Clinical Indications of Penetrating Keratoplasty: An Epidemiological Study in Teaching Hospitals of Birjand

Mohammad-Hossein Davari, MD1 • Abdullah Amini, PhD2

Abstract

Purpose: The aim of this study was to determine indications of keratoplasty during 7 years (1999–2006) in Emam-Reza and Vali-Asr teaching hospitals of Birjand University of medical sciences.

Methods: Medical records of all patients who underwent penetrating keratoplasty (PK) in teaching hospitals of Birjand University of Medical Sciences from 1999 to 2006 were investigated retrospectively. The recorded data covered sex, age, indication, job and place of life of the patient. This data were analyzed regarding statistical significance was determined using X² analysis.

Results: During a 7-year period, total number of 120 patients were operated. The most common indication for PK was corneal opacity (62%), followed by keratoconus 20% and other 18% (Bolus keratopathy plus corneal dystrophia). The major job group for keratoplasty was farmer and the keratoplasty in patients that live in village (56%) was more than the city (44%).

Conclusion: Corneal opacity was the leading indication for PK. The major cause of corneal scarring was trauma with Thorn barberry and corneal infection in our study.

Keywords: Penetrating keratoplasty, Corneal Opacity, Keratoconus, Bullous Keratopathy, Corneal Dystrophy


Introduction

The cornea is normally a clear avascular tissue that refracts or bends light rays as they enter the eye, allowing them to focus on the retina.1,2 Corneal diseases are a significant cause of visual impairment and blindness in the developing world.3 Penetrating keratoplasty (PK) offers hope for visual rehabilitation in many such cases.4

Corneal transplantation, also known as corneal grafting or PK has two major types: PK in which the full thickness of cornea is replaced, and lamellar keratoplasty (LK) in which a portion of cornea is replaced. The term PK commonly refers to surgical replacement of a portion of the cornea with that of a donor eye. LK consists of placing a partial thickness donor corneal graft in a recipient corneal bed that is prepared by lamellar dissection of diseased anterior stroma corneal tissue.5-7

Corneal transplantation is one of the most common transplant procedures worldwide. Although almost 100,000 procedures are performed each year; some estimates report that 10,000,000 people are affected by various disorders that would benefit from corneal transplantation.7

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In some situations such as scar, edema, thinning and severe distortion there is no treatment other than corneal transplantation.\(^9\)

The decline of certain disorders due to changes in surgical practice, and the emergence of new surgical techniques have largely influenced the changing trend. The indications for PK have continued to change since 1940,\(^9,10\) and investigators have studied the changing trends over the past few decades.\(^9,13\)

To update these trends and also to provide information for the prevention of corneal blindness, we report the indication for PK in teaching hospitals of Birjand University of Medical Sciences from 1999 to 2006.

**Methods**

The medical records of 120 patients who underwent PK at the Emam-Reza and Vali-Asr teaching hospitals of Birjand University of Medical Sciences during a 7 years period from 1999 to 2006 were investigated retrospectively. This data were analyzed regarding sex, age, job, indication for keratoplasty, and place of life of the patient. Statistical significance was determined using \(X^2\) analysis and descriptive statistic measures including percentiles, mean and standard deviation were calculated. Personal information of patients was not disclosed and the data sheets were anonymous.

**Results**

A total of 120 patients underwent PK operations during the 7 year study period. From 120 patients; 86 (71.66%) were male and 34 (28.33%) were female. The mean age was 53±20.9 years and a median of 59 years. The mean age of males was 51.3±21.5 and for women was 57.2±19.1 (\(P=0.26\)). The mean age of rural patients was 61±17.4 and in urban patients was 42.7±20.7 (\(P=0.001\)).

The main indications of keratoplasty were corneal leucoma 75 (62.5%), keratoconus 23 (19.16%) and others (Bolus keratopathy + corneal dystrophy) 22 (18.34%) (\(P=0.001\)) (Table 1).

<table>
<thead>
<tr>
<th>Job group</th>
<th>Corneal locu</th>
<th>Kerato-</th>
<th>The else</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Farmers - Animal husbandman</td>
<td>29 (76%)</td>
<td>--------</td>
<td>9 (24%)</td>
</tr>
<tr>
<td>2) Simple worker - Artisan</td>
<td>7 (71.4%)</td>
<td>2 (18.18%)</td>
<td>2 (18.18%)</td>
</tr>
<tr>
<td>3) Staff - Driver - Carpet weaver</td>
<td>12 (66.66%)</td>
<td>4 (22.22%)</td>
<td>2 (11.11%)</td>
</tr>
<tr>
<td>4) Housewife - Not busy</td>
<td>25 (68%)</td>
<td>4 (11.11%)</td>
<td>7 (19.44%)</td>
</tr>
<tr>
<td>5) Students</td>
<td>2 (9.1%)</td>
<td>13 (76.47%)</td>
<td>2 (11.76%)</td>
</tr>
<tr>
<td>Total</td>
<td>75 (62.5%)</td>
<td>23 (19.16%)</td>
<td>22 (18.34%)</td>
</tr>
</tbody>
</table>

The major job for keratoplasty group was farmer 29 (76%) and housewife (not busy) 25 (68%).

In corporation for clinical indication of keratoplasty, there was a significantly difference between the rural patients group and urban patients groups, as shown in (Table 2) (\(P=0.0015\)) but no significant sex difference was found for the cause of keratoplasty in diagnostic categories (\(P=0.563\)) (Table 3).

Similar to this finding, studies for indications of keratoplasty according to age showed a significant difference between the age and cause of PK (\(P=0.001\)). In other words, in the ages under 25 years old, the main diagnosis was keratoconus 15 (75%) and in the ages over 25 years old, the main diagnosis was corneal leucoma (Table 4).

### Table 1. Indications of keratoplasty based on job groups

<table>
<thead>
<tr>
<th>Residence</th>
<th>City</th>
<th>Village</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corneal locu</td>
<td>29 (54.72%)</td>
<td>46 (68.66%)</td>
</tr>
<tr>
<td>Keratoconus</td>
<td>17 (32.07%)</td>
<td>6 (8.95%)</td>
</tr>
<tr>
<td>Other</td>
<td>7 (13.21%)</td>
<td>15 (22.39%)</td>
</tr>
<tr>
<td>Total</td>
<td>53 (100%)</td>
<td>67 (100%)</td>
</tr>
</tbody>
</table>

\(P=0.015; df=2; \text{Value}=8.381\)
Table 3. Relation between cause of PK and sex groups

<table>
<thead>
<tr>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corneal locu ma</td>
<td>53 (61.63%)</td>
<td>22 (64.70%)</td>
</tr>
<tr>
<td>Keratoconus</td>
<td>20 (23.25%)</td>
<td>5 (14.71%)</td>
</tr>
<tr>
<td>The else</td>
<td>13 (15.12%)</td>
<td>7 (20.59%)</td>
</tr>
<tr>
<td>Total</td>
<td>86 (100%)</td>
<td>34 (100%)</td>
</tr>
</tbody>
</table>

P=0.563; df=2; Value=1.151

Table 4. Comparison of cause of PK in age groups

<table>
<thead>
<tr>
<th>Cause of PK</th>
<th>11-25 (N=19)</th>
<th>26-45 (N=25)</th>
<th>Up to 46 (N=76)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corneal locu ma</td>
<td>3 (15%)</td>
<td>12 (54.55%)</td>
<td>60 (76.92%)</td>
</tr>
<tr>
<td>Keratoconus</td>
<td>15 (75%)</td>
<td>7 (31.82%)</td>
<td>1 (1.28%)</td>
</tr>
<tr>
<td>The else</td>
<td>2 (7.10%)</td>
<td>3 (13.63%)</td>
<td>17 (21.80%)</td>
</tr>
<tr>
<td>Total</td>
<td>20 (100%)</td>
<td>22 (100%)</td>
<td>78 (100%)</td>
</tr>
</tbody>
</table>

P=0.001; df=4; Value=40.234

Discussion

PK can visually rehabilitate many of those who suffer from blindness or visual impairment due to corneal diseases. The prognosis, however, is dependent on the pathology responsible for causing corneal blindness or visual impairment.13-15 The purpose of our study was to document the indications for PK in teaching hospitals of Birjand University of Medical Sciences which are major referral centers for the treatment of corneal diseases in eastern of Iran.

In this study we found that the leading indications for PK were corneal scar (43%), keratoconus (20%), bullous keratopathy (16%), and corneal dystrophy and degeneration (11%). The most common indication for PK was corneal scarring and keratoconus. Similarly, a study by Ngamti et al in Maharaj Nakorn hospital showed that the leading indications for PK were bullous keratopathy (28.9%), corneal scar (22.2%), corneal dystrophy and degeneration (20.0%), corneal ulcer (17.8%), regraft (8.9%), and trauma (2.2%).17 Pseudophakic bullous keratopathy and corneal scar were the most common indications.17 A study in French in 2001 showed that pseudophakic bullous keratopathy (27.7%) and keratoconus (25.3%) were the most common indications for PK.16 Another study in Atlanta in 2001 showed that reoperative graft (29.1%), bullous keratopathy (21.5%), keratoconus (23%) and corneal scar (19%) were the most common indications for PK.19 In the study in Iran at teaching hospital of Yazd University of Medical Sciences between 1992 and 1996, the most common indication for PK were keratoconus (31%), corneal scar (27%), pseudophakic bullous keratopathy and corneal dystrophies.20 The difference in our results and and above mentioned studies can be explained by the more frequent presence of corneal infectious and traumatic insults such as trachoma, herpes simplex and bacterial ulcers. Dobbing21 has reported trauma as the main cause of corneal scarring and also in the study in Iran by Foroutan et al22 showed that the most common indication for PK was ocular adnexal infections,22 but trauma with Thorn barberry and ocular adnexal infection were more important causes of corneal scarring in our study.

Also, the decreases of bullous keratopathy disorders may be due to changes in surgical practice, and the emergence of new surgical techniques.17

The rate of corneal transplant rejection in most studies is between 9.9 and 17.2% but we had a failure rate of 12.3% because of poor prognosis factors in most scarred corneas such as deep vascularization and defects in eyelid and conjunctiva.

There is no significant difference in the indications and outcome of corneal transplantation between males and females as could be expected12 but other studies may show a predominance of keratoconus and trauma in males and Fuchs’ dystrophy in females as indication for corneal transplantations.16

Conclusion

Corneal scar and keratoconus is the most common indication for PK in teaching hospitals of Birjand University of Medical Sciences.
References