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Original Article

PATTERN, RISK FACTORS AND OUTCOME OF OCULAR TRAUMA IN CHILDREN TREATED AT SOHAG UNIVERSITY HOSPITAL

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Abstract

***Purpose**: To assess the pattern, risk factors and outcome of ocular trauma in children treated at Sohag University Hospital. **Methods**: A prospective, observational study was conducted to provide an epidemiological data. This study included all children admitted to the Ophthalmology Department, via the Emergency Department, at Sohag University Hospital, in the period between May 2010 and April 2011 with ocular trauma. Patients were analyzed with respect to: (1) demographics, (2) time, place and nature of trauma, (3) type of injury, (4) Interval between trauma and start of treatment, (5) management and (6) visual outcomes following repair. **Results**: Sixty children with ocular injuries presented to the ER, at Sohag University Hospital, between May 2010 and April 2011 were included; 35 cases (58.3%) were males and 25 cases (41.7%) were females. There was a higher incidence among children from urban areas (40 cases, 66.7%) than those from rural areas (22 cases, 33.3%). The majority of patients (46 cases; 76.7%) came to the hospital within 24 hours of their trauma; 9 cases (15%) showed a delay of more than 24 hours, and 5cases (8.3%) showed a delay of more than 1 week, who had a higher rates of complications. The most common cause of ocular Trauma in children in this study was injury by sharp objects accounted for 27 cases (45%), followed by blunt trauma 10 cases (16.7%), then trauma by stones 8 cases (13.3%), trauma by a plant object 7 cases (11.7%), falling on the face 5 cases (8.3%), and trauma by woody objects 3 cases (5%). The Post traumatic Complications included traumatic cataract (26 cases, 43.3%), retinal detachment (4 cases, 6.7%), aphakia (6 cases, 10%), atrophia bulbi (7 cases, 11.7%), endophthalmitis (2 cases, 3.3%), and blood stained cornea (3 cases, 5%). **Conclusion**: Ocular injuries in children may result in severe visual impairment which can affect the future of these children. The earlier the presentation to the hospital, the better the visual prognosis. The author recommends establishment of educational programs to teach the first aid treatment measures to nurses working in primary health centers, teachers, and general population. Fortunately, most pediatric ocular trauma is preventable by simple measures. Increased literacy and health awareness is vital.*

Keywords: *Emergency room, Ocular trauma & Children*

1. Introduction

Ocular trauma is a significant cause of unilateral blindness in Egypt [1], other Arab world countries [2-7], and even in developed countries [8-16]. However, a general survey of the incidence of ocular trauma and the resultant visual morbidity and blindness in Egypt has never been formally reported. In the literature, there

are some reports of ocular injuries reported from certain localities in Egypt, one of which reviewed ocular injuries among children attending Assiut University Hospital [1]. Ocular trauma remains an important cause of potentially preventable and avoidable cause of ocular morbidity. It predominantly causes monocular visual morbidity (visual impairment and blindness). However, ocular injuries in children can be devastating and may result in severe visual impairment which can affect their future and education [2,3]. The persistently high rate of hospitalized ocular injuries among children admitted to the Ophthalmology Department, via the Emergency Department (ER), at Sohag University Hospital along the previous years, had prompted the author to conduct this study to determine the pattern and different risk factors and visual outcome of ocular trauma in children, and, also, to identify the possible preventive measures aiming to reduce the incidence of visual morbidity and blindness in those children.

2. Patients and Methods

A prospective, observational study was conducted to provide an epidemiological data. This study included all children under 15 years of age, sustaining acute serious ocular trauma and admitted in the Ophthalmology Department, at Sohag University Hospital, via the ER, in the period between May 2010 and April 2011. The study was designed according to the principles outlined in the Declaration of Helsinki, and had been approved by the Health Research Ethics Committee at Sohag Faculty of Medicine. Informed consent was taken from parents of those children. The exclusion criteria included: age over 15 years, children with minor eye injuries e.g. minor lid laceration, conjunctival tear, corneal abrasion, or superficial corneal foreign body; and those admitted for chronic sequelae of previous eye trauma. Demographic data and details of the injury for all patients were recorded, including, type and cause of injury, date of injury, time interval between injury and presentation to ER, immediate investingations in the ER, and any treatment given in the ER before admission. Eye examination assessed the visual acuity (without correction), pupillary reactions, ocular motility, slit lamp biomicroscopy, and fundoscopy, whenever possible. In accordance with the age of the child and respecting the limitations arising from the stress caused by the trauma, evaluation of visual acuity was standardized, with the fixation and following test, hand motion and counting fingers in pre-schoolers (under 6 years), and measured by the Snellen chart in school children (6-15 years). B-scan ultrasonography was done to evaluate the posterior segment for patients in whom details of the fundus could not be seen due to severe hazy ocular media, except for cases of penetrating ocular trauma, in whom it was postponed after repair of the corneal or scleral wound. Orbital CT scan was done for cases of penetrating ocular trauma associated with intraocular foreign body (IOFB). The visual outcome following treatment was recorded as: a) Good: 6/60 and better; b) Moderate: 6/60–1/60; and c) Poor: Less than 1/60. The pre- and post-treatment examination findings of the injured eye in each patient were recorded, and statistically analysed.

3. Results

Sixty children with ocular injuries were admitted in the Ophthalmology Department, at Sohag University Hospital, between May 2010 and April 2011. Of whom, 35 (58.3%) were males and 25 (41.7%) were females. The distribution of

children in this study according to age and sex are shown in tabs. (1 & 2). According to residence, the study revealed a higher incidence among children from urban areas (40 cases, 66.7%) than those from rural areas (22 cases, 33.3%), tab. (3). The majority of patients (46 cases; 76.7%) came to the hospital within 24 hours of their trauma; 9 cases (15%) showed a delay of more than 24 hours, and 5cases (8.3%) showed a delay of more than 1 week, who had a higher rates of complications, including endophthalmitis and glaucoma. The most common cause of ocular Trauma in children in this study was injury by sharp objects accounted for 27 cases (45%), followed by blunt trauma 10 cases (16.7%), then trauma by stones 8 cases (13.3%), trauma by a plant object 7 cases (11.7%), falling on the face 5 cases (8.3%), and trauma by woody objects 3 cases (5%), tab. (4). Figs (1, 2 & 3) show wounds by sharp objects before and after trauma. The ocular injuries in this study were classified into 2 main categories: Closed globe injuries accounted for 11 cases (18.3%) and open globe injuries accounted for 49 cases (81.7%). The latter group was further subdivided into corneal wounds (36 cases, 60%), corneo-scleral wounds (9 cases, 15%), and scleral wounds (4 cases, 6.7%), tabs. (5 & 6). Regarding the visual outcome following repair of the ocular trauma: 10 patients (16.7%) gained visual acuity of ≥ 6/60; 17 patients (28.3%) gained visual acuity of 6/60-1/60; 29 patients (48.3%) gained visual acuity of < 1/60; and 4 patients could not be assessed, tab. (7). The Post traumatic Complications in this study included traumatic cataract (26 cases, 43.3%), retinal detachment (4 cases, 6.7%), aphakia (6 cases, 10%), atrophia bulbi (7 cases, 11.7 %), endophthalmitis (2 cases, 3.3%), and blood stained cornea (3 cases, 5%), tab. (8).

Table (1) The distribution of children according to age.

Age	No. (%)	
	Boys	***Girls***
Preschool	12 (20)	**4 (6.7)**
School	23 (38.3)	**21 (35)**
Total	**35 (60)**	**25 (40)**

Table (2) The distribution of children according to age and sex

Age (Ys.)	No. (%)
Preschool children	**16 (26.7)**
School children	**44 (73.3)**
Total	**60 (100)**

Table (3) Distribution of children by their residence.

Residence	No. (%)
Urban	40 (66.7)
Rural	20 (33.3)
Total	60 (100)

Table (4) Causes of the ocular trauma in this study.

Etiology	Number (%)
Sharp objects	27 (45)
Blunt trauma	10(16.7)
Stone	8 (13.3)
Plant objects	7(11.7)
Falling on face	5 (8.3)
Woody objects	3 (5)
Total	60 (100)

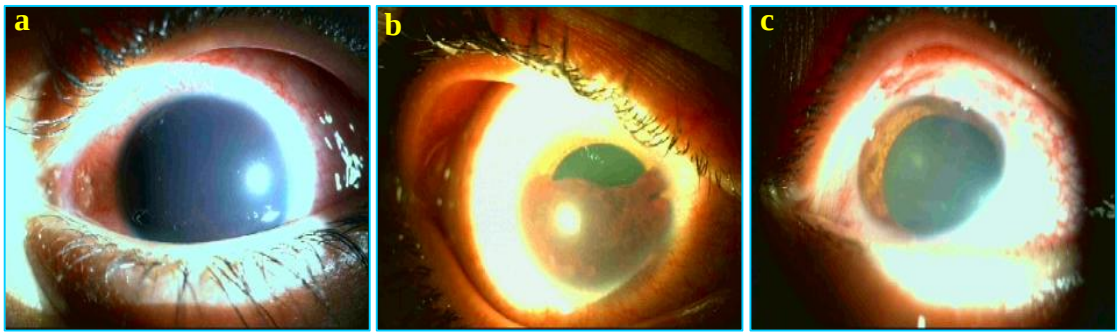

Figure (1) Shows total hyphema **a.** before treatment, **b.** responding to treatment, **c.** complete disappearance of hyphema after treatment

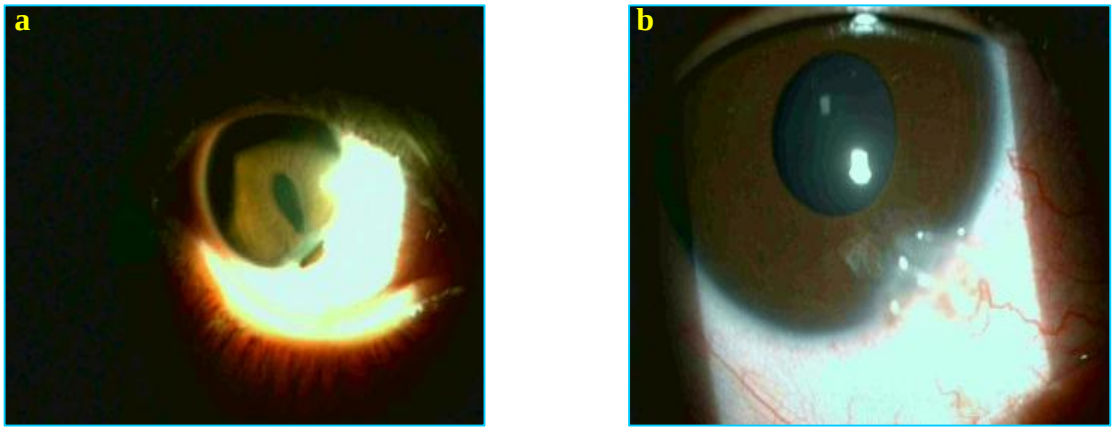

Figure (2) Shows limbal wound **a.** before repair with iris prolapse, **b.** after repair with iris reposition.

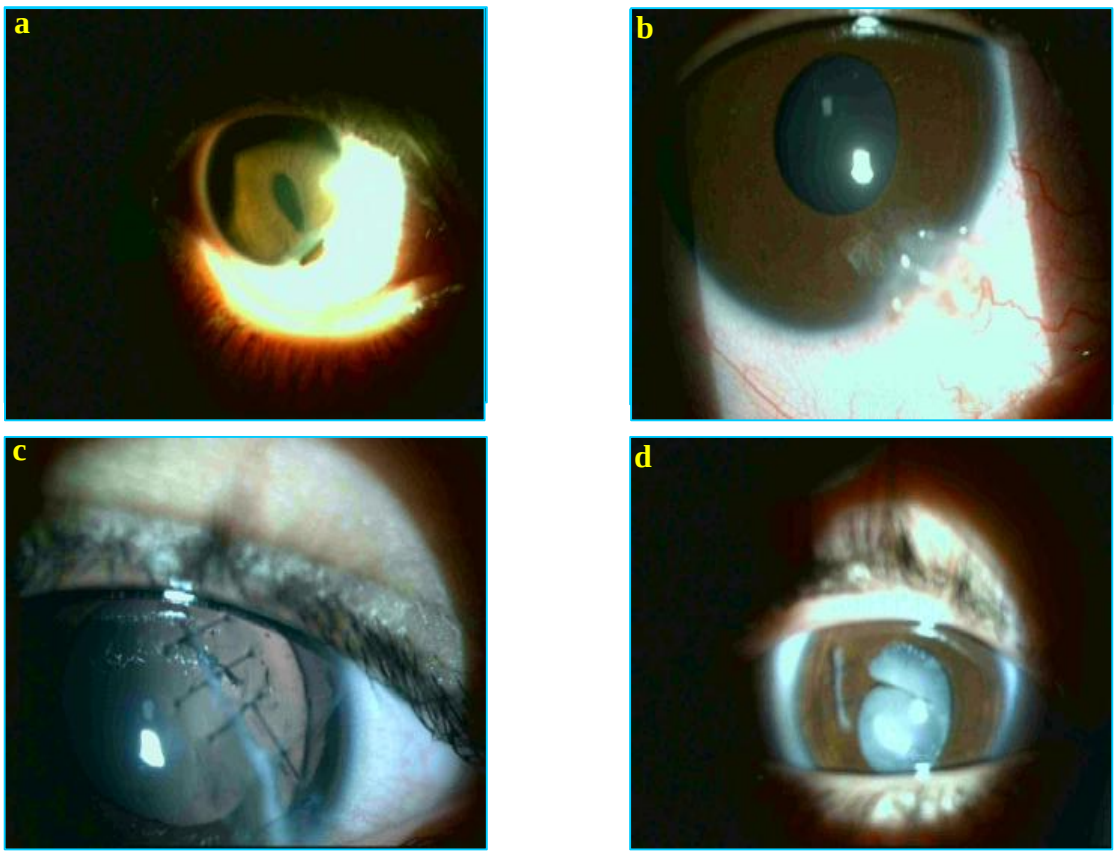

Figure (3) Shows **a.** corneo-scleral with by a traumatic sharp object, **b.** repaired wound with wound cataract , **c.** repaired corneal wound with clear lens, **d.** repaired corneal wound with traumatic cataract

Table (5) Classifications of globe injuries

Type of globe injury	No. (%)
Closed globe injury	11(18.3)
Open globe injury	49 (81.7)
Total	60 (100)

Table (6) Classifications of open globe injuries

Classification of open globe injury	No. (%)
Corneal wounds	36 (60)
Corneo- scleral wounds	9 (15)
Scleral wounds	4 (6.7)
Total	**49 (100)**

Table (7) Visual outcome after ocular trauma.

Visual outcome	No. (%)
≥ 6/60	10 (16.7)
6/60- 1/60.	17 (28.3)
< 1/60	29 (48.3)
Could not be assessed	4 (6.7)
Total	60 (100)

Table (8) Post traumatic complications in this study .

Complications	No. (%)
Traumatic cataract	16 (26.7)
Retinal detachment	4 (6.7)
Aphakia	6 (10)
Atrophia bulbi	7 (11.7)
Blood stained cornea	3 (5%)
Endophthalmitis	2 (3.3)

4. Discussion

It had been reported that more than one third of ocular injuries occurred in pediatric age group. In general, children are more susceptible to ocular injuries because of their immature motor skills, and their tendency to imitate adult behavior without evaluating risks. Many children suffered visual impairment from ocular trauma that could seriously hamper their psychosocial development. Also children were often allowed to observe adult activities that might pose a risk to them (*e.g.* working with dangerous tools) [4]. In this study, children above the age of 6 years (73.3%) had higher incidence of ocular trauma than children below the age of 6 years (26.7%). This varied from that reported in Brazil [12], which identified the 0-5 age group as the population at highest risk with 61 % incidence of ocular trauma. This might be due to a difference in social culture between the 2 populations. Another study in Kuwait, also showed an increased risk of severe ocular trauma among very young, children with more than one third of all injuries occurred in the pediatric age group [17]. Our results were consistent with one study in that school children were more susceptible to ocular trauma than younger age groups [18]. This study identified that boys (58.3%) tend to be affected more commonly than girls (41.7%), which might be due to the greater liberty and aggressive behavior of boys. A higher incidence of ocular injuries in boys was consistent findings of other others, this higher male to female ratio could be attributed to a greater degree of freedom and stimulus to aggressiveness given to boys in all societies [19-25]. As reported by other authors, boys outnumbered girls in the frequency of ocular trauma with a ratio of 2:1. This was explained as boys tend

to spend more time outside with their friends with less adequate supervision [26-29]. Mechanical injuries were the commonest mechanism of ocular injury in this study. Among the mechanical injuries, penetrating trauma due to sharp objects (43.3%) was more common, compared to blunt trauma (16.7%). The results of etiology of ocular trauma were consistent with Krishnan and Sreenivasan, who reported that penetrating injuries are more common [30]. Other studies showed that pointed objects, particularly sticks, were the most common causative agent in these studies [21,25,31]. Also Shoja's study showed that, pointed objects particularly stick, pencil, and air gun were the most common causative agent [32]. In contrast to our results, one study [23] showed that blunt injuries were the commonest mechanism of ocular injury. Most children were admitted because of hyphema. Penetrating ocular trauma (81.7%) was more common than blunt trauma (18.3%) in this study. This was consistent with Krishnan and Sreenivasan [30], who reported in their study that penetrating injuries were more common. The higher incidence of blunt trauma in studies by MacEwen *et al*. probably reflected the difference in mechanisms of injury seen in developed and developing countries like India, where penetrating injuries were relatively more common. Injuries other than due to mechanical causes were less common [30,31]. In other, penetrating injuries (open globe 51.7%) predominate in comparison to blunt injuries (closed globe 33%) [26]. Ocular perforations were also more common in children in other studies [21,22,24,25,32]. In contrast to our results, other study reported that blunt injuries predominated, and this could be due to the fact that these studies did not include patients with trauma treated as outpatients [33]. In Carolin's study, blunt trauma accounted for 65% of total injuries. This difference represented further evidence that there was not a trend of decreased incidence of open globe injury in children in our company compared with other studies [31,34,35]. The visual prognosis in this study was poor in open globe injury, which could be attributed to decreased parental awareness, delayed consultation time, increased post-operative complications, and poor visual rehabilitation. Penetrating injuries, in general, carried a poorer prognosis and they were more likely to require surgery and subsequently to suffer from long term visual impairment [36]. Niirran and Raivio claimed that despite therapeutic advances, visual prognosis in children was still worse than adults due to nature of the injury and amblyopia problems [23]. Other studies stated that, penetrating eye injury contributed to poor visual outcome and ocular survival. Poor visual outcome was also related to multiple ocular structure injury and severity of initial injury, and still ocular trauma in children was a major cause of monocular blindness and a common cause of enucleation in children [37-39]. Cascairo stated that, better visual outcome was achieved for patients with non-penetrating injuries, while severe contusions or penetrating injuries had much worse visual outcome despite very active treatment [27].

5. Conclusion

Ocular trauma remains a significant cause of unilateral blindness in Egypt. It remains an important cause of potentially preventable and avoidable cause of ocular morbidity. However, ocular injuries in children may result in severe visual impairment which can affect the future of these children. The earlier the presentation to the hospital, the better the visual prognosis. The author recommends establishment of educational programs to teach the first aid eye treatment to nurses working in primary health centers, teachers, road traffic police, and general population. Fortunately, most pediatric ocular trauma is preventable by simple measures. Increased literacy and health awareness is vital.

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