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Clinical Indications for Penetrating Keratoplasty and Epidemiological Study in Teaching Hospitals of Birjand Medical University from 1999 to 2006

Mohammad Hossien Davari¹ and Hoda Gheytasi²

¹Vali-Asre Hospital,
Birjand University of Medical Sciences and Health Services, Birjand,
²Birjand University of Medical Sciences, Birjand,
Iran

1. Introduction

The cornea is normally a clear layer of tissue covering the front of the eye, similar to a watch crystal. Its purpose is to refract or bend 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 (3).

Corneal transplantation, also known as corneal grafting or penetrating keratoplasty, is a surgical procedure where a damaged or diseased cornea is replaced by donated corneal tissue which has been removed from a recently deceased individual having no known diseases which might affect the viability of the donated tissue (1, 4). Corneal transplantation has two major types, penetrating keratoplasty (P.K) in which the full thickness of cornea is replaced and lamellar keratoplasty (L.K) in which a portion of cornea is replaced. The term PK commonly refers to surgical replacement of a portion of the corneal with that of a donor eye. LK surgery consists of placing a partial thickness donor corneal graft in a recipient corneal bed that is prepared by lamellar dissection of diseased anterior stoma corneal tissue (5, 6).

In Worldwide, Corneal transplant is one of the most common transplant procedures although approximately 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. In some situations such as scar, edema, thinning and severe distortion there is no treatment other than corneal transplantation (7, 8).

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).

Indications for corneal transplantation include the following:

Optical: To improve visual acuity by replacing the opaque or distorted host tissue by clear healthy donor tissue. The most common indication in this category is pseudophakic bullous keratopathy, followed by keratoconus, corneal degeneration, keratoglobus and dystrophy, as well as scarring due to keratitis and trauma.

Tectonic/reconstructive: To preserve corneal anatomy and integrity in patients with stromal thinning and descemetocelles, or to reconstruct the anatomy of the eye, e.g. after corneal perforation.

Therapeutic: To remove inflamed corneal tissue unresponsive to treatment by antibiotics or anti-virals.

Cosmetic: To improve the appearance of patients with corneal scars that have given a whitish or opaque hue to the cornea.

To update these trends and also to provide information for the prevention of corneal blindness we report the indication causes for penetrating keratoplasty (PK) in Teaching Hospitals of Medical Birjand University from 1999 to 2006.

2. Methodology

A retrospective analysis of the records of 120 patients, who underwent PK at the Emam-reza and Vali-asr teaching hospitals of Birjand University during 7- year period from 1999 to 2006, was performed.

All surgeries were performed by one expert surgeon using the same procedure and there were no intra-operative complications. Preoperative examinations consisted of visual acuity, refractive error and slit-lamp examination. Patient's pre-operative information included age, sex, systemic disease, lid abnormalities, pre-existing ocular surface disease and corneal vascularization, surgical indications and preoperative medications. The data of the last examination including uncorrected visual acuity (UCVA), refractive error, intra-ocular Pressure (IOP), graft clarity, any episode of endothelial graft rejection during the follow-up, also, suturing technique and intraoperative complications were recorded.

graft failure and recurrence of MCD in the transplanted cornea were compiled Patients were followed up for a minimum of 2 years .This data were analyzed regarding sex, age, indication, job and location of the patient. Statistical significance was determined using X2 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.

The donor lenticule was secured to the recipient corneal rim with 10-0 monofilament nylon sutures. The suturing techniques consisted of interrupted (16 separate sutures), single running (with 16 bites), and combined (8 separate sutures and a 16-bite running suture).

At the end of the operation, subconjunctival gentamicin 20 mg and betamethasone 4 mg were injected. Postoperatively, the patients were medicated with topical betamethasone 0.1% and chloramphenicol eye drops four times a day. Antibiotic eye drop was discontinued after 7 to 10 days and betamethasone eye drop was gradually tapered over 4 months.

Selective suture removal was performed for any suture-related problems and for control of astigmatism, based on topography, from four month onward. Suture removal was completed between 12 and 18 months after the date of the surgery. Patients were examined on 1st, 2nd, 3rd and 7th days and then every week up to one month, every 2 weeks up to 2 months, monthly up to 4 months, and every 2 months thereafter. Finally, Two months after complete suture removal, patients were reevaluated.

3. Result

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 patient's age was 53 years with a standard deviation (SD) of 20.9 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)

And also, the average age of rural patients was 61± 17.4 and urban patients were 42.7 ± 20.7, in statistically, there is a significantly difference between the average age of rural patients group in compared with average age of urban patients group. (p=0.001).

The main indications cause keratoplasty were corneal locuma 75(62.5%), keratoconus 23(19.16%) and others (Bolus keratopaty + corneal dystrophy) 22(18.34%). (p=0.001) (Table1).

Job Groups	corneal locum	keratoconus	The else
1) Farmers-animal husbandman	29(76%)	-----	9(24%)
2) Simple worker -Artisan	7(71.4%)	2(18.18%)	2 (18.18%)
3) Staff-Driver-carpet weaver	12(66.66%)	4(22.22%)	2(11.11%)
4) Housewife-Not busy	25(68%)	4(11.11%)	7(19.44%)
5) Students	2(9.1%)	13(76.47%)	2(11.76%)
Total	75(62.5%)	23(19.16%)	22(18.34%)

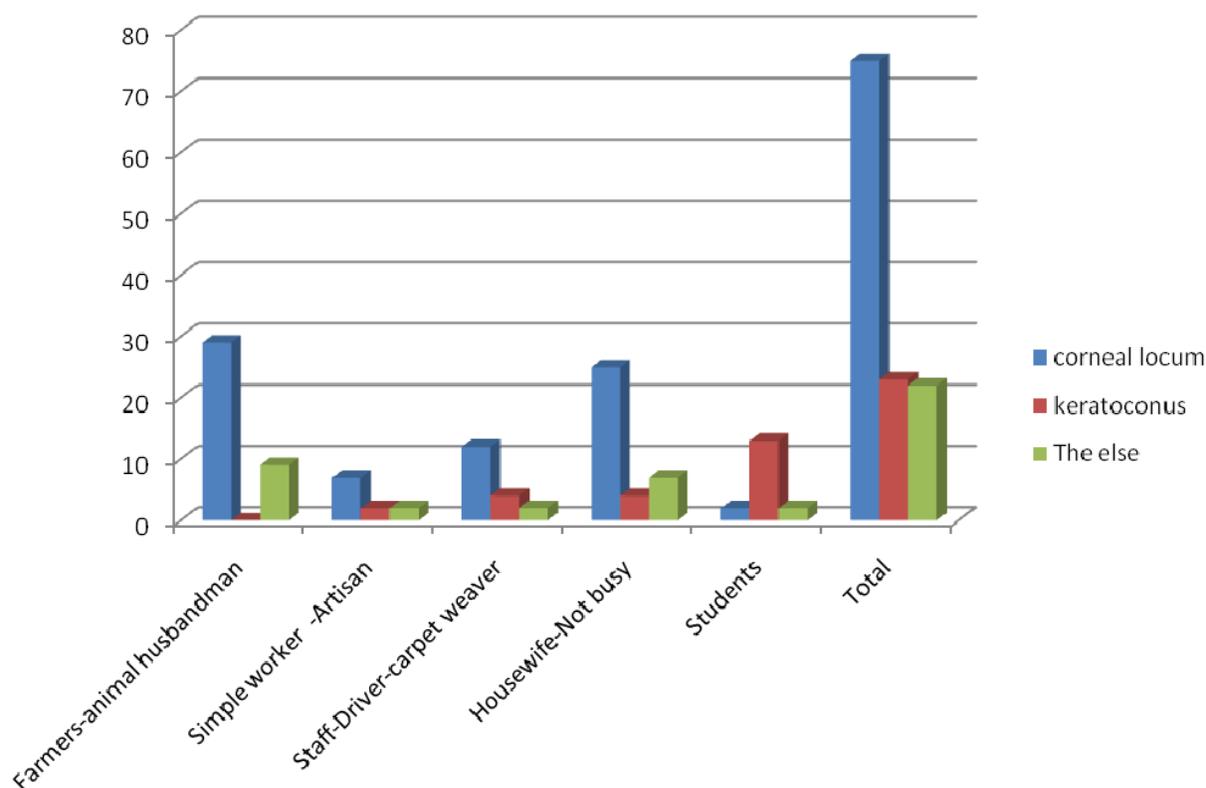


Table 1. Evaluation of indication cause of keratoplasty in Job groups

The major job for keratoplasty group was agriculture 29(76%) and housekeeping(not busy) 25(68%). because of frequent presence of corneal infectious and traumatic insults such as trachoma, herpes simplex and bacterial ulcers and trauma with Thorn barberry and ocular adnexal infection, it may be the most important cause of corneal scarring in our studies.

In corporation for indication cause 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 ($P=0.563$).Table3

similar to this finding, studies for indication cause of keratoplasty according to age showed a significantly difference between the age and cause of PK ($P=0.001$) In other words, in The ages under 25 years old the main diagnoses were keratoconus (75%)15, and in The ages over 25 years old the main diagnoses were Corneal locum (Table 4).

Residence	City	village
Corneal locuma	(54.72%)29	(68.66%)46
Keratoconus	(32.07%)17	(8.95%)6
The else	(13.21%)7	(22.39%)15
Total	(100%)53	(100%)67

$P=0/015$ $df=2$ $value=8/381$

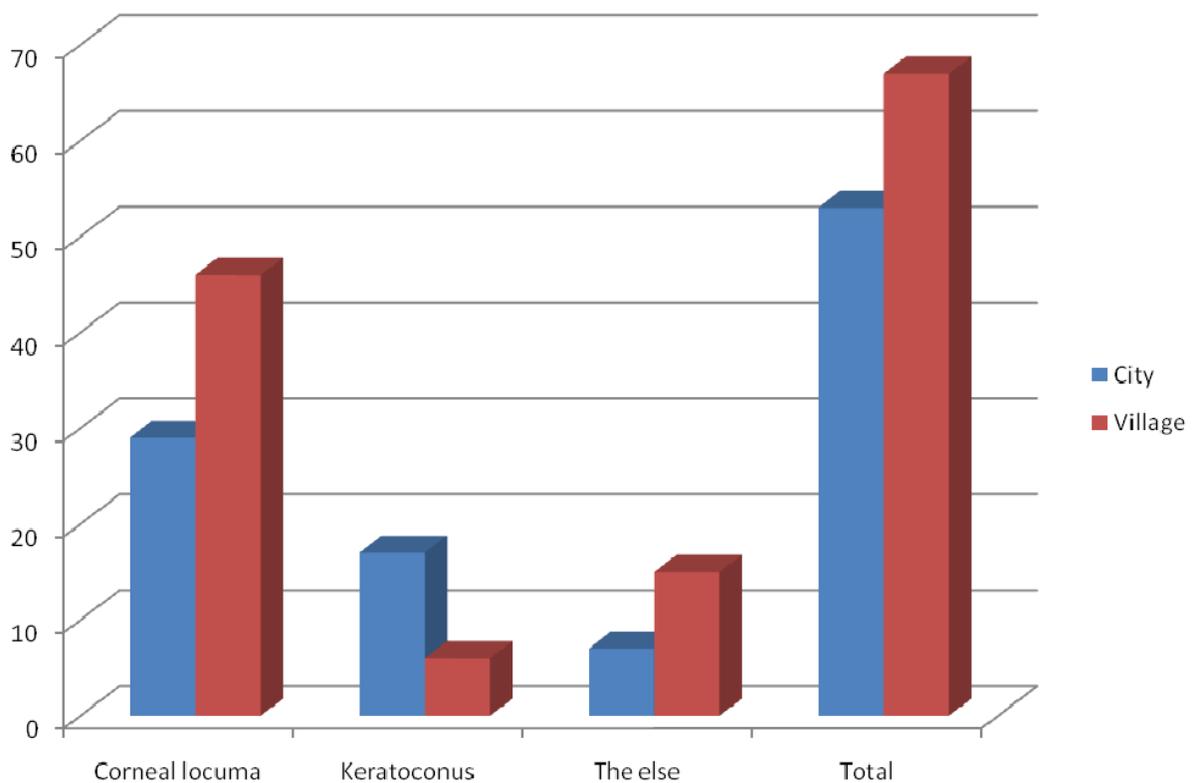


Table 2. Relationship between cause of PK and Residence

Sex	Male	Female
Corneal locuma	(61.63%)53	(64.70%)22
Keratoconus	(23.25%)20	(14.71%)5
The else	(15.12%)13	(20.59%)7
Total	(100%)86	(100%)34

P=0/563 df=2 Value:1/151

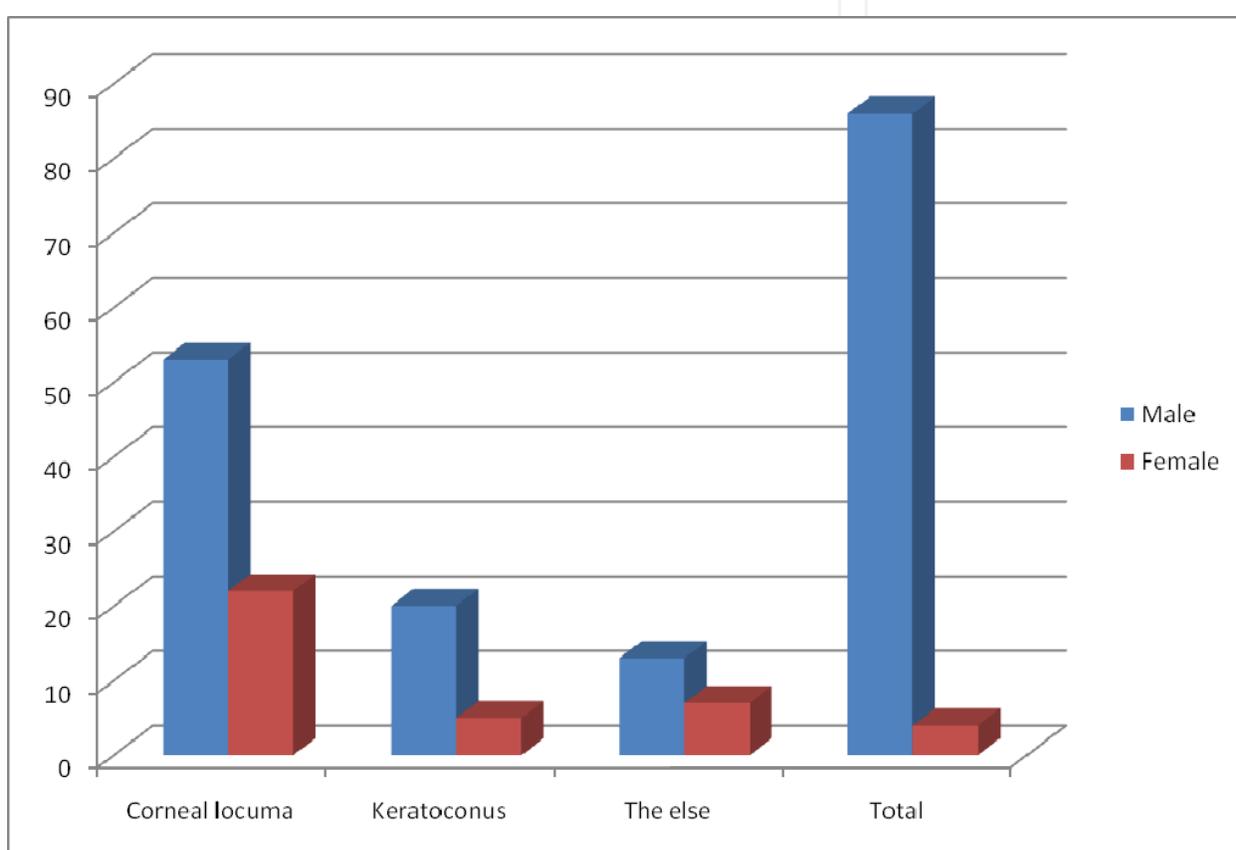


Table 3. Relationship between cause of PK and sex groups

4. Discussion

Penetrating keratoplasty can visually rehabilitate many of those who suffer from blindness or visual impairment due to corneal diseases. The prognosis of the outcome, however, is dependent on the pathology responsible for causing corneal blindness or visual impairment. [13][14][15] The purpose of our study was to document the indications for PK in Teaching Hospitals of Medical Birjand University which is a major referral centre for the treatment of corneal diseases in the Iran -Birjand .

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%). In other words, the most common indication for PK was corneal scarring and

Age groups	11-25	26-45	Up to 46
Number	19(15.83%)	25(20.83%)	76(63.34%)
Cause of pk			
Corneal locuma	(15%)3	(54.55%)12	(76.92%)60
Keratoconus	(75%)15	(31.82%)7	(1.28%)1
The else	(7.10%)2	(13.63%)3	(21.80%)17
Total	(100%)20	(100%)22	(100%)78
	P=0/001	df=4	value=40/234

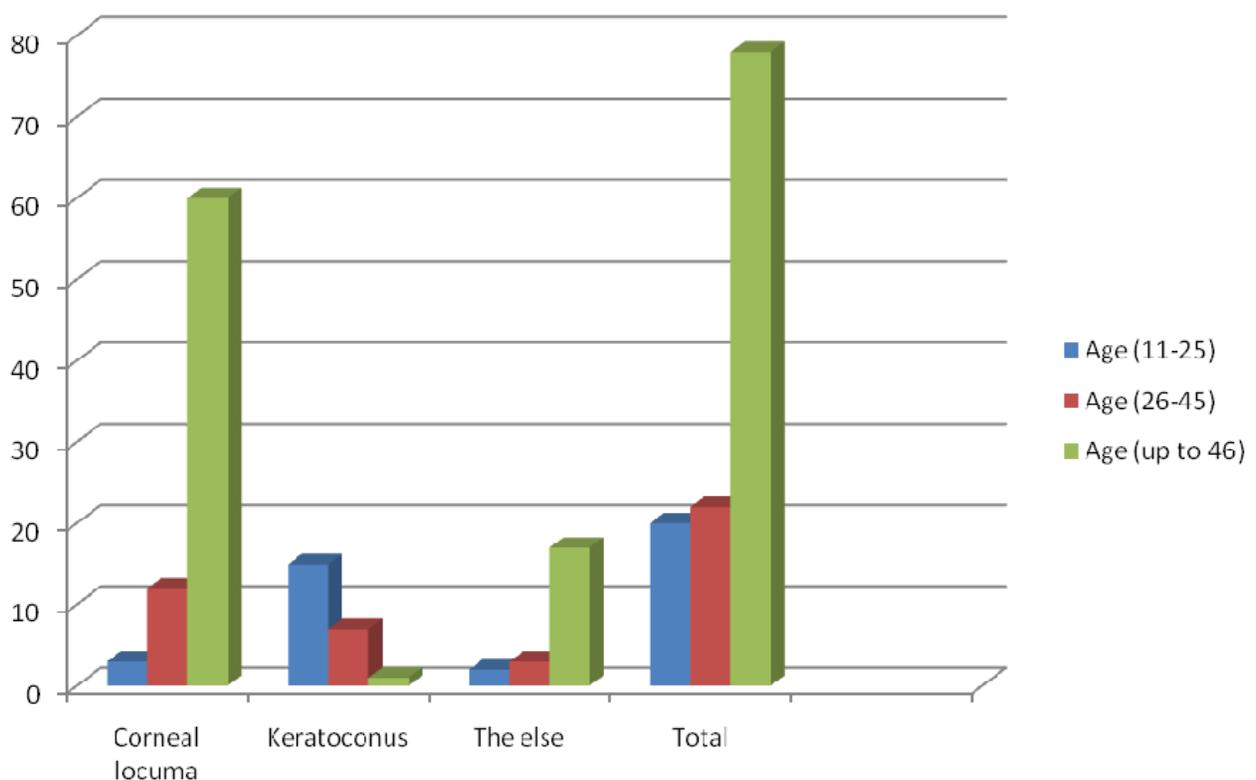


Table 4. Comparison of cause of PK in age groups

keratoconus. Similar to this finding, studies in Nakorn hospital (17) showed that The leading indications for penetrating keratoplasty, in order of decreasing frequency, were bullous keratopathy (28.9%), corneal scar (22.2%), corneal dystrophy and degeneration (20.0%), corneal ulcer (17.8%), re-graft (8.9%), and trauma (2.2%)(17). In other words, pseudophakic bullous keratopathy and corneal scar were the most common indications (17). In the study in French in 2001 pseudophakic bullous keratopathy (27.7%), keratoconus (25.3%), was the most common indication (18). In Atlanta in 2001 study showed reoperative graft (29.1%), bullous keratopathy (21.5%), keratoconus (23%), corneal scar (19%), was the most common indication (19). In the study in Iran (Teaching Hospital of Medical yazd University) between 1992 and 1996, The most common indication for PK was keratoconus (31%), corneal scar

(27%), pseudophakic bullous keratopathy and corneal dystrophies (20). The difference in our results and them can be explained by the more frequent presence of corneal infectious and traumatic insults such as trachoma, herpes simplex and bacterial ulcers. Dobbin has reported trauma as the main cause of corneal scarring but trauma with Thorn barberry and ocular adnexal infection may be more important causes of corneal scarring in our study.

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

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 eyelid and conjunctiva defects.

There is no significant difference in the indications and outcome of corneal transplantation between males and females as could be expected (12) but other studies may show a predominance of keratoconus and trauma in males and Fuchs' dystrophy in females as indication for corneal transplantation (16).

5. Conclusions

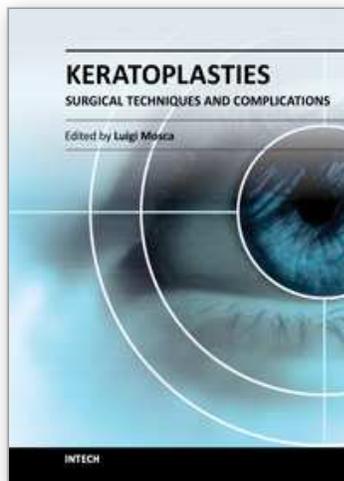
Corneal scar and Keratoconus is the most common indication for PK in teaching hospitals of Birjand Medical University, Iran. These findings were in agreement with data reported in recent literature in Iran.

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