

Domestic ocular injuries: A case series

M. REZA MANSOURI^{1,2}, A. MIRSHAHI^{1,2}, M. HOSSEINI²

¹Department of Ophthalmology, Farabi Hospital

²Tehran University Eye Research Center, Tehran University of Medical Sciences, Tehran - Iran

PURPOSE. *To determine the nature and types of domestic eye injuries.*

METHODS. *The authors prospectively analyzed data of 100 consecutive patients with domestic eye injury (104 eyes) referred to the emergency room of Farabi Hospital during October 2003. Standardized international classification of ocular trauma (Birmingham Eye Trauma Terminology) was used for eye injury classification.*

RESULTS. *Domestic ocular trauma represented 4.85% of all ocular emergencies (2061 patients) referred to the emergency room during that period. Male to female ratio was 1.13 and mean age of patients was 26±18 years (range, 1-73). Cornea was involved in 50.0% and sclera, lens, and retina each was involved in 4.8%. There was severe visual loss (best-corrected distance visual acuity <20/200 due to trauma) in 4% of the patients. The most frequent domestic ocular injury was globe injury (93.7%) including mechanical (72.1% closed and 4.8% open), chemical (14.4%), and thermal (1.9%) injuries.*

CONCLUSIONS. *Closed mechanical injuries were the most common type of domestic ocular injury in our series. Considering the high rate of domestic eye trauma among ocular emergency cases, more preventive measures should be taken at home. (Eur J Ophthalmol 2007; 17: 654-9)*

KEY WORDS. *Emergencies, Eye injury, Home accidents, Iran*

Accepted: February 12, 2007

INTRODUCTION

Ocular trauma is an important worldwide preventable public health problem. In many countries, especially those which are industrialized, ocular trauma is a major reason for hospitalization among patients with eye problems (1). Worldwide, 1.5 million people are blind as a result of eye injuries. Each year, there are almost 2.5 million new eye injuries in the United States; of these, between 40,000 and 60,000 patients are diagnosed with trauma-related blindness (1, 2).

Severe eye injuries are a major problem in developing countries (1). The Nepal Eye Study showed that 860 out of 100,000 people in the country have monocular blindness caused by trauma. An additional 200 out of 100,000 have bilateral blindness due to trauma (3).

Most eye injury victims are young (1), and eye injuries are the leading cause of monocular visual disability and blind-

ness in children (4-6). Many childhood eye injuries can be prevented by adult supervised play (7, 8) and by securely locking chemicals.

The home has become the most frequent location for eye injuries instead of the workplace. This is common in both industrialized and developing nations (9-11). At home, many activities and objects are potentially dangerous. According to the National Eye Trauma System (NETS), the most frequent penetrating eye injuries occurred at home during repair and construction-related activities (12). Moreover, the vast majority of eye injuries are preventable, so every home should have the Home Safety Guide (13).

Systemic collection of standardized data on the occurrence of eye injuries can help the ophthalmologist play a key role in successfully preventing ocular trauma (14). As a preventive measure, this case series study was designed based on the United States Eye Injury Reg-

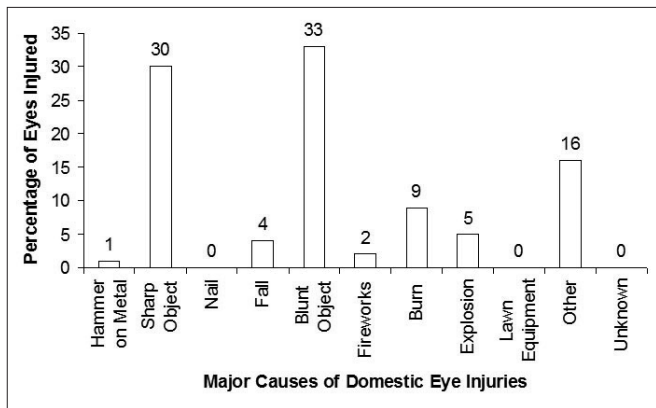


Fig. 1 - Frequency of the major causes of domestic eye injuries.

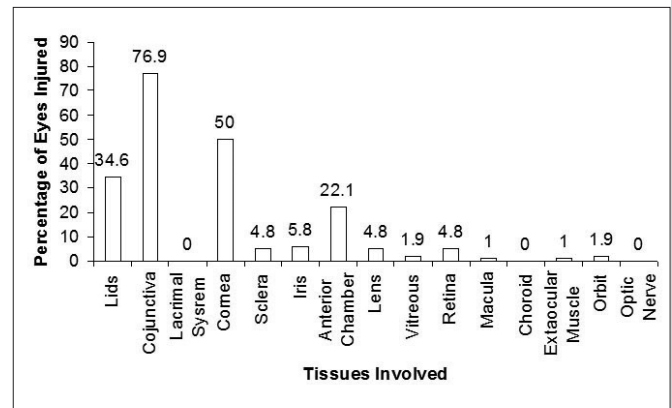


Fig. 2 - Frequency of ocular tissue involved in domestic eye injuries.

istry (USEIR) model (14) to provide useful information on the causes, settings, and consequences of ocular trauma in Iran.

METHODS

Domestic ocular trauma is defined in our study as any blow or accident that occurred at home that causes visual impairment, structural and/or functional changes to the eye, adnexa, or causes any difficulty that made the patient visit the emergency clinic.

In a prospective study, we analyzed data on 100 consecutive patients with domestic eye injuries (104 injured eyes) who were treated at Farabi University Hospital emergency clinic in October 2003. This research was approved by the ethics committee of Tehran University of Medical Sciences. All subjects gave their informed consent prior to participating in the study. The Birmingham Eye Trauma Terminology system (BETT) (15) and the USEIR model were used as the basis of our questionnaire which was completed during an in-person interview and comprehensive ocular examinations. The data collection was independent of patient care.

Through patient examinations and interviews, the following information was recorded from each patient: age, sex, laterality of eye injured, time elapsed between injury to treatment (days), source of injury, whether the injury was accidental or intentional, whether any kind of eye protection was worn, history of previous eye injury/surgery, activity while trauma occurred, tissues involved, initial vision, initial diagnosis, and ocular trauma score (OTS) (16).

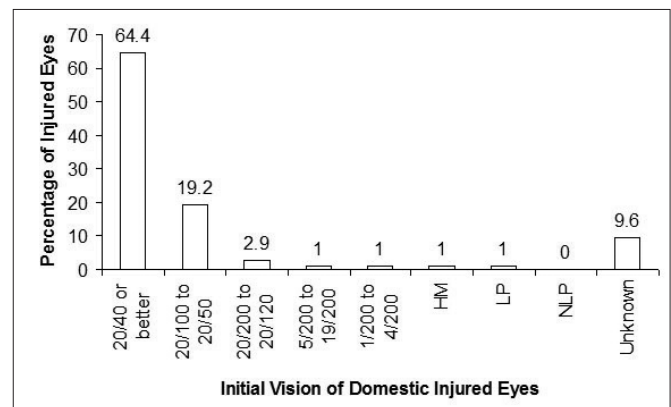


Fig. 3 - Distribution of initial best-corrected distance visual acuities of the domestic injured eyes in our series.

RESULTS

During a 1-week period, 2061 patients were referred to Farabi Hospital emergency clinic at the time of the study. Of these patients, 4.58% of them (100 patients, 104 eyes) were treated for domestic ocular trauma. The mean age of patients was 26 years \pm 18. Of these patients, 53% were male (male to female ratio: 1.13), 66% of them were under 30, and 34% were children (\leq 15 years old). Of the injuries, 89% happened unintentionally, and 7% by assault. None of the patients had been using any kind of eye protection at the time of the accident. Only 75% of the patients sought treatment within 24 hours of their injury. Routine daily activities (41.3%), playing (28.8%), and housekeeping (14.4%) were the most common activities while trauma occurred. Of the injuries, 51% occurred to the right eye, 45% to the left, and 4% bilaterally. The two

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major causes of injuries were blunt objects (33%) and sharp objects (30%) (Fig. 1).

The most important tissue involvement included cornea (50.0%), sclera (4.8%), lens (4.8%), and retina (4.8%) (Fig. 2). Immediately after injury, 64.4% of the patients' injured eyes had vision of 20/40 or better (Fig. 3). Severe visual loss (best-corrected distance visual acuity <20/200 due to

trauma) was reported in 4% of patients, and 7% were hospitalized. Among globe injuries (93.2%), 76.9% were mechanical (72.1% closed and 4.8% open), 14.4% chemical, and 1.9% thermal (Tab. I). Open and closed mechanical globe injuries are demonstrated in detail in Tables II and III, respectively.

Ocular trauma score was calculated for 94 injured eyes (in

TABLE I - INITIAL DIAGNOSIS OF DOMESTIC INJURED EYES IN OUR SERIES (N=104)

Initial diagnosis	Males	Females	Total
Ocular injuries	54 (51.9)	50 (48.1)	104 (100)
Globe injuries	51 (49)	46 (44.2)	97 (93.3)
Mechanical	43 (41.3)	37 (35.6)	80 (76.9)
Open	2 (1.9)	3 (2.9)	5 (4.8)
Closed	41 (39.4)	34 (32.7)	75 (72.1)
Non-mechanical	8 (7.7)	9 (8.7)	17 (16.3)
Thermal	2 (1.9)	0 (0)	2 (1.9)
Chemical	6 (5.8)	9 (8.7)	15 (14.4)
Photoc and electrical	0 (0)	0 (0)	0 (0)
Nonglobe injuries	18 (17.3)	18 (17.3)	36 (34.6)
Eyelids and lacrimal system	18 (17.3)	18 (17.3)	36 (34.6)
Orbital	1 (1)	1 (1)	2 (1.9)
Optic nerve	0 (0)	0 (0)	0 (0)
Extraocular muscle involvement	1 (1)	1 (1)	2 (1.9)

Values are n (%)

TABLE II - FREQUENCY OF OPEN GLOBE INJURIES IN OUR SERIES (N=5)

Open globe injury classification	Males	Females	Total
Type			
Open globe injury	2 (40)	3 (60)	5 (100)
A: Rupture	0 (0)	0 (0)	0 (0)
B: Penetrating	1 (20)	3 (60)	4 (80)
C: IOFB	0 (0)	0 (0)	0 (0)
D: Perforating	0 (0)	0 (0)	0 (0)
E: Mixed	1 (20)	0 (0)	1 (20)
Grade (visual acuity)			
A: \geq 20/40	0 (0)	0 (0)	0 (0)
B: 20/50 to 20/100	0 (0)	1 (20)	1 (20)
C: 19/100 to 5/200	0 (0)	0 (0)	0 (0)
D: 4/200 to light perception	1 (20)	1 (20)	2 (40)
E: No light perception	0 (0)	0 (0)	0 (0)
Unknown	1 (20)	1 (20)	2 (40)
Pupil			
A: Positive, relative APD in injured eye	0 (0)	1 (20)	1 (20)
B: Negative, relative APD in injured eye	2 (40)	2 (40)	4 (80)
Zone			
1: Cornea and limbus	2 (40)	2 (40)	4 (80)
2: Limbus to 5 mm posterior into sclera	0 (0)	1 (20)	1 (20)
3: Posterior to 5 mm from the limbus	0 (0)	0 (0)	0 (0)

Values are n (%).

IOFB = Intraocular foreign body; APD = Afferent pupillary defect

TABLE III - FREQUENCY OF CLOSED GLOBE INJURIES IN OUR SERIES (N=75)

Open globe injury classification	Males	Females	Total
Closed globe injury	41 (54.7)	34 (45.3)	75 (100)
Type			
A: Contusion	18 (24)	17 (22.7)	35 (46.7)
B: Lamellar laceration	13 (17.3)	12 (16)	25 (33.3)
C: Superficial foreign body	4 (5.3)	0 (0)	4 (5.3)
D: Mixed	6 (8)	5 (6.7)	11 (14.7)
Grade (visual acuity)			
A: $\geq 20/40$	28 (37.3)	19 (25.3)	47 (62.7)
B: 20/50 to 20/100	8 (10.7)	9 (12)	17 (22.7)
C: 19/100 to 5/200	2 (2.7)	1 (1.3)	3 (4)
D: 4/200 to light perception	0 (0.0)	1 (1.3)	1 (1.3)
E: No light perception	0 (0)	0 (0)	0 (0)
Unknown	3 (4)	4 (5.3)	7 (9.3)
Pupil			
A: Positive, relative APD in injured eye	0 (0)	1 (1.3)	1 (1.3)
B: Negative, relative APD in injured eye	41 (54.7)	33 (44)	74 (98.7)
Zone			
1: External	32 (42.7)	25 (33.3)	57 (76)
2: Anterior segment	7 (9.3)	7 (9.3)	14 (18.7)
3: Posterior segment	2 (2.7)	2 (2.7)	4 (5.3)

Values are n (%).

APD = Afferent pupillary defect

10 cases because of unknown visual acuity OTS was not calculated). Among these OTS in 64.4% was 5 (n=67), in 22.1% was 4 (n=23), and OTS 2 and 3 each was reported in 1.9% (n=2).

DISCUSSION

Although ocular trauma is an important worldwide cause of preventable monocular blindness, limited information is available regarding its epidemiology outside the United States and other developed countries (17). In particular limited information is available about the Asian population.

Systemic collection of standardized data on occurrence of eye injuries can help ophthalmologists play a key role in successfully preventing ocular trauma. The USEIR model, which we used as the base of our questionnaires, has proved to be an efficient epidemiologic tool which provides valid comparison between regions and countries (14).

Due to the importance of severe injuries threatening vision, from the public health perspective, many epidemio-

logic studies confine their study to these cases. As an example, USEIR limits data collection to injuries resulting in permanent and significant structural or functional change to the eye. On the other hand, the vast majority of injuries are minor ones that do not result in visual or other impairments (14). In preventive strategies minor injuries are as important as major ones as they potentially may lead to injuries threatening vision.

During our study, we recorded both minor and severe eye injuries. To our knowledge, this study is the first in our country based on standard international classification. We performed this study as a basis for more comprehensive studies on the occurrence of ocular trauma. Although we faced some difficulties due to the fact that BETT was a new system to our ophthalmologists, this study had a role in presenting international terminology and the significance of the use of this classification.

We limited our study to domestic cases for two reasons. First, our focus was on in-home injuries, as most incidences occur there in developed and developing countries (9-11). Second, this limitation would increase the accuracy of our data collection.

Even though the result of our study is comparable to oth-

er studies which have provided data concerning ophthalmic emergencies, there are some differences. We limited our study to domestic cases and considered both minor and severe trauma, while other studies focused on severe trauma only.

It has been a persistent finding that those injured are young and around 30 years of age (4, 18-20). This is comparable to the average age in our study, which is under 30 (26 years \pm 18). The vast majority of persons sustaining eye injuries are male. The figure reported in most studies is approximately 80% (4, 18, 20-23). One study reported that overall, men are at 5.5 times greater risk of eye injury than women (24). In our study there was a 1.3:1 male to female ratio, probably because of confining our study population to domestic cases.

In the United States, average annual hospitalization of children with the diagnosis of ocular trauma is 15.2 to 15.8 per 100,000, compared to 29.1 per 100,000 for patients of all ages (25, 26). In addition, pediatric ocular injuries occurred most frequently (around 40%) at home (27, 28) while many of them are preventable. Thus children represent a disproportionately large percentage of total ocular trauma (29). In our series, pediatric ocular trauma included 34% of our cases.

Kalmbø Wa Kaimbo et al showed that only 16% of new patients visiting the department of ophthalmology presented within 48 hours (10) while in our study 75% of patients presented within 24 hours, which may reflect the public opinion toward rapid management of eye injuries supporting prevention measures.

In conclusion, we recommended the BETT and the USEIR model in reporting ocular injuries. We encourage the use of an international-based questionnaire for reporting all eye injury types. Use of the above systems will provide valid and internationally comparable data regarding this important health problem. As a preventive measure, use of preventive goggles is highly recommended while working with chemicals and during construction. Supervising children during play time will likely minimize their chance of injury. Considering that a high rate of eye trauma occurs at home (4.85% of all ocular emergency cases), more preventive measures should be taken there.

ACKNOWLEDGEMENTS

This study was supported by a grant from Tehran University of Medical Sciences.

The authors thank Dr. A.H. Kashi (MD, Tehran University of Medical Science) for his statistical consultation.

Proprietary interest: None.

Reprint requests to:
Mona Hosseini, MD
Tehran University Eye Research Center
Tehran University of Medical Sciences
No. 43, Golestan 6, Pasdaran St.
Tehran, Iran 1668643511
M_Hosseini2002@hotmail.com

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