

A Prospective Study of Visual Outcome in Patients with Perforating Corneal Injury with Retained Intraocular Foreign Body in Anterior Segment

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Abstract

Background: Eye trauma occurs fairly frequently in developing countries and constitutes a major health problem. It is the cause of blindness or partial loss of vision in more than half a million people worldwide. This prospective study was aimed at describing the risk factors, agents involved, and final visual outcomes of 30 patients who presented with perforating eye injuries.

Methods: All patients who presented with perforating eye injuries were selected for this study. Consecutive patients were enrolled and categorized according to many criteria like age, sex, place at which the injury occurred, and causative factors. All patients were examined and followed up for a minimum of three months. The following parameters were noted for all the patients. Visual acuity with a pinhole at presentation. Slit lamp examination to evaluate the extent of the injury. Investigations like plain X-rays in a suspected metallic foreign body. B scan ultrasonography was done in all cases.

Results: The visual acuity was assessed in the patients at the time of presentation to the hospital and it was found that the visual acuity was between 1/60 – PL in 40% of cases and it was between 6/36 – 2/60 in 36.67% of cases. 16.67% of cases had visual acuity > 6/12. After the treatment, the visual acuity was recorded at the end of 3 months, and it was found that 50% of cases had visual acuity between 6/36 - 2/60 and 23.23% of cases had visual acuity > 6/12. Visual acuity of 1/60 – PL was in 16.67% of cases and 6/18 - 6/24 visual acuity scores were in 10% of cases.

Conclusion: Most perforating eye injuries are potentially preventable. Improvement in farming techniques should be done. Education should be aimed at young individuals. Parental education regarding the danger of sharp toys and air guns should be emphasized. The use of protective eyewear in both works related as well as recreational activities should be the main focus of preventive education. When prevention fails and an eye injury occurs early, an appropriate referral is very essential to preserve vision.

Keywords: Perforating Corneal Injury, Retained Intraocular Foreign Body, Anterior Segment, Ocular Injuries.

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Introduction

Ocular trauma is an important cause of preventable morbidity worldwide. [1] It is a major cause of acquired unilateral blindness and visual impairment. It constitutes about 1.5% of all the causes of blindness, 7% of all bodily injuries, and 10-15% of all eye diseases. Worldwide the typical male-to-female ratio is 4:1 2-4 and open globe injury is said to be more common. [2-5] Despite having a major socioeconomic impact, very fewer data is available on the risk factors and magnitude of ocular trauma. The impact of Ocular trauma ranges from minute subconjunctival hemorrhage to a lacerated globe. In patients with grossly reduced visual acuity on presentation visual outcome is poor. The delicacy of ocular tissues and delayed presentation worsens the visual outcome. [6]

The impact of ocular trauma in terms of the need for medical care, loss of income, and cost of rehabilitation services points towards the need for strengthening preventive measures. Decreased or lost eyesight, whether monocular or binocular, may place a significant financial burden on families and nations owing to time away from job or school, time spent caring for family members, pricey hospitalization, specialized care, protracted follow-up, and visual rehabilitation. Mass awareness regarding risk factors and agents causing injury can prevent ocular hazards. [6] Ophthalmologists play an important role in the management as well as prevention of ocular trauma. The adage 'Prevention is better than cure' is apt for ocular injuries. The epidemiology of ocular trauma has been well described in developed countries. WHO estimates, about 55 million eye injuries restricting activities for more than one day occur each year, with 750,000 cases requiring hospitalization which includes 200,000 open globe injuries. [7] The majority of clinico-epidemiological

research on ocular trauma has been done in industrialized nations. Western models cannot be adopted in our country since the situations there are different from those in industrialized countries. The purpose of this study is to evaluate the visual outcome of patients with perforating eye injuries with retained IOFB. Analysis of visual outcome in patients with perforating corneal injury with a retained intraocular foreign body in the anterior segment at Tertiary eye care center.

Material and Methods

This cross-sectional study was conducted in the Department of Ophthalmology [Corneal trauma division] at Sarojini Devi Eye Hospital and Gandhi Hospital from Dec 2019 to May 2021 May. Institutional Ethical approval was obtained for the study. Written consent was obtained from all the participants of the study after explaining the nature of the study in the vernacular language. Those willing to participate voluntarily were included in the study.

Inclusion Criteria

1. Patients with eye injuries who presented to trauma dept of a Tertiary eye Hospital in Hyderabad.
2. Patients of all ages and both sexes.
3. Patients who are willing to take part in the study.

Exclusion Criteria

1. Patients with a retained foreign body in the posterior segment.
2. Prior history of ocular disease.
3. Previous ocular trauma with previous ocular surgery.
4. Patients who are not willing to take part in the study.

Based on the inclusion and exclusion criteria during the study period a total of n=30 patients with perforating corneal injury with a retained intraocular foreign

body in the anterior segment at the tertiary eye care center. All patients who presented with perforating eye injuries were selected for this study. Consecutive patients were enrolled and categorized according to many criteria like age, sex, place at which the injury occurred, and causative factors. All patients were examined and followed up for a minimum of three months. The following parameters were noted for all the patients: Demographic profile of the cases with Occupation and the place at which injury occurred. Agents involved in causing injury. Any prior treatment and the time elapsed since the trauma. Visual acuity with a pinhole at presentation. Slit lamp examination to evaluate the extent of the injury. Investigations like plain X-rays in suspected metallic foreign bodies. B scan ultrasonography was done in all cases to evaluate the posterior segment, to see the integrity of the posterior capsule, and to see the presence of any foreign body. CT scan was also done to find out the exact location of foreign bodies and in the case of associated fractures. The patients were started on broad-spectrum antibiotics. Further treatment was done based on whether the wound was self-sealing or not. In a self-sealing injury with a normal anterior chamber without any uveal prolapse, a medical line of management was done. Except for pediatric cases where the wound was sutured. In the case of leaking wounds primary repair of the wound along with abscission of prolapsed

uveal tissue and anterior chamber reformation was done. In cases of traumatic cataract, cataract extraction, and IOL implantation was done as secondary procedure in most cases. Vitrectomy was done in a case with an intraocular foreign body. The treatment given, medical or surgical was analyzed. Visual acuity was recorded on day 1, day 7, and day 28 and the final best corrected visual acuity was recorded at the end of 3 months.

Statistical analysis: The data was collected and uploaded on an MS Excel spreadsheet and analyzed by SPSS version 22 (Chicago, IL, USA). Quantitative variables were expressed on mean and standard deviations and qualitative variables were expressed in proportions and percentages. Fisher's exact test has been used to find the difference between two proportions.

Results

Out of the n=30 cases included in the study n=26(86.67%) were males and n=4(13.33%) were females. The age range of the cohort was from 16 years to 52 years. The mean age of the cases in the study was 35.5 ± 3.5 years. The highest number of cases were reported from the age group 20 – 30 years followed by the age group 31 – 40 years. This shows that trauma was more common in younger age group males. The details of the age-wise distribution of the cases in the study are depicted in table 1.

Table 1: Showing the age-wise distribution of cases.

Age Group (years)	Frequency	Percent (%)
< 20	5	16.67
20 - 30	8	26.67
31 - 40	7	23.33
41 - 50	6	20.00
51 - 59	4	13.33
> 60 years	0	00.00
Total	30	100.0

All the patients had a unilateral injury the RE was involved in a majority of cases accounting for 57% of total cases. Based on

the physical agents causing the injury to the eye we found the wooden stick fragment was one of the common causes of injury in

the case reported in 40% similarly, stone fragments were the cause of injury in

33.33% of cases the details have been depicted in table 2

Table 2: Agent of Injury reported by patients in the study.

Agent	Frequency	Percent
Stone	10	33.33
Wooden stick	12	40.00
Metal	4	13.33
Thorn	2	6.67
Others	2	6.67

In this study, we found that most of the patients reported injuries which is related to their occupation many of them were carpenters and wooden sawmill dealers, and workers with broken wooden

fragments injuries. In our country, there is negligible use of safety goggles during hazardous occupational activities details of the distribution of cases have been depicted in figure 2.

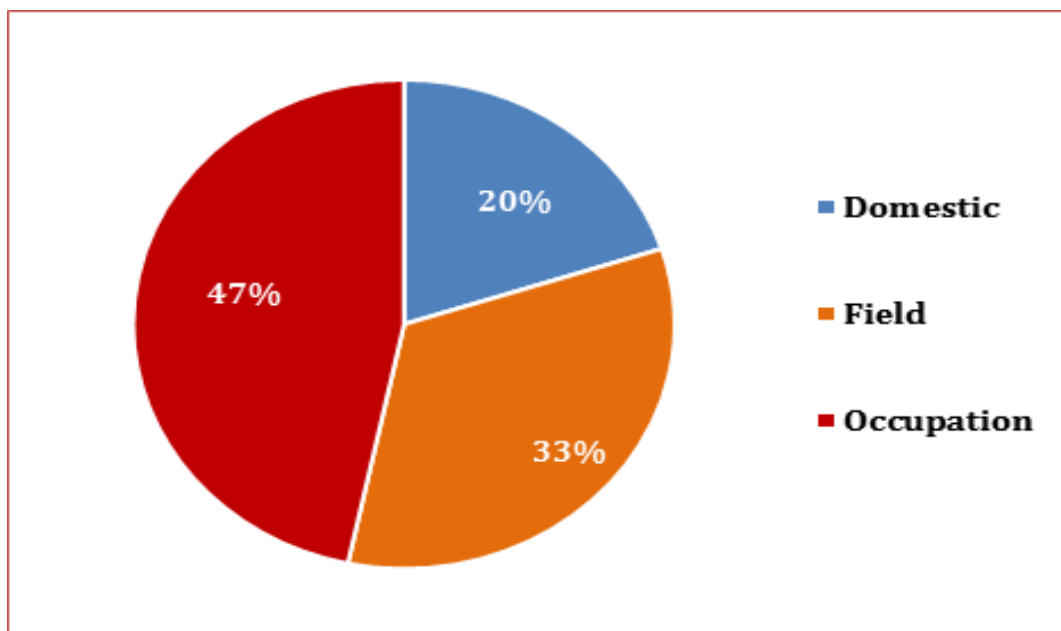


Figure 1: Showing the place of injury reported by the cases in the study.

The distribution of injuries based on the size was determined by cut-off values of < 6mm and > 6mm it was found that in the majority of cases, 66.67% of injuries were less than 6 mm in size. The time lag between the injury and presentation to the hospital was determined and in most of the cases, 66.67% reported within less than 7 - 24 hours, and 30% of cases reported within 6 hours and more than 24 hours duration

was reported by one patient. The delay in reporting in the cases was mainly due to poor educational background and lack of awareness of the seriousness of the injury and some people were located in rural areas which required time to report to the tertiary care hospital after receiving a referral from the PHC centers details have been depicted in table 3.

Table 3: Showing the wound size and time lag between injury and presentation.

	Frequency	Percent
Wound size		
<6 mm	20	66.67
>6 mm	10	33.33
The time lag between injury and presentation		
6 hours	9	30.00
7-24 Hours	20	66.67
>1 Day	1	3.33

The visual acuity was assessed in the patients at the time of presentation to the hospital and it was found that the visual acuity was between 1/60 – PL in 40% of cases and it was between 6/36 – 2/60 in 36.67% of cases. 16.67% of cases had visual acuity > 6/12. After the treatment, the visual acuity was recorded at the end of

3 months, and it was found that 50% of cases had visual acuity between 6/36 - 2/60 and 23.23% of cases had visual acuity > 6/12. Visual acuity of 1/60 – PL was in 16.67% of cases and 6/18 - 6/24 visual acuity scores were in 10% of cases depicted in table 4.

Table 4: Visual acuity recording at the time of presentation and post-operatively.

	Frequency	Percent
Initial Visual Acuity		
> 6/12	5	16.67
6/18-6/24	2	6.67
6/36-2/60	11	36.67
1/60-PL	12	40.00
NO PL	0	0.00
Final Visual acuity		
> 6/12	7	23.23
6/18 - 6/24	3	10.00
6/36 - 2/60	15	50.00
1/60 - PL	5	16.67
NO PL	0	00.00

Discussion

Ocular trauma is a major cause of preventable monocular blindness and visual impairment in the world. Despite its public health importance, there is relatively less population-based data on the magnitude and risk factors for ocular trauma, especially from developing countries. Worldwide there are about 1.6 million blind and 19 million unilateral visual loss from eye injuries²⁸. 23.5% of the world's blind population is confined to India. [8] In our study, the commonest age group affected was 20-39 years accounting for 50% followed by the age group 40-59 years

(33%). In the Israeli ocular injuries study by Ron Koval et al., [9] most of the cases were in the age group 18 - 44 years (37.9%). According to Eye injuries: A prospective study of 5671 patients the average age was 30.6 years and 96% were over 10 years. [10] In a study conducted at Goa medical college by Mukherjee AK et al., [11] %of the patients were less than 30 years of age 25. According to the study by David et al, patients less than 40 years accounted for 77%. Our study showed a male: female ratio of 7.3:1 males constituted 87% of our cases in a similar study by AK Mukherjee et al., [11] males constituted 73.17%. In a

prospective study of 5671 patients by Caroline J Macewan et al., [10], males constituted 98.8% 30. In the study, epidemiology, and diagnosis of perforating eye injuries, by Smith D et al., males constituted 80%. [12] The male predominance of injuries may be a result of males being engaged in activities that have more risk of ocular injury compared to females. The right eye (57%) was slightly more commonly affected than the left eye in our study. In the Israeli ocular injuries study by Ron Koval et al., [9] the right eye was more affected than the left eye. The left eye was more commonly affected than the right eye in a study of ocular injuries in the union territory of Pondicherry. [13]

In the study conducted in Rural South Wales, there was a slight preponderance of injuries to the right eye accounting for 55%. [14] The wooden particle-like stick had been the most common agent of injury in this study accounting for 40%. This is because the main occupation of the people here is agriculture. According to the study at Goa medical college by AK Mukherjee et al., [11] metallic injuries were commonest reflecting the high incidence of industrial accidents in this developing coastal belt. [15] According to the study, Ocular Trauma in a rural population of southern India: The Andhra Pradesh Eye Disease Study, injury with vegetable matter like thorns, sticks, and branches of a tree is the most common agent accounting for 45.3%. [16] According to a study, a 2-year review of ocular trauma in Jimma University Specialized Hospital, wood was the commonest material accounting for 40.9%. [16] In the present study, the commonest place where the injury occurred was at a Factory/workplace (Occupation) accounting for 46% followed by field (34%). In a study done by Hsu-Chieh Chang et al., [17] the workplace was the most common place of injury (56.3%), followed by home (23.1%). In an Israeli ocular injuries study by Ron Koval et al., [9] home was the commonest place of

injury accounting for 31.8% and followed by the workplace which accounted for 26.9%. In the present study, 66% of the patients presented to the hospital between 7- 24 hours after injury while 19% presented to the hospital between 7 and 24 hours. Only 30% of the patients presented to the hospital within 6 hours of injury. In Sanjeev K Nainiwal et al., [18] study, twenty-seven (54%) patients took 24-72 hours (1-3 days) to look for medical care after their injuries; however, 14 (28%) patients took less than 24 hours. In Fasina Oluyemi et al., [1] study, seventy-two (53.3%) patients were seen within 24 hours of the injury, whereas 39(28.9%) patients presented after 72 hours. The wound size was less than or equal to 6 mm in 66% of cases while it is more than 6mm in 34% of cases in the present study.

Hsu-Chieh Chang et al., [17] reported that most of the wounds were 5–8 mm in length (n = 91, 45.7%). In the present study, the patients presented with an initial visual acuity of 1/60 to PL positive in about 40%. According to the study by Smith D et al., [12] 54% of the patients presented with an initial visual acuity of perception of light to 20/200. [12] In the study, O Fasina et al., [1] reported 63% of the patients presented with an initial visual acuity of perception of light of 3/60. The poor visual acuity at presentation shows the severity of the injury. This can also be explained by the late presentation of the patients to the hospital. In the present study, 50%of the patients attained final visual acuity of 6/36 to 2/60. According to the study by Smith D et al., [12] 52% of the patients attained a final visual acuity of 20/200 or better. In a study conducted in rural South Wales, 61% of the patients attained a final visual acuity of 6/12 or better. Initial visual acuity at the time of presentation is the most important prognostic factor regardless of age, type of injury, or other factors. [19]

Conclusion

The majority of the patients were in the age group of 20-39 years followed by 40-59

years representing the working population. The visual impairment in terms of loss of productivity and economic gain can be devastating. Most perforating eye injuries are potentially preventable. Improvement in farming techniques should be done. Education should be aimed at young individuals. Parental education regarding the danger of sharp toys and air guns should be emphasized. The use of protective eyewear in both works related as well as recreational activities should be the main focus of preventive education. When prevention fails and an eye injury occurs early, an appropriate referral is very essential to preserve vision.

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