Original Article

Pattern of Medicolegal Ocular Trauma in Cases of Assault and Its Visual Outcome in An Outpatient Department of a Tertiary Care Hospital

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ABSTRACT

Purpose: To determine the pattern of medicolegal ocular trauma and its visual outcome in cases of assault presenting in the outpatient department of ophthalmology.

Study Design: Descriptive cross-sectional study.

Place and Duration of Study: Abbasi Shaheed Hospital, Karachi Medical and dental college **(KMDC)**, from January, 2020 to June, 2022.

Methods: This study included 199 patients of assault, registered as medicolegal cases and referred for examination by a police surgeon. Findings were recorded on a pre designed proforma and categorised according to Bermingham Eye Trauma Terminology (BETT). The results were presented in frequencies.

Results: The study analysed ocular injuries in a group of participants, predominantly male (81.9%), with a mean age of 34 years. The majority of injuries were closed-globe (70.4%), primarily occurring in Zone 1. Pre-treatment visual acuity was generally high, with 85.4% of patients having 20/20-20/40 vision, which improved slightly to 87.4% post-treatment. Open-globe injuries were rare (1.0%) and also confined to Zone 1. The most common trauma setting was the home, and the most frequent cause of injury was assault using a fist.

Conclusion: Majority of the patients were young males who suffered trauma at home and fist was the most common causative agent. The study highlights the prevalence of closed-globe injuries, the effectiveness of treatment in preserving visual acuity, and the domestic nature of most ocular traumas.

Key Words: Medicolegal, trauma, injury, violence, visual acuity.

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INTRODUCTION

A medicolegal case is any instance of ocular trauma where the attending doctor, after taking a detailed history and conducting a thorough examination, determines that an investigation is necessary to establish the responsibility for the trauma, in accordance with local laws.[1] Medicolegal cases are quite important aspect of routine clinical ophthalmology practice. Some common examples of medicolegal cases are alleged cases of assault, burns, poisoning, alcohol intoxication, road traffic accidents and industrial accidents.[2] Medicolegal cases may involve further proceedings against the accused such as claims for injury, domestic claims and issues for compensation. The outcome of the reports has legal and socioeconomic implications. The medicolegal reports of these cases form the basic documentary

evidence in the court of law. They have to be well prepared, complete, accurate and unbiased.[3] Most of these medicolegal cases present in public sector hospitals for examination, management and formulation of medicolegal reports.

Assault is an act of administering physical harm or un-wanted physical contact upon a person. While evaluating the trauma by assault, the injuries have to be assessed thoroughly regarding its nature (thoroughly regarding) and amount of visual loss. Eye is an important sense organ and a trauma significant enough to cause permanent loss of vision has been termed as grievous injury. Dangerous injury is an injury that causes imminent danger to life directly or indirectly. This type of injury may prove to be fatal without surgical intervention.[4] The ophthalmologist has to document visual acuity, intraocular pressure, other ocular findings and wound diagrams.[5,6]

Medicolegal cases may present days or even weeks after the trauma. These cases require a careful examination and thorough examination to assess the exact nature of injury as these patients may pretend false injuries to get the legal benefits and mislead the doctor.[7]

Ocular trauma has remained an ignored entity. Approximately 1.6 million people are blind due to ocular injuries, 2.3 million have become visually handicapped bilaterally and 19 million have unilateral visual loss.[8,9] Most of the patients of medicolegal ocular trauma are young males with average age of about 30-40years.[10] Ocular injuries are forensically significant when they occur due to trauma to the body leading to the loss of eyeball and vision. The consequences may have legal, social and economic aspects.[11]

Despite its importance very little work has been done regarding the medicolegal aspects of ocular trauma. This study will be helpful in generating data at national and international level. As mechanisms of ocular injuries are changing rapidly with modernization, knowing the pattern of medicolegal ocular injuries will help us in preventing visual loss and improve the visual outcome of such cases. Prompt and appropriate intervention in sight-threatening emergencies will help to reduce long-standing loss of visual acuity and improve post-injury quality of life.

METHOD

This was a descriptive cross-sectional study conducted in Abbasi Shaheed Hospital, Karachi Medical and dental college **(KMDC)**, from January, 2020 to June, 2022. This hospital is among the three public sector hospitals of the city where medicolegal cases are referred for issuance of medicolegal report for the court of Law and management of patients. The study was approved by the ethical Review Board of Karachi Medical and Dental College, ASH (letter no 01\21) and adheres to Declaration of Helsinki. Sample size of the study was 199 calculated with Open Epi sample size calculator version 3. The population size was 1000,000, confidence interval 85%, margin of error 5% and hypothesized frequency was 40.[11]

All Patients of assault with ocular trauma were included, registered as medicolegal cases and referred for examination by a police surgeon. Patients with accidental eye injuries and patients who did not give consent to participate in the study were excluded.

Patients referred to the ophthalmology department by the medicolegal officer were recruited through non-probability consecutive sampling technique for comprehensive ocular examination with and hypothesized was taken from every patient. A thorough history of the patient was taken regarding demographics, date and time of reporting of the incident, mechanism of injury, place of injury and object of injury. Comprehensive eye examination was done including torch examination, visual acuity, colour acuity, colour grid, slit lamp examination, gonioscopy and intraocular pressure. Fundoscopy was done in patients with decrease vision. Pupillary light reflex was checked for relative afferent pupillary defect (RAPD). Extraocular movements were checked to rule out blow out fracture. Radiological investigations like X-Ray orbit, CT scan-scan and Optical coherence tomography (OCT) was carried where required. All the findings were recorded on a pre designed proforma. Patients were advised for regular follow up in case of visual impairment and treatment advised accordingly.

Ocular injury was classified according to

Birmingham Eye Trauma Terminology (BETT)
Type of Trauma

Type	Open-globe	Closed-Globe
A	Rupture	Contusion
B	Penetrating	Lamellar laceration
C	Intraocular foreign body	Superficial foreign body
D	Perforating	Mixed
E	Mixed	N/A

Extent of Trauma

ZONE	OPEN GLOBE INJURY	CLOSEDGLOBE INJURY
I	Isolated to cornea (including corneoscleral limbus)	External (limited to bulbar conjunctiva, sclera, cornea)
II	Corneoscleral limbus to point 5mm posterior into sclera	Anterior segment (involving structures in anterior segment internal to cornea and including posterior lens capsule, also includes pars plicata but not pars plana)
III	Posterior to the anterior 5mm of sclera	Posterior segment (all structures posterior to posterior lens capsule)

Visual acuity was graded in the following way.
Grade A (≥20/40),
Grade B (20/50–20/100),
Grade C (19/100–5/200),
Grade D (4/200 to light perception), and
Grade E or no perception of light.
Pupil was categorized into Pupil A and B.
Pupil A indicates positive RAPD in the injured eye and Pupil B indicates nonrapid in the injured eye.
Data was collected and analysed on SPSS version 20. Frequencies were computed for categorical variables like age, gender, aetiology and type of trauma. Means were calculated for numerical data.

Bermingham Eye Trauma Terminology (BETT) to assess the pattern of trauma.[12] Open Globe Injury (OGI) consists of lacerations with total thickness of the eyeball, cornea and/or sclera. Closed-Globe injuries (CGI) included injuries where eyeball does not have full thickness wound.[12]

RESULTS

A total of 199 patients of medicolegal ocular trauma due to assault were studied from January, 2020 to June, 2022. Among them 163(81.9%) were male patients. Mean age of the patients was 34.41±12.93years. Most frequent place of trauma was home i.e. 81 (40.7%) followed by workplace seen in 45 (22.6%) patients and most frequent object used for assault was fist, seen in 106 (53.3%) patients (Table 1).

CGI were seen in 140 (70.4%) patients and OGI were seen in 2 (1.0%) according to Bermingham Eye Trauma Terminology (BETT) classification, CG Type A injuries were seen in 92 (46.2%) patients and CG Type B injuries were seen in 22 (11.0%) patients. Only 2 (1.0%) patients presented with OG Type A injuries. The frequencies of pattern of ocular injuries are given in Table 2. Patients who presented with grade A visual acuity at the time of presentation were 170 (85.4%). Pre and post treatment visual acuity are given in Table 3.

DISCUSSION

Medicolegal ocular trauma is an essential aspect of clinical ophthalmic practice. It is important to examine these cases with great responsibility and report the findings accurately as compensation and insurance claims are entirely reliant on these findings. It is also crucial to rule out the malingerers from the true victims.

CGI due to assault was the most common category in this study and only 1.5% had OGI. Tripathy et al

Table1: Frequency distribution of data of the patients, object and place of assault.

Variables	Frequency (%)
Mean age-+SD	34.41 ± 12.93 years (12 to 82 years)
Mean time	4.32 ± 8.74 days (0 to 60 days)
Gender	
Males	163 (81.9%)
females	36 (18.1%)
Jobless	60 (30.2%)
Skilled	80 (40.2%)
Schooling	
Uneducated	62 (31.2%)
Educated	137 (68.8%)
Laterality	
Right eye	61 (30.7%)
Left eye	69 (34.7%)
Bilateral eye	26 (13.1%)
Place of injury	
Home	81 (40.7%)
Work place	45 (22.6%)
Street	52 (26.1%)
Object of Assault	
Fist	106 (53.3%)
Danda (wooden shaft)	28 (14.1%)
Stone	17 (8.5%)
Pistol butt	7 (3.5%)
Hose	5 (2.5%)
Glass	5 (2.5%)
Belt	2 (1.0%)
Chemical	2 (1.0%)
Blast	2 (1.0%)
Metallic object	24 (12.1%)

Table 2: *Frequency distribution of eye injuries.*

Closed d globe injury	140 (70.4%)
Open globe injury	3 (1.5%)
No ocular injury	43 (21.6%)
Lid edema	98 (49.2%)
Ecchymosis	92 (46.2%)
Sub conjunctival haemorrhage	78 (39.2%)
Lid cut	12 (6.0%)
Blow out fracture	2 (1%)
Closed globe Type A	92 (46.2%)
Closed globe Type B	22 (11.0%)
Closed globe zone 1	84 (42.2%)
Closed globe zone 2	3 (1.5%)
Closed globe zone 3	5 (2.5%)
Open globe Type A	2 (1.0%)
Open Globe Zone 1	2(1.0%)
Pupillary Reaction closed globe Pupil A	4(2.03%)
Pupillary Reaction open globe Pupil A	2(1.0%)

Table 3: *Visual Acuity at the time of presentation and after treatment*

Visual acuity	Frequency (%) at the Time of Presentation	Frequency (%) after Treatment
Closed globe		
20/20-20/40 (A)	170 (85.4%)	174 (87.4%)
20/50-20/100 (B)	9 (4.5%)	8 (4.0%)
19/100-5/200 (C)	10 (5.0%)	9 (4.5%)
4/200-PL (D)	10(5.0%)	6 (3.0%)
Open globe		
NPL (E)	2 (1.0%)	2 (1.0%)

reported CGI in 61.7% among 188 medicolegal cases.[6] Shaheer et al conducted a study on the clinical profile of medicolegal ocular trauma including 40 patients and reported CGI in 92.5% of patients and OGI in 7.5%.[13] A study from Assam India reported CGI in 60.7% of patients and OGI in 15.3% of patients.[14] Another study from Turkey reviewed the medical records of 250 patients and reported 72% of OGI as they had more cases of road traffic accidents.[15]

In this study, type A injury was the most common (46.2%) among assault patients. Tripathy et al reported CG, type A injury in 79% of patients and type B injury in 17% of patients.[6] In our study, zone I injury was seen in 42.2% of patients, zone 11 in 31.5% of patients, and zone III in 2.5% of patients. Tripathy et al reported 2% of patients in zone I, 12% in zone II, 16% patients in zone III and Type C injury in (2.1%) of patients.[6]They had covered accidental injuries and admitted patient contrary to our study.

In our study OGI were seen in 1.5% patients. Among them 1.0% presented with type A, zone I injury, and type A (RAPD) pupil. OG type A injuries were reported in 28% of patients and type A pupils in 41% of patients by Tripathy et al.[6] In the CGI group, pupil A was seen in 2.03% of patients. Tripathy et al, reported type A pupils in 5% of patients in the closed globe group. Life threatening assault cases like gunshots or blast victims are attended by the casualty medical officer and are usually shifted to the medical or surgical ICU. Only vitally stable patients are referred for ophthalmic examination in an OPD.

Regarding visual acuity among the closed globe group, Grade A was seen in 85.4% of eyes, and Grade B was seen in 4.5% of eyes. Tripathy et al reported Grade A in 68% and Grade B in 11% of eyes.[6] The grade E visual acuity was seen in 1.0% of eyes in this study while it was reported in 38% of eyes by Tripathy et al.[6] Another study reported 69.7% of patients with visual acuity of 6/6-6/12.[14] Voon et al, reported visual acuity of 6/6 to 6/9 in 82.7% of ocular injury.[16]Poor initial visual acuity and hyphaemia are the risk factors for poor visual outcome. Ocular trauma score is the most significant factor for predicting post-treatment visual acuity proposed by other studies.[13,17]

Bilateral ocular involvement of eyes was seen in 13.1% of patients. Tripathy et al reported very similar results i.e. 13.8% of patients with bilateral injury.[6] There were (21.6%) of the patients with no ocular injuries in this study. Shaheer et al, reported 15% unremarkable cases[13] and Tripathy reported 7% malingers with no fresh ocular trauma. The patients in this study who claimed assault as alleged were either malingerers to get legal benefits or wanted to penalize the opponents. Some patients presented very late and their injuries were resolved. In these circumstances, an ophthalmologist plays a very important role to report whether the victim is eligible for a legal benefit or not.

The most frequent cause of injury in this study was blow or fist, seen in (53.3%), followed by a Danda (wooden shaft) in (14.1%) and stone in (8.5%) of patients. Amjad et al, have also reported blow by a fist (75%) as the most common cause of injury.[10] Tripathy et al, also reported fist as the commonest cause of injury followed by stones in (6.9%) of and wooden shafts in (6.3%) of patients.[6] Gupta et al, also reported fist among 55% of the patients.[18] Hand, stone, and Danda are the easiest gears to knock out someone within reach during a fight. These objects do not have sharp edges but the force of impact might result in open globe injury.

In our study, the most common place where

trauma occurred was home (40.7%) followed by the workplace (22.6%). A study from Korea reported that medicolegal ocular trauma was commonly seen at the workplace (34.9%).[19] Tripathy et al, also reported home to be the most common place for injury infliction i.e. in (30%) of patients.[6]Previously workplace has been reported as the most common place of trauma.[19,20]

Most of our data were collected in the COVID era (March 2020-September 2021) with lockdown in our country. People were at home, either jobless or working from home. Families from low-income areas were confined to single rooms. Their social life was severely affected by COVID-19 as acknowledged in another study.[21] All of these factors have a compound effect causing intolerance and hostile behaviour among the masses, with a sudden rise in domestic violence. [22]

Male preponderance was observed in our study (81.9%). Tripathy et al and Amjad et al, reported a male preponderance i.e. (87.2%) and (65%) respectively, mostly between the age of 21-30 years.[6,10] Other studies have also reported medicolegal ocular trauma among young males of 30-40 years of age.[8,9] Ahmadabadi et al, and Gupta et al also reported a male preponderance i.e. in 80% and 87% of cases.[18,20] Young males are the most productive members of our society, which makes them more exposed to outdoor activities and surroundings for work. The aggressive nature of the male gender especially young males places them at higher risk of assault. In the culture of the subcontinent, females are mostly restricted to household activities and more prone to domestic abuse.[22] In our opinion, the female gender is underreported. The patients should report early after assault for the precise findings to be testified and for the maximum legal benefit. Medicolegal officers should be trained to screen these cases. Assault cases should be referred to an ophthalmologist in case of decreased vision and urgently in case of OGI for its documentation and management.

There were certain limitations to our study. First, the cross-sectional design prevents us from establishing causal associations. Second, being a single-centre study, the results may not be generalizable. Third, we lacked long-term follow-up for patients with open-globe injuries, making it difficult to document their final outcomes.

The strength of this study lies in its unique focus on the pattern of ocular injuries resulting from assault in our region and their visual outcomes. In contrast, most other studies have primarily addressed accidental eye trauma.

CONCLUSION

Most of the patients were young males who had suffered assault at home, with fists being the most common causative agent. According to the Birmingham Eye Trauma Terminology (BETT), the common presentation was a closed-globe injury, specifically type A, Zone 1 injury. Open-globe injuries (OGI) were rare but resulted in vision loss. The majority of patients initially presented to an ophthalmologist with a visual acuity of 6/9 or better.

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Patient's Consent: Researchers followed the guidelines set forth in the Declaration of Helsinki.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval: The study was approved by the Institutional review board/Ethical review board **(01/21)**.

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Authors Designation and Contribution

Uzma Fasih; Professor: *Concepts, Design, Literature search, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing Manuscript review.*

Erum Shahid; Assistant Professor: *Concepts, Design, Data acquisition, Data analysis Statistical analysis, Manuscript editing Manuscript review.*