

Demographic Profile, Indications, and Techniques of Keratoplasty Services in Iraq: Insights from Ghazi Al Hariri Hospital

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ABSTRACT:

Background: Keratoplasty services in Iraq depend on imported corneas and are managed through a centralized waiting list. Understanding patient demographics, primary indications, and surgical techniques is crucial for effective resource allocation and improving services. This study analyzes keratoplasty patient records from Ghazi Al Hariri Hospital, focusing on demographic profiles, indications, and techniques. **Methods:** A retrospective study was conducted at the Ophthalmology Department of Ghazi Al Hariri Hospital. Records of corneal transplantations between August 2017 and October 2018 were reviewed. Collected data included patient names, ages, genders, residences, indications for keratoplasty, and surgical techniques. **Results:** A total of 207 keratoplasties were performed, excluding 19 cases. Patients under 30 years old constituted the majority (54.3%), with a male predominance (55.3%). The primary indication was keratoconus in patients under 40 (70%) and leukoma in those aged 40 and above (13.2%). Penetrating keratoplasty (43.6%) and anterior lamellar keratoplasty (43.1%) were the most common techniques. **Conclusion:** This study provides insights into keratoplasty services in Iraq, highlighting demographic trends, indications, and techniques. Addressing limitations and expanding data collection in future research can enhance keratoplasty practices in Iraq.

INTRODUCTION:

Keratoplasty services in Iraq rely exclusively on imported corneas and are administered through a centralized waiting list managed by the Iraqi Ministry of Health. Understanding the demographic characteristics of patients undergoing keratoplasty, identifying the primary corneal diseases necessitating this procedure, and determining the optimal surgical techniques represent pivotal considerations. This critical information holds the potential to guide hospitals, healthcare practitioners, and higher health authorities in Iraq to judiciously allocate resources, establish an effective framework to cope with escalating demand, implement preventive strategies, and provide essential staff training. Consequently, this study aims to scrutinize the patient records of keratoplasty procedures conducted at Ghazi Al Hariri Hospital. The investigation focuses on assessing the demographic profile, discerning surgical indications, and delineating the techniques employed.

METHODS:

This retrospective study was conducted at the Ophthalmology Department of Ghazi Al Hariri Hospital. A comprehensive review was undertaken, encompassing the medical records of patients who underwent corneal transplantations between August 2017 and October 2018. The collected data included pertinent patient details such as names, ages, genders, and places of residence, indications for keratoplasty, and the specific surgical techniques employed.

Inclusion and Exclusion Criteria:

Patients were selected based on the following criteria:

- Undergoing corneal transplantation between August 2017 and October 2018.
- Availability of complete medical records.

Exclusion Criteria Comprised:

- Patients with missing or incomplete medical records.

- Patients who underwent therapeutic or tectonic keratoplasty.

Indications for Keratoplasty:

The indications for keratoplasty were determined by the clinical diagnoses provided by surgeons at the time of the respective surgeries. In cases involving multiple transplantations, the diagnosis of regraft was considered, irrespective of the initial indication for transplantation and the type of keratoplasty.

For the Purpose of this Study:

- Corneal leukoma was defined as non-herpetic corneal scars without active bacterial or viral infection.
- Old corneal scars with confirmed diagnoses of herpes simplex keratitis were classified as post-herpetic leukoma in a separate category.
- Traumatic corneal leukoma referred to corneal opacities resulting from mechanical trauma or chemical burns.
- Patients undergoing keratoplasty due to corneal decompensation in the presence of aphakia or pseudophakia were categorized as cases of aphakic bullous keratopathy (ABK) or pseudophakic bullous keratopathy (PBK), regardless of the underlying mechanism for corneal decompensation (e.g., complicated cataract surgery).

Surgical Techniques:

The surgical techniques employed in this study encompassed a range of procedures, namely penetrating keratoplasty (PKP), anterior lamellar keratoplasty (ALK), endothelial keratoplasty, and the combination of penetrating keratoplasty with cataract surgery, intraocular lens implantation, and/or anterior vitrectomy (PKP+).

Within the domain of anterior lamellar keratoplasty, the classification proposed by Sarnicola et al (1) was adopted, which includes the following types of keratoplasty:

- Deep anterior lamellar keratoplasty
- Subtotal anterior lamellar keratoplasty
- Total anterior lamellar keratoplasty

At our center, the procedure of choice for endothelial keratoplasty was Descemet stripping endothelial keratoplasty (DSEK). The donor corneal tissue used for endothelial keratoplasty underwent manual cutting as part of the surgical protocol.

Variables Gathered for Analysis:

The variables collected for analysis encompassed sex, age, place of residence, surgical technique, and indication of surgery

Statistical Analysis:

Data analyzed by descriptive statistics such as mean, standard deviation, percentages, tables and graphs. IBM SPSS Statistics 22 software has been used.

RESULTS:

A total of 207 keratoplasties were performed, excluding 19 cases from the analysis. The age distribution ranged from 0 to 79 years, with a significant predominance in the 0-18 and 19-29 age groups (N=102, 54.3%). Male patients constituted a larger proportion (n=104, 55.3%) compared to females (n=84, 44.7%). Among the patients, 108 individuals (57.3%) resided in Baghdad, with Anbar and Missan contributing 12 and 9 patients, respectively (Table 1 & Table 2.).

Table1. Demographic profile of the patients according to sex and age.

Variable	N(%)
Sex	
Female	104(55.3)
Male	84(44.7)
Age (years)	
0-18	52(27.7)
19-29	50(26.6)

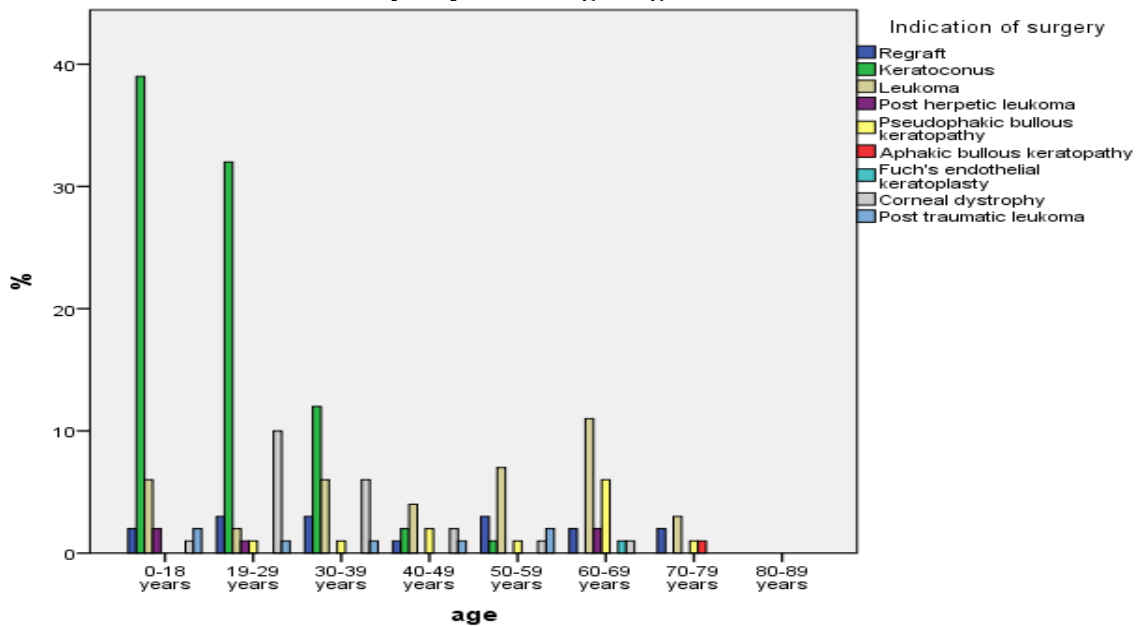
30-39	29(15.4)
40-49	12(6.4)
50-59	15(8)
60-69	23(12.2)
70-79	7(3.7)

Table2. Demographic profile of the patients according place of residence.

Variable	N (%)
Place of residence	
Baghdad	80(57.4)
Qadisiyah	3(1.6)
Missan	9(4.8)
Thi-Qar	7(3.7)
Muthanna	4(2.1)
Najaf	2(1.1)
Kirkuk	3(1.6)
Sulaimanya	1(.5)
Anbar	12(6.4)
Babil	3(1.6)
Wasit	5(2.7)
Ninevah	7(3.7)
Basrah	5(2.7)
Diala	8(4.3)
Salahuddin	7(3.7)
Kerbala	4(2.1)

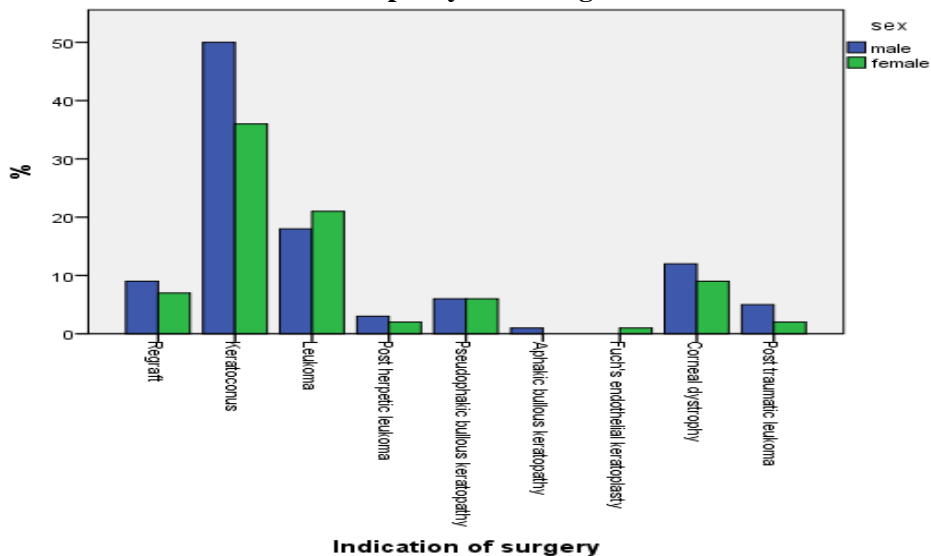
Keratoconus emerged as the primary indication for keratoplasty in patients under 40 years old (n=83, 70%), while leukoma was the predominant indication for patients aged 40 years and above (n=25, 13.2%) (Figure 1).

Figure 1. Distribution of indications of keratoplasty according to age



In cases of leukoma, females slightly outnumbered males by 21 to 18. However, in pseudophakic bullous keratopathy, the number of male and female patients was equal (n=6 for each sex) (Figure 2).

Figure 2. Distribution of indications of keratoplasty according to sex.



The principal corneal diseases leading to transplantation were keratoconus (n=86, 45.7%), leukoma (n=39, 20.7%), and corneal dystrophy (n=21, 11.2%) (Table 3).

Table 3. Indications of corneal transplantations

variable	N	(%)
Indication of transplantation		
Keratoconus	86	(45.7)

Leukoma	39	(20.7)
Corneal dystrophy	21	(11.2)
Regraft	16	(8.5)
Pseudophakic bullous keratopathy	12	(6.4)
Post traumatic leukoma	7	(3.7)
Post herpetic leukoma	5	(2.7)
Aphakic bullous keratopathy	1	(.5)
Fuch's endothelial keratoplasty	1	(.5)

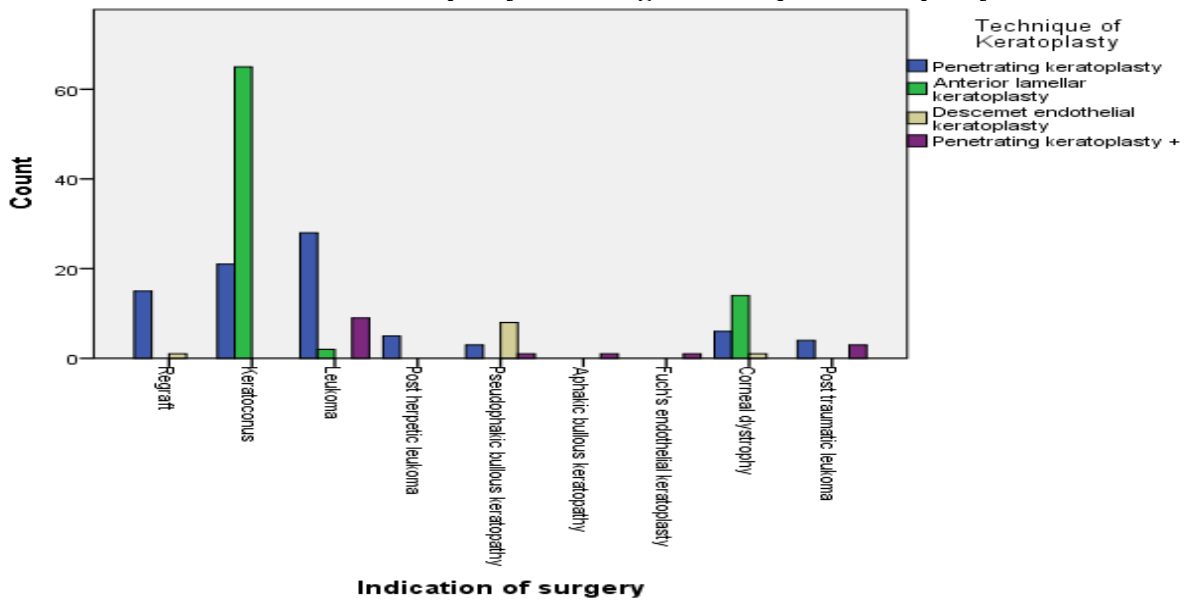
The most commonly performed surgical technique was penetrating keratoplasty (n=82, 43.6%), closely followed by anterior lamellar keratoplasty (n=81, 43.1%; Table 4).

Table4. Techniques of keratoplasty

variable	N	%
Penetrating keratoplasty	8	(43.6)
	2	
Anterior lamellar keratoplasty	8	(43.1)
	1	
Penetrating keratoplasty combined with(cataract surgery, IOL implantation, and/or anterior vitrectomy)	1	(8.0)
	5	
Descemet endothelial keratoplasty	1	(5.3)
	0	

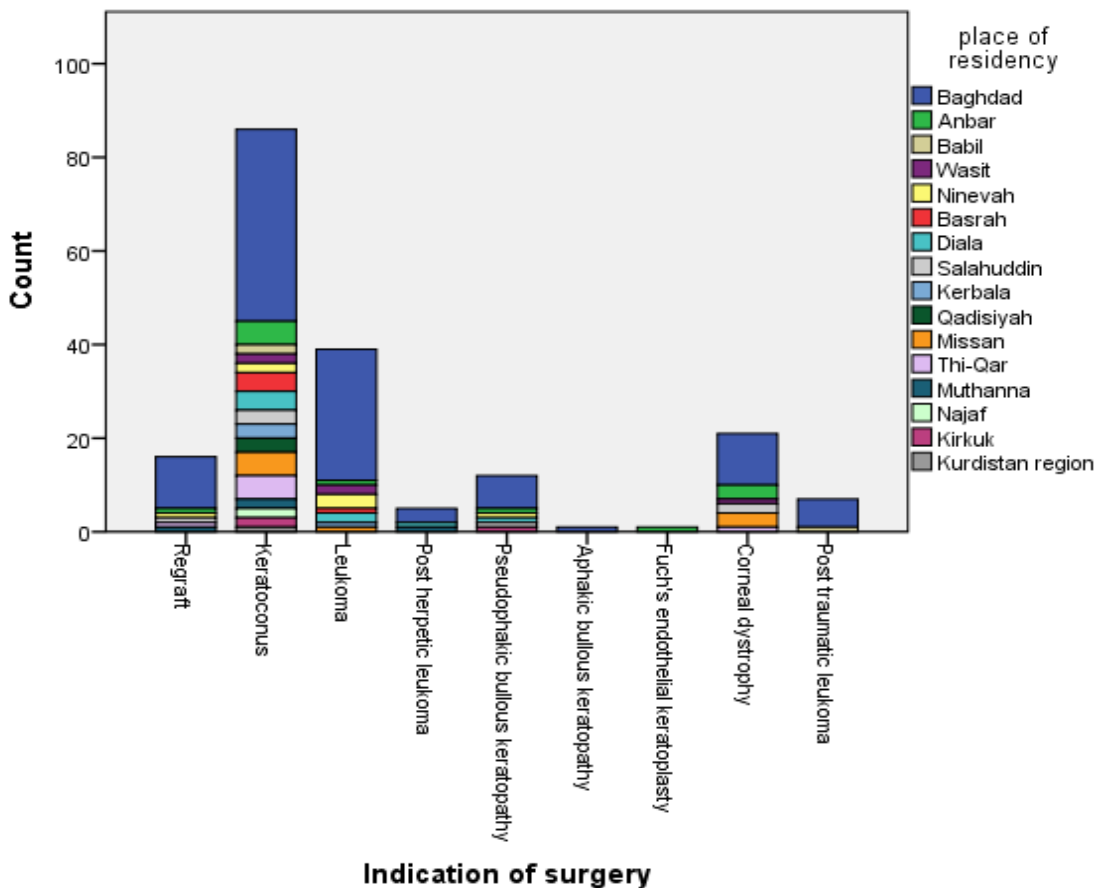
When analyzing the surgical techniques based on corneal diseases, anterior lamellar keratoplasty was preferred for keratoconus (n=65, 75.6%) and corneal dystrophy (n=14, 66.7%). In contrast, penetrating keratoplasty was the favored technique for leukoma (n=28, 71.7%) and regraft (n=15, 93.7%). For pseudophakic bullous keratopathy, DSEK was the preferred technique (n=8, 66.7%; Figure X). Penetrating keratoplasty combined with cataract surgery, IOL implantation, and/or anterior vitrectomy was the most frequent procedure among patients with leukoma (n=9, 23%; Figure 3).

Figure 3. Distribution of indications of keratoplasty according to technique of keratoplasty



Irrespective of the type of corneal disease, the majority of patients hailed from Baghdad. Fewer keratoconus patients originated from the northern regions of Iraq (Kirkuk, Nineveh, and Kurdistan) compared to the central and southern governorates (n=79, 94%). Corneal dystrophy patients were distributed among Baghdad and four other governorates (Anbar, Missan, Salahuddin, and Wasit). Notably, six out of seven patients with post-traumatic corneal opacity were from Baghdad (Figure 4).

Figure 4. Distribution of indications of keratoplasty according to place of residence.



DISCUSSION:

Our data corroborate the findings of several studies conducted in different parts of the world, suggesting that there are variations in the demographic profile, indications, and surgical techniques used for keratoplasty patients across different regions (2) (3) (4) (5) (6). The majority of our patients (54.3%) were below the age of 30, primarily due to keratoconus (45.7%) being the main corneal disease. Another contributing factor is our center's patient selection criteria, where priority is given to younger patients with bilateral disease over older patients with unilateral disease. Most of the patients in this study hailed from Baghdad, which can be attributed to its status as the most populous city in Iraq and the location of our center. However, it's noteworthy that only one patient came from the Kurdistan autonomous region, where a separate facility for keratoplasty services exists. Keratoconus was more prevalent in the middle and southern regions of Iraq, which have hotter and more arid climates. The preferred keratoplasty technique was anterior lamellar keratoplasty, reflecting a global trend towards lamellar corneal surgery (7) (3). The higher incidence of keratoconus among those under 19 years old may be due to factors such as the lack of collagen cross-linking services or insufficient awareness about these procedures among patients and their parents. Furthermore, keratoconus was found to be more common in males, aligning with previous studies that suggest a higher occurrence of the condition in males (8) (9) (10) (11)

Leukoma ranked as the second leading indication for keratoplasty, which is in contrast to findings in other developing countries like India and Taiwan, where scarring was the primary cause (12) (13). Different types of leukoma, such as post-herpetic and post-traumatic leukomas, were also reported in this study. Raising public awareness about preventive measures, early diagnosis, and proper management can potentially reduce the number of keratoplasties due to corneal scarring. The higher need for combined surgery and penetrating keratoplasty in these leukoma cases could be explained by the older age at the time of surgery and the severity of the condition.

Corneal dystrophy ranked third as an indication for keratoplasty, and consanguinity was found to play a role in its occurrence. Anterior lamellar keratoplasty was the preferred technique for treating corneal dystrophy, indicating a shift towards lamellar corneal surgery and a prevalence of stromal types of corneal dystrophy.

Regraft was the fourth leading indication, similar to trends observed in developed countries like the USA (14). This could be attributed to a higher rate of keratoplasty for keratoconus in our center, as

keratoconus has a low risk of graft failure (15). Unfortunately, important details such as the primary cause of re-raft, the initial surgical technique used, and the cause of graft failure were not documented, limiting our ability to fully understand the relationship between the type of keratoplasty, cause of corneal failure, and indication for surgery. Additionally, it's worth noting that only one patient received treatment with DSEK, while all others required PKP. Contrary to studies from neighboring countries (6) (16) (17), pseudophakic and aphakic bullous keratopathy were relatively uncommon in our study, accounting for only 6% and 1% of all cases, respectively. DSEK was the preferred technique for treating pseudophakic bullous keratopathy.

The almost equal distribution between PKP and ALK in corneal transplantation procedures indicates a noticeable shift towards favoring anterior corneal layer-specific techniques. This shift could be attributed to an increasing awareness of the critical role played by endothelial cells in maintaining corneal clarity and function. In the West of Scotland, the percentage of lamellar keratoplasty procedures performed increased from 14.1% between 2001 and 2005 to 40.4% between 2006-2010 (18). The limited frequency of DSEK observed in our dataset implies that several factors may hinder its wider adoption. These factors encompass different indications for keratoplasty, technical challenges, a steep learning curve, limited availability of microkeratomes, and the absence of domestically recovered, eye bank prepared, pre-cut tissues. In 2019, within the United States, a total of 35,555 endothelial keratoplasty procedures were conducted, constituting a significant portion of the 85,601 keratoplasty procedures performed during that period. (19).

The presence of the (Penetrating keratoplasty combined with cataract surgery, IOL implantation, and/or anterior vitrectomy) category underscores the importance of adopting a collaborative approach when managing complex ophthalmic cases. By combining penetrating keratoplasty with other ocular surgeries, clinicians can simultaneously address multiple pathologies, optimizing visual outcomes and enhancing patient satisfaction.

Despite the valuable insights gained from this study, there are certain limitations that need to be acknowledged. Firstly, the study's retrospective design using patient records may introduce selection bias and limit the availability of complete and consistent data. Additionally, the single-center nature of the study conducted at Ghazi Al Hariri Hospital might restrict the generalizability of the findings to other regions in Iraq. Therefore, caution should be exercised when extrapolating the results to the entire country.

Furthermore, the absence of long-term follow-up data in this study prevented a comprehensive assessment of post-operative outcomes and graft survival. Long-term follow-up data are crucial for understanding the durability and success of keratoplasty procedures and should be considered in future research.

CONCLUSION:

This study's findings offer crucial insights into Iraq's keratoplasty services, encompassing demographic profiles, indications, and surgical techniques. By understanding the prevalence of corneal diseases and surgical trends, healthcare institutions can efficiently allocate resources and introduce preventive measures. Despite limitations related to retrospective design and single-center scope, this research lays the foundation for improved corneal transplantation practices in Iraq. Future endeavors should overcome these limitations and encompass multi-center collaborations to refine keratoplasty approaches and enhance patient outcomes.

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