Original Article

Pattern of Presentation and Factors Leading to Ocular Trauma

Tehmina Jahangir, Nadeem Hafeez Butt, Uzma Hamza, Haroon Tayyab, Samina Jahangir

Pak J Ophthalmol 2011, Vol. 27 No. 2

See end of article for authors affiliations

Correspondence to:
Tehmina Jahangir
Senior Registrar
Eye Unit I, AIMC/JHL
Lahore

Received for publication
February' 2011

Acceptance for publication
May' 2011

Purpose: To describe the pattern, extent and severity of ocular injuries and to identify the factors leading to ocular trauma in patients presenting at Jinnah Hospital, Lahore.

Materials and Methods: We did a cross-sectional study at the Eye Department of Jinnah Hospital, Lahore over a period of six months from 25-09-2006 to 24-03-2007.One hundred patients who presented with eye injury through the outpatient or emergency routes were included in the study. They were examined by standard procedures to note the areas injured, type and extent of injury and impact on vision.

Results: The men in the age groups between 18 and 45 years were the most commonly affected group. Only 3 % of the case had bilateral injury. The most common injury was penetrating trauma with sharp objects. Domestic environment was the most common setting for trauma to occur. More than 3/4th of the patients had visual acuity worse than 6/60 at presentation. Open globe injury counted for 57 % injuries. Mechanical injuries were more common than thermal and chemical injuries combined.

Conclusion: Systematic collection of standardized data on the occurrence of eye injuries can help the ophthalmologist play a key role in successfully preventing ocular trauma. Preventive measures should be targeted at young men.

Ocular trauma continues to be a significant cause of morbidity in terms of visual loss or impairment and diminished quality of life[1]. Even the most minor injuries can cause pain and discomfort, lost wages and health care expenses. Thus, it is important to identify the causes and extent of ocular trauma to recognize preventable factors.

According to the data compiled by WHO's Blindness Data Bank, it is estimated that globally approximately 55 million eye injuries restricting activity for more than one day occur each year and 750,000 cases require hospitalization each year, including approximately 200,000 with open-globe injuries.

There are approximately 1.6 million blind from injuries, additionally some 2.3 million people with bilateral low vision resulting from ocular trauma and almost 19 million people with unilateral blindness or low vision[2]. In the United States alone, over 2.4 million eye injuries occur yearly, with ocular trauma being the third most common ophthalmic indication for hospitalization[3]. In developing countries like Pakistan, eye injuries are not only more common but also more severe in nature[1]. However, most ocular injuries and their complications can be prevented by appropriate safety precautions and early detection[4].

Just a few years ago, ophthalmologists dealing with ocular trauma had no epidemiologic information to aid prevention and treatment efforts. The dilemma has now changed from a lack of epidemiologic data to uncertainty over how to reconcile the various studies into a coherent description of the ocular trauma

epidemic. The primary goals of epidemiologic study of eye trauma are prevention and more effective treatment[5].

MATERIAL AND METHODS

This cross-sectional study was carried out at the Eye Department of Jinnah Hospital, Lahore over a period of six months from 25-09-2006 to 24-03-2007. One hundred patients presenting themselves with eye injury were included. We employed non-probability convenience sampling. Patients of all ages and both sexes giving acute injury history affecting one or both eyes were included. Exclusion criteria included: a co-existing ocular disease potentially affecting visual acuity; cases with prior ocular trauma and patients who had received surgical treatment for ocular trauma from elsewhere.

Cases presenting in OPD and emergency of the Department of Ophthalmology with acute ocular injury of one or both eyes were registered. An informed consent was obtained from patients or their parents in cases of children, for permitting to use their data.

Their demographic profile was recorded, asking name, age, sex, profession, education, address etc.

The history of injury was obtained to know the time, circumstances leading to injury and development of symptoms. They were examined by standard procedures to note the areas injured, type and extent of injury and impact on vision. The refractive errors if existing before and usage of glasses etc were enquired. Any investigations indicated for confirming foreign body were conducted.

The cases were assessed for identifying the management needs and prediction of damage to the eye.

All this information was collected on a specially designed proforma.

The information collected was entered in the SPSS version 11.0 and analyzed. Socio-demographic variables such as categorical (sex) and numerical (age, education) data were analyzed. They were presented in statistical form as frequency distributions (sex), mean and standard deviation (age).

History yielded descriptive data of time, place of accident, factors leading to it and types of symptoms. These were presented as proportions. The outcome of examination provided qualitative data on extent, site and type of injury and affect on vision. These were presented as tables of frequencies. The management needs were assessed, classifying types of actions and prognosis. Causes of injury were associated with sex and tested for significance by applying Chi Square test. P value < 0.05 was taken as significant.

RESULTS

A total of one hundred ocular trauma patients, who presented to the Jinnah Hospital via emergency and outpatients department, were studied during a six months period from 25-09-2006 to 24-03-2007.

The two commonest affected age groups were from 18 to 29 years (31%) and 30 to 45 years (24%). This was followed by children between 3-12 years (18%). The mean age was found to be 28.6 ± 17.6 years (Table 1). There were 75 male (75%) and 25 female (25%). Male: female ratio was 3:1.

Out of one hundred, only 3 patients (3.0%) had bilateral injury.

Table 1: Distribution of cases by age n = 100

Age (Year)	**No. of Patients n (%)**
< 3	03 (03)
3-12	18 (18)
13-17	09 (09)
18-29	31 (31)
30-45	24 (24)
46-64	07 (07)
≥ 65	08 (08)
Total	**100 (100)**
Mean±SD	**28.6±17.6**

Table 2: Distribution of cases by time elapsed between injury and treatment n = 100

Time elapsed	**No. of Patients n (%)**
Less than 1 hour	23 (23)
Several hours	26 (26)
Next day	38 (38)
Several days	13 (13)
Total	**100 (100)**

Majority of the patients 38 (38%) presented 24 hours after injury. This was followed closely by those who presented within several hours of sustaining trauma 26 (26%). A sizeable majority (23%) arrived within less than one hour after sustaining trauma (Table 2).

The most common source of injury was a sharp object (32%) resulting in penetrating globe trauma, followed by trauma with a blunt object (27%). Burns of thermal and chemical nature accounted for 8 out of the one hundred cases. Fireworks and hammer on metal injuries constituted an equal share (7%) each. A total of 6 patients presented with injuries due to motor vehicle crash (Table 3).

The most common place of injury was home 31 (31%) followed by industrial premises 23 (23%). Fourteen patients (14%) presented with injuries sustained on the street and highway, while 12 (12%) had farming related injuries. Places for recreation and sport like playgrounds etc. accounted for 10 (10%) of the 100 cases. Only 2 (2%) of the injuries occurred at school (Table 4).

The visual acuity at presentation was light perception in 27 cases. Twelve patients had no light perception at presentation, whereas in 21 cases the visual acuity was better than 6/60 (Table 5).

Open globe injury accounted for 57% of the cases. The breakdown of these was: 28 had corneal lacerations, 24 had corneo-scleral lacerations and 5 had scleral wounds (Fig. 1). In eighty four patients (84%), the injury was un-intentional while sixteen patients (16%) were victims of assault. A total of 75 injuries (75%) were preventable by protective eye wear (Table 6). The right eye was involved in 45% of the patients, the left eye in 52%; while 3 patients (3%) had bilateral injury.

Burns were present in 15 (15%) patients. Nine (9%) had thermal burns while chemical burns accounted for six (6%) of the total patients.

Lens damage in form of cataract was present in 34% of the injuries while the lens was displaced in 3% of the cases. Anterior chamber abnormalities were present in 84% of the cases. The most common finding was Iritis in 48% followed by hyphaema in 19%. Uveal prolapse was present in 10 patients (10%).The lids were damaged in 64% cases. The most common finding was ecchymosis in 39% followed by laceration in 13% (Fig. 2). Thermal and chemical burns of the eye-lids accounted for 7% and 5 % of the total patients respectively.

Table 3: Distribution of cases by source of injury n = 100

Source of injury	**No. of Patients n (%)**
Sharp object	32 (32)
Blunt Object	27 (27)
Burn	08 (08)
Fireworks	07 (07)
Hammer on Metal	07 (07)
Motor Vehicle Crash	06 (06)
Pellet gun	03 (03)
Firearm	03 (03)
Fall	03 (03)
Nail, Finger	03 (03)
Sports equipment	01 (01)
Total	**100 (100)**

Table 4: Distribution of cases by place of injury n = 100

Place of injury	**No. of Patients n (%)**
Home	31 (31)
Industrial Premises	23 (23)
Street and Highway	14 (14)
Farm	12 (12)
Place for recreation and sport	10 (10)
Public Building	08 (08)
School	02 (02)
Total	**100 (100)**

Table 7 presents the distribution of the source of injury according to the gender of the patients. Trauma with a sharp object occurred in 23 of the 75 males (30.7%) while 9 out of the 25 females (36%) sustained injuries from a sharp object. A total of 21 males (28%) suffered from trauma due to a blunt object in contrast to only 6 females. Firearm and pellet injuries occurred exclusively in males in this study (3 cases each). Motor

vehicle crash accounted for 5 male (6.7%) and 1 female (4%) patient. Similarly, they were six male patients with fireworks related injuries (8%) as compared to one female patient (4%). Result of the chi-square analysis show that, in this study, the gender distribution of ocular trauma according to the cause was found statistically significant in males as compared to females (p= 0.054)

Table 5: Distribution of cases by visual acuity at presentation n = 100

Visual acuity	**No. of Patients n (%)**
No light perception	12 (12)
Light perception	27 (27)
Hand movements	16 (16)
Counting fingers	06 (06)
1/60 to 6/60	18 (18)
Better than 6/60	21 (21)
Total	**100 (100)**

Table 6: Distribution of cases by injury preventable by protective eyewear n = 100

Protective eyewear	**No. of Patients n (%)**
Yes	75 (75)
No	02 (02)
Uncertain	23 (23)
Total	**100 (100)**

Only one patient had blowout fracture of the orbital floor with entrapment of the inferior rectus muscle (Fig. 3 and 4).

DISCUSSION

The impact of eye trauma is immense, whether measured in monetary terms, number of eyes lost, blind years or human suffering. Although ocular trauma is an important worldwide cause of preventable monocular blindness, relatively little epidemiological information is available outside the United Sates and developed countries.

Table 7: Distribution of cases by source of injury according to the gender; n = 100

Source of Injury	**Male (n = 75)**	**Female (n = 25)**
	No. of Patients n (%)	**No. of Patients n (%)**
	07 (9.3)	-
Hammer on metal	23 (30.7)	09 (36)
Sharp Object	-	03 (12)
Nail, Finger	02 (2.7)	01 (4)
Fall	21 (28)	06 (24)
Blunt Object	03 (4)	-
Firearm	03 (4)	-
Pellet Gun	05 (6.7)	01 (4)
Motor vehicle crash	06 (8)	01 (4)
Fireworks	05 (6.7)	03 (12)
Burn	-	01 (4)

Chi Square =18.04, P Value=0.054

In this study, more than half of the eye injuries were in patients between 18 to 45 years, with 80% of the injuries in patients younger than 45 years. The distribution of injuries showed a male predominance with a male/female ratio of 3/1. The age and gender pattern observed in this study is consistent with the studies by Babar et al[7]. Their study revealed a male/female ratio of 4/1. Approximately 3/4th of the sample population was 30 years or younger. Similar results have been quoted by Jan and associates[8]. The higher risk in men has been found in almost every population and hospital based study of ocular injury. This increased risk reflects a combination of a high incidence of work, assault and motor vehicle crash related ocular injuries[9] Studies on ocular trauma in rural Nepal[10] and Tanzania[11] reveal similar age and gender distribution. A study conducted by Jan and associates in 2002[12], revealed that of the patients with eye injuries 85% were males and below the age of 40 years. These results are highly consistent with our study.

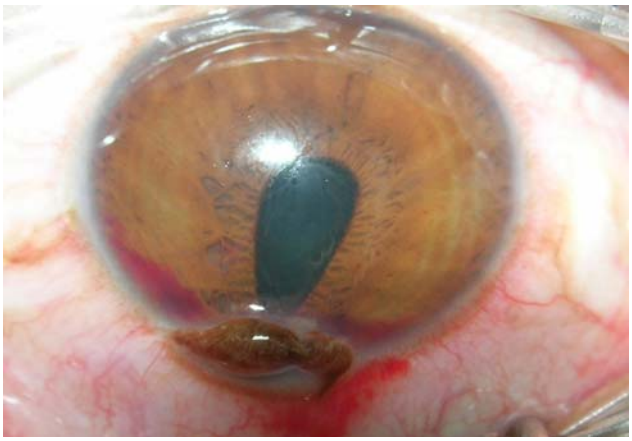

Fig. 1: A typical inferior limbal laceration with uveal prolapse

Fig. 2: Right eyelid laceration with involvement of medial canthus.

Fig. 3: A case of blow-out fracture of the left orbital floor.

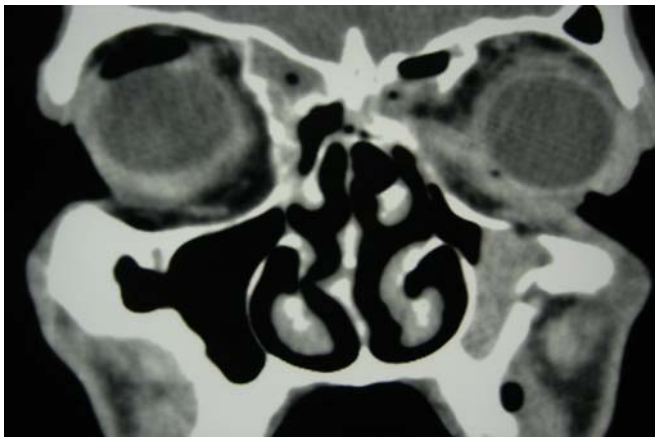

Fig. 4: A case of blow-out fracture of the left orbital floor.

Only 3 of the 100 cases in our study were bilateral. These results correlate with those computed by Babar et al in 2007. [7] In another study conducted by the same author on 1551 patients, the frequency of bilaterality was 2.9%[13].

Approximately half of the patients had open globe injury (57%). These results are consistent with the findings of Babar and associates who reported open globe injuries in 46% of their cases[7]. A Medicaid Enrollees based study conducted by Chen et al also reported open globe injuries of the eyeball as one of the major type of ocular trauma in their report[4] A four year review by Iqbal and associates[14] also determined open globe injuries to be leading the list of traumatic ocular emergencies (71.9%).

In our study the most common place of injury was home (31%), followed by the industrial premises (23%). These results are consistent with those of Khatry et al[10] and Serranco[15]. Desai et al[16] also reported similar results: home was the most common place for eye injury to occur (30.2%) followed by the workplace (19.6%). Occupational ocular trauma in our study accounted for 46% of the cases, of these a quarter had farming related injuries (26%). Although a vast majority of our population is involved in agriculture, the relatively low turnover of the patients is due to lack of awareness regarding the health care facilities and poor transport network from rural to urban areas.

The most common source of injury was a sharp object in 32% of the cases followed by trauma with a blunt object (27%). Thus penetrating and blunt were more common as compared to chemical, electrical and thermal injuries. These findings were consistent with

those of Fasih and associates[17]. The typical sharp objects were: broken glass pieces, knives, scissors, nibs of pens and pencils. Hammering on metal and nails is again a common and easily preventable cause of eye injury. Its proportion in this study was 7%, which is comparable to the results of the Hungarian Eye Injury Registry[18]. Fireworks are a major source wherever they are legal, 7% in this study. In Hungary (where private fireworks use is forbidden by law), their rate is 0.1%[19]. Motor vehicle collisions were responsible for 6% of the cases; this is in contrast to 12% in industrialized nations[18].

Attesting to the fact that these were very serious injuries is the finding that the visual acuity at presentation was worse than 6/60 in 79% of the cases. A total of twelve eyes had no light perception at presentation.

Unintentional injuries made up majority of the eye injuries reported. In cases of the work-related injuries, none of the workers were using eye protection devices. They were either broken or not provided by the employer. Over 3/4th of the injuries were preventable by protective eyewear. A staggering 92% of the injuries reported in this study were preventable by patient education alone. These figures reflect the vast opportunity for preventive measures to be introduced and public awareness increased regarding how to protect against eye trauma. This can be done through mass-media campaigns, public health workers and even by creating awareness at a grass root level in schools and vocational training centers.

The chief weakness of this study is that it is not population based and hence does not give a true measure of the incidence and prevalence of ocular trauma in our population. Appropriate and effective prevention requires developing and maintaining a comprehensive and standardized eye trauma surveillance system in a defined population.

Although an eye injury is a sudden and usually unanticipated event to the person involved, general trends can be identified if the surveillance is on a sufficiently large scale, such as the United States Eye Injury Registry. Its affiliates currently operate in 25 countries, allowing comparison of findings from different geographic locations and making it easier to highlight area amenable to prevention. Among the many areas showing the benefits of systematic data collection and implementation of prophylactic measures are the effects of seat belt laws, which have reduced the incidence of eye injuries by 47 to 65%[20].

Trauma to the eye is extremely common. This is especially so in developing countries like Pakistan[21]. 5% of all ophthalmic admissions in the developed world result from ocular trauma, while in developing world this figure is much higher[22].

CONCLUSION

Ocular trauma is a challenging problem; it has long been considered a result of random, unrelated, and unpreventable factors rather than a disease and, as such, has received far less attention. Therefore it continues to be a significant cause of morbidity in terms of visual loss or impairment and diminished quality of life. However, neither prevention nor treatment can be optimized unless surveillance data on eye injuries is collected in a systematic manner.

Author's affiliation

Dr. Tehmina Jahangir
Senior Registrar
Eye Unit I, AIMC / JHL
Lahore

Professor Nadeem Hafeez Butt
Professor of Ophthalmology
Eye Unit II, AIMC / JHL
Lahore

Dr. Uzma Hamza
Assistant Professor
Eye Unit I, AIMC / JHL
Lahore

Dr. Haroon Tayyab
Registrar
Eye unit 1, AIMC / JHL
Lahore

Professor Samina Jahangir
Professor and Head
Department of Ophthalmology
AIMC / JHL
Lahore

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