PENETRATING KERATOPLASTY IN HIGH RISK CASES

Col DP VATS, ^{VSM*}, Lt Col JKS PARIHAR [†],
Lt Col FEA RODRIGUES [#], Lt Col N RAMCHANDRAN ^{**},
Brig RG DASH ^{VSM^{††}}, Sqn Ldr HS TREHAN ^{##},
Sqn Ldr MA KHAN ^{***}

ABSTRACT

Penetrating Keratoplasty in high risk cases like paediatric patients, complicated cases of pseudophakic bullous keratopathy, or in patients with highly vascularized corneal opacities have been a challenge for ophthalmologists because of the poor outcome. 101 patients with such high risk indications underwent penetrating keratoplasty. Some of them also underwent concurrent procedures like PC IOL implantation or vitrectomy. The patients' follow up period ranged from six months to four years. The results were evaluated. Good quality donor material, good intraoperative tissue handling, aggressive and meticulous postoperative management contributed to gratifying results. However chemical injuries and patients with dry eyes continued to have a bad prognosis and keratoplasty in these cases proved to be unrewarding.

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KEY WORDS : Concurrent procedures; Graft clarity; Penetrating keratoplasty, Regrafting; Triple procedure; Vascularized cornea; Visual outcome.

Introduction

Ever since the first experimental cornea graft was performed using porcine cornea as the donor material [1] corneal transplantation has been fascinating ophthalmic surgeons. The present use of homograft of human cadaver corneas along with rapid advancement in ophthalmic microsurgical techniques, instrumentation and an increased understanding of the human immune processes has resulted in a high success rate in keratoplasty with good functional recovery [2,3]. This improvement though impressive is by no means complete [3-5]. High risk cases like keratolenticular trauma, paediatric corneal involvement, complicated pseudophakic and aphakic bullous keratopathy associated with significant anterior segment derangement, significantly vascularized cornea, dry eye and chemical injuries have significantly lower success rates after keratoplasty [2,5].

This study was carried out to evaluate the factors that adversely influence the success rate of penetrating keratoplasty in high risk cases. The study also suggests norms to improve functional recovery in these patients.

Material and Methods

101 cases of corneal opacities of high risk group underwent penetrating keratoplasty along with other concurrent procedures at Armed Forces Medical College and Army Hospital (R&R) Delhi Cantt. All these patients underwent a detailed ocular examination

preoperatively. This included evaluation of visual acuity, nature and extent of corneal opacities, status of anterior segment, presence of coexisting glaucoma or uveitis. Ophthalmic ultrasound studies were carried out in all these patients to evaluate the posterior segment for any coexisting pathology and to determine the IOL power when possible. In cases of bilateral corneal disease, IOL power calculation was based on the previous history of the refractive status with approximate estimation of power.

Excellent quality (A or A plus) donor corneas were obtained from donors who had been screened for HIV and Hepatitis B. These corneas were used for transplantation. The donor material was preserved by moist chamber technique at 4 degrees celsius until transplanted. A single surgical team using a standard technique performed surgery. The procedure used was trephning of donor corneal button, 0.5 mm larger than the planned recipient corneal button, with the help of trephine followed by complete excision of the button using a curved microsurgical scissors and an adequate quantity of viscoelastic substance. The recipient corneal button which was 0.5 mm smaller than the donor one, was removed in similar fashion. Meticulous tissue handling was ensured at all times.

Concurrent procedures like synaecholysis, membranectomy, IOL implantation, vitrectomy, or IOL exchange was performed wherever required. The graft was sutured with four cardinal sutures of 8-0 monofilament silk followed by continuous sutures with 10-0 polyamide. After completion of continuous sutures the cardinal sutures were replaced with 10-0 polyamide sutures. All the patients were given energetic postoperative management with systemic, topical and subconjunctival steroids, along with adjuvant measures to control glaucoma and uveitis. Meticulous follow up was maintained. The total follow up period ranged from six months to four years.

*Senior Advisor (Ophthalmology), Command Hospital (Western Command), Chandimandir. **Classified Specialist (Ophthalmology), 158 Base Hospital, C/o 99 APO. ^{††}Consultant (Ophthalmology), Army Hospital; (R&R), Delhi Cantt. [†]Reader in Ophthalmology, ^{##}Post Graduate Student in Ophthalmology, Armed Forces Medical College, Pune - 411 040.

TABLE 1

Aetiological distribution of high risk cases who underwent penetrating keratoplasty

Procedure profile	No. of cases	%
Aphakic bullous keratopathy with vitreous touch	25	24.75
Pseudophakic bullous keratopathy requiring IOL exchange	21	20.79
Keratolenticular scars with triple procedure	18	17.83
Deeply vascularized corneal opacities from misc. causes	16	15.84
Regrafting	16	15.84
Paediatric penetrating keratoplasty	03	2.97
Dry eye and chemical injuries	02	1.98

TABLE 2

Postoperative complications in penetrating keratoplasty in high risk group

Post operative complications	No. of patients	%*
Hypotony	60	59.42
Uveitis (moderate)	51	50.50
Secondary glaucoma	30	29.71
Corneal opacification	18	17.82
Graft rejection	15	14.85

*% exceeding total number of cases due to single or multiple involvement in a single case.

Results

Out of the 101 patients of the high risk group, 46 cases (45.54%) required penetrating keratoplasty due to complicated aphakic or pseudophakic bullous keratopathy having associated multiple anterior and posterior synaechiae, malpositioned IOLs, derangement of anterior segment of eye. 18 cases (17.83%) underwent triple procedures due to keratolenticular disease. 16 patients (15.84%) had deeply vascularized corneal opacities of grade two or three due to different causes and required regrafting. Pupilary atrophy was seen in 60 cases (59.42%) and there was vitreous in the anterior chamber or incarcerated in the old surgical wound in 48 patients (47.53%). Such intra operative hurdles were overcome by performing other simultaneous procedures. Persistent hypotony in 60 cases (59.42%) and moderate uveitis in 51 cases (50.50%) along with graft rejection and ultimate opacification were some of the postoperative complications seen (Table 3). Such complications were managed as per standard norms. Corrected

visual acuity of 6/12 or better was obtained in 35 patients (50.50%) and between 6/12 and 6/60 in 39 cases (38.62%). Remaining patients had a poor visual outcome.

It was observed that patients who had undergone triple procedure, IOL exchange or who had complicated aphakic bullous keratopathy had higher success rate and consequently better graft clarity and visual acuity (80% cases). However the visual outcome remained poor in cases of dry eye and chemical injuries.

Discussion

Of all organ transplant procedures corneal transplant has the highest rate of success [2]. This is because the cornea is avascular and therefore is immunologically a protected zone against graft rejection [2,6,7]. However protected zone is adversely affected by corneal vascularisation, trauma, reduced tear production and previous graft failure [2]. Such eyes along with low-grade uveal inflammation and glaucoma constitute a high risk for keratoplasty [2,3,8]. Though pseudophakic and aphakic bullous keratopathy are by and large considered as good prognostic cases, however in present series such cases were associated with significant preexisting derangement like extensive anterior and posterior synaechiae, proliferation of connective tissue in the angle of anterior chamber, malpositioned IOL and epithelial in growth. Hence we have considered complicated aphakic and pseudophakic bullous keratopathy as high risk cases. While the success rate of keratoplasty in favourable eyes is claimed to be 90 to 95% [3], it is significantly less in high-risk cases amounting up to -60-70% [5,8]. In this study also the success rate has been about 73%. In our series patients with complicated aphakic and pseudophakic bullous keratopathy were found to have the best results among the high risk group. This is expected because in bullous keratopathy, the corneal pathology is due to its poor endothelial status of the cornea and its replacement with a healthy and viable graft with good endothelial cell count prevents recurrence of corneal oedema in the graft.[2,4].

TABLE 3

Visual outcome (corrected) after penetrating keratoplasty in high risk group

	VA > 6/12 No. of cases (%)	6/12 to 6/60 No. of cases (%)	Less than 6/60 No. of cases (%)	Total
Triple procedure	10 (55.56%)	4 (22.22%)	4 (22.22%)	18
Complicated aphakic bullous keratopathy	8 (32%)	12 (48%)	5 (20%)	25
IOL exchange	7 (33.33%)	8 (38.10%)	6 (28.75%)	21
Vascularized corneal opacities	4 (25%)	8 (50%)	4 (25%)	16
Regrafting	4 (25%)	7 (43.75%)	5 (31.25%)	16
Paediatric keratoplasty	2 (66.67%)	Nil	1 (33.33%)	3
Dry eye	Nil	Nil	2 (100%)	2
Total	35 (34.66%)	39 (38.62%)	27 (26.72%)	101

Graft rejection and poor visual outcome remain problems in paediatric age group, in dry eyes and in eyes with chemical injuries. Our results compare well with other workers [2,5,8,9]. The corrected visual acuity remained stable at twelve weeks and one year follow up visits. Thereafter, regrafting, preoperative vascularization, trauma and longstanding inflammation with poor endothelial status were invariably associated with persistent deterioration of the visual status.

In our view, better visual outcome and graft survival in high-risk group can be achieved by understanding the underlying pathology and formulating a preoperative plan with subsequent modification during surgery if required. Excellent quality donor material, meticulous tissue handling, adequate control of intraocular pressure and postoperative inflammation are the factors leading to success. However patients with chemical injuries and dry eyes continue to have a poor prognosis.

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