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OUTCOME OF DONOR GRAFT QUALITY ON CLINICAL RESULTS AFTER PENETRATING KERATOPLASTY FOR KERATOCONUS

[1]Dr. Fraz Shakil, [2] Dr Sana Shahid, [1]Dr. Fartash Zahra
[1]Lahore General Hospital
[2]Jinnah Hospital Lahore

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Abstract:
Aim: *To evaluate the effect of donor and eye bank characteristics on graft rating and medical results after penetrating keratoplasty (PK) in the keratoconus.*
Place and Duration: *In the Eye Unit-1 of Lahore General Hospital, Lahore for 3 years duration from March 2017 to February 2020.*
Methods: *252 keratoconic PK eyes were used in this retrospective interventional case series. Donor data include age and gender, cause of death, stromal and epithelial status, death-to-preservation time, time of surgery, morphology, transplant classification and endothelial cell density (ECD). Post-operative results involved visual refractive error, acuity, suture complications, epithelial problems, transplant transparency and transplant rejection. In the multivariate regression analysis, the correlation among donor and eye bank characteristics, post-operative results and graft quality was assessed.*
Results: *The average age of donor and recipient was 26.2 ± 8.8 and 29.7 ± 10.0 years, and the 66.7 ± 38.5 months was the mean follow-up time, correspondingly. Death-to-preservation time was signifcantly related with the incidence of stromal cloudiness (P < 0.001) and graft epithelial sloughing (P = 0.005). The donor's age suggestively prejudiced endothelial cell density (P = 0.02), hexagonicity (P = 0.01) and mean cell area (P = 0.04). The occurrence of defects of epithelium = on the 1st day after surgery was suggestively correlated with the death-to-preservation time (p = 0.004). On the first post-operative day, graft stromal edema was found to be suggestively related with graft epithelial sloughing (P <0.001). Post-operative refractive and visual results, survival and transplant complications were not associated with any ocular or donor factor.*
Conclusion: *Eye bank and donor variables influenced donor corneal quality and early post-operative course. Though, the longstanding consequence on transplant complications, survival and clinical outcome were negligible.*
Keywords: *donor quality; keratoconus; Penetrating keratoplasty; Postoperative results.*

Corresponding author:
Dr. Fraz Shakil,
Lahore General Hospital

QR code

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INTRODUCTION:

Penetrating keratoplasty is an operating method in which the entire viscosity of the recipient's cornea is swapped by donor tissue. PK surgeons prefer a transplant of a qualitative, excellent quality donor corneal tissue that provides endothelial cells that are viable[1]. Local and systemic diseases, Age, post-traumatic injury or surgery, cause of death, storage factors (primarily storage method), time among tissue and protection, and period of tissue protection may affect the ultimate value of the cornea[2].
The evidence that currently sets minimum acceptable donor conditions for corneal transplantation is insufficient. Eye Bank America Human corneal transplant standards, endothelial cell limits, donor age upper and lower limits, death compartment protection, extortion or recognition of an eye excision bank[3-4]. Donor age and eye bank variables, cause of death, time interlude from expiry to enucleation and protection, retention time, type of memory carrier and endothelial cell transplant (ECD), and post-transplant corneal compatibility will help determine eye bank standards[5]. It is extremely important to determine the appropriate criteria for corneal transplantation with these eye bank and donor parameters and the cor-relation between donor parameters and post-transplant results[6]. This study examined the impact of donor and eye bank aspects on the adequacy of corneal transplantation and determined whether any of these donor aspects affected medical outcome, graft survival and complications after PK. A large group of keratoconic eyes.

METHODS:

Records of patients with corneal keratoconus were reviewed. In this comparative study, demographic data, best-corrected visual acuity (BCVA) and refraction, retrospective time, donor characteristics and the number of transplant rejection episodes, clarity were analyzed. The fission lamp (stromal thinning, corneal ectasia, Vogt stretch marks and Fleischer ring) and keratoconus were diagnosed and confirmed by conventional topography as determined by keratometry. Coverage criteria included poor visual acuity with correction for vision, gas permeable contact lenses (RGP), hard intolerance (RGP) or moderate keratoconus (mean keratometry 47-52 D) (mean keratometry> 52 D or unmeasured keratometry). Participation principles also obligatory a least observation period of 1 year. Elimination criteria involved the coexistence of other ocular pathologies such as spring keratoconjunctivitis, cataracts, glaucoma and retinal disorders or lack of relevant donor information. Patients whose observation has disappeared were omitted from the analysis of data collected. The Ethics Committee approved the use of patient data. Uncorrected preoperative visual acuity (UCVA), conventional corneal topography (TMS-1 topographic modeling system, version 1.61), dilated fundus examination, Uncorrected preoperative visual acuity (UCVA), open refraction (if possible), full prescription glasses, BCVA.

Postoperative results included UCVA, BCVA, mean keratometry, keratometric astigmatism and refraction were determined during the last examination of follow-up when no sutures remained. In addition, post-operative complications such as epithelial problems, permanent epithelial defects and suture complications, graft failure and graft rejection attacks were observed.

Research of the donor and exams.

Good or excellent quality donor corneas were purchased from the Eye Bank. A general slit lamp and biomicroscopy study was performed to classify them all according to pre-defined guidelines. Prerequisites for donor cornea did not include medical or social factors, infectious or structural contraindications, or turbidity or injury from previous studies that are thought to adversely affect donor corneas. slit lamp, protection time <48 hours and negative serological results. Donor-recipient matching was not performed for ABO / Rh age and blood group.

Corneas were stored at 4 ° C and corneal nodules (n = 206, 81.7%) in Optisol medium (Optisol-GS protector; Chiron Vision, Irvine, California) (n = 46, 18, 3%). Eye Bank data in wet rooms include donor sex and age, cause of expiry, retention time (hours), operation storage time (days), and transport classification. Ocular epithelial, stroma, ECD and donor morphology assessments were only available for 99 (39.3%) grafts.

The time of death for protection was divided into 2 intervals (<24 hours and 24-48 hours) for statistical analysis. The condition of the donor epithelium is classified as permanent and separate. The severity of epithelial detachment was rated as benign (less than a third of the graft epithelial defect), moderate (less than two-thirds of the graft epithelial defect) and severe (less than two-thirds of the graft epithelial defect). The donor frame status has been assigned as light or cloudy. Before preserving the central corneal endothelium, it was photographed under a mirror microscope (Konato Eye Bank Keratoanalyzer, Hyogo, Japan). ECD, mean endothelial cell area, co-efficient of endothelial cell variation, and percentage of hexagonal cells were calculated from mirror images. The cornea quality from the donor used for transplantation was assessed as good, very good or excellent according to the assessment of the slit lamp of all layers of the cornea.

Surgical technique

A sole experienced anterior segment surgeon (MAJ) performed all operations under general anesthesia using the techniques described above. Intraoperative keratoscopy was performed to adjust the suture tension.

Postoperative course

Patients were inspected 1 day after surgery and daily until epithelial healing was completed. Epithelial status and graft clarity were observed at each visit. After using fluorescein, the corneal surface was examined carefully and defects of epithelial were observed. At 1, 3, 6 and 12 months; follow-up examinations were performed after minimum three months after complete elimination of the suture and every six months.

Keratometric astigmatism was reduced by selective removal of sutures after cutting 3 months after surgery and correction of continuous suture tension. Selective removal of intermittent sutures was done sequentially, starting with tight sutures (determined on the basis of keratometric readings) and continued until the permissible amount of astigmatism was obtained. The remaining sutures were left in place, unless there were complications related to the suture, such as abscesses, loosening or vascularization of the suture channel. The following factors identified graft

rejection reactions: the presence of an epithelial rejection line, the presence of sub-epithelial infiltration, the presence of reactive or non-reactive corneal deposits (KP) in the anterior chamber, and the reaction of removal of the graft or anterior chamber with or without KP. Reversal of edema following corticosteroid administration helped distinguish graft rejection from endothelial decompensation in cases of graft edema without KP or anterior chamber reaction. Betamethasone and 0.1% systemic prednisolone topical eye drops were used to treat acute rejection reactions in corneal transplants. Transplant failure was defined as irreversible loss of graft clarity for any reason, including persistent epithelial defects, graft rejection, or transplant turbidity / vascularization.

Statistical analysis

Statistics was examined using SPSS 21. Usual distribution of continuous variables was confirmed using the Q-Q graph and the Kolmogorov-Smirnov test. Preoperative and postoperative visual and refractive results were constantly compared with normal and abnormal variables using a suitably Wilcoxon rank test and paired t test. Pearson's correlation co-efficient evaluated the relationship among usually distributed continuous variables, and Spearman's correlation was used for abnormal variables. A multivariate analysis was achieved involving statistically significant variables at one-dimensional level (P <0.05). This analysis includes logistic regression of binary and sequential variables and multiple regression of continuous variables. In the multivariate analysis, only statistically significant correlations were noted. Less than 0.05 P value was taken substantial. All reported P values are two-sided.

RESULTS:

Functions of the donor and recipient.

A total of 252 consecutive eyes (126 on the right) of 226 (165 men) patients affected by corneal keratosis received PK during the study period. The average age of the recipient was 29.7 ± 10.0 (range, 13-62) years, and the mean follow-up was 66.7 ± 38.5 (range, 12-184) months. A total of 252 buttons from 252 corpses were collected, including 223 male and 29 female donors with an average age of 26.2 ± 8.8 (range, 7-60) years. Causes of donor death were numerous injuries in 68.5%, cardiovascular diseases in 8.7%, intoxication in 8.2%, drowning in 6.9%, hanging in 2.6%, internal diseases in 1.3% and other causes in 3.8%. crates the maximum storage time is 5 days in an optisol environment and 2 days in wet rooms. Donor statistics are given in Table 1.

Table 1. Data related to donor corneas

Preservation-to-transplantation time (days)	1.2±1.1 (0-5)
Death-to-preservation time (%) <24 h	79 (31.3)
24-48 h	173 (68.7)
Graft rating (%) Excellent	50 (19.9)
Very good	177 (70.2)
Good	25 (9.9)
Epithelial defects* (%) No	33 (33.3)
<30%	40 (40.4)
30-60%	11 (11.1)
>60%	15 (15.2)
Stromal clarity* (%) Clear	82 (82.8)
Cloudiness (edema)	17 (17.2)
Endothelial cell* Density (cells/mm^2)	3116.9±330.5 (2192-4149)
Mean cell area (µm^2)	322.3±39.0 (241-456)
Coefficient of variation of cell area	34.2±4.5 (22-42)
Hexagonality (%)	57.7±10.1 (38.0-82.0)

Visual and refractive results

The mean pre-operative UCVA was 1.53 ± 0.39 (range 0.4-2.60) logMAR, and in the last study was 0.54 ± 0.42 (range 0.05-2.90) logMAR (p <0.001). BCVA preoperative mean was 1.34 ± 0.54 (0.10-2.60) logMAR and increased to 0.17 ± 0.13 (range 0-1.30) logMAR in the last episode (P <0.001). The mean pre-operative keratometry was 55.05 ± 3.14 D (range 46.0-59.5 D) and fell to 45.42 ± 2.54 D (range 38.75-56.00 D) after surgery (P < 0.001). The mean pre-operative equivalent global refractive error and keratometric astigmatism were -11.84 ± 4.45 D and 5.05 ± 3.26 D., respectively. After surgery, these numbers dropped to -2.90 ± 3.04 D, respectively (P <0.001) and 3.98 ± 2.05 D (P = 0.01).

Post-operative course and complications.

Eighty (71.4%) eyes had epithelial defect on the 1st day. The epithelial disorder resolved after 5.4 ± 5.8 (range 1-38) days. Healing of the epithelium was completed for 52 eyes (20.6%) within 1-2 days after surgery. Healing of epithelial cells lasted 3-7 days in 97 (38.5%) eyes. Healing of soft contact lenses (n = 11) or transient hyperemia (n = 4) helped complete healing of the epithelium and the transplant failed due to epithelial disorders. On postoperative day 1, a total of 201 (79.8%) grafts were opened, and the remaining grafts showed a degree of stromal edema, which resolved after 4.6 ± 3.9 days (1-22 days).

The mean time from transplant to first suture removal was 12.2 ± 9.3 months and the time from transplant to suture removal was 17.8 ± 8.6 months. Suture complications in 76 eyes (30.2%) and early or tear sutures (n = 66), suture vascularization (n = 6) and suture abscesses (n = 16). The abscess vascular system and sterile vascular sutures were successfully treated with topical corticosteroids and / or sutures. In general, at least one graft rejection attack occurred in 97 (38.5%) eyes, including epithelium (n = 3),

epithelium (n = 30), endothelium (n = 40), and endothelium and endothelium (n = 40) . n = 24) rejection. The time from transplant to the first graft reduction period was 9.8 ± 16.8 (range 1-115) months. Two or more transplant rejection cases occurred in forty (15.9%) eyes. Frequent topical steroids reversed rejection, and all eyes restored visual acuity just before refractive attack. In a recent follow-up study, 248 eyes (98.4%) remained open. The external vascularization of the graft, which did not interfere with visual acuity, was observed with four eyes.

correlations

Time of death for behavior had a significant positive association with graft epithelial separation (r = 0.28, p = 0.005, OR = 3.62 [95% CI: 1.30-10.09]) and stroma turbidity (r = 0) . , 43). P <0.001, OR = 10.0 [95% Cl: 3.0-33,3]). Age of the ECD donor (r = -0.27, P = 0.02, β = -8.8 [95% CI: -17.3 to -0.4]) and hexagonal (r = -0.34, P = 0.01, β = 0.50.51 [95% CI: -0.85 to -0.17]). Only the donor's age was closely related to the transplant outcome (r = -0.17, p = 0.05, OR = 0.96 [95% CI: 0.93-0.99]).

showed significant correlation with epithelial graft separation (r = 0.27, p = 0.004, OR = 2.90 [95% CI: 1.24–6.77]). Structural transplant turbidity (r = 0.24, p = 0.03, β = 4.38 [95% CI: 0.34–8.43]) affected the time interval from transplant to complete healing of the epithelium. On the first postoperative day, graft stromal edema was significantly associated with graft epithelial detachment (r = 0.42, P <0.001, OR = 0.05 [95% CI: 0.006-0.41]).
In a recent follow-up study, tarpafili bandages or contact lenses, suture complications, graft rejection attacks, and permanent epithelial defects requiring transplant transparency were not associated with donor or eye factors. Postoperative BCVA and refractive results were not significantly associated with donor or eye bank variables.

DISCUSSION:

This study examined the impact of donor and eye bank traits on the value of transplants used in PK. Our findings have shown that long-term protection against death increases the frequency of epithelial detachment and stromal edema[7]. In addition, donor age negatively affected ECD and morphology. Other factors, such as donor sex, cause of death, and retention time, did not show a significant association with endothelial cell traits[8].

Most previous studies assessing the impact of donor characteristics and eye bank variables on ECD have shown that donor age and time interval in organ culture are major variables affecting donor value. transmitter. endothelium Gavrilov et al[9]. The percentage of corneas grown in organs unsuitable for PK due to insufficient endothelium increases from 40% in donors older than 80 to 13% in young donors[10]. A corneal donor study showed a negative correlation among donor ECD and age. Armitage et al. In organ culture, donor age and retention time were the main variables affecting PC endothelium benefit. ECD rates less than 2500 cells / mm² increased with longer retention times and donor age. Increasing the intervals from enucleation to resection of the corneal disc also increased the likelihood of ECD <2500 cells / mm², but the overall effect is small and substantial only for intervals> 18 hours[11].

One study measured endothelial cell loss during conservation in organ culture. Donor age, sex, posthumous deviation and cause of death did not significantly correlate with the % of endothelial cell loss. Though, shelf life was significantly correlated with 0.07% cell loss per storage day[12]. Because these parameters were measured just before tissue preservation in this study, we were unable to assess the effect of ECD retention time and graft quality[13].

Many studies have shown that the technique and time of donor age, cause of death, donor protection, and morphometric and pre-operative measurements of morphometry and ECD (coefficient of variation and hexagonal) do not affect the total failure[14]. From donors. vaccine. Similarly, we found that donor tissue features did not significantly affect graft survival. Though, one study has shown that pre-operative risk aspects for the development of late endothelial failure include low ECD and older donors. The writers of the corneal donor study noticed that transplants from donors aged 66–75 who meet the criteria for compliance with their studies had a 5-year survival rate comparable to young donors. However, the advanced age of the donor was expressively associated with a decrease in graft success during long-term follow-up[15]. Age and longer retention times of older donors are more associated with lower ECD. In contrast, the results of this study show that donor parameters will not significantly affect graft survival as long as the ECD is higher than the minimum (> 2000 cells / mm2) used during corneal transplantation. Eventually.

CONCLUSION:

In conclusion, we are investigating factors that affect donor transplant quality and the relationship between donor traits and clinical PC results. The sample we studied was a homogeneous group with keratoconus and did not show any other comorbidities of the eye, which was sufficient to identify donor traits that may affect postoperative outcomes. Our results showed that donor and eye bank variables affect donor corneal quality and early postoperative course. However, after meeting the minimum selection criteria set by Göz Bankas, his impact on clinical results, complications, and graft survival is insignificant.

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