

Eye injuries in childhood: A retrospective investigation of 88 cases from 1988 to 2000

L. TOMAZZOLI, G. RENZI, C. MANSOLDO

Institute of Ophthalmology, Borgo Trento University Hospital, Verona - Italy

PURPOSE. *To assess the frequency, causes, mechanisms, and functional outcomes of eye injuries in childhood.*

METHODS. *A retrospective analysis of the hospital files of patients younger than 12 years admitted to the Institute of Ophthalmology of Verona University for eye injuries from January 1, 1988, to December 31, 2000.*

RESULTS. *Eighty-eight cases of eye injuries (69 [78%] boys, 19 [22%] girls) were identified. The mean age at admission was 7.2 years. The most frequent causes of eye injuries were domestic accidents in patients younger than 6 years (25%) and accidents at play in those older than 6 years (35%). Scissors were the most frequent causative agents in children under 6 and toys, stones, and ball injuries in those over 6. Diagnoses, therapies implemented, ocular complications, and outcomes are reported.*

CONCLUSIONS. *The major causes of eye injuries in childhood are preventable; thus more adequate adult supervision and educational and legislative measures are necessary and useful in order to reduce prevalence and morbidity of these accidents. (Eur J Ophthalmol 2003; 13: 710-3)*

KEY WORDS. *Eye injuries, Childhood, Cause of trauma, Perforating injuries, Contusive injuries*

Accepted: June 3, 2003

INTRODUCTION

Eye injuries are an important cause of serious morbidity in childhood; they can lead to temporary or permanent loss of vision and expose the patient to a greater risk of amblyopia. Many of these injuries are preventable with better education, adequate legislative measures, and removal of the most common and dangerous risk factors. These considerations prompted us to conduct a retrospective study of the main risk factors for eye injuries and of the consequent functional outcomes in childhood. We analyzed the fre-

quency, causes, and functional consequences of eye injuries in children admitted to our institute from 1988 to 2000, in an attempt to clarify effective means of prevention.

METHODS

We reviewed the hospital files of children younger than 12 years admitted to the Institute of Ophthalmology of the University of Verona for eye injuries from January 1, 1988, to December 31, 2000.

The following data were analyzed for each child: age at the time the injury occurred; sex; eye affected; season when the accident occurred; place, cause, and type of injury; visual acuity at admission and at subsequent check-ups; therapy implemented; and complications, if any. We also recalled children who had developed ocular complications to evaluate long-term optical and functional outcomes.

The study population was subdivided into two age groups – preschool-age infants (<6 years) and school-age children (>6 years) – in view of the distinct differences in behavior and types of games in the two age groups, and especially because the risk for amblyopia is much higher in the younger children.

RESULTS

Over the study period, 88 patients under 12 years of age were admitted for eye injuries. Of these, 37 (42%) were preschool-age (mean age \pm SD, 4 ± 1.4 years) and 51 (58%) school-age (9.6 ± 1.7 years). The mean age at admission was 7.2 ± 3.2 years. Boys were affected almost four times more frequently than girls – 69 (78%) versus 19 (22%) – especially among school-age children, whereas there was no significant difference in the eye affected, which was the right eye in 43 cases (49%) and the left eye in 45 (51%). There were no bilateral injuries.

The eye injuries occurred with the highest frequency during the summer ($n = 31$, 35%), followed by winter ($n = 25$, 28%); cases occurring in spring ($n = 20$, 23%) and autumn ($n = 12$, 14%) were rarer.

Thirty-one (35%) of the accidents occurred at play, 22 (25%) at home, 12 (14%) at school, 5 (6%) while engaging in sporting activities, and 3 (3%) on the street. In 15 cases (17%), the place the accident occurred was not reported or was not included among the main ones listed above. Domestic accidents predominate particularly in infants under the age of 6, whereas the most frequent types of accidents occurring in school-age children were those occurring at play (Tab. I).

Among the causative factors involved in the eye injuries, the most frequent in the children under 6 were scissors, followed by accidentally bumping into furniture. In the school-age children, on the other hand, lesions were more often caused by toys, footballs, and stones (Tab. II). As a result, perforating injuries

TABLE I - PLACES WHERE EYE INJURIES OCCURRED

Place	Under 6 years	Over 6 years
Home	13 (35)	9 (18)
Play	11 (30)	20 (39)
School	7 (19)	5 (10)
Sport	0	5 (10)
Street	0	3 (6)
Other/not reported	6 (16)	9 (18)
<i>Total</i>	37	51

Values are n (%)

TABLE II - CAUSES OF EYE INJURIES

Cause	Under 6 years	Over 6 years
Sharp instruments (scissors, knives)	5 (13)	2 (4)
Bumping into furniture	4 (11)	1 (2)
Wire	3 (8)	1 (2)
Falling off bicycle	2 (5)	3 (6)
Ballpoint pens	2 (5)	1 (2)
Broken glass	2 (5)	0
Sticks	2 (5)	2 (4)
Screwdrivers	1 (3)	1 (2)
Punches/drifts	1 (3)	0
Metal hooks	1 (3)	0
Toys (air guns, slings, arrows, projectiles, boomerangs)	1 (3)	6 (12)
Footballs	0	5 (10)
Stones	0	4 (8)
Tennis balls	0	2 (4)
Elastic bands	0	2 (4)
Balls of sand	0	1 (2)
Plastic balls	0	1 (2)
Baseball bats	0	1 (2)
Ping-pong bats	0	1 (2)
Pencils	0	1 (2)
Fireworks	0	1 (2)
Animal scratches	0	1 (2)
Road accidents	0	1 (2)
Other/not reported	13 (35)	13 (25)
<i>Total</i>	37	51

Values are n (%)

were more frequent in the smaller patients, whereas contusive injuries were found more often in those older than 6 years. Perforating trauma in the anterior

TABLE III - TYPES OF EYE INJURIES

Type of injury	Under 6 years	Over 6 years
Eyelid laceration	2 (5)	2 (4)
Eyelid laceration with interruption of the tear duct	4 (11)	1 (2)
Traumatic lid drop	1 (3)	0
Conjunctival perforating injury	2 (5)	1 (2)
Corneal burn	1 (3)	0
Corneal retained foreign body	8 (22)	1 (2)
Corneal perforating injury	5 (13)	11 (21)
Corneal perforating injury with iris prolapse	5 (13)	4 (8)
Corneoscleral perforating injury with iris prolapse	1 (3)	3 (6)
Burst eyeball	2 (5)	1 (2)
Contusive injury	6 (16)	27 (53)
<i>Total</i>	<i>37</i>	<i>51</i>

Values are n (%)

segment was the most common type of injury; in particular, the cornea was involved in the majority of cases (Tab. III).

Surgery proved necessary in 53 cases (60%), including vitrectomy (n = 2.2%). The other 35 patients (40%) were given medical therapy, generally consisting of antibiotics and antifibrinolytic agents.

Sixteen injuries (18%) were followed by ocular complications, including post-traumatic cataract (n = 12, 13%), corneal leukoma (n = 3.3%), and subluxation of the lens (n = 1.1%). No cases of retinal detachment as a result of the injuries were observed.

As far as the analysis of functional outcomes was concerned, visual acuity at admission could not be determined in half of the cases and was less than 1/10 in 7 patients (8%). In the remaining cases, mean visual acuity ± SD was 7/10 ± 3/10. At 1 month postinjury, mean visual acuity was 9/10 ± 2/10, but 39 patients (44%) failed to come back for the follow-up examination. The worst visual outcomes, both at admission and at 1 month postinjury, were those associated with perforating injuries.

Among children with ocular complications, we found and subjected to long-term functional evaluation 10 cases, 2 of whom had developed corneal leukoma and 8 post-traumatic cataract. Children with corneal

leukoma did not need keratoplasty, whereas all cases with post-traumatic cataract underwent cataract extraction; in three of these patients an intraocular lens was implanted in the sulcus.

At the time of injury these children were, on average, 6 ± 3 SD years old and all had undergone cataract surgery immediately afterwards. The intraocular lens implant was performed at the moment of the main surgery.

All aphakic children used contact lenses with diopter power ranging from +10.5 sphere to +12 sphere and all aphakic/pseudophakic children had an additional spectacle correction for near vision.

Mean visual acuity ± SD was 7/10 ± 2/10 in children with corneal leukoma and 9/10 ± 2/10 in patients who had lens trauma. Binocular function was preserved in two cases who underwent intraocular lens implantation. More precisely, Lang II test resulted in 3+ in both cases.

DISCUSSION

From our analysis, it appears that eye injuries tend to occur distinctly more often in boys than in girls, particularly in children older than 6 years. This result has been extensively reported in the literature (1-7) and reflects the tendency toward more aggressive behavior of boys and the kinds of games they play. Furthermore, as reported by Leitner et al (8), eye injuries are more frequent during the summer, a period when children are on vacation and therefore have more occasion to incur injury.

As regards the places where eye injuries occurred, accidents at home predominate in children younger than 6, whereas injuries at play are the most frequent in schoolchildren. These findings were also observed by other investigators (3, 6, 9-12) and underline the greater amount of time that younger children spend at home and the dangers present in the everyday domestic environment. Chemical products, detergents, and objects of everyday use may become dangerous weapons in children's hands.

Eye injuries are infrequently incurred at school and while engaged in sport activities – i.e., in the presence of adult supervision (e.g., teacher, coach, trainer); ocular trauma tends to occur more frequently when an adult is not present.

As reported by other authors (1, 13-15), scissors and other sharp objects are the most common cause of eye injuries in children under 6 years of age and toys and stones in children older than 6; consequently, perforating ocular trauma is more frequent in the first age group, and contusive eye injuries are found more often in children older than 6.

Visual outcome is mainly associated with the type of injury and the extent of the initial damage; particularly, functional consequences of perforating injuries are worse than those of contusive injuries, with a slower and worse recovery of visual acuity. However, functional outcomes of our children are good; we did not find cases of serious visual loss or blindness consequent to trauma, because of availability of refined and immediate surgical techniques such as vitrectomy, removal of subluxated lens, and corneal transplantation.

Many of the causes of ocular injuries listed above are preventable; for this reason, educational and legislative measures are very important to prevent ocular injuries in childhood. Use of after-school and sporting centers where children are under adult supervi-

sion and therefore distracted from dangerous games is desirable. Furthermore, the approval and observation of laws designed to guarantee the safety of toys; attention of parents and teachers, who must be well-informed about risks associated with certain objects and situations; and the use of protective eye-wear during sport and dangerous activities must be encouraged.

In conclusion, prevention and adequate trauma management are essential to reduce the prevalence and the most serious visual outcomes of these injuries; for this reason, health education on the preventive aspects and knowledge of ophthalmologists and pediatricians about prophylactic measures are desirable.

Reprint requests to:
Prof. Laura Tomazzoli
Clinica Oculistica-Ospedale B.go Trento
Piazzale Stefani 1
34126 Verona, Italy
laura.tomazzoli@univr.it

REFERENCES

1. Bratton SL, Dowd MD, Brogan TV, Hegenbarth MA. Serious and fatal air gun injuries: more than meets the eye. *Pediatrics* 1997; 100: 690-12.
2. MacEwen CJ, Baines PS, Desai P. Eye injuries in children: the current picture. *Br J Ophthalmol* 1999; 83: 933-6.
3. Al-Bdour MD, Azab MA. Childhood eye injuries in North Jordan. *Int Ophthalmol* 1988; 22: 269-73.
4. Luff AJ, Hodgkins PR, Baxter RJ, Morrell AJ, Calder I. Aetiology of perforating eye injury. *Arch Dis Child* 1993; 68: 682-3.
5. Alfaro DV, Chaudhry NA, Walonker AF, Runyan T, Saito Y, Liggett PE. Penetrating eye injuries in young children. *Retina* 1994; 14: 201-5.
6. Ariturk N, Sahin M, Oge I, Erkan D, Sullu Y. The evaluation of ocular trauma in children between ages 0-12. *Turk J Pediatr* 1999; 41: 43-52.
7. Rostomian K, Thach AB, Isfahani A, Pakkar A, Pakkar R, Borchert M. Open globe injuries in children. *J AAPOS* 1998; 2: 234-8.
8. Leitner J, Klemen UM, Niederreiter P. Eye injuries in childhood. *Klin Monatsbl Augenheilkd* 1987; 191: 367-70.
9. Rudd JC, Jaeger EA, Freitag SK, Jeffers JB. Traumatically ruptured globes in children. *J Pediatr Ophthalmol Strabismus* 1994; 31: 307-11.
10. Soylu M, Demircan N, Yalaz M, Isiguzel I. Etiology of pediatric perforating eye injuries in southern Turkey. *Ophthalmic Epidemiol* 1998; 5: 7-12.
11. Bella-Hiag AL, Mvogo CE. Ocular traumatism in children at Laquintinie Hospital, Douala (Cameroon). *Sante* 2000; 10: 173-6.
12. Ben Zina Z, Jamel F, Wissam K, et al. Ocular trauma in children: report of 136 cases. *Tunis Med* 2000; 78: 580-3.
13. Smith GA, Knapp JF, Barnett TM, Shields BJ. The rockets' red glare, the bombs bursting in air: fireworks-related injuries to children. *Pediatrics* 1996; 98: 1-9.
14. Umeh RE, Umeh OC. Causes and visual outcome of childhood eye injuries in Nigeria. *Eye* 1997; 11: 489-95.
15. Rapoport I, Romem M, Kinek M, et al. Eye injuries in children in Israel. A nationwide collaborative study. *Arch Ophthalmol* 1990; 108: 376-9.