Section: Ophthalmology

Original Research Article

A RETROSPECTIVE STUDY OF INCIDENCE OF OCULAR TRAUMA IN TERTIARY CARE TEACHING HOSPITAL, SOUTH KERALA, INDIA

Digin Mariam Joseph[1], Kashinatha Shenoy M[2], Asha George[1], Cinu Elsa James[3]

[1]Assistant Professor, Department of Ophthalmology, Pushpagiri Institute of Medical Sciences & Research Centre, Thiruvalla, Kerala, India
[2]Professor & HOD, Department of Ophthalmology, Pushpagiri Institute of Medical Sciences & Research Centre, Thiruvalla, Kerala, India.
[3]PG 3rd year Resident, Pushpagiri Institute of Medical Sciences & Research Centre, Thiruvalla, Kerala, India

Received : 05/04/2024
Received in revised form : 24/05/2024
Accepted : 11/06/2024

Keywords:
Intraocular foreign body; Open globe; closed globe; Hyphema; Corneal epithelial defect.

Corresponding Author:
Dr. Kashinatha Shenoy M,
Email: manikarashenoy@gmail.com

DOI: 10.47009/jamp.2024.6.3.141

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (3); 617-621

Abstract

Background: Aetiologies of ocular trauma differ in rural area compared to urban area and differ in demographic or socioeconomic classes. Ocular trauma is one of the most neglected area in ophthalmology which causes severe loss of vision in the clinical setup. The study was conducted to assess different types of ocular injuries involving anterior and posterior segment of eye presented at emergency department and ophthalmology outpatient department of a tertiary hospital. **Materials and Methods:** It was a retrospective study of collecting data from May 2021 to May 2023 of ocular trauma cases reported to the centre. All patients attended by trained emergency duty doctors, ophthalmologists and residents were included in the history as documented in electronic patient record (EPR) through Medical records department. The data was analysed using descriptive and analytic statistics. **Result:** A total number of 487 case records were analysed 303 were male patients (62.2%) and 184 were (37.78%) female patients. In this study most common mode of injuries were superficial corneal metallic foreign body injury in 178 eyes (51.14%) followed by non- metallic injury, Road Traffic Accident (RTA) in 74 patients (21.26%) and wood injuries in 33eyes (9.48%). The ocular complication related to the different types of trauma were corneal superficial foreign bodies in178 eyes (51.14%), corneal epithelial defect seen in 48 eyes (13.79%), lid and canalicular tear seen in 34 eyes (9.77%), sub-conjunctival haemorrhage in32eyes (9.19%), Hyphema in 9 eyes (2.58%), Globe rupture with uveal tissue prolapse in 18 eyes (5.17%), Orbital floor fracture in 9 (2.58%) eyes, retroflexion of iris 1(0.28 %), traumatic optic neuropathy in 4 cases(1.14%), retinal detachment and vitreous haemorrhage in13 cases (3.73%)and one case of panophthalmitis (0.57%). **Conclusion:** Ocular trauma was more common in males in our current study. Majority of patients were industrial workers followed by farmers. Cornea was the most commonly affected in our study.

INTRODUCTION

Ocular trauma is one of the most neglected area in ophthalmology which causes severe loss of vision as reported in the developing countries. Penetrating injuries by definition penetrate into the eye but not through and through, there is no exit wound. Perforating injuries have both entrance and exit wounds. Strategies for prevention of ocular trauma require knowledge of the cause or mechanism of injury, which may enable more appropriate targeting of resources towards preventing injuries. Worldwide there are approximately 6 million people who are blind from ocular injuries, 2.3 million people who are visually impaired bilaterally; these facts make ocular trauma one of the most common causes of unilateral blindness.[1]

Birmingham Eye Trauma Terminology (BETT) and Ocular Trauma Classification (OTS) Group subdivided mechanical trauma into open and closed globe injuries.[2] In India, injuries are reported more in males (81%).[3] This is true for both rural and urban populations, but in the 0-10 age group, the difference between males and females is less. In sedentary workers, farmers, labourers and industrial workers, the male percentage is as high as 95%. Chemical accidents are a common cause of bilateral eye injury.[3] Ocular trauma is a major cause of

preventable monocular blindness and visual impairment in the world.[4]

Brimingham Eye Trauma Terminology (1996) (BETT) provides a clear definition for all type of injuries, an unambiguous simple and comprehensive system to classify any type of mechanical globe trauma and preferred terminology for categorizing eye injuries in ophthalmic clinical practice. Khun F, et al,[2] developed Ocular Trauma Score (OTS) in 2002, a simplified categorical system for standardized assessment and visual prognosis in ocular injuries.

The OTS is used to predict the visual outcome of patients after open-globe ocular trauma. The score's predictive value is used to counsel patients and their families to manage their expectation. The OTS is a scoring system that includes visual acuity at presentation and the extent of ocular trauma, as well as the presence or absence of globe rupture, endophthalmitis, retinal detachment, and relative afferent pupillary defect. A higher OTS score is typically associated with a better prognosis.

In children visual acuity (VA) and relative afferent pupillary defect (RAPD), can be challenging to obtain, especially those who have just sustained eye injuries. In children, eye trauma differs in many ways from that in adults and it is very difficult to obtain sufficient history from children about cause of trauma, mode of injury and they may not be aware of a reduction in their visual acuity. As such, diagnostic delay increases the risk of loss of vision and other complications.

Under the best ophthalmic setup, injuries are complicated by the presence of an intraocular foreign body (IOFB).[5,6] Acar U, et al,[7] introduced initially the pediatric penetrating eye injuries (POTS) classification based on agents. It may be toxic (iron, copper, vegetable matter) or inert (glass or plastic). Vision loss may result from the mechanical injury, blunt trauma or from post-traumatic complications such as endophthalmitis, retinal detachment, metal toxicity and sympathetic ophthalmia [6]. Prompt diagnosis, referral, removal of the IOFB and surgical repair will help to preserve the visual acuity and the globe's anatomy.

MATERIALS AND METHODS

The ethical approval to perform the study was obtained from the institutional ethical committee. This was a hospital-based retrospective study conducted at Pushpagiri Institute of Medical Sciences & RC hospital in South Kerala, India, spanning a period of two years from May 2021 to May 2023. Patients with ocular injuries attending the Emergency Medicine Department and the Ophthalmology department were included for the study.

Patients with ocular injuries reporting to the emergency department and the ophthalmology OPD who were aged between 5 and 80 years were included in this study. Only ocular trauma less than 7 days of injury were included and older ocular trauma cases were excluded from this study.

A total of 487 patients with ocular trauma who presented to the hospital during the study period were enrolled. The study and data collection protocols conformed to all local laws, and complied with the principles of the hospital.

On arrival to Emergency department or outpatient department, following history were noted from all patients such as gender, religion, caste, residential area, marital status, and occupation and education level of patients. Details regarding mechanism of injury including blunt or penetrating, velocity of object and any other details relevant to injury was collected. Specific history of trauma including date, time, place and seasonal predilection (rainy seasons, harvesting), road traffic accident (RTA), circumstances of injury (occupational or no-occupational), characteristic of traumatic agent (solid, fluid, or gas), mode of injury (projectile object, fall, impact) and persons condition at time of injury and assault were also collected. Information about use of protective measures at the time of injury was noted. Symptoms and signs (pain, redness, and decreased vision), treatment or intervention already given and level of consciousness were noted.

Visual statuses before injury (previous history and surgery) were asked. All patients underwent basic eye examination including visual acuity, slit lamp examination, intraocular pressure measurement (IOP)if necessary dilated fundus examination, B-Scan, OCT Macula and CT Scan orbit. Following measures were taken on arrival of the patient to Emergency or outpatient department during eye examination - use of eye shield to protect the eye from further damage, administration of systemic analgesics, tetanus toxoid and systemic antibiotics for globe rupture or eye lid injuries. Patients requiring acute surgical intervention were managed as standard protocol.

Birmingham Eye Trauma Terminology (BETT) and Ocular Trauma Classification (OTS) Group subdivided mechanical trauma into open and closed globe injuries [2]. Based on the BETT, the mechanisms of injury were classified as rupture, superficial laceration, penetration, IOFB, perforation, and mixed injury. Closed globe injury caused by blunt trauma is where the eye globe is intact.

There are two types of closed globe injuries.

i) Contusion-No full thickness wound.

ii) Lamellar laceration-partial-thickness wound of the eye wall.

Open globe injury, by sharp objects, causes full thickness injury of the eye wall (cornea and sclera). It is classified into rupture and laceration.

i) Rupture- Full thickness wound of the eye wall and is an inside-out injury.

ii) Laceration-It is full-thickness wound.

Laceration is subdivided into IOFB, Penetrating injury and Perforating injury.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Penetrating injury-The globe integrity is disrupted by a full thickness entry wound and may be associated with prolapse of the internal contents of the eye.
Perforating injury-The globe integrity is disrupted in two places due to an entrance and exit wound (through and through injury). This is a quite severe type of eye injury. Both wounds caused by the same object.
Based on Visual acuity- the following 6 categories are done

- VA-20/40 or better.
- Between -20/40 to 20/400.
- Between -20/400 to counting fingers (CF).
- Hand movement (HM).
- Light perception (LP).
- No Light perception (NLP).

The visual acuity of NLP was confirmed by using an indirect ophthalmoscope (IO).
Wound location was classified into three zones

- Zone I-Injuries were confined to the cornea and limbus.
- Zone II- Injuries involved the anterior 5 mm from the limbus (not extending into the retina).
- Zone III- Injuries which includes the macula and optic nerve is posterior to zone II. Extended to the posterior by more than 5 mm from the limbus.

Cases were subjected to radiological imaging of CT scan or MRI appropriate tool in studying the nature of injury and its features based on need.
Statistical analysis: Data were analysed using IBM SPSS statistics 22.0 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0.Armonk, NY: IBM Corp.) Categorical variables were presented with frequency and percentage, continuous variables presented with mean and standard deviation.

RESULTS

A total of 348 eyes in 487 patients participated in this study. 303were male patients (62.21%) and 184 were (37.78%) female patients [Table 2]. Patients of above 5 years of age groups were considered in this study. Most vulnerable age group was 20-40 years (38.60%) followed by 40-60years (15.28%) [Table 1]. Out of 487 eyes, 294(84.48%) eyes had unilateral involvement and 54eyes (15.5%) had bilateral involvement. In our study maximum numbers of patients were industrial workers followed by farmers. Most common mode of injuries were metallic injury, 178 eyes (51.14%) followed by non-metallic injury by wood, 34 eyes (15.59%) and road traffic accident (RTA) 21 patients (9.33%) as depicted in [Table 3].
Ocular trauma related complication were corneal superficial foreign bodies in 178 eyes (51.4%), lid and canalicular tear in 34 eyes (9/77%), corneal epithelial defect in 48 eyes(13.79%), subconjunctival haemorrhage in 32 eyes (9.19%), Hyphema in 9 eyes (2.58%), total hyphema seen in 9 cases (2.58%) Vitreous haemorrhage and retinal detachment in 13 eyes (3.73%) , Globe rupture with uveal tissue prolapse in 18 eyes (5.17%), Orbital floor fracture in 9 eyes (2.58%) , and 2 cases of panophthalmitis (0.57 %). One case of retroflexion of iris (0.28%), and 4 cases of traumatic optic neuropathy (1.14%). Closed-globe injury was more common in 330 eyes (94.82%) and open-globe injury was in 18eyes (5.17%) as shown in [Table 4].

Table 1: Age wise distribution of cases.

Age	n=487	Percentage%
5-20 Years	70	14.37%
20- 40 Years	188	38.60%
40-80 Years	148	15.28%
60- 80 Years	81	16.63%

Table 2: Sex wise distribution of cases

Gender	n=487	Percentage (%)
Male	303	62.2%
Female	184	37.78%

Table 3: Mode of Injury

Mode of Injury	n=348	Percentage (%)
Non- Metallic	n=170 cases	49.86%
RTA	72	21.26%
Wood	33	9.48%
Finger Nail	29	8.33%
Stone	21	6.03
Assault	10	2.87
Fall from Bed	3	0.86
Metallic (iron particles)	178 cases	51.14%

Table 4: Complications of Ocular Trauma

Complications	n=348	Percentage (%)
Lid and canalicular tears	34	9.77%
Orbital Floor Fracture	9	2.58%
Subconjunctival Haemorrhage	52	9.19%

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Corneal superficial metallic Foreign body	178	51.14%
Globe Rupture and Uveal tissue Prolapse	18	5.17%
Retroflexion of Iris	1	0.28%
Total Hyphema	9	2.58%
Corneal epithelial Defect	48	13.79%
Panophthalmitis	2	0.57%
Retinal Detachment and Vitreous Haemorrhage	13	3.73%
Traumatic Optic Neuropathy (TON)	4	1.14%

DISCUSSION

This retrospective, hospital-based study provides data on the current pattern of serious ocular injuries in patients attended to a tertiary care teaching centre in the emergency and outpatient department of ophthalmology. A significant number of injuries were industrial related workers followed by farmers with wood injuries. As most of these injuries occurred in middle aged patients, it underscores a lack of awareness among patients about the hazards of work and not wearing proper protective glasses during working. Despite of the protective nature of the orbit, there is still risk of injury to the globe. Ocular trauma or eye injury remains a common and preventable cause of blindness throughout the world.[14,15]

Ocular trauma is one of the major worldwide causes of preventable morbidity and accounts for half a million cases of monocular blindness worldwide.[14,15] This is the most recent and large-scale epidemiological study of ocular trauma in southern India. As observed in this study (M/F-3:1), several injuries have male predominance in case of ocular trauma. Higher preponderance of ocular trauma in males can be explained by their increased outdoor nature of job, such as being farmers, factory workers and drivers.[16] The life time prevalence of ocular trauma is estimated with an annual incidence of about 8.1% per 100,000 US persons.[17-19] The most common types of injuries are foreign bodies (35%), open wounds, contusions (25% each) and burns 15%. 90% of all eye injuries can be prevented with use of protective eye wear.[20]

The most common ocular part involved was anterior segment mainly cornea. In our study maximum number of patients were industrial welding workers followed by farmers. The study revealed that the most injuries occurred at industrial area and lack of basic safety precautions was the common factor. These findings have implications for health and safety strategies in prevention of serious eye injuries. The current emphasis on safe work environments must be expanded. In developing countries ocular trauma has not been studied extensively. This study in a developing country such as India underscores that trauma remains a significant cause of monocular vision loss in all age groups with a large proportion of younger patients getting affected, thereby entailing increased lifetime of disability years. This study also highlights the importance of adopting protective eyewear to prevent most workplace-related eye injuries and the value of early intervention.

CONCLUSION

Despite our methodology, the inherent limitations of studies should be considered and conclusion drawn from our pooled results should be interpreted with caution. Future large volume, well-designed with extensive follow-up is awaited to confirm and update the findings of this analysis.Corneal injuries were most common. While males were more affected likely due to job types, eye injuries remain a significant cause of vision loss, especially in younger individuals. However, the retrospective nature limits causal relationships, and the single-center design restricts generalizability. Additionally, milder injuries seeking care elsewhere might be underrepresented. These limitations highlight the need for further, multi-center, prospective studies capturing a broader injury spectrum.)

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ISSN (O): 2687-5365; ISSN (P): 2753-6556

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ISSN (O): 2687-5365; ISSN (P): 2753-6556