



ORIGINAL RESEARCH PAPER

Ophthalmology

INDICATIONS AND OUTCOMES OF PEDIATRIC KERATOPLASTY IN WESTERN INDIA.

KEY WORDS: Pediatric keratoplasty, corneal opacities, congenital opacities

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ABSTRACT

Unlike adult transplants there are many preoperative, intraoperative, postoperative challenges specific to paediatric keratoplasty and the occurrence of serious post operative complications result in a relatively higher rate of graft failure. This study reports the indications and also analyzes the outcomes of paediatric corneal grafting done in a single center in a developing country over a period of 5 years. Congenital opacities accounted for 20 of the total number of cases which were further subdivided into congenital glaucoma(3), CHED(5), Sclerocornea(2), Peter's(3), Others(7).The Acquired non traumatic accounted for 23 of the total number of cases which were further subdivided as healed infectious keratitis with corneal scar(13), active infection leading to perforation(5), keratomalacia(1), Others (4).Acquired traumatic were 15, which again were futher subdivided into trauma with scarring(13), aphakic bullous keratopathy(1), alkali burn injury(1).The relationship between the age of surgery and graft outcome was also evaluated. Outcomes were better in children less than 5 years of age than those more than 5 years of age. However, our study highlights the fact that factors other than the indication affect the ultimate outcome of paediatric grafts. It also shows the importance of infectious keratitis which is both a cause for the primary keratoplasty and also a major cause of its failure.

Corneal Transplants in children is a high risk procedure, it presents with variety of problems ranging from preoperative assessment to postoperative follow ups. Unlike adult transplants there are many preoperative, intraoperative, postoperative challenges specific to paediatric keratoplasty and the occurrence of serious post operative complications result in a relatively higher rate of graft failure.1,2,3,4 Even if the graft clarity is maintained, the visual outcome may still be disappointing due to the ambyopia induced by the long standing opacities , as well as other associated ocular abnormalities^{5,6}

Outcomes of paediatric corneal transplants are considered inferior to adult transplants, because of challenges in paediatric anterior segment surgery created by low scleral rigidity, and forward displacement of the lens iris diaphragm and also significant postoperative challenges including high risks of rejection, associated with more difficult follow up and compliance.

Children often may be uncooperative for examination and may require anaesthesia for evaluation. This study reports the indications and also analyzes the outcomes of paediatric corneal grafting done in a single center in a developing country over a period of 5 years.

MATERIAL AND METHOD

This longitudinal, retrospective cohort study was undertaken after obtaining the approval of the Institutional Review Board. Medical Records of patients < 16years who underwent penetrating keratoplasty at our centre were retrospectively reviewed. The parameters analyzed were demographic profile, preoperative findings, age at the time of surgery, indication for surgery, surgical technique, any simultaneous intraocular procedure, intraoperative as well as post operative complications, graft survival and visual outcomes. Preoperatively, risk factors in terms of prognosis for keratoplasty, such as Vascularisation, glaucoma, active inflammation, presence of iridocorneal or lenticulo-corneal adhesions or a combination of those were registered.

Penetrating Keratoplasty was performed by three different surgeons at our centre. Most suture removals were complete in the first 8 months. The postoperative examination schedule was day 1, day 3 followed by an EUA at 1 week in case of younger children, then every 2 weeks for the first 3 months and every other month for the next 6 months. Irregular

followup was considered when the patient followed up after more than double the time period he was supposed to follow up.

This study made use of the classification devised by Stulting and associates to classify the indications of paediatric keratoplasty into "Congenital Opacities", Acquired Traumatic Opacities" and "Acquired Nontraumatic Opacities"

Glaucoma was defined as postoperative increased intraocular pressure requiring one or more medications in an eye with no noted increase in intraocular pressure preoperatively, or requirement of additional medication or surgery in an eye previously being treated for the same. A persistent epithelial defect was defined as an epithelial defect occurring anytime in the postoperative period lasting more than 14 days.

Graft clarity was noted in all postoperative visits and the most recent examination was taken into consideration. Keratitis was defined as the appearance of any infiltrate on the graft that was either culture positive, or responsive to topical antibiotics. Number of events was defined as the no of eyes where graft failed after keratoplasty.

Duration of follow up was taken as interval from the time of surgery to the most recent followup in eyes that had clear grafts. For grafts that failed, duration of followup was considered to be the interval between surgery to the date where irreversible loss of graft clarity was documented in the records.

Visual Acuity was defined as the best corrected visual acuity measured at the most recent examination. In cases where precise determination of the visual acuity was difficult the ability to fixate on and follow visual targets was mentioned. The cases where ambulatory vision was mentioned in the records were documented as counting fingers 3 feet or better. In patients suspected to have amblyopia, occlusion therapy was done.

All the data was entered into a spreadsheet and analyzed using the SPSS ver 21 software.

RESULTS

A total number of sixty four keratoplasties were performed in

this time period in 58 children, (52 children had unilateral and 6 children had bilateral) which met the inclusion criteria. There were nine children operated at < 5 years of age, thirteen in between five and nine years of age, eighteen in between ten and fourteen years of age and fourteen >fourteen years of age.

INDICATIONS

Congenital opacities accounted for 20 of the total number of cases (Table no 1) which were further subdivided into congenital glaucoma(3), CHED(5), Sclerocornea(2), Peter's(3),Others(7).
 The Acquired non traumatic accounted for 23 of the total number of cases which were further subdivided as healed infectious keratitis with corneal scar(13), active infection leading to perforation(5), keratomalacia(1),Others (4).
 Acquired traumatic were 15, which again were futher subdivided into trauma with scarring(13), aphakic bullous keratopathy(1), alkali burn injury(1).

Table No 1

INDICATIONS OF KERATOPLASTY			
INDICATION	FREQUENCY	NO	
Congenital	32.7%	20	
Congenital Glaucoma	5.17%	3	
Congenital hereditary endothelial disease	%	5	8.6
Peters syndrome	5.17%	3	
Sclerocornea	3.44%	2	
Other congenital corneal opacities	12.06%	7	
Acquired Non Traumatic opacities	39.5%	23	
Healed infectious keratitis with Scarring	22.4%	13	
Active infection leading to perforation		5	8.6%
Keratomalacia		1	1.7%
Others	6.8%	4	

Reported preoperative ocular conditions included corneal vascularisation in 2 patients, raised intraocular pressure in 1 patient. Additional operative procedures performed were anterior vitrectomy in (n=3) 25%, cataract extraction in (n=4) 33.33%, anterior vitrectomy and lens removal (n=1) 8.3%, scleral buckle (n=2) 16.83%, tube implant(n=1) 8.3%, silicone oil insertion(n=1) 8.3%.

Preoperative Visual acuity in Log mar of 2 was in 11 patients and Perception of light in 35 patients. Post operative visual acuity is listed in table 2 of 0.1 to 0.2 was found in 5 patients, 0.3 to 0.6 in 8 patients, 0.7 to 1 in 17 patients, 2 in 9 patients, fixing and following light in 2 patients as they were less than 4 years of age and PL + in 5 patients.Amblyopia appeared to be cause for poor vision in those with clear graft. Occlusion therapy was undertaken for 12 patients suspected to have pre existing amblyopia

Table 2.

Post operativeVisual acuity (LogMar)	No of Children
0.1 to 0.2	5

0.3 to 0.6	8
0.7 to 1	17
2	9
Fixing and following Light	2
Perception of Light	5

In our study, over the period of follow up there were 11 cases of graft failure various causes for the same are listed in the

Table 3

	Frequency	Percentage
Failed graft secondary to infiltrate	5	45.45%
Glaucoma	3	27.27%
Graft infiltrate resolved with scar	2	18.18%
Lscd	1	9.9%
Total	11	100.00%

Graft Survival

Cumulative graft survival at 1 year and 4 years for children less than 5 years and more than 5 years is shown in Table 4.

Table 4

Age Group	Total N	Overall survival rate of 1 year	Overall survival rate of 4 years	P value
Less than 5 years	7	85.71%	85.71%	0.55
More than equal to 5 years	39	86.95%	64.84%	
Overall	46			

Overall graft survival for congenital, acquired non traumatic and acquired traumatic is shown in Kaplan meir survival analysis.(Fig 1)

The relationship between the age of surgery and graft outcome was also evaluated. Outcomes were better in children less than 5 years of age than those more than 5 years of age.(Fig 2)

However there were significantly less number of patients in the age group of less than 5 years than greater than 5 years.

DISCUSSION

A primary factor in predicting the success of PK in pediatric patients is indication for graft. In most of the studies reported previously, a poor outcome has been linked to younger age, congenital corneal opacities, and anterior segment dysgenesis.8, In our study, we evaluated the outcomes of PK in patients with corneal pathologies secondary to multiple causes. Adherent leucoma was a common indication for surgery in our study, which may be attributed to the greater prevalence of infectious keratitis in the Indian subcontinent when compared to the West.

The indications for paediatric keratoplasties vary considerably amongst most published literature. Although congenital corneal opacities are the primary indications for paediatric keratoplasties in the developed world, infectious keratitis, corneal scar and perforations are the major indications in the Asia Pacific region.10,11, In our study majority of the patients had acquired causes 69.7%, and corneal scars were the most common indication for keratoplasty. These represent two different spectrums of patients from the urban developed population and also the referrals from a more agricultural surrounding rural populations. However, in our study the long term follow up has been better with congenital opacities than the acquired

group. The followup may not correlate with the cause of the opacity and can be attributed firstly, distance from the centre and also education and socioeconomic status of the patients. Most of the patients that were lost to follow up belonged to the non paying category, with multiple factors responsible for non compliance.

The overall graft survival in different studies is very varied, a comparison between the same is very difficult because of the varying sample sizes, difference in etiology and also the differing followup periods. Acquired opacities were found to have better outcomes compared to congenital opacities. 2,4,7 Amongst the acquired indications non traumatic causes were found to have a survival rate of 55 to 100%, whereas traumatic causes had a survival rate of 40 to 85 %. Our results of graft survival are similar to that of most studies. Our graft survival of 100 % in the first year in the acquired group may be attributed to the fact that most corneal grafts were done at an older age in those patients. Also, a significant number of congenital corneal opacities with kerato-irido-lenticular adhesions were operated at a later age resulting in dense amblyopia.

In this study, 23.9% (11 cases) had graft failure which is lower than the two major studies which had a failure rate of 33% and 37% 3, . Most western literature report glaucoma and rejection as the most important causes of graft failure 3,13 whereas in our study 62.63% (7 out of 11 cases) failed because of graft infection. This may be attributed to the rural background of most patients where poverty, malnutrition and microbial infections are prevalent. Also due to the distance, the financial constraints and large families these patients fail to followup regularly, thus adversely affecting the graft as well as visual outcomes.

The main limitations in this retrospective study are the relatively small sample size and the varied followup period. However, our study highlights the fact that factors other than the indication affect the ultimate outcome of paediatric grafts. It also shows the importance of infectious keratitis which is both a cause for the primary keratoplasty and also a major cause of its failure.

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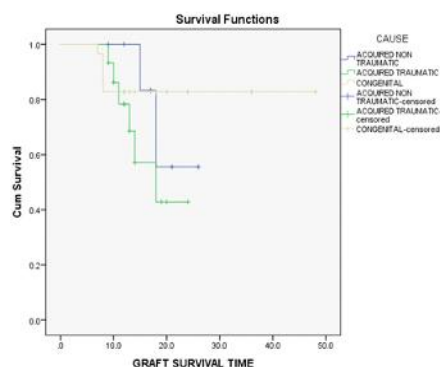


Fig 1.

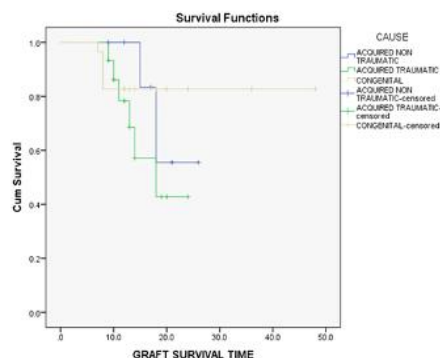


Fig 2.