



CLINICAL EVALUATION OF ANTERIOR SEGMENT FOLLOWING BLUNT OCULAR TRAUMA

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ABSTRACT **Background:** Blunt ocular trauma is a significant cause of ocular morbidity and preventable vision loss worldwide. It predominantly affects younger, active individuals and can lead to sight-threatening complications. Understanding the epidemiological trends, clinical presentations, and management strategies is critical to improving patient outcomes. **Aim:** To evaluate the epidemiological characteristics, clinical manifestations, and management outcomes in patients with blunt ocular trauma involving anterior segment structures. **Methods:** The Regional Institute of Ophthalmology, Sitapur, undertook a one-year prospective, non-randomized hospital-based research with 50 patients aged 5–60. Complete ophthalmological exams included diffuse light, slit-lamp biomicroscopy, and non-contact tonometry. In certain instances, ultrasonography B-scan, CT/MRI imaging, and gonioscopy were done. **Results:** About 54% of the 50 patients were male, whereas 46% were female. It afflicted 28 left eyes (56%), and 22 right eyes (44%). The most prevalent age group was 5–20 (38%). Road traffic accidents caused 30% of trauma, followed by wooden object injuries (38%). Conservative care was most common (36%), corneal tear repair was 28%, and evisceration was 16%. 10% had traumatized cataracts, and 6% had anterior lens dislocations that needed surgery. **Conclusion:** Blunt ocular trauma is mostly experienced by men and younger adults, with road traffic accidents being the primary cause. Traumatic cataract and angle recession glaucoma need long-term follow-up, although prompt diagnosis and treatment enhance results. Preventing ocular injuries requires protective eyewear and traffic safety.

KEYWORDS : Blunt ocular trauma, anterior segment, road traffic accidents, traumatic cataract, ocular morbidity, corneal tear repair.

INTRODUCTION

Eye injuries are common in the emergency department and contribute significantly to preventable monocular blindness and visual impairment worldwide. Globally, approximately 55 million people are affected by ocular trauma each year, with approximately 750,000 cases requiring hospitalization [1,2]. The prevalence of eye trauma in India is between 1% and 5% [3,4]. Blunt trauma is the most common type of eye injury, accounting for 54.9% of cases [5].

Blunt eye trauma can result in open or closed injuries to the eyeball, with the latter being more common in children. These injuries are often the result of sports accidents or domestic incidents. Contusions and lamellar lacerations are the two main categories of closed globe injuries, while open globe injuries include lacerations or perforations of the eyeball [6,7]. Four mechanisms of blunt trauma have been identified: coup, countercoup, anteroposterior compression, and horizontal expansion of the ocular tissues, with the anterior segment frequently bearing the primary impact [8,9].

Symptoms of blunt eye trauma include erythema, increased tearing, edema around the eye, hemorrhage, loss or distortion of vision, and pain [10]. In addition to immediate injury, long-term complications, including glaucoma and traumatic cataract, are common and require close monitoring to prevent visual compromise [11,12]. Hyphema, a frequent complication, carries risks such as corneal discoloration, recurrent hemorrhage, and increased intraocular pressure, necessitating prompt diagnosis and treatment [13].

Despite the eye's natural anatomical and physiological protective mechanisms, such as the bony orbital rim, blink reflex, and lacrimation, modernization and industrialization have led to an increased prevalence of eye injuries [14]. These injuries can largely be prevented through appropriate safety measures and public education [15].

It is important to perform a thorough clinical examination to detect injuries to the anterior segment of the eye caused by blunt trauma. The anterior segment of the eye is often the target of direct and indirect forces due to its high exposure. Visual outcomes can be significantly impacted by the rapid detection and treatment of injuries. The purpose

of this study is to evaluate the epidemiologic characteristics, potential injury types, anterior segment structures, and treatment modalities of patients with blunt ocular trauma.

MATERIALS AND METHODS

This prospective, non-randomized hospital-based study was conducted over one year at the Regional Institute of Ophthalmology in Sitapur. A total of 50 patients diagnosed with blunt ocular trauma involving the anterior segment of the eye were included. Patients aged 5–60 years of both sexes were included in the study based on specific inclusion criteria. Cases with orbital wall fractures, chemical injuries, eyelid trauma, globe rupture, systemic diseases or previous eye surgeries were excluded. Ethical approval was obtained and participants gave informed consent.

The comprehensive ophthalmologic examination included a diffuse light examination, visual acuity assessment using the Snellen chart, and slit-lamp biomicroscopy to assess the anterior segment of the eye. Intraocular pressure was measured using non-contact tonometry. Dilated fundus examinations with tropicamide 0.8% and phenylephrine 5% were performed, with indirect ophthalmoscopy and scleral indentation in selected cases. Gonioscopy was performed when required. Systemic assessment included documentation of concurrent injuries, assurance of tetanus prophylaxis, and examination for wound contamination risks.

Laboratory tests such as a complete blood count, blood typing, viral markers and serum electrolytes were performed along with imaging such as ultrasound B-scan, CT scan of the orbit and MRI for structural assessment. If infection was suspected, bacterial and fungal cultures as well as aqueous humor and vitreous sampling were performed. The aim of the study was to analyze the type of injury, anterior segment structures affected and treatment outcomes to provide a comprehensive understanding of blunt eye trauma management.

Data were analyzed using descriptive statistics, with categorical variables such as gender, type of injury, and anterior segment complications expressed as numbers (n) and percentages (%).

RESULTS

This study included 50 patients with blunt trauma and eye damage. The participants were 27 men (54%) and 23 women (46%), with men being slightly more frequently affected. The left eye was affected 28 times (56%) and the right eye 22 times (44%). This indicates that the eye damage is not eye-specific, but rather affects the left eye.

Adolescents, especially those aged 5–20 years, were more frequently affected with 19 cases (38%). This shows that children and adolescents are more susceptible to eye damage due to high-risk activities. The remaining 31 cases (62%) involved people over the age of 20, showing that violent eye injuries occur in all age groups.

Road traffic accidents caused 15 (30%) injuries, highlighting their danger to eye health. The most common cause of trauma was wooden objects, 19 (38%), followed by other miscellaneous causes, 11 (22%). Conservative treatment was performed in 18 cases (36%), indicating a non-invasive approach. Lens extraction was performed in 7 patients (14%), while corneal tear repair was performed in 14 (28%). In 8 (16%) severe cases, evisceration surgery was performed, while 3 (6%) had various interventions. Traumatic cataract in 5 patients (10%) and anterior lens dislocation in 3 patients (6%), all of whom required lens extraction.

These results emphasize the need for prompt and appropriate treatment to preserve vision and avoid long-term problems. The prevalence in younger people and the high rate of conservative or surgical interventions underline the importance of prevention, especially in high-risk activities and road traffic.

Table 1: Demographic, Clinical, And Management Details

		n	%
Gender	Male	27	54.0
	Female	23	46.0
Age (years)	5-20	19	38.0
	>20	31	61.0
Side	Right	22	44.0
	Left	28	56.00
Mode of BOT	RTA	15	30.0
	wooden objects	19	38.0
	Traumatic Cataract	5	10.0
	Other	11	22.0
Management	Conservatively	18	36.0
	Corneal tear repair	14	28.0
	Extraction surgery	7	14.0
	Evisceration surgery	8	16.0
	Other	3	6.0
Anterior Dislocation Of Lens	lens extraction surgery	3	6.0

DISCUSSION

Blunt ocular trauma is a major cause of ocular morbidity and preventable vision loss worldwide. This study corroborates existing evidence on the epidemiology, clinical manifestations, and management outcomes of blunt ocular trauma.

In this study, males constituted 54% of cases, consistent with findings by Sudha Madhavi et al. (73.33%), Hariharan and Mohankumar (68%), and Sahu et al., who reported male-to-female ratios ranging from 2.75:1 to 5.25:1 [16–18]. This higher prevalence in males may be attributed to increased participation in high-risk activities such as outdoor work, driving, and sports [3,18].

The younger age group (5–20 years) accounted for 38% of cases, aligning with studies by Sudha Madhavi et al., where the largest affected group was aged 26–35 years (40.8%), and Parida S et al., who highlighted the vulnerability of the 21–30 age group due to occupational and recreational exposures [17,19]. A higher incidence among younger individuals emphasizes the need for targeted preventive strategies.

The left eye was more frequently involved (56%), consistent with findings by Sudha Madhavi et al. (54%). Most cases were unilateral (81.67%), highlighting the importance of understanding trauma mechanisms and patterns [17].

Road traffic accidents accounted for 30% of cases, similar to the findings of Sudha Madhavi et al. (39.16%) and Singh et al. This underscores the critical role of vehicular safety in reducing ocular trauma. Agricultural incidents and falls were also notable causes,

emphasizing the importance of workplace safety and fall prevention measures [17,18].

Anterior segment injuries predominated, with management strategies including corneal tear repair (28%), lens extraction (14%), and evisceration (16%). Similar to Sudha Madhavi et al., common manifestations included eyelid ecchymoses (56.7%), subconjunctival hemorrhages (55.8%), and traumatic cataracts (8.33%) [17]. These findings underscore the need for early and thorough ophthalmological evaluation to address immediate and long-term complications such as glaucoma and cataract [12,13].

This study emphasizes the necessity of comprehensive examination, early intervention, and long-term follow-up in cases of blunt ocular trauma. Preventive measures, such as the use of protective eyewear, enforcement of traffic regulations, and workplace safety practices, are vital to reducing the incidence and impact of ocular injuries [14,15].

CONCLUSION:

Avoidable vision loss in younger men is usually caused by blunt eye trauma. Road traffic accidents and injuries to the anterior segment of the eye predominate. Prompt treatment, protective eyewear and safety standards are essential. Long-term follow-up is required to resolve the problems, underlining the need for interdisciplinary prevention of trauma-related eye morbidity.

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