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The Cuban Ocular Trauma Registry

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Abstract

Purpose: To create an ocular trauma registry and analyze the epidemiology and clinical characteristics of serious eye injuries in Cuba.

Methods: Analysis of information from 120 eyes entered in the Cuban Ocular Trauma Registry was done. Age, gender, trauma scenarios, use of eye protection, cause and type of eye injury, ocular structure involvement and initial and final best-corrected visual acuity at 3 months of follow-up were addressed. Legal blindness was defined as visual acuity worse than 20/200.

Results: The mean age was 38 years with a male predominance. No less than 43 percent of ocular trauma took place at home. Hammering on metal was the main source of injury in 39 percent of patients. Intraocular foreign body was seen in 48 percent of lesions. Fifty-one percent ended with vision better than 20/200 and 49 percent had legal blindness in the injured eye.

Conclusions: The creation of our Ocular Trauma Registry has allowed us to recognize the specific features of ocular injury in our country. Preventive measures based on these results should reduce the incidence of blinding trauma.

Keywords: Ocular trauma registry; Eye injuries

Introduction

Although the eye represents only 0.1 percent of body surface, eye injuries have an importance in society disproportionately higher than injuries occurring elsewhere in the body. Eye injuries can significantly change the life of patients by causing disability and impairment. Furthermore, the health care system suffers from elevated costs of treatment and rehabilitation from eye trauma. Therefore, prevention from eye trauma should be the first task for any health care system, but this must be based on data collected rigorously and analyzed scientifically [1]. Trauma, a major cause of early death and disability has been classified historically as the result of a random event and not a disease. However, this situation has been changing recently [2]. In industrialized countries, ocular trauma has become the most common cause of hospitalization for patients with ophthalmic disease. In the United States about 2 million accidents are related to eye damage each year, leaving 40,000 patients with some form of permanent visual impairment [3,4]. The incidence of hospitalization for ocular trauma can vary in different countries and regions. In Scotland, it is 8.1 per 100,000 inhabitants, while it is 11.3 in Australia, 12.6 in Singapore, 13.2 in the U.S. and 15.2 in Sweden [5-10]. In Cuba, more than 50% of individuals with eye trauma are young men between 20 and 30 years. It is estimated that at least 73.6 % of individuals who work and engage in activities at risk of eye injury do not wear eye protection [11].

Currently more than 25 countries have eye injury registries including the United States Eye Injury Registry (USEIR) and the Hungarian Eye Injury Registry (HEIR). There is also a world registry, The World Eye Injury Registry (WEIR), which can store data from nations, institutions and researchers working independently. The databases are accessed through a website. The system is secure and can only provide information that the user has deposited [2]. Our country, despite having recently made great strides in other areas of eye care, has had no such registry. We have begun to do this, and our findings are as follows.

Material and Methods

We performed a prospective study with the aim of establishing an Ocular Trauma Registry (OTR) centralized in the Cuban Ophthalmology Institute "Ramon Pando Ferrer" (ICO "RPF"). We made an epidemiologic analysis emphasizing the socio-demographic characteristics with patients treated with ocular trauma. So far, we have evaluated 120 patients presenting to the emergency services of the ICO "RPF" and the Central Military Hospital "Dr. Luis Diaz Soto" (HMC "LDS") with severe ocular trauma (SOT) from September 2010 through September 2011. These two hospitals receive most of the population from Havana city and all over the country suffering from ocular trauma, due to their high qualified personnel and 24 hour working emergency services. Sometimes these patients are sent after having initial evaluation and treatment in other institutions. So patients included in our study come from both, rural and urban environments, as well as from several social classes and virtually any location of our country. All of them were evaluated within 48 hours of the injury in these two hospitals. SOT was defined as a severe and permanent injury to any ocular structure along with loss of function observed during examination [1]. This included any situation that required emergency surgery within 72 hours of traumatic event plus admission to the hospital. The types of mechanical globe injury are strictly defined following the recommendations in the Birmingham

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Eye Trauma Terminology system (BETT) [12]. All patients were able to return for follow-up within at least 3 months after the trauma.

Best-corrected visual acuity (BCVA), which was obtained initially using a Snellen chart, was followed by slit-lamp and fundus examination. In the presence of obvious ocular perforation or due to difficult examination, some cases were referred to the surgical unit for exploratory surgery.

Data including age, gender, trauma scenarios, use of eye protection, source and type of eye injury, ocular structure involvement, initial - final BCVA and legal blindness (defined as visual acuity worse than 20/200), among others, were entered into a collection chart during the initial evaluation and incorporated into the patient's medical file. This was completed during follow-up (within at least 3 months). All patient information was properly reviewed by the trauma team of the ICO "RPF." Data from both institutions were introduced in the WEIR through the website http://www.weironline.org/site. The results from the database were processed using SPSS 15.0 for Windows. Statistical processing included calculating the frequency of injury in terms of percentage calculated from demographic and clinical variables related to the trauma.

Results

Now our institutions have a trauma record from all patients with SOT which can be accessed through the WEIR site with the consent of the authors. So far we have recruited a total of 120 patients ranging in age from 2-90 years. The age group most affected was from 30-39 years (Figure 1) with an average of 39 years, while the median age was 36 years. We found a 14:1 ratio in favor of males.

The most common place of injury was the home (Table 1). Forty three percent of the patients studied with SOT suffered the injury at home, 28% occurred at work and 12% were related to traffic accidents. There was an eye witness present in 60% of the injuries and about 7% occurred intentionally during an assault or altercation. No self-inflicted injuries were reported. Ten percent of traumatic events were related to alcohol intake. No other drug use was detected. When alcohol consumption was associated with SOT, the injury usually occurred during sports or criminal activities.

Fifty-seven percent of affected eyes were on the right side. No bilateral injuries were detected. Only 2 patients wore glasses at the time of the trauma. One of them wore glasses to correct a refractive

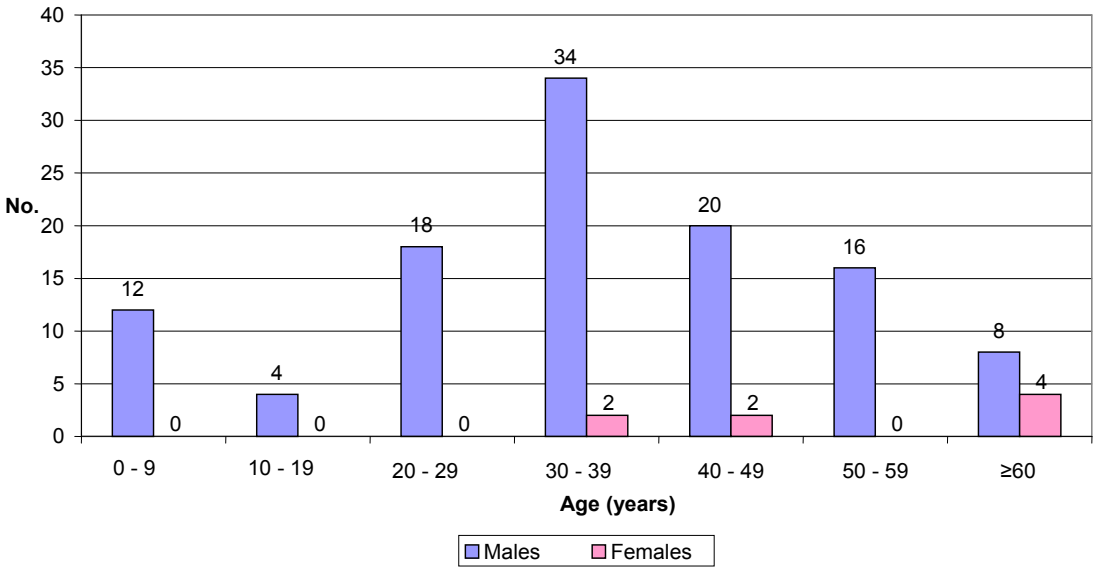

Figure 1: Rate of severe ocular trauma by gender and age.

Scenario	No. SOT	% SOT	No. blind eyes	% blind eyes**	Source	No. SOT.	% SOT	No. blind eyes	% blind eyes**	Injury type	No. SOT.	% SOT	No. blind eyes	% blind eyes**
Home	52	43	35	67	Hammering on metal	47	39	24	51	IOFB***	48	40	21	44
Labor facilities	34	28	14	41	Sharp objects	38	32	16	42	Penetrating	42	35	13	31
Traffic accident	14	12	3	21	Blunt objects	26	22	13	50	Rupture	16	13	14	88
Theft / robbery	8	7	2	25	Falls	4	3	2	50	Contusion	10	8	7	70
Sport / recreational	6	5	3	50	Explosions	2	2	2	100	Perforating	4	3	4	100
School	2	2	1	50	Projectiles	2	2	2	100					
Other	4	3	1	25	Other	1	1	-	-					
Total	120	100	59		Total	120	100	59		Total	120	100	59	

*Defined as visual acuity worse than 20/200
**Eye blind percentage is calculated toward each kind of ocular trauma scenario, source and injury type
***Intra Ocular Foreign Body

Table 1: Frequency of severe ocular trauma (SOT) and legal blindness* rate per scenario, source and type of injury in the Cuban Ocular Trauma Registry data base.

error, and the other wore goggles specially designed for protection. Hammering on metal as well as trauma from sharp and blunt objects were the most frequent sources of SOT (Table 1).

Comprehensively open globe trauma was detected most commonly in injured eyes in the shape of intraocular foreign body (IOFB) as well as penetrating injuries (Table 1). These were the types of injury most commonly seen in 40 and 35% respectively.

The cornea was the most affected structure followed by the iris and the vitreous (Figure 2). There were no lesions affecting the optic nerve, but the other portions of the posterior segment were damaged in 40%.

The most frequent initial best-corrected visual acuity (BCVA) was hand movement (HM) in 27% of patients (Table 2), while the final BCVA was more often in the range of 20/100 to 20/50 in 34%. Sixty-two percent showed initial BCVA below or equal than 20/200 while 51% ended up with better than 20/200 vision at 3 months. Five patients with initial BCVA of no light perception (NLP) ended up with light perception (LP) or better.

At three months follow up all patients that suffered an ocular injury sourced from explosions and projectiles or presenting perforating trauma (Table 1) were legally blind from this eye (final BCVA less than 20/200). This finding was detected in 88% of eyes ruptured too. Comprehensive, 59 eyes became blind (49 %) at this point of the study.

Discussion

The creation of our OTR in Cuba has allowed us to understand the specific features of SOT in our environment. In some aspects this is similar to other published papers, although, in other it is diametrically different, even though that the short study time of one year may have influenced this.

By deciding to follow only patients admitted to our centers as a means to make data collection possible, other cases were not included, such as blunt trauma and partial lacerations as well as lesser threatening conditions not requiring admission to the hospital. These peculiarities

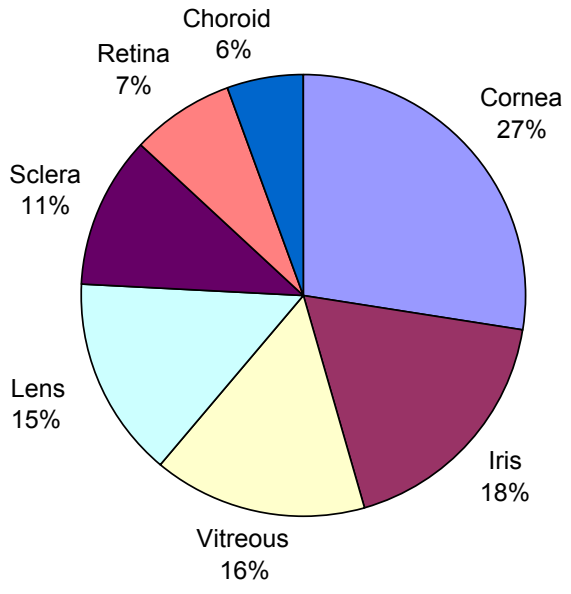

Figure 2: Structure involvement in serious eyes injuries.

Initial BCVA	No.	%	Final BCVA	No.	%
≥20/40	18	15	≥20/40	20	17
20/100-20/50	28	23	20/100-20/50	41	34
20/400-20/200	12	10	20/400-20/200	9	8
C/F	10	8	C/F	11	9
H/M	32	27	H/M	24	20
LP	8	7	LP	8	7
NLP	12	10	NLP	7	6
Total	120	100	Total	120	100

BCVA: Best Corrected Visual Acuity; C/F: Counting Finger; H/M: Hand Movements; LP: Light Perception; NLP: No Light Perception

Table 2: Initial and final visual acuity in patients with SOT.

may give the impression that our visual results may be below standards when reviewing other published studies.

Multiple reports from the literature indicate a higher incidence of ocular trauma in males [13-19]. The male to female ratio ranged in other studies from 4.3:1 [14] to 5.5:1 [15], whereas it was 14:1 in our study. The male predominance might be due to the greater exposure of men to risks such as heavy work, contact sports, altercations, traffic accidents and alcohol intake among others [15]. Previously published reports have indicated mean ages ranging from 29 to 35 years. In most reports, injuries occurred in men under 50 with higher incidences in the 3rd and 4th decades of life [14-19]. Our results with respect to age are similar to these reports. The place where trauma occurred most frequently in our study was the home (43%) followed by the workplace and the streets (traffic accidents) (28% and 12% respectively). There are reports showing similar places almost with the same frequency [14-20]. However, other studies cite the workplace and recreation facilities as the most frequent locations [15,19,21,22]. We believe that these differences are due to the interrelationship between the development of occupational medicine and prevention campaigns with education in the use of protective measures in other nations. It is remarkable that only one patient injured at work had adequate eye protection, which might suggest its effectiveness preventing ocular trauma. As stated by other authors, there appears to be a gap in the education process of our system aimed at the prevention of this phenomenon using eye protection [11]. It is likely that economic factors impinge on the existence of protective material, influencing on this issue. While this is not only our problem, in more developed nations this phenomenon has been detected [15,23]. However, some authors are beginning to report the benefits of the introduction of these preventative practices [14]. Although some would question the possible protective role of these devices, at least one report has shown a clear positive balance in favor of its use [24].

Witnessed assaults and fights occurred in 7% of our cases, which corresponds to that in other reports [15]. In other countries, this situation has been observed as high as 20%. Factors such as gun ownership, educational level and political conflicts could play a role. We detected no self-inflicted injuries, and this is also rare in the literature [14]. We found the use of alcohol in 10%. This result is different from other reports where it is as high as 18% to 23% [22,25], and even up to 71.4% [15]. However, as in these studies, ocular trauma was closely linked to violent situations in sporting or recreation environments.

When hammering on metal was not a major cause of SOT in one report [14], it was an important issue in our study. This source (39%) followed by sharp (32%) and blunt objects (22%) was the principal cause

of SOT in our series. Other studies also suggest that this is the most frequent source [19], unlike exposure to sharp objects followed by blunt objects [22]. These results vary depending on the design of the studies. In our case, less serious contusions not requiring hospitalization were not recorded, so there was under-reporting of agents causing closed-globe trauma in our group.

For the foregoing reasons, open-globe injuries prevailed with the cornea being most affected. This is a consistent finding in other studies [26,27], where IOFB and penetrating injuries occurred in the range of 35-40 percent. The posterior segment was affected in 40% of our cases. Other authors have reported damage to these structures in up to 55% of cases including the optic nerve [14], which was not seen in our series.

The initial BCVA below 20/200 seen in 52% (up to 62% taking cases with less than or equal to 20/200) was not significantly different from the latest data from the USEIR or other similar sources (46% and 68%) [14,19,28]. However, final BCVA below 20/200 was present in 49% of our patients while others reported a range from 27-30 % [14,19,28]. Our final BCVA may be lower because closure of our study occurred only after 3 months follow-up, and some patients still had the potential for visual improvement. However, one study showed this finding to be similar to ours [22].

At the endpoint, as well as others authors have noted, several patients with initial BCVA of NLP ended improving their visions in the course of the study. This finding in the initial assessment does not determine what action to take. With appropriate care and treatment, even this severe degree of visual loss can be reversed as we observed in our study [14,16,22].

Frequently in the literature perforating trauma and ruptured globes are associated with worse visual prognoses [14,16,22,28]. In our case, we found 100% of eyes with perforating trauma and 88 % of ruptured eyes ending legally blind. Such severe injuries, like perforations, frequently affect vital structures of the posterior pole. On the other hand, ruptures are mostly caused by blunt objects with great force that led to devastating ocular injuries and severe anatomical destructuration [1]. This could be the reason for these results.

All eyes injured from explosions and projectiles resulted blind too. Explosions cause concussion and direct contact (burns or lacerations) lesions, inflicting severe eye damage [29]. Moreover, depending on the size of the projectile, its momentum, impact site and posterior segment damage, they can cause permanent visual impairment [1]. Data from the USEIR also shows these cases of trauma with higher percentage of final BCVA of less than 20/200. Blunt and sharp objects have also been reported as major causes of blindness from ocular trauma, not occurring in our series [14].

The introduction in of modern techniques and instrumentation for retinal surgery has improved the prognosis of visual outcome from ocular trauma. However, prevention should be the primary goal in any healthcare system. Data obtained by implementing our OTR as well as continuous expansion of this database should lead to a larger enterprise to decrease the incidence of ocular trauma in our country.

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