



Etiology of Corneal Perforations in Patients Attending A Tertiary Care Hospital Of Kashmir: A Study From North India

Dr. Ifrah Shafat Kitab, Dr Afshan Kounser, Dr Poonam Sharma, Dr Shabnum Nabi, Dr Faizan Younus Shah, Dr Sidra Javaid Thakur, Dr Shahnawaz Shafi
Government Medical College, Srinagar

*Corresponding Author:

Dr. Ifrah Shafat Kitab

Gousia Colony, Bemina, Srinagar, J&K, India. 190018

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Introduction: Eye trauma is a common cause of visits to the emergency eye department and accounts for approximately 3% of all visits. Owing to their significant impact on vision, corneal injuries have a direct impact on the quality of life of the affected patients. The severity and morphology of corneal tear depends on the size and material of the object causing the injury, as well as the speed and angle at which the object strikes the eyeball. Despite being a common cause of ocular morbidity, not much attention has been given to this disease with potentially disastrous consequences on the vision.

Materials and Methods: This study was conducted in the outpatient and emergency department of ophthalmology in our tertiary care institute over a period of 6 months. All the patients presenting to our department, who were diagnosed as having full thickness corneal tear, were included in the study. The patients were followed up and examined post-operatively at 6 weeks. All the data was tabulated in the form of a master chart and was subjected to statistical analysis using OpenEpi software.

Results: The study comprised a total of 60 cases of corneal tears with 40 males and 20 females. The age of the patients ranged from 5 years to a maximum of 60 years with a mean age of 22.2 ± 15.5 years. The visual acuity at presentation was greatly impaired in majority of the patients with hand movement (50%) being the most common presenting visual acuity followed by perception of light (35%). Limbus was the most common site to be involved in corneal injury seen in 46.67% of cases while the most common shape was linear laceration seen in 53.3% of cases.

Discussion: Penetrating corneal injuries are a leading cause of unilateral visual loss especially in children. It results in development of corneal opacities and is considered the third most common cause of blindness after cataract and glaucoma. Its epidemiological importance lies in the fact that it is a preventable cause of visual loss. Early reporting of patient along with minimal intervention by self or by unqualified quacks will go a long way in improving the visual outcome in cases of corneal injuries

Keywords: Corneal injury, blindness, ocular trauma, Kashmir

Introduction

Eye trauma is a common cause of visits to the emergency eye department and accounts for approximately 3% of all visits.¹ Corneal tears form a significant chunk of the injuries resulting from eye trauma. Cornea forms the main refractive surface of the ocular apparatus and even a small injury or scar

on the cornea considerably affects the visual acuity of the patient. This is especially true in patients with injuries localized over the pupillary area. Owing to their significant impact on vision, corneal injuries contribute significantly to ocular morbidity and also

have a direct impact on the quality of life of the affected patients.²

Traumatic afflictions to the cornea can result in perforating and non-perforating injuries, with the latter including corneal abrasions, acute oedema or tears in descemet's membrane. Penetrating injuries are seen more commonly in males and typically in a younger age group.³ The severity and morphology of corneal tear depends on the size and material of the object causing the injury, as well as the speed and angle at which the object strikes the eyeball. Corneal perforations may be divided into small shelving wounds, medium sized wounds, wounds with iris involvement and those with lens damage. Suturing often becomes mandatory in all types of wounds except for small shelving wounds which usually heal spontaneously. Wounds with iris involvement or lens damage require additional management in the form of excision/abscission of prolapsed iris or traumatic cataract extraction.

An extensive review of literature reveals that there are very few studies that provide a detailed insight into the epidemiology of corneal perforations especially from this part of the country. Despite being a common cause of ocular morbidity, not much attention has been given to this disease with potentially disastrous consequences on the vision. In this study, we attempt to fill the void that exists regarding the epidemiology of this common ocular complaint.

Aims and Objectives: To study the clinico-epidemiological characteristics of patients presenting with corneal tear/perforation in a tertiary care hospital of Jammu & Kashmir.

Materials and Methods: This study was conducted in the outpatient and emergency department of ophthalmology in our tertiary care institute over a period of 6 months. The institutional ethical committee clearance was obtained prior to conducting the study. All the patients presenting to our department, who were diagnosed as having full thickness corneal tear, were included in the study. An informed consent was obtained from all patients or their guardian where applicable. A detailed history was taken which included patient demographics, past, personal and family history and a detailed description of the cause and nature of object causing injury. Assessment of visual acuity and torch light

examination was done in all patients followed by detailed slit lamp examination. Computerised tomography (CT) scan was done in all patients to rule out any intraocular foreign body. All the information and investigations relevant to the patient were recorded on pre-designed proformas. The patients were provided with emergency treatment which involved repair of the corneal tear with anterior chamber formation. The patients were followed up and examined post-operatively at 6 weeks. All the data was tabulated in the form of a master chart and was subjected to statistical analysis using OpenEpi software.

Results: The study comprised a total of 60 cases of corneal tears with 40 males and 20 females. The age of the patients ranged from 5 years to a maximum of 60 years with a mean age of 22.2 ± 15.5 years. The most commonly affected age group was 10-20 years. The age wise distribution of patients is tabulated in table 1. Majority of the patients were students undergoing basic or higher education, who constituted 73.3% (n = 44/60) of the study sample. The rest of the patients were either homemakers (13.3%, n = 8/60), labourers (11.7%, n = 7/60) or pre-schooler (1.7%, n = 1/60). Eighty percent (n = 48/60) of patients were from a rural background while the remaining twenty percent (n = 12/60) belonged to urban areas.

All the patients had suffered corneal tear secondary to trauma and none of the patients had any underlying ectatic disorder of cornea. Most of the patients reported blunt trauma though the possibility of a sharp fragment from the object chipping off and causing injury couldn't be ruled out. The cause of trauma as reported by the patients is enumerated in table 2. Maximum patients (53.3%, n = 32/60) reported within 12 hours of injury, another 24 patients (40%, n = 24/60) within 24 hours while four patients (6.7%, n = 4/60) reported after a lapse of 24 hours. All the patients reported diminution of vision except one patient who didn't report any symptoms. Additional symptoms of pain were encountered in 43 patients (71.7%, n = 43/60) while watering occurred in 55 patients (91.7%, n = 55/60) and 8 patients (13.3%, n = 8/60) reported foreign body sensation.

The visual acuity at presentation was greatly impaired in majority of the patients with hand movement (50%, n = 30/60) being the most common

presenting visual acuity followed by perception of light (35%, $n = 21/60$). Details of visual acuity seen in all the patients at the time of presentation and 6 weeks post-operatively are reported in table 3.

The site and shape of injury in the patients is documented in table 4 and table 5. Limbus was the most common site to be involved in corneal injury seen in 46.67% of cases while the most common shape was linear laceration seen in 53.3% of cases. Uveal prolapse was always associated with limbal tear, though it was also seen occasionally with other types of injuries.

Discussion: Penetrating corneal injuries are a leading cause of unilateral visual loss especially in children.⁴ Penetrating injuries involving the cornea result in development of corneal opacities and is considered the third most common cause of blindness after cataract and glaucoma.^{5,6} This signifies the importance of ocular trauma as a leading cause of corneal blindness secondary to corneal opacity, in developing countries.⁷

The most commonly affected age group in our study was 11-20 years. This is consistent with previous studies by Saka et al and Omobonanle et al, who have reported corneal injuries to be most common in young individuals, particularly children.^{3,7}

Majority of the patients in our study were males, forming approximately 67% ($n = 40/60$) of the study sample. This is expected in our setup as males are more likely to move out of the house and more likely to engage in physical activities and recreations which can predispose them to traumatic ocular injuries. Our findings were consistent with those reported previously by El-Sebaity et al and Liu et al.^{8,9}

Majority of the patients in our study were students undergoing basic or higher education. This is expected in view of the fact that most of the patients in our study belonged to the young age group.

Majority of the patients reported trauma with blunt objects, most commonly wooden stick. This finding was consistent with previous reports wherein sticks have been documented as the most common cause of corneal injuries.^{3,10,11} Although Omolase et al reported vegetative material as the most common causative agent of trauma, we didn't document similar findings.¹²

A vast majority of patients (53.3%) presented within six hours of trauma and almost all the patients (93.3%) presented within 24 hours of injury. The figures are much more optimistic than those reported by Omolase et al and Saka et al.^{3,12} This finding is encouraging as it indicates greater awareness and caution regarding vision among people living in this part of the country and a greater faith in the healthcare system and doctors. The unfortunate part, however, remains that the time of presentation did not have any correlation, neither positive nor negative, on the visual acuity at first contact or at follow up.

Visual acuity of most of the patients at the time of presentation was distressing. Fifty percent of patients could perceive hand movements only while an additional thirty five percent could only perceive light. An overwhelming majority of patients (93.3%, $n = 56/60$) could be categorized as blind based on visual acuity of less than 3/60 at time of presentation. Our findings were in concordance with those of Al-Mahdi et al, Ashaye et al and Saka et al who reported poor visual acuity in majority of their patients although we documented a higher proportion of patients with a poor visual acuity at the time of first contact.^{3,6,13} This could be attributed to the fact that only the patients with complete corneal perforation were included in our study while the aforementioned studies included both partial injuries as well as perforations. Besides, most of the injuries in this study were of a severe injuries with a significant proportion involving the limbus.

Even though surgery was performed in all patients within 24 hours of presentation, the prognosis was poor in most of the patients. Visual acuity of 6/60 or better at follow up was seen in only ten patients out of which four patients were already in this range at the time of presentation. This was similar to the findings reported in a study conducted in Ibadan and another study conducted by Omobonanle et al.^{5,7} In contrast, a Scottish study demonstrated significant improvement in the visual acuity with vast majority of patients showing excellent prognosis. This is consistent with the fact that corneal injuries are more common in developing countries and corneal transplant services are more frequently available in developed countries, accounting for better visual outcomes.

Conclusion: Traumatic corneal perforation is a substantial cause of ocular morbidity and visual impairment. Its epidemiological importance lies in the fact that it is a preventable cause of visual loss. Early reporting of patient along with minimal intervention by self or by unqualified quacks will go a long way in improving the visual outcome in cases of corneal injuries.

References:

1. Willmann D, Melanson SW. Corneal Injury. StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2018.
2. Kwok SS, Shih KC, Bu Y, Lo AC, Chan TC, Lai JS et al. Systematic Review on Therapeutic Strategies to Minimize Corneal Stromal Scarring After Injury. *Eye & contact lens*. 2019; 45: 347-55.
3. Saka ES, Monsudi KF, Olatuji V. Traumatic corneal laceration in northwestern Nigeria. *J West Afr Coll Surg*. 2017; 7: 72-84.
4. Sternberg JP, Michels RG. Penetrating ocular injuries in young patients. Initial injuries and visual results. *Retina*. 1984; 4: 5-8.
5. Baiyeroju-Agbeja AM, Olurin-Aina OI. Penetrating eye injuries in children in Ibadan. *Afr J Med Med Sci*. 1998; 27: 13-15.
6. Ashaye AO, Oluleye TS. Pattern of corneal opacity in Ibadan, Nigeria. *Ann Afr Med*. 2004; 3: 185-7.
7. Omobolanle AA, Henrietta N. Pattern of paediatric corneal laceration injuries in the University of Port Harcourt teaching hospital, Rivers state, Nigeria. *BMC Res Notes*. 2012; 5: 683.
8. El-Sebaity DM, Soliman W, Soliman AM, Fathalla AM. Pediatric eye injuries in upper Egypt. *Clin Ophthalmol*. 2011; 5: 1417-23.
9. Liu ML, Chang YS, Tseng SH, Cheng HC, Huang FC, Shih MH et al. Major pediatric ocular trauma in Taiwan. *J Pediatr Ophthalmol Strabismus*. 2010; 47: 88-95.
10. Onyekonwu GC, Chuka-Okosot CM. Pattern and visual outcome of eye injuries in children at Abakaliki, Nigeria. *West Afr J Med*. 2008; 27: 152.
11. Grieshaber MC, Stegmann R. Penetrating eye injuries in South African children: aetiology and visual outcome. *Eye (Lond)*. 2006; 20: 789.
12. Omolase CO, Omolade EO, Ogunleye OT, Omolase BO, Ihemedu CO, Adeosun OA. Pattern of ocular injuries in Owo, Nigeria. *J Ophthalmic Vis Res*. 2011; 6: 114-118.
13. Al-mahdi HS, Bener A, Hashim SP. Clinical pattern of pediatric ocular trauma in fast developing country. *Int Emerg Nurs*. 2011; 19: 186-91.
14. Macewen CJ, Baines PS, Desai P. Eye injuries in children: the current picture. *Br J Ophthalmol*. 1999; 83: 933-6

Table 1: Age wise distribution of patients

Age group	Males	Females	Total
0-10 years	4	8	12
11-20 years	16	4	20
21-30 years	12	4	16
31-40 years	4	0	4
41-50 years	0	4	4
51-60 years	4	0	4
Total	40	20	60

Table 2: Means of injury in different patients

Agent of injury	Frequency	Percentage
Wooden stick	24	40% (n = 24/60)
Glass	12	20% (n = 12/60)
Stone	8	13.3% (n = 8/60)
Iron nail	7	11.7% (n = 7/60)
Plastic pipe	4	6.7% (n = 4/60)
Knife/blade	2	3.3% (n = 2/60)
Screw driver	1	1.7% (n = 1/60)
Bird's beak	1	1.7% (n = 1/60)
Blast injury	1	1.7% (n = 1/60)
Total	60	100% (n =60/60)

Table 3: Visual acuity at presentation and 6 weeks post-operatively

Visual acuity	At presentation	6 weeks post-operative
6/9	0	1.67% (n = 1/60)
6/36	1.67% (n = 1/60)	3.3% (n = 2/60)
6/60	5% (n = 3/60)	15% (n = 7/60)
1/60	8.3% (n = 5/60)	25% (n = 13/60)
Hand movement	50% (n = 30/60)	36.67% (n = 23/60)
Perception of light	35% (n = 21/60)	23.3% (n = 14/60)

Table 4: Site of injury

Site of injury	Frequency	Percentage
Center of cornea	16	26.67% (n = 16/60)
Limbal involvement	28	46.67% (n = 28/60)
Corneo-scleral	16	26.67% (n = 16/60)

Table 5: Shape of tear

Shape of tear	Frequency	Percentage
Linear	32	53.3% (n = 32/60)
Cruciate	12	20% (n = 12/60)
V-shaped	8	13.3% (n = 8/60)
U-shaped	4	6.67% (n = 4/60)
Y-shaped	4	6.67% (n = 4/60)