penetrating keratoplasty, indications, developing world.

Introduction

Corneal diseases are a significant cause of visual impairment worldwide. As per the survey conducted by MOH&FW in 2006-2007, 1% of the total blindness (vision 6/60 or < 6/60) constituting 1.22 lakhs of the Indian population are bilaterally corneal blind.[1] Penetrating keratoplasty (PK) is one of the main surgical treatments for corneal blindness. Many studies have been done on the indications for PK in India [2,3,4,5,6] and the developed world. [7,8,9,10,11,12,13,14,15,16,17] As the prognosis depends on the pathology responsible for causing the corneal blindness, [18,19,20] the purpose of the present study is to evaluate the indications for PK at our institution that would enable comparison with the indications for PK reported from other parts of India and the developed world.

Material and Methods

A retrospective investigational analysis of 311 cases undergoing penetrating keratoplasty between June 2006 and June 2008 was conducted to analyze the indications for penetrating keratoplasty .The Institutional Ethical Committee had cleared the project. All the patients had given their informed consent. Pre operative examination of recipient included details of patient, chief complaints, presence of any predisposing factors such as ocular surface disorders, trauma, contact lens use, systemic illness and previous history of graft infection, systemic history and past history of ocular surgery. Clinical examination included uncorrected visual acuity, best corrected visual acuity, cycloplegic refraction (not done in infective keratitis cases), slit lamp biomicroscopy to determine any ocular pathology, applanation tonometry (not done in infective keratitis cases), dilated fundus examination to rule out posterior segment pathology and sac syringing. Investigations included tear film status, gonioscopy, routine blood investigations, fasting blood sugar and fasting urine sugar, serology to screen for infectious diseases such as AIDS (HIV), Hepatitis (HBsAg) and sexually transmitted diseases (VDRL). Blood pressure recording, ultrasonography of the posterior segment to rule out vitreous exudation suggestive of endophthalmitis and specular microscopy was done. All penetrating keratoplasties were performed with standard technique under local anaesthesia except in children where general anaesthesia was used. Donor button oversized by 0.5 mm was used except in cases of keratoconus where the graft of same size as the recipient was used. Anterior vitrectomy was performed when required. Donor cornea was sutured to host with interrupted 10.0 nylon monofilament sutures with adjustable suture technique. All cases received amikacin (25mg), cefazolin (100mg) and dexamethasone (4mg) subconjunctivally at the end of the operation. In cases of infective keratitis dexamethasone was not given. Postoperatively, the eyes were patched and topical steroid was administered once the epithelium was intact over the transplant, except in cases of infective keratitis. Gradually steroid was tapered over a period of one year. Topical antibiotics and antifungal were continued till there was no suspicion of infection. Short-acting cycloplegic (cyclopentolate1%) was instilled till iritis subsided.

Topical antiglaucoma medication and lubricants were given in the initial period. The patients were evaluated on first day, first week, then at the end of the first, third and six month and one year post operatively in the same manner as the preoperative assessment mentioned above. From the available record the indication for which keratoplasty was done was especially noted. The findings were compared with similar studies done in other regions of India and in the developed world. The results were statistically analyzed using paired and unpaired t Tests.

Observations

On observing the demographic details mean age of the patients was 43.04± 17.67 (range 6 years to 78 years). Maximum number of patients was in 41 to 50 years group (24.43%). In the present study the male recipients were more (63.66%) than female recipients (36.33%).The Right eyes were operated more (58.84%) than the Left eyes (41.15%). 'Corneal Opacity' was the most common indication for PK (39.53%) followed by AIK cases (23.47%) and PBK cases (17.04%). In 'Regrafts' PK was done in 7.71% and Descemetocele was the indication in 4.18%. Aphakic bullous keratopathy (ABK) cases (3%) and Keratoconus (3.85%) were uncommon indications for PK in the present study.

Discussion

The institution where this study was carried out is a major referral centre for the treatment of corneal diseases in Gujarat region and therefore the findings may be considered representative of this region. On observing the demographic details mean age of the recipients was 43.04± 17.67 (range 6years to 78 years). Maximum number of recipients was in 41 to 50 years group (24.43%) followed by 51 to 60 years (17.36%). This suggests that the working class was more prone and exposed to the diseases that lead to indications for keratoplasty. In the present study the Male recipients were more (63.66%) than Female recipients (36.33%). This finding is explained by the male predominance in the workforce that is exposed to diseases that lead to indications for keratoplasty. The indications for PK were divided into 7 categories viz. Corneal Opacity, Active Infectious Keratitis, Regraft, Pseudophakic Bullous Keratopathy, Aphakic Bullous Keratopathy, Descemetocele and Keratoconus. (Table-4) In our present study, we found that 'corneal opacity' was the most common indication for PK (39.53%). Other studies reporting corneal opacity as commonest indication are Dandona *et al* [2] (35.6%), Shilpa et al [4] (42.54%) and Sony *et al* [5](38.03%). Varghese *et al* [6] (12.39 %) reports it to be less common indication. Kanavi *et al* (18.68%) and Xie *et al* (16%) report it as the second most common indication in their study. Dobbins *et al*(11.2%), Mamalis *et al* (8.2%) report it as a less common cause while Cosar *et al*, Brady *et al* and Haaman *et al* do not even categorize this indication. [7,8,9,10,11,12,13,14,15,16,17]

Most [2,4,5] studies carried out in India report corneal opacity as the significantly ($p<005$) commonest indication compared to the other indications. The incidence of commonest indication of corneal opacity in India is also significantly different from the incidence in the developed world. AIK (25%) was the second most common indication in our study and Xie *et al* report it as their commonest indication (31%). Saldanha *et al* (20%), Sony *et al* (28.38%) and Haamann *et al* (13.9%) also have reported AIK as their second commonest indication. Literature from western countries reports it to be less common indication for PK. Varghese *et al* [6] reports it as the commonest indication for PK. The three groups of corneal scarring due to keratitis (19.29%), AIK (23.47%) and Descemetocele (4.18 %) together suggest that keratitis of various aetiologies was responsible for about 46.94 % of the PKs in our series.(Table-4) The comparative analysis of the above observation reveals a pattern also suggested by other authors of Indian Subcontinent like Dandona *et al* , Shilpa *et al* , Sony *et al* that the single largest indication for PK in the developing countries was keratitis and this trend may be indicative of several problems prevalent in the developing countries related to availability, accessibility and affordability of eye care often leading to delayed diagnosis of corneal infections and consequent corneal opacification[2]. As compared with our study, the proportion of PKs done for corneal scarring and AIK has been reported to be less in the developed world. [7,8,9,10,11, 12, 13, 14,15,16,17]

PBK (17.04%) was reported as third and therefore less common indication in our study while Saldhana *et al* (50%), Dobbins *et al* (31.5%), Cosar *et al* (27.2%), Brady *et al* (23%), Haaman *et al* (28.3%) report it as their commonest indication. Mamalis *et al* (23.0%) document it as a common indication too. This analysis illustrates how PBK has been reported to be the leading or the second most common indication for PK in the developed world. [7,8,9,10,11,12,13,14,15,16,17] Regraft was a less common indication (7.71%) in our study, while most Indian studies also report this as a less common cause, Dandona *et al* (17.1%) and Cosar *et al* (18.1%) document it as their second common indication. In the developed world regrafts have been reported to make up 6.6% to 18.2% of the indications for PK. [2,3,4,5,6,7,8,9,10,11] Descemetocele which was sequelae to healed corneal ulcer was found as a less common indication (4.18%) in our study while other authors have not categorized this condition in their study. ABK (4.18%) is a less common indication in our study and all other authors also report it as a less common indication (6.09-14%).[2,4,5,7,8,11,13,17] This could be due to

the fact that in India and worldwide intracapsular technique of cataract extraction has decreased.

Keratoconus (3.85%) is a less common indication in our study similar to Dandona (6%) and Haamann at al (6.7%) but studies of Kanavi *et al* (34%) done in Iran reports it as their commonest indication. Mamalis *et al* (24.2%) and Lindquist (24%) reports it as their commonest indication. Indication for keratoconus may be more in study by Kanavi *et al* and Mamalis *et al* (24.2%) as the incidence of keratoconus is more in the Middle East population. With the advent of newer techniques like Deep Anterior Lamellar Keratoplasty, Collagen cross linking, Intacs etc. for management of keratoconus the indication for PK is decreasing which is manifested in it being a less indication for PK in our study. Corneal Dystrophy was not found as an indication in any case in our study while Dobbins *et al* (23.2%), Cosar et a (15.2%) and Brady *et al* (16%) report it as a common indication. The leading indication for PK in our series was corneal scarring unlike the developed world where pseudophakic bullous keratopathy and keratoconus are the leading indications for PK.[7-17]

Conclusion

Corneal scarring with vascularisation and adherent leucoma has a poor prognosis for graft survival, active infectious keratitis has a very poor prognosis for graft survival, [18,19,20] Pseudophakic bullous keratopathy have a fair to good prognosis for graft survival while Keratoconus has an excellent prognosis for graft survival after PK. Thus it can be concluded from our study that in Gujarat region of Western India, the commonest indication for PK is corneal opacity. Still today high risk cases for penetrating keratoplasty are performed more in the India than in the developed countries and, so effective preventive programmes should be implemented to reduce the incidence of corneal blindness.

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Tables

Table 1: Age Distribution of Patients

Age Groups	<10 YRS	11-20 YRS	21-30 YRS	31-40 YRS	41-50 YRS	51-60 YRS	61-70 YRS	>71 YRS
Number of Cases	5	24	36	59	76	54	42	15
Cases (%)	1.60%	7.71%	11.57%	18.97%	24.43%	17.36%	13.50%	4.82%

Table 2: Sex Distribution of Patients

Sex	Male	Female	Total
Number of Cases	198	113	311
Cases (%)	63.66%	36.33%	100%

Table 3: Laterality of the Patients Eyes

Laterality	Right (OD)	Left (OS)	Total
No. Of cases	183	128	311
% of cases	58.84%	41.15%	100%

Table 4: Indications for Penetrating Keratoplasty

S.No	Indications		No of cases	Total % of cases	
1	ACUTE INFECTIVE KERATITIS		73	23.47%	
2	CORNEAL OPACITY	a. Post keratitis	60	19.29%	39.53%
		b. Post trauma	29	9.32%	
		c. Adherent leucoma	11	3.53%	
		d. Corneal degeneration/ & unknown	23	7.39%	
3	DESCEMETOCELE		13	4.18%	
4	REGRAFTS		24	7.71%	
5	PSEUDOPHAKIC BULLOUS KERATOPATHY		53	17.04%	
6	APHAKIC BULLOUS KERATOPATHY		13	4.18%	
7	KERATOCONUS		12	3.85%	
8	TOTAL		311	100%	

Table 5: Indications of PK- in Different Studies*

Study	Region	Corneal opacity	AIK	PBK	ABK	Re-grafts	Desce metocee	Keratoconus	Corneal dystrophy	Miscellaneous
Present study	Western India	**39.53**	23.47	17.04	4.18	7.71	4.18	3.85		
Shilpa *et al*[4]	Western India	**42.54**		17.67	12.5	14.36			4.97	7.39
Dandona *et al*[2]	South India	**35.6**	12.2	10.6	11.8	17.1		6	9.6	5.9
Saldanha *et al*[3]	South India	12.3	20	**50**		13.3				
Varghese *et al*[6]	South India	12.39	**37.61**	18.26		13.04		8.26		10.43
Sony *et al*[5]	North India	**38.03**	28.38	6.18	7.27	11.5			3.85	
Kanavi *et al*[7]	Iran	18.68		9.19	6.09	5.28		**34.51**	6.47	
Dobbins *et al*[8]	USA	11.2		**31.5**	7.5	8.9		11.4	23.2	
Cosar *et al*[9]	UK			**27.2**		18.1		15.4	15.2	
Xie at al[10]	China	16	**31**	13		5		13	4	
Brady *et al*[11]	USA			**23**	14	10		15	16	
Mamalis *et al*[12]	Middle East	8.2		23.0		13.1		**24.2**		5.8
Haamann at al[13]	Denmark		13.9	**28.3**	10.0	11.1		6.7		
NAl-Yousuf[14]	UK			7.6		**40.9**		15		15.6
Lindquist TD[15]	USA			21.2		8.1		**24**		
Damji KF[16]	Canada	13.5	9.0	**22.2**		12.2		17.1		8.3
Hyman L[17]	USA		12	**23**	10	17		13		13

(*all Values in %)