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Frequency, Causes and Medico-Legal Aspects of Grievous Injury to the Eye after Physical Assault

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Abstract:

Background: A medicolegal report is prepared by the medicolegal officer in conjunction with an ophthalmologist in cases of physical assault claiming vision loss. The objective was to report the frequency and cause of grievous injury to the eye after a physical assault.

Materials & Method: This was a descriptive cross-sectional study, conducted in the Department of Ophthalmology of a tertiary care hospital in Pakistan from October 2019 to August 2022. A total of 378 medicolegal cases were reported in the ophthalmology outpatient. Among them, 285 patients of physical assault were included with consecutive sampling technique.

Results: The mean age of the patients was 33.93±12.96 years. The mean reporting time to an ophthalmologist was 4.1±8.2 days. Simple and grievous injuries were found in 278 (97.5%) and 7 (2.4%) cases, respectively. Among the grievous injuries, 4 (57.2%) were close globe injuries and 3 (42.8%) were open globe injuries. Thirteen (4.5%) were malingers. Domestic violence was observed in 82 (28.8%) study subjects.

Conclusion: The frequency of grievous injury to the eye is very low (2.4%) in patients with physical assault. The patients of assault-related grievous injury were mostly males, young age, low level of education, and doing manual jobs. Vitrolage with corneal melting, and firearm injury caused the grievous injury in open globe patterns. Vitreous hemorrhage, retinal detachment, macular hole, and secondary glaucoma were seen among close globe patterns.

Keywords: Grievous eye injury, physical assault.

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Introduction:

A medicolegal case is an incident of injury or illness where the attending doctor after taking history and examination considers that investigations by law enforcement agencies are necessary to establish and fix accountability for the case by the law of the land[1]. Road traffic accidents, assault, as alleged, poisoning, burns, industrial mishaps, and alcohol intoxication, are all medicolegal cases that need evaluation[2].

An offer of threat or application of force to another person's body in a hostile or angry manner is called assault[3]. Administration of criminal force or intoxication and restrain him or her from their freedom and assault him or her to injure or kill, is made punishable by the police force proportionately to the harm brought to the victim[4].

Hurt can be simple or grievous. Grievous hurt is an injury that causes serious harm, and Simple hurt is simple that does not fall in the domain of grievous hurt[5]. The permanent deprivation of the sight of either or both eyes is termed as grievous hurt[3].

In this part of the world, doctors and specialists working in a recognized public sector hospital are the only liable authority to issue a medicolegal report. This tertiary care hospital is attended mostly by patients belonging to low socioeconomic backgrounds for treatment. It is among the three hospitals in a metropolitan city that caters to medicolegal cases. Individuals come from large urban catchment areas for the medicolegal report to claim compensation and to penalize the assailant. Accidental injuries have been reported in the literature extensively. There is a shortage of data regarding eye trauma due to assault or violence. The objective of the study is to report the frequency and cause of grievous injury to the eye among cases of physical assault coming to a tertiary care hospital.

Methods:

This descriptive cross-sectional study was conducted in Karachi Medical & Dental College and Abbasi

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Shaheed hospital, a tertiary care hospital from October 2019 to August 2022. The study adheres to the tenets of the Declaration of Helsinki and is approved by the Ethical Committee of the institute. Informed consent was taken from all the patients.

.During the study period, 378 medicolegal cases were reported in an Out-Patient (figure 1) of the Department of Ophthalmology. A total of 285 patients with physical assault complaining of ocular injury referred by the medicolegal officer for expert opinion were included. Ninety-three patients with accidental injuries were excluded (Figure-1). All the patients were enrolled with a consecutive sampling technique.

.A complete history of the patient was recorded on a Performa including age, gender, occupation, education, time of trauma, place of trauma, time of reporting, mechanism of injury, and object of trauma.

A detailed clinical examination of the eye was done. Best corrected visual acuity (BCVA) was checked on Snellen's chart. Pupillary reflexes, extraocular motility, and cover uncover test was done in every patient. Slit lamp biomicroscopic examination, fundus examination with a direct and indirect ophthalmoscope, intra-ocular pressure measurement with applanation tonometer, and visualization of the angle of anterior chamber with gonioscopy were performed.

Diagnostic investigations like X-ray orbit, Computerized Tomographic scans, B scans, Optical coherence tomography (OCT), Perimetry, and Electrophysiological tests were carried out where required for documentation to produce in a court of law if needed. Patients were advised follow-ups according to the severity of the injury.

Ocular injuries included eyeball injury and injury to the ocular adnexa. Eyeball injuries were classified into open globe (corneal or scleral perforation) or close globe injury. Malingers were defined as those who complained of decreased vision in the presence of normal eye examination and investigations or those with old eye pathology claiming to be caused by recent assaults. The grievous injury was defined as structural or functional loss of either or both eyes according to the Qisas and Diayat law of our country[3]. Functional loss is defined as a decline in eyesight from 6/6 to 6/12 or more following the injury[6]. Structural loss is defined as injuries to eye and ocular adnexa causing disfigurement or permanent scars.

Data was analyzed on SPSS version 21. Frequencies were computed for categorical data and means with standard deviation (SD) were calculated for numerical data.

Results:

A total of 285 patients with physical assault were included in the study. The mean age of the patients was 33.93±12.96 years. The median interquartile range (IQR) was 38 years (27.50-50.0). The minimum age of the patient in this study was 12 years and the maximum age was 96 years. Males were 230 (80.7%) in our study. The mean reporting time of the patients to an ophthalmologist was 4.1±8.2 days, with a minimum and maximum reporting time of 6 hours and 60 days, respectively. The most common place of assault was at home seen in 117 (41.1%) patients. Fist, punches, and kicks were the most common mode of assault found in 114 (50.5%) patients. Domestic violence was reported in 82 (28.8%) patients. A total of 263 (92.3%) patients came for follow-up. The minimum follow-up period ranged from 1 week to a maximum of 6 months. Demographic characteristics of the study subjects are given in Table-I. Table-II shows the places and objects of assault.

Table-I

Demographic variables of the study subjects

Variables	Frequency (%)
Gender	
• Male	230 (80.7)
• Female	55 (19.3)
Education	
• Illiterate	102 (35.8)
• Elementary	115 (40.3)
• High school	39 (13.6)
• Undergraduate	27 (9.4)
• Postgraduate	02 (0.7)
Occupation	
• Laborer	48 (16.8)
• Housewife	45 (15.8)
• Shopkeeper	28 (9.8)
• Office worker	26 (9.1)
• Driver	25 (8.8)
• Tailor	14 (4.9)
• Student	11 (3.9)
• Forces	11 (3.9)

Table-II

Place and objects of assault of the study subjects

Variables	Frequency (%)
Place of assault	
• Home	117 (41.1)
• Street	65 (22.8)
• Workplace	62 (21.8)
• Neighbourhood	41 (14.3)
Object of assault	
• Fist	114 (50.5)
• Stone	38 (13.3)
• Wooden shaft	25 (8.8)
• Metallic object	15 (5.3)
• Pistol butt	11 (3.9)
• Blast injury	3 (1.1)
• Chemical	2 (0.7)
• Nonspecific	77 (27.0)

Eyeball injury was found in 221 study subjects (77.3%). Close globe injury was seen in 218 (76.2%) patients compared to open globe injury in 3 (1.1%) patients (Figure-1 and Figure-2). Involvement of the right, left and both eyes were found in 110 (38.6%), 32 (10.9%) and 52 (18.2%) of the ocular injuries.

Sixty-four patients (22.7) did not have any eyeball injury, among whom 51 (17.9%) had injury to orbital adnexa (sparing the eyeball), and 13 (4.5%) were malingers

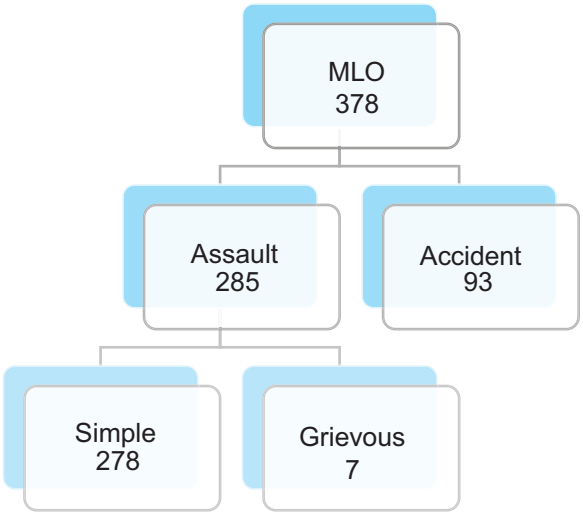

Figure 1: *Inclusion and exclusion of the study subjects*

(Figure-2). The most common sign of injury was ecchymosis seen in 142 (49.8%) patients. A pattern of ocular injury in patients with physical assault is given in Table-III.

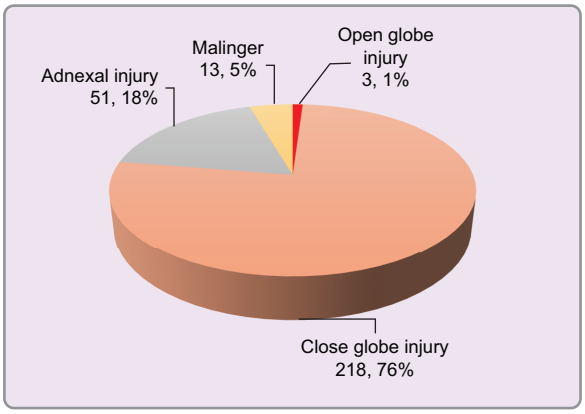

Figure 2: *Types of ocular injury among the study subjects*

Table-III

Ocular injuries of the study subjects

Ocular injury	Frequency (%)
Ocular adnexa	
Partial thickness lid laceration	24 (8.4)
Full-thickness lid laceration	22 (7.7)
Ecchymosis	142 (49.8)
Lid edema	117 (41.1)
Conjunctiva hemorrhage	123 (43.2)
Corneal abrasion	3(1.1)
Corneal Melt	2 (0.7)
Hyphema	1(0.4)
Uveitis	3 (1.1)
Sphincter tear	2 (0.7)
Traumatic mydriasis	3 (1.1)
Iridodenesis	1(0.4)
Phacodonesis	2 (0.7)
Lens	
Cataract	1(0.4)
Subluxation	2 (0.7)
Glaucoma	1(0.4)
Vitreous hemorrhage	2 (0.7)
Vitreous detachment	1(0.4)
Retina hemorrhage	1(0.4)
Commotio retinae 2 (0.7)	
Retinal detachment 2 (0.7)	
Macular hole 1(0.4)	
Orbital fracture (inferior wall) 2 (0.7)	
Globe perforation (firearm) 1 (0.4)	

Table-IV

Characteristics of the grievous eye injury patients

	Profession	Cause of injury	Object of assault	Injury type	Place of assault	Age & sex	Reporting time	Longest follow up	BCVA
1	Driver	Corneal melting (vitriolage)	Sulphuric acid	Open globe	Street	32 Male	1 day	2 weeks	CF*
2	Driver	Corneal melting (vitriolage)	Sulphuric acid	Open globe	Street	27 Male	1day	3 weeks	CF*
3	Robber	Macular hole	Fist/ punch	Close globe	Work	23 Male	2 days	No	20/200
4	Factory worker	Retinal detachment	Pistol butt	Close globe	Work	36 Male	7 days	No	20/200
5	Labor	Retinal detachment + VH***	Metallic object	Close globe	Home	70 Male	2 days	No	CF*
6	Farmer	Secondary pupillary block glaucoma (subluxated lens)	Pistol butt	Close globe	Home	52 Male	2 days	6 months	20/200
7	Robber	Perforated eye	firearm	Open globe	Street	47 Male	3 hours	No	NLP**

*CF: Counting fingers **NLP : No light perception ***VH : Vitreous haemorrhage

The grievous injury was noted in 7 (2.4%) patients. All of them were males (100%) of 23-70 years age range. The close globe injury was seen in 4 patients (57.2%). Three patients (42.8%) had open globe injury. The reporting time ranged from 3 hours to 7 days. All the open globe injuries took place on the street. Their best corrected visual acuity was not more than 20/200. Characteristic features of patients with grievous injury due to assault given in Table-IV.

Discussion:

Worldwide physical assault is a common cause of morbidity and mortality predominant in underdeveloped and developing countries[7]. The frequency of grievous injury to the eye in our study was 2.4%. In a study by Archana et al, the grievous injury to the body was 9% among 99 patients of physical assault[8]. Another study has reported 22% grievous injury to the body among assault patients[9]. Both the above studies have included all the body injuries not specifically eye injuries after the assault as reported by our study. A study conducted in Egypt has reported permanent eye damage in 10.42% of criminal assaults and accidents[10]. We have excluded accidental injuries to the eye as a lot of research work on them has already been published in the literature. In the case of interpersonal violence, the most accessible and exposed part of the body is the head and face[11]. The incidence of grievous injury to the eye specifically is low as it has a small surface area, is placed within the orbit, and is protected by the orbital margins.

Most of the patients (278) in this study presented with simple injuries. The majority of them had close globe injury (76.2%) and the most frequent ocular signs were ecchymosis, subconjunctival hemorrhage, and lid edema. These were minimal lesions that recovered on their own over time and didn't need serious medical care. Our results are consistent with the results of other studies[2, 8, 9, 11]. Two patients in our study were robbers, one was beaten by the mob and the other had a firearm injury by the police force. One had a close globe injury resulting in a macular hole and the latter one had an open globe injury causing globe perforation. The law enforcement agency brought them for the first-line treatment and medicolegal report but there was no follow-up. Firearm injuries have risen significantly in recent years due to interpersonal abuse and terrorism accounting for 10% of all maxillofacial trauma[12]. The violent nature of assault-related open-globe injuries is reported to have worse functional and anatomic outcomes than open-globe injuries in general[13]. Vitreous hemorrhage, retinal detachment, and prolapsed uveal tissue have been identified as predictive factors for poor visual outcomes[14].

Vitriolage is an act of throwing a corrosive agent on the body, particularly on the face of a person to disfigure and destroy the eyes causing permanent vision loss

out of jealousy or revenge[15]. In our study two patients with grievous injuries had an incident of vitriolage in a dispute. They presented with corneal sloughing. Vitriolage is rising in the UK, Cambodia, Pakistan, India, and Bangladesh[16]. A retrospective study conducted in the UK has reported two-thirds of cases of severe ocular chemical injury were not accidental, but were due to assault and the incident occurred in a public place[17]. In Pakistan acid attacks are typically committed by husbands against their wives in the name of honor[18]. In contrast to that both the patients in our study were males, and drivers, and the incident took place on the street.

Assault and trauma both are more common among the male gender, as previously published in the literature[1, 2, 7-10]. There is permanent disfigurement, loss of productive work years, and impaired quality of life[10]. Abd El-Hady et al. proposed illiteracy, occupation, and rural setting associated with permanent infirmities[10]. By profession 16.8% were laborers and only 3.9% were students in this study. A large number of individuals were illiterates (35.8%) and (40.3%) had gone to elementary school. Physical labor and illiteracy may have contributed to stress and made stress management more challenging for them. White-collar jobs have been linked with minimal risk of eye injury[19]. All of our patients who suffered grievous injuries were men, uneducated, and employed in blue-collar jobs. Casual associations between these factors were not statistically significant due to a small number of patients with grievous injuries.

Tripathy reported 7% malingers among 188 medicolegal cases[1]. We are reporting 4.5% malingers. Six patients among them had decreased vision with the normal investigations and seven had preexisting ocular diseases including amblyopia, corneal opacity, aphakia, senile cataract, coloboma, and failed Keratoplasty. These patients claimed that their vision loss was secondary to the fresh assault. It is difficult for the ophthalmologist to determine the magnitude of the visual loss unless the status of eyesight before the injury is available with the medicolegal expert, which is a rare possibility in our health care system[6].

Domestic violence was reported in 28.8% cases in this study. The assailants were husbands, brothers, sons, fathers, in-laws, and other family members. The victims were both men and women. Subjects with domestic violence mostly had simple injuries and no grievous injury. Sixty-five (22.8%) patients had no ocular findings at the time of examination. They might have arrived late, which allowed the small wounds to heal, or they might have wanted to report the incident to ensure the assailant was punished. Many patients were illiterate and unaware of the medicolegal implications of late reporting. Follow-up of the patients was also inadequate as they were interested in the medicolegal report for compensation claims but not in the treatment. Many of these cases are also settled outside court.

A small percentage of medicolegal cases is trailed in the court of law for which the attending ophthalmologist is called as an expert witness[20]. We have not been called in a court of law as an expert witness during the entire study period. A large fraction of patients in this study had simple injuries with no structural or functional loss.

We suggest that every assaulted patient with vision loss or claiming vision loss should be referred promptly to an ophthalmologist. Before filing a police report or beginning an investigation, a patient in an acute condition should be referred for urgent clinical treatment because prompt emergency care can significantly impact the patient's long-term functional and aesthetic outcomes. Malingers should be distinguished from grievous injury. We need to create awareness among the public about the medico-legal implications of early reporting before they develop any variation in ocular injury. It has been recommended that every medical doctor should have sound knowledge about the concept of grievous injury[21]. The healthcare system needs to be upgraded by connecting the data and hospital records of the patients. These measures need to be implemented at all the public and private sector hospitals in the interest of the public.

The strength of the study is that it is the only study to identify the frequency and causes of grievous injury to the eye in cases of assault worldwide and in our population. The limitation of the study is that it is a single-center study. There was no long-term follow-up of patients with grievous injuries. Casual associations cannot be generated with this type of study design.

Conclusion:

The frequency of grievous injury to the eye is very low in patients with physical assault. The patients of assault and assault-related grievous injury were mostly males,

young age, low level of education, and doing manual jobs. The grievous injury was seen in both open-globe and close-globe injury patterns. Vitirolage with corneal melting, and firearm injury with perforated eyeball caused the grievous open globe injuries. Vitreous hemorrhage, retinal detachment, macular hole, and secondary glaucoma were the causes of grievous close globe injuries.

Conflicts of Interests: NONE

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