

# FREQUENCY AND VISUAL OUTCOME OF ANTERIOR SEGMENT INVOLVEMENT IN ACCIDENTAL OCULAR TRAUMA IN CHILDREN

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## ABSTRACT

**Objective:** To analyze the frequency and visual outcome of anterior segment involvement in accidental ocular trauma in children.

**Methodology:** This descriptive case series was conducted in the Department of Ophthalmology Lady Reading Hospital, Peshawar from 15th June 2007 to 15th October 2008 on 200 cases of anterior segment involvement in children during accidental ocular trauma. Patients were admitted through casualty or Out-patient Department. After detailed history, systemic examination and complete ocular examination was done including visual acuity, slit lamp examination and examination under anesthesia when necessary.

**Results:** In this study, male children constituted 74.5% (149) and females 25.5% (51) of the total. Children between ages of 6-10 years are more vulnerable (42 %). Injury caused by blunt object was seen in 64.05% (129) of children and mostly it was due to stone in 21.50 % (71). The commonest place of injury was indoors in 38.50% (77), followed by playgrounds in 28.00% (56) and on streets and roads in 21.5% (43). The visual acuity on arrival was PL + ve in (35.5%) and open globe injury was observed in 36.0%. At the end of two months 13.5% eyes were phthisical.

**Conclusion:** Blunt ocular trauma is a common ocular trauma in children with males more vulnerable. School going children are more at risk. Blunt trauma especially because of stone is the main culprit with devastating visual results.

**Key Words:** Ocular trauma in children, Blunt eye trauma.

## INTRODUCTION

Ocular trauma is an important cause of avoidable and predominantly unioocular visual impairment and blindness<sup>1</sup>. Globally it is estimated that 1.6 million cases of blindness and 2.3 million cases of impaired vision are caused by ocular trauma, while 19 million cases of monocular blindness and impaired vision are due to injuries<sup>2</sup>. It is also reported that 5% of blindness is caused by trauma<sup>3</sup>. In United States, some 2.5 million eyes injuries i.e (approximately) 1.1% of general population, occur yearly with eye trauma being the 3rd most common ophthalmic indication for hospitalization<sup>4, 5</sup>. In Pakistan, hospital based data revealed that 9.54% of total ophthalmic admissions are due to ocular trauma and every 4th case on operation list is caused by trauma<sup>6</sup>. One survey

revealed 7% of irreversible blindness was trauma related<sup>7</sup>.

Victims of ocular trauma are predominantly male and young under the age of 30 years<sup>8, 9</sup>. The non existence or inadequacy of safety measures at home, school, workplace, sports and road, the lack of adequate eye health care facilities, the delay in presentation and the use of traditional medicine are some of the important factors responsible for poor visual outcome after ocular trauma in developing countries<sup>10</sup>.

Despite such high prevalence and serious consequences ocular trauma is probably the most unrecognized major health problem in our setup. That is why recognition, effective management and efficient prophylaxis, is critical for reduction of

ocular morbidity in our children. The objective of this study was to determine the frequency and the visual outcome of anterior segment accidental ocular trauma in children.

**METHODOLOGY**

All those patients who were received through casualty or Out-Patient Department and fulfilled inclusion criteria which included patients of age group 1-15 years of either sex receiving trauma of accidental nature involving the anterior segment of the eye were included in the study. Patients with nonaccidental eye injuries, diagnosed with established eye disease and children above 15 years of age were excluded. The study was conducted on first two hundred children received from June 2007 to October 2008. They were admitted in Lady Reading Hospital, Peshawar.

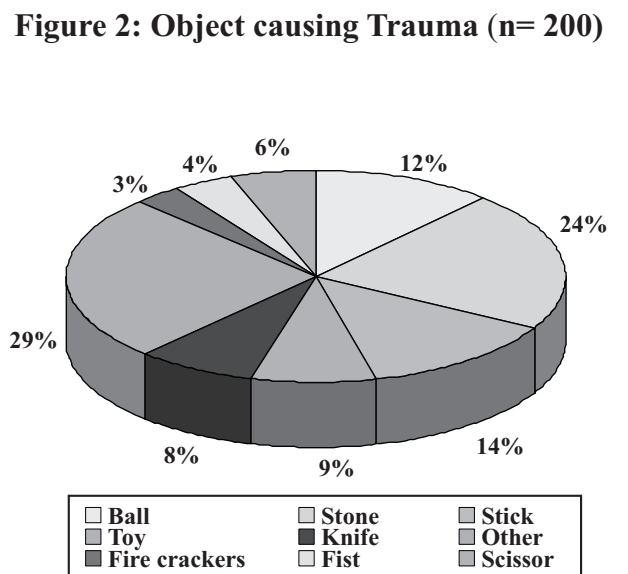
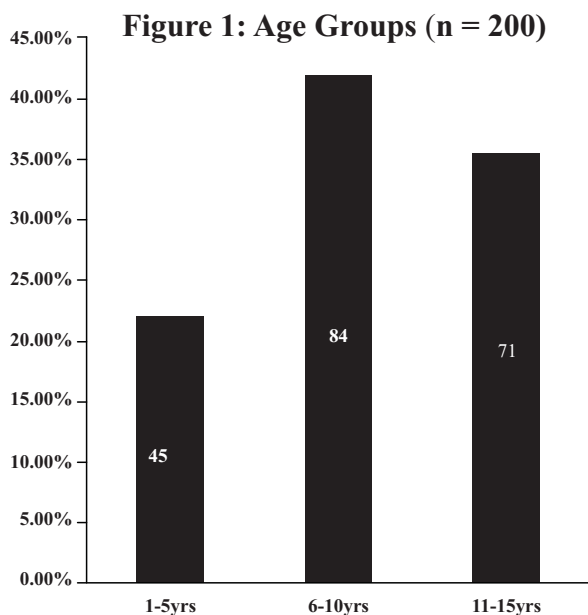
Informed consent was obtained from all the concerned relatives of the patients before entry into study. A separate data collecting Performa was filled for every patient. Past and present history of any preexisting ocular pathology and topical or systemic drug was recorded. Inquiry was made about any systemic disease. After detailed history including type of trauma, causative agents and systemic examination, complete ocular examination was done including visual acuity, torch examination, slit lamp examination anterior segment examination intra-ocular pressure and where required examination under anesthesia was done . After examination the patient was admitted and investigated and treated according to the type of injuries. Those patients who had open globe injury including lid lacerations. Conjunctival lacerations, scleral full thickness perforations, limbal perforations, corneal lacerations, iris

prolapse, free lens matter and were treated with primary repair under general anesthesia after taking care of any intra ocular foreign body. Non resolving hyphema went evacuation under General Anesthesia. Those patients who had traumatic endophthalmitis were admitted and then treated for endophthalmitis. Those patients having shattered, unreparable globes required evisceration after taking written consent from the parents. The cornea, pupil and lens were examined on 10th, 30th and 60th days. Complications were documented during this postoperative period for all the patients. Best corrected visual acuity, integrity of the globe and the out come of the trauma were recorded on 60th day for all the patients.

**RESULTS**

A total of 200 patients between the age of 1 and 15 years diagnosed as having anterior segment involvement in accidental injuries after adopting the exclusion criteria were included in our study. The male constituted 74.5% (149) and females 51 (25.5%) of the total. Children were divided in 3 main groups, as shown in Figure 1. The mean age was 8.65 years. The duration between injury and admission was 1 day in 95 (47.50 %), more than 2 days in 44 (30.50 %) and 2 days in 61 (22.0 %) of patients.

The type of trauma and the sub type of agent causing the injuries is shown in Figure 2. Injury caused by blunt object was seen in 129 ( 64.05%) of children and mostly it was due to stone in 71 (21.50 %) while others type of agents including toys pistols, knife, pair of scissors and cricket and tennis balls were responsible in 51 (25.50 %) of patients.



**Table 1: Study of Complications**

Complications observed	On Arrival	On 30 <sup>th</sup> day	On 60 <sup>th</sup> day
Corneal	85.5%	43.5%	42.0%
Pupil	75.0%	41.0%	39.0%
Lens	58.0%	34.5%	34.0%
Globe	35.5%	25.5%	14.5%

In place of injury, 77 (38.50%) of children received injury indoors and 56 (28.00%) children were injured in playgrounds and other places of injuries including streets and roads were 43 (21.5%). The average visual acuity on arrival was between 4/60 and 1/60 in 35.00 % of children while 33.50 % had VA of only PL +ve. The VA on arrival is shown in Table 2. During the assessment of anterior chamber it was seen that corneal full thickness laceration including limbal perforation was seen in 71 (35.50%) of patients while edema and corneal haziness seen in 52 (31.00%). Shallow Anterior chamber because of open globe injury was seen in 51 (25.5%) of cases. Hyphaema was present in 76 (18.00%) while endophthalmitis was seen in 53 (17.50%) of cases. The scleral involvement was observed in 31(16.00%) of children. The pupil was distorted in 68 (34.0%) and 63 (31.50%) we were unable to see the pupil. Lens was not visible in 88 (44.00%) and traumatic cataract was observed in 23 (11.50%) of cases. The IOP could not be recorded in 46 (23.00%), was above 21mm Hg in 52 (26.0%) and the eye was soft in 26 (13.00%) as shown in Table 1. In 98 (49.00 %) patients, surgical intervention was carried out while 68 (34.00 %) children were treated conservatively and in 34 (17.00%) of cases both surgical and conservative management had to be done.

The cornea upon examination on day 30<sup>th</sup> showed repaired in 56 (28.0%) and scar was visible in 16 (8.0%) children .The final integrity of the globe was phthisical eye in 27 (13.5%) and evisceration in 2 (1.0%) of the children .The final visual acuity on 60th day was better than 6/24 in 44.50%, while in 28.00% of patients the VA was between 6/36 and 1/60 .12.00% of children were barely PL and 4.50% were NPL as shown in Table 2 with comparison of VA on arrival.

**DISCUSSION**

Ocular trauma is the second most common cause of unilateral partial or total loss of vision after cataract in all age groups. Worldwide, there are approximately 1.6 million people blind from

**Table 2: Comparison of Visual Acuity**

Visual Acuity	On Arrival	On 60 <sup>th</sup> Day
6/6 to 6/9	Nil	24.00%
6/12 to 6/24	Nil	20.00%
6/36 to 6/60	4.0%	19.50%
4/60 to 1/60	35.0%	8.50%
HM	19.0%	6.00%
PL +ve	30.0%	12.00%
NPL	5.0%	4.50%
Not Recordable	7.0%	5.00%

eye injuries, 2.3 million bilaterally visually impaired and 19 million with unilateral visual loss. This being the commonest cause of unilateral blindness today <sup>4, 5</sup>. In Pakistan population based epidemiological data is not available, however, two hospital studies from the North-West Frontier province revealed that between 12.86 %<sup>11</sup> and 12.9%<sup>12</sup> of hospital admission is due to trauma .For developing countries 10 well conducted population based cross-sectional studies have been reviewed<sup>13</sup>. These indicate that prevalence estimates of blindness due to eye trauma ranges from 0 to 75 per 100,000 and unilateral visual loss impairment due to eye injury range from 0 to 490 per 100,000<sup>2</sup>.

Children are particularly vulnerable because of lack of awareness and inability to protect themselves. Upto 50% of all penetrating injuries occur in this age group<sup>13-15</sup> and is considered a frequent cause of unilateral visual loss in children. The etiology of injuries which occur in this age group are predominantly domestic, accidents and sports, thus putting more responsibility on the parents for prevention of these injuries, which may lead to permanent physical disability and psychological damage .

In our study, male constituted 74.50 % and females 25.50 % .These figures are almost similar to those quoted by Khan et al<sup>12</sup>(84.7 % versus 15.3 %) and of Babar et al<sup>13, 16</sup> (79.66 % to 20.33 % ). Male patients outnumbered female counterparts as victims of eye injuries by other studies by ratio of approximately 2:1 to 4:1 by Stahlman et al <sup>17</sup>. These data are presumably due to the great physical contact, more adventurous or aggressive behavior of young boys, mostly in leisure activities.

In this study the school age group was more susceptible than other group (77.50 %) with mean age of 8.65 years. It is believed that children

in this age group are more independent than the younger one but more immature than the older one<sup>18</sup>, which correspond with other studies as well. The incidence of ocular trauma less than 5 years was 22.50%. It can be explained by parent's greater protection, the children's less independence, but the risk situation were more for these children<sup>17</sup>.

In this study 52.50% of patient waited more than 24 hours to seek medical assistance. More than 30.50% of our patient presented after 48 hours of ocular trauma, while the average time delay was 3 days in Khan et al studies<sup>12</sup>. This delay in presentation is mainly due to low level of literacy rates and carelessness on the part of the parents and poor or no access to appropriate health care facilities for social or economic reasons.

In this study 64.50% of children received trauma by blunt objects such as stone (21.50%), stick (13.00%), cricket and tennis balls (11.50%) and others objects (25.50%). Data in literature found high prevalence of ocular traumatism in sports and related activity<sup>13,16</sup>, like cricket, football and baseball, but in this study trauma with stone is more than 21.50%, while ball caused 11.50% of trauma and because of lack of facilities for sports because of low socioeconomic nature of our country. It is also observed by Babar et al<sup>11</sup> these children bareleft of access to sport practice, tend to improve play thing with object that could increase the risk of ocular traumatism.

As far as the place of trauma was concerned, most of the trauma occurred during sports and play, such as stones and mud ball thrown from catapults or slingshots, stick, and firecrackers related injuries 28.00%. In our study we found that toy pistols (8.00%) are a common cause of ocular injury in children, and toy pistols injuries have a poor prognosis because of the damage caused by the high velocity pellets and often result in loss of vision<sup>17</sup>.

In the present study domestic related ocular injuries accounted for 38.50%. Common causes included knife 7.50%, scissors 5.50% and needle 1.5 %. In this study 42.00 % constituted open globe injury where as 58.00 % had closed globe injuries. In this study superficial injuries are present in 29.50%, about 38.00% of children of ocular trauma victims presented with hyphaema. The commonest cause was sports and playing with stones 33.00%. Babar et al<sup>11</sup> reported 28.45% incidence of hyphema. Ali<sup>7</sup> reported an incidence of hyphema of 36% in his series and in Khan et al<sup>12</sup>, this figure were 39%.

In this study scleral perforation was observed in 16.00%, again leading to a poor visual

prognosis. Traumatic cataract constituted 13.00%, most of it was after full thickness corneal perforation.

In this study 18.00% of children had infection and developed endophthalmitis. The study by Baber et al<sup>11</sup>, 14.6% of children had infection. The most common causes of such trauma induced infection were mud stones, agricultural trauma and sticks.

Post trauma visual acuity could be assessed in 192 patients although not very accurately. The average visual acuity was only PL in 33.50%, and the cause of this poor VA was multifactorial including the severity of the injury, the type of the injury and the delay in the seeking medical help. Besides that pain, younger age group and lid oedema also contributed in difficulty to assess visual acuity.

Corneal scarring was seen in 34.50% of patient making the final visual prognosis poorer. Most of these patients will be requiring penetrating keratoplasty later on but most of these patients are poor enough that they will not be able to meet the expenses and thus they will develop dense amblyopia, which was also mentioned by Esmaeli et al<sup>19</sup>.

In my study the final visual acuity on 60th day was better than 6/24 in 44.50%, while in 28.00% of patients the VA was between 6/36 and 1/60 .12.00% of children were barely PL and 4.50% were NPL . Penetrating eye injury contributes to poor visual outcome and ocular survival<sup>20</sup>. Poor visual outcome is also related to multiple ocular structure injury and severity of initial injury<sup>12</sup>. In this study 42.00 % constituted open globe injury where as 58.00 % had closed globe injuries including superficial injuries. Koo et al<sup>4</sup> have quoted an annual incidence rate of 3.7 per 100,000 of open globe injury and nearly 15% were associated with post segment injury with intraocular foreign body. In Khan et al<sup>12</sup> study perforating injuries compromised 61.64%.

In this study the pupil remain distorted in 21.00% of patients. This was mostly due to the excision of non viable uveal tissue. Moreover 5.50% of patients were left aphakic after lens aspiration again increasing the burden of unuseful vision, and 17.50 % were pseudophakic.

After 2 months of follow up 13.50 % of children developed phthisical eyes in this study. This number is more when compared when to any other study<sup>12,17,19</sup>. Most of the patients with phthisis bulbi suffer more mental trauma than the other with low vision, because of the disfigurement.



## CONCLUSION AND RECOMMENDATION

Blunt ocular trauma is a common ocular trauma in children with males more vulnerable. School going children are more at risk. Blunt trauma especially because of stone is the main culprit with devastating visual results. There is a clear need for primary preventive measures both at home and playgrounds because they are not safe.

The data presented in this study regarding the circumstances surrounding ocular trauma and the factors associated with it demonstrate a clear need for primary preventive and control measures. Most of the accidents could have been avoided if simple prevention measures had been in place. Education targeting parents, school teachers, and children regarding hazardous objects and toys, dangerous activities, the devastating effects of eye injuries, and preventive measures is urgently needed to reduce the incidence of ocular trauma and its consequences.

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