



PATTERN OF OCULAR INJURIES AMONG MEDICOLEGAL CASES PRESENTING TO A TERTIARY EYE HOSPITAL IN NORTHERN RAJASTHAN: A RETROSPECTIVE STUDY

Ophthalmology

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ABSTRACT

Ocular injuries are an important cause of visual morbidity and frequently present as medicolegal cases in ophthalmic practice. Understanding the epidemiological pattern of Assault related injuries is beneficial for improving clinical management, documentation and preventive strategies. **Aim and objectives** -To analyze the pattern and characteristics of ocular injuries in Medicolegal cases presenting to a tertiary eye hospital in Northern Rajasthan. **Methods:** This retrospective observational study was conducted in the Department of Ophthalmology of a tertiary eye hospital after obtained approval from Institutional ethics committee. Medicolegal records of patients presenting with ocular injuries between August 2022 to December 2025 were reviewed and data regarding demographic profile, mode of injuries, type of injuries and other associated finding etc. were collected from Medicolegal (MLC) records. The data were analyzed using descriptive statistics and expressed as frequencies and percentages. **Results:** A total 204 patients with medicolegal ocular injuries were analyzed. The mean age was 35.86 ± 13.9 years with marked male predominance (84.31%). The assault related ocular injuries were common in urban areas. The majority of ocular injuries were closed (55.88%). The visual acuity at the time of presentation was predominantly high, with 72.54% of the patient exhibiting vision ranging from 20/20 to 20/50. Injuries caused by hand such as slap and fist, accounted for 49.01%, followed by injuries from heavy objects at 26.47%. Simple injuries constituted 85.29% (174 individual), while 12.74% (26 Individuals) had grievous injuries and 0.98% (2 Individual) exhibited no injuries. Most patients were managed conservatively (85.29%), while 11.76% required surgical interventions. **Conclusion:** Medicolegal ocular injuries predominantly affected young adult male, with blunt trauma being the most prevalent method. The majority of cases were managed conservatively but Improved public knowledge, early referral to ophthalmologist, proper medical care and preventive efforts may reduce the incidence and outcome ocular of injuries in medicolegal settings.

KEYWORDS

Medicolegal Ocular injuries, assault related injuries, ocular injuries, blunt trauma

INTRODUCTION

A medico-legal case may be defined as an instance of injury or medical condition that requires investigation by law enforcement authorities to determine the circumstances and an accountability associated with its occurrence. Such cases have legal implications for attending doctor, who is responsible not only for providing appropriate medical care but also for maintaining accurate documentation of clinical findings. After obtaining a detailed history and thorough clinical examination of the patient, the doctor determines that case requires investigation by law enforcement agencies^[1,2]. Medicolegal ocular injuries may arise from a wide range of injuries and incidents including assaults, road traffic accidents, occupational accidents, suspected self-harm and other form of trauma^[3]. Ocular injuries represent as significant clinical and medicolegal concern, as trauma to eye may lead to functional impairment and permanent visual disability. The consequences may have legal, social and economic aspects^[4]. Medicolegal assessment of ocular injuries is important as in assault cases, blunt and penetrating injuries to the eye can serve as significant evidence in identifying the type of weapon used, the power of impact and circumstances of injuries^[5], while in road traffic accidents, the pattern and severity of ocular injuries may provide clues about the mechanism and dynamics of the incident, which is valuable for medicolegal investigations. The objective of the study was to evaluate the demographic profile, mechanism of injuries, pattern of ocular trauma and management outcomes in medicolegal ocular injuries presenting at tertiary eye hospital in Northern Rajasthan.

Materials and Methods

Study Design: This was a retrospective observational study conducted to evaluate the pattern and demographic profile of ocular injuries in medicolegal cases.

Study Setting: The study was carried out in the Department of Ophthalmology at a tertiary eye hospital in Northern Rajasthan, where patients with ocular trauma requiring medicolegal documentation are routinely examined and recorded in the medicolegal (MLC) register

Study Duration: The study included cases registered between August 2022 and December 2025.

Sample Size and Sampling Technique: A total of 204 patients with ocular injuries registered as medicolegal cases during the study period were included in the study. All eligible cases recorded in the MLC register during the study period were include, therefore a consecutive sampling method was used.

Inclusion Criteria:

1. patients presenting with ocular injuries registered as medicolegal cases during the study period.

Exclusion Criteria:

1. patients with incomplete medical or medicolegal records.

Data Collection: Data were collected retrospectively from the medicolegal (MLC) register using structured proforma. The variables recorded included age, gender, residence (urban/rural), mechanism of injury, laterality (right /left or bilateral), type and pattern of ocular injury, and management provided.

Classification of ocular injuries: Ocular injuries were classified according to the "Birmingham Eye Terminology System (BETT's) in to open globe and closed globe injuries. Adnexal injuries involving the eyelids and periocular structures were recorded separately.

Management Protocol: Patients were managed either conservatively or surgically depending on the type and severity of the injuries. Conservative management include medical management and observation, while surgical intervention was performed when indicated. Patients with poor injuries and complicated ocular trauma requiring specialized care along with who requested referral, were referred to a higher center after providing primary ophthalmic management.

Statistical Analysis: The collected data were entered and analyzed using Microsoft Excel and IBM SPSS software. Descriptive statistics such as mean, standard deviation, frequency and percentage were used to summarize the findings.

Classification of Injuries

Classification of injury as per BETTS	
Closed-globe injury	Lamellar
	Laceration
	Contusion
	Corneal FB
Open-Globe injury	Penetrating injury
	Intraocular FB
	Rupture
	Laceration

Ethical Considerations: Approval was obtained from the Institutional Ethics Committee. As this was a retrospective study based on hospital records, patient confidentiality and anonymity were strictly maintained.

RESULTS

The present study included 204 patients with ocular injuries registered as medicolegal cases, of which 172(84.31%) were male and 32(15.68%) females. The age of patients ranged from 17 to 78 years with a mean age of 35.86± 13.94 years. The majority of patients were in age group of 21-30 years(n=72, 35.3%) followed by patients aged 31-40 years(n=48, 23.5%). Patients in the age group of 41-50 years constituted 32 cases(15.7%). Equal cases were observed in the age groups of 17-20 years and 51-60 years(n=20, 9.8%). A smaller proportion of patients belonged to the age group of 61-70 years (n=10, 4.9%), while the least number of cases were seen in patients aged 71-78 years(n=2, 0.98%). One hundred twenty (58.82%) patients belonged to urban category, whereas eighty-four (41.17%) patients were from rural background. Out of all cases, majority of patients presented early (1-5 days) (n=128, 62.7%), followed by patients presenting during intermediate period (6-15 days) (n=64, 31.4%). A smaller portion of cases presented late after 15 days (n=12, 5.9%). One hundred patients (49.01%) were involved in Hand related injuries which included fist related injuries(n=68, 33.33%) followed by slap related injuries(n=32, 15.68%), whereas injuries from blunt objects were seen in 54 cases (26.47%) which include injuries from heavy objects like Helmet, wooden sticks, stone and brick etc. Sixteen cases (7.84%) were associated with vehicle related and fall injuries respectively, while 14 patients (6.86%) were accounted for metal injuries and 4 patients (1.96%) had sharp weapon injuries. One hundred twenty-six patients (61.76%) denied the alcohol consumption during assault and 78 cases (38.23%) had alcohol involvement. Unilateral eye involvement was more common (n=182, 89.7%), and left eye(n=96, 47.05%) involvement was more than right eye(n=86, 42.15%) whereas 22 patients (10.7%) had bilateral involvement. The majority of patients(n=114, 55.88%) had Closed globe injuries followed by Adnexal injuries (n=76, 37.25%) and 12 patients (5.88%) sustained open globe injuries while 2 cases (0.98%) presented with no eye injuries. Out of total cases studied, the majority of cases sustained simple injuries (174, 85.29%), followed by grievous injuries in 26 cases (12.74%). In 4 cases (1.96%), the opinion for nature of injury was kept reserved, primarily because patients were advised follow up 4-6 week later or were referred for higher center. No injury was found in 2 cases (0.98%). Twenty-three patients (11.27%) experienced vision loss in Left eye followed by vision loss in Right eye (n=13, 6.33%) while 2 cases (0.98%) experienced vision loss in both eyes. Out of total cases studied, Sixty eight patients(33.33%) suffered from Adnexal injuries(ecchymosis and lid edema), followed by 62 cases (30.39%) suffered from conjunctival injuries (subconjunctival hemorrhage), followed by anterior chamber injuries (hyphaema)(n=14, 6.86%) and corneal epithelial defects(n=14, 6.86%) followed lid tear (n=8, 3.92%), iris related injuries (n=8, 3.92%) and scleral tear (n=8, 3.92%). A smaller portion had Superficial foreign body(n=6, 2.94%) followed by Vitreous haemorrhage (n=4, 1.96%), subluxated lens (n=4, 1.96%), corneoscleral tear(n=4, 1.96%), retinal detachment (n=2, 0.98%) and no injuries in 2 cases(0.98%). Surgical intervention was required in 24 cases (11.76%). Twenty-five (12.25%) patients were referred to higher center for management. Police intimation was done in all cases.

Gender and Residence Distribution

Category	n	%
Male	172	84.31
Female	32	15.68
Urban	120	58.8
Rural	84	41.2

Laterality

Type	n	%
Left	96	47.05
Right	86	42.15
Both	22	10.8

Age Distribution

Age Group	N	%
17-20	20	9.8
21--30	72	35.3
31-40	48	23.5
41-50	32	15.7
51-60	20	9.8
61-70	10	4.9
71-78	02	0.98

Mode of Assault

Mode	n	%
Fist	68	33.3
Slap	32	15.7
Heavy Objects	54	26.47
Fall	16	7.8
Vehicle accidents	16	7.8
Sharp objects	4	1.96
Metal objects	14	6.86

Type of Injury

Type	n	%
Adnexal	76	37.25
Closed Globe	114	55.88
Open Globe	12	5.88
No injury	2	0.98

Pattern of Injury

Pattern of Injury	n	%
Ecchymosis, abrasion and lid swelling	68	33.33
Conjunctival (Subconjunctival Haemorrhage)	62	30.39
Corneal epithelial defects	14	6.86
Anterior chamber involvement (hyphaema)	14	6.86
Lid tear	8	3.92
Iris-Related	8	3.92
Scleral tear	8	3.92
Superficial foreign body	6	2.94
Vitreous Haemorrhage	4	1.96
Subluxated lens	4	1.96
Corneoscleral tear	4	1.96
Retinal detachment	2	0.98

MLC Classification

Category	n	%
Simple	174	85.29
Grievous	26	12.74
Reserved	4	1.96

DISCUSSION

This retrospective observational study comprised of 204 patients with ocular injuries registered as medicolegal cases during study period. In our study 84.31% were male and 15.68% were female, highlighting the gender disparity which can be attributed to greater exposure of males to interpersonal violence and outdoor activity. This male predominance is consistent with previous research studies^[6,7,8,9] which also reports a significant gender predisposition towards male in ocular injuries. Females accounted for a much smaller proportion (14.7%), suggesting relatively lower involvement in medicolegal ocular injuries. Present study shows a majority of patients belongs to urban areas (58.8%), which may be attributed to higher reporting rates, better access to tertiary care facilities and increased interpersonal conflicts in densely populated settings. Unlike Mahalingappa R et al.^[10] found more rural cases due to farming and Wadewekar A et al.^[11] noticed urban cases from RTA and outdoor Activities. In present study, most cases were belonged to age group 21-30 years (35.3%) .it is in accordance with other studies who found that majority of patients were within the age group of 21-30 years^[12]. This can be attributed to higher risk-taking attitude, interpersonal conflicts and high-risk occupations. In our study, mostly cases (62.7%) presented to the department within 5 days while 31.4% presented between 6 to 15 days and 5.9% reported after 15 days. Alem et al^[13] found that 74% patients reported after 3 or more days of injury. The most common cause of ocular injury in this

study was Hand related injuries, seen in 100 patients (49.01%) which includes injuries due to fist (33.3%) and slap (15.7%), followed by injuries from heavy objects (26.47%) like wooden stick, helmet, stone and bricks. This finding is in accordance with Tripathy et al^[14] who reported, fist as the commonest cause of injury followed by stone and wooden objects. Other studies^[15,16] also supported that fist, most common cause of medicolegal trauma. This indicates that most ocular injuries in medicolegal cases are caused by blunt trauma, which typically results in a spectrum of injuries ranging from minor adnexal involvement to severe globe damage. Tripathi et al^[14] observed mechanical trauma was present in 90% of patients. The relatively lower incidence of sharp weapon injuries (1.96%) suggests that ocular involvement is more incidental in physical altercations rather than intentional targeting.

In our study, left eye involvement (47.05%) was more than right eye (42.15%), which could be due to right hand dominance of assailants and defensive behavior of victims. Similar findings were noted by previous studies^[11,17]. In present study, alcohol consumption was noted in 38.2% cases, which may influence the circumstances of injury, impair judgement, reduce self-control and increase aggressive behavior. Hoskin AK et al. also found similar findings. Closed globe injuries were seen in 114(55.88%), followed by Adnexal injuries(n=76,37.25%) and Open globe injuries were seen in 12 cases (5.88%) and no injuries in 2 patients (0.98%). Tripathy et al^[14] reported closed globe injuries in 61.7% among 188 MLC cases. Another study by Shaheer et al^[21] observed closed globe injuries in 92.5% cases and open globe injuries in 7.5% cases. These findings were in accordance with previous studies^[19,20]. In this study large number of patients had Adnexal injuries and exclusion of these injuries could affect the results. In present study, Zone I, injury was most common (44.11%) among medicolegal ocular injuries, Zone II in 9.8% patients and Zone III in 1.96% of patients. These finding were consistent with study conducted by Tripathy et al^[14]. Conjunctival injuries were observed in 30.39% of patients. Sahu et al^[22] reported similar findings. Corneal injuries and anterior chamber injuries were reported in 6.86 % of patients respectively. Scleral injuries were observed in 3.92% cases which shows deeper trauma to eye, often connected to blunt force. This finding was similar to Soni et al^[23]. In our study, Iris related injuries (3.92%), scleral injuries (3.92%)^[23], lens related injuries (1.96%) and posterior chamber injuries (2.94%) were reported as less frequent injuries but potentially sight threatening. In our study, vision loss affected the left eye was more (11.27%) than the right eye (6.3%) and bilateral vision loss was noted in 0.98% of patients due to Traumatic Optic neuropathy, Unresolved vitreous haemorrhage, Retinal detachment, vitreous loss in few scleral and corneal tear and corneal staining in one patient. These findings were in accordance of study conducted by Kushwaha et al^[17]. In our study 22 patients (10.78%) presented with pre-existing cataract, 2 patients (0.98%) pre-existing subluxated intra ocular lens while 9 patients had pre-existing Posterior capsular opacity (PCO).

Medicolegal ocular trauma constitutes a significant proportion of cases encountered in routine ophthalmic practice. These cases require careful and meticulous evaluation, as accurate documentation of finding is essential for legal proceedings, compensation and insurance claims. Any discrepancy or oversight may have serious legal implications. Therefore, it is crucial for the ophthalmologist to distinguish genuine injuries from malingering, ensuring that true victims receive appropriate recognition and that false claims are identified and excluded.

Strength and limitation of the study

This study mainly focusses on medicolegal ocular injuries, a clinical important proportion of routine ophthalmic practice in northernmost part of Rajasthan. It consists of adequate sample size and detailed medicolegal profiling.

This was retrospective single center study with limited follow up and no advanced statistical analysis

CONCLUSION

The present study demonstrates that ocular injuries in medicolegal cases predominantly affect males and are mainly caused by blunt trauma, with fist (Hand related injury) being the commonest mode of injury. Closed globe injuries were most common, followed closely by Adnexal, while Open globe injuries were relatively uncommon. The left eye was more commonly involved due to predominance of right-

handed assailants. A significant proportion of cases were associated with Alcohol consumption, highlighting its role as an important contributing factor in medicolegal ocular injuries. Most injuries were classified as simple and managed conservatively, with only a small proportion required surgical intervention.

Overall, the study emphasizes the importance of careful clinical evaluation and accurate documentation in medicolegal cases, as well as the need for preventive strategies to reduce the burden of medicolegal trauma especially in alcohol related violence. Also suggests that early presentation and timely intervention play a crucial role in preserving vision and improving outcomes.

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