

A Hospital Based Prospective Study to Analyse Mode, Type and Pattern of Ocular Injuries and Visual Prognosis after Ocular Injury in ChildrenMonisha Sahai¹, Lokendra Tyagi², Manju Muhnot³, Siddharth Sahai⁴¹Associate Professor, Department of Paediatrics JNU Institute of Medical Sciences & Research Centre, Jaipur, Rajasthan, India²Senior Consultant in Ophthalmology Sahai Hospital & Research centre, Jaipur, Rajasthan, India³Senior Consultant in Ophthalmology Sahai Hospital & Research centre, Jaipur, Rajasthan, India⁴Resident, Ophthalmology JNU Institute of Medical Sciences & Research Centre, Jaipur, Rajasthan, India

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Abstract:**Background:** Childhood eye trauma includes a variety of injuries ranging from corneal surface abrasions to corneal and scleral perforations. The incidence of childhood ocular trauma varies from region to region and also varies with demographic data such as age and gender. The aim of this study is to analyse mode, type and pattern of ocular injuries and visual prognosis after ocular injury.**Material & Methods:** This is a hospital based prospective study done on all paediatric patients (12 years and below) attending OPD with history of ocular trauma at Sahai hospital, Jaipur during one-year study period. Demographic profiles of all patients in terms of age, sex, residential area (urban or rural), date and time of injury, and any previous treatment were noted. Visual acuity was assessed. Fundus examination after dilatation was done for cooperative children. Type of injury, mode of injury, zone of injury was recorded. X- Rays, B-Scan, CT scan were done for appropriate patients.**Results:** Out of 220 children examined, 40 (18.18%) presented ocular trauma. Our study showed that children aged 9–12 years (50%) were most commonly affected followed by the age group consisting of 6-8 years children (25%). There were 24 (60%) boys and 16 (40%) girls. The nature of injuries was classified into open (65%) and closed globe (25%). Other injuries (10%) included adnexal and chemical injuries. A perforating open globe injury to the cornea (n = 19, 47.5%) was the most common injury. Most open globe injuries present to the tertiary care centre OPD/ emergency immediately (within 6 hrs) after injury whereas closed globe injuries reported late.**Conclusion:** We concluded that visual prognosis of ocular trauma depends on area of the involvement and time of presentation. More emphasis should be laid out on preventive measures by educating parents and children on ocular trauma and timely management.**Keywords:** Ocular trauma, type of injury, open globe injury, closed globe injury, Zone of injury.

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Introduction

Ocular traumas are the leading cause of acquired unilateral blindness in the paediatric age group. [1] It is a devastating trauma in the paediatric age group and is an important cause of morbidity in children. The consequences of childhood injury are harmful as it leads to permanent blindness and visual handicap. It adds to the economic burden on the society. It also affects the psychological, social, and emotional development of a child. At the same time, parents are also worried about the future of the child.

Ocular injuries are usually caused by sharp objects, toys, wooden sticks, pencils, various sports activities, and stones in children. [2] Traumas are generally classified into two types as globe and

adnexal. The most common emergency admission is with open globe injuries and require urgent intervention. [3]

Ocular trauma in children accounts for 8% to 14% of the total injuries. [4] Childhood eye trauma can range from mild corneal surface abrasions to sight threatening corneal and scleral perforations. The majority of ocular injuries in children are preventable by taking minor precautions and identification of risk factors for ocular injury. [5-8]

The incidence of childhood ocular traumas varies from region to region and also varies with demographic data such as age and gender. While many studies have been conducted on ocular trauma in developed countries, the incidence of eye

injuries in developing countries is not well known. [2,9,10] The nature of the injury and visual outcome is different between developing and developed countries due to vast differences in social, demographic, and cultural factors. The aim of this study is to analyse mode, type and pattern of ocular injuries and visual prognosis after ocular injury.

Material & Methods

This is a hospital based prospective study done on all paediatric patients (12 years and below) attending OPD with history of ocular trauma at Sahai hospital during a one-year study period from January to December 2022

The study included all children of age group ≤ 12 years who sustained eye injuries and presented to the outpatient department or emergency services. A detailed history as to the cause of the injury was obtained. Details of any systemic injury sustained by the patient was noted. Demographic profiles of all patients in terms of age, sex, residential area (urban or rural), and data about the time of injury, and any treatment received prior to reporting to this were recorded.

Clinical evaluation: Children (<7yrs) with open globe injuries were examined on table only after anaesthesia. Whereas for >7 yrs and cooperative children, they were examined with standard slit lamp/portable slit lamp.

Visual acuity was assessed. Fundus examination after dilatation was done for cooperative children.

Type of injury, mode of injury, zone of injury was recorded. X- Rays, B- Scan, CT scan were done where it was felt clinically appropriate to do so.

Treatment given was recorded and postoperative complications if any, were noted and followed up to 1 years at regular intervals. Late complications if any, and repeat surgery if done, was noted.

Patients requiring surgical intervention were operated upon with the repair of perforation, removal of foreign body, Vitrectomy etc. These patients were followed up on day one postoperative period and subsequently till 6 months.

Ocular trauma score was carried out according to the scoring system developed by Khun et al. [11] The ocular injuries were classified using the standardized international classification of ocular trauma, the Birmingham Eye Trauma Terminology System (BETTS). [12] BETTS is to depict the ocular injury terminology (open or closed globe). [13] Classification of ocular trauma according to the location of the wound was defined by the Ocular Trauma Classification Group. [14]

Statistical Analysis: Mean and standard deviation were used to describe the continuous variables, while frequencies and percentages were used to describe the categorical and binary variables. Parametric and nonparametric comparisons were performed for all variables.

Results:

Table 1: Demographic characteristics of patients

Demographic characteristics	No. of patients (N=40)	%
Age (yrs)		
< 2 yrs	2	5%
3-5 yrs	8	20%
6-8 yrs	10	25%
9- 12 yrs	20	50%
Sex		
Male	24	60%
Female	16	40%
Residence		
Rural	18	45%
Urban	22	55%
Laterality		
Right	21	52.5%
Left	17	42.5%
Both	2	5%

Table 2: Area of injury

Area	category	No. of patients (N=40)	%
Anterior segment	I	22	55%
Post. Segment	II	2	5%
Ant. & post. Seg.	III	9	22.5%
Orbital & adnexal	IV	5	12.5%
Neuro ophthal.	V	1	2.5%
Orbital & neuroophthal.	VI	1	2.5%

Table 3: Open globe injury profile

Type of injury	No. of patients (N=26)	Percentage
Corneal perforation	19	47.5%
Corneoscleral perforation	3	7.5%
Scleral perforation	2	5%
Globe rupture	2	5%

Table 4: Closed globe injury profile

Type of injury	No. of patients (N=10)	Percentage
Hyphema	3	7.5%
Superficial foreign bodies	1	2.5%
Corneal abrasion	5	12.5%
Endophthalmitis	1	5%

Table 5: Time of presentation

Time	Category	No.	%
< 6 hrs	I	18	45%
6- 24 hrs	II	8	20%
25hrs-6days	III	8	20%
1 week-1 month	IV	4	10%
> 1 month	V	2	5%

Out of 220 children examined in the ophthalmology unit of the hospital, 40 (18.18%) presented with ocular trauma. Our study showed that children aged 9–12 years (50%) were most commonly affected followed by the age group consisting of 6-8 years children (25%). There were 24 (60%) boys and 16 (40%) girls. There were no significant differences between rural and urban children (45% and 55%, respectively). In our study, right eye is involved more than left eye (table 1).

Here in our study anterior segment trauma seems common. This could be due to referral of posterior segment trauma and those with associated head trauma to government hospital since the prognosis of ocular trauma is poor when these areas are involved (table 2).

The nature of injuries was classified into open (65%) and closed globe (25%). Other injuries (10%) included adnexal and chemical injuries. A perforating open globe injury to the cornea (n = 19, 47.5%) was the most common injury. In a closed globe injury, corneal abrasion (n = 5, 12.5%) was the most common injury followed by hyphema (n = 03, 7.5%) (table 3 & 4).

Most open globe injuries present to our hospital immediately (within 6 hrs) because of pain and sudden loss of vision. Whereas closed globe injuries report late. Neuro-ophthalmic trauma like traumatic optic neuropathy come in very late stage this being, due to lack of pain and vision loss not noticed until the other eye is occluded incidentally (table 5).

Discussion

Rural paediatric population has more ocular trauma because of their peculiar type of games like playing

fan with broom stick, gillii danda, mainly involving outdoor games, and playing in the streets for hours together. Whereas, in children from urban areas mainly involved indoor games (using ball, pen scissors). Even in urban areas injuries are more common in outskirts of city and slum areas.

The incidence of paediatric ocular trauma in our study was found to be 18.18% (220/40) in a one-year period. Singh et al noted the incidence of paediatric ocular trauma in the central Indian population as 12.8%. [15] Saxena recorded the incidence in a tertiary eye care center in the duration of 6 months as 20.8%. [5] Maurya (in an epidemiological study from the northern part of India) showed about 30.35% of ocular trauma occurred in the paediatric age group. [16] Wadei et al noted an increase in the childhood trauma to the extent of 49.7% in the Egyptian population. [17] In the Nigerian population, the proportion of eye injuries in children was 26.4%. [18] A study from Saudi Arab demonstrated a high incidence of paediatric trauma to the tune of 58.5%. [19] China found the incidence of paediatric ocular injury in the Chaoshan region to be 23.6%. [20] Five percent of all admissions in developed countries [21] and 12.9% from developing countries result from eye injuries. [22] The variability in the documentation of ocular trauma incidence in paediatric population could be due to vast differences in cultural and social factors and study design. It also depends on the referral services and the facilities available for the treatment in the hospital.

Our study showed that incidence of ocular trauma increases as age advances in children. This is because of their increase in outdoor activities and playing different unusual games among their friends. The incidence is less in children <2 yrs,

because they were always under the care of parents. This finding correlates with other studies from Indian population [5,15] and those from all over the world also show the same trend. [17,20] Increased incidence, seen in males indicates relatively more involvement in outdoor games, their aggressiveness and quarrel among their friends compared to female children. Another possible explanation given by Singh et al is the importance given to males over females in Indian society with respect to taking them for medical care, a finding with which we also agree.¹⁵

In the current study, the most common cause of ocular injury was sports-related injury (spinning top, cricket ball) in a closed globe and wooden stick in the open globe. This observation correlates with Qayum et al, who also found that sports-related injuries are common with respect to closed globe injuries, and wooden stick injuries were found in open globe. [23]

Most cases were managed surgically under GA. One case of traumatic subluxation reported to us with vision 6/12 and was planned to be observed periodically. During postoperative period, it was very difficult to open and examine the eyes of pediatric children managed with corneal suturing. Postoperative Uveitis was common and severe in many children with exudates and fibrin in anterior chamber. Two cases of traumatic optic neuropathy managed with IV methylprednisolone did not show any improvement despite CT scan showing no evidence of fracture, only presenting later as optic atrophy.

During follow up period of one year, injuries limited to anterior segment generally had good prognosis compared to posterior segment trauma. Most corneal lacerations, even managed meticulously cause corneal opacity, astigmatism and decreased vision. Further vision is compromised by other complications as cataract etc. With vitreous involvement in open globe injuries, there is more incidence of endophthalmitis and visual prognosis is grave. Neuro-ophthalmic trauma generally presents at a later date in the stage of optic atrophy. Most orbital and adnexal trauma had very good visual prognosis. Agrawal et al demonstrated poor visual outcome in patients with posterior segment trauma. [24] Singh et al reported that visual acuity presentation may suggest the extent of damage to the ocular structures. [15] Delayed presentation of the patients to the hospital delays intervention thus leading to poor prognosis. [5,15] Significant delays in the presentation of patients in our study could be due to lack of awareness about the severity of ocular injury in the population, late recognition of the problem, inability to bring child to the hospital due to loss of daily wages, or residing in remote areas. About half

of the patients (54.1%) in our study were residing in rural areas.

Conclusion

We conclude that visual prognosis of ocular trauma depends on area of the involvement and time of presentation. More emphasis should be laid out on preventive measures by educating parents and children on ocular trauma and timely management.

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