Epidemiology of open globe injuries in cap bon: about 100 cases

Épidémiologies des traumatismes oculaires a globe ouvert chez l'homme: a propos de 100 cas

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RÉSUMÉ

Prérequis: Les traumatismes oculaires à globe ouvert sont une cause majeure de déficience visuelle et de cécité permanente.

Objectifs: A travers cette étude retrospective, nous identifions les caractéristiques cliniques ainsi que les résultats d'une série de traumatismes oculaires à globe ouvert.

Méthodes: Nous avons étudié rétrospectivement les dossiers de 100 patients, hospitalisés et pris en charge dans le service d'ophtalmologie du CHU Mohamed Taher Maamouri de Nabeul, pour un traumatisme oculaire à globe ouvert, entre Janvier 2006 et Novembre 2013. La durée moyenne du suivi a été de 15,9 mois. L'étude des dossiers a pu déterminer les données démographiques, les mécanismes et les caractéristiques des plaies oculaires. L'acuité visuelle à la présentation initiale, les signes cliniques initiaux et l'acuité visuelle finale ont été, également, enregistrés.

Résultats: Au total, 100 cas de traumatismes oculaires à globe ouvert ont été identifiés. L'âge moyen des patients était de 31.9 ans. Quatre-vingt-deux pour cent (82%) des patients étaient des hommes. Les accidents domestiques, les agressions et les accidents de travail ont représenté les principales étiologies avec des fréquences respectives de 30, 29 et 12% des cas. Vingt-huit (28) patients avaient des ruptures du globe oculaire et 72 des lacérations oculaires. Les plaies oculaires étaient cornéennes dans 60 cas, cornéo-sclérales dans 15 cas et sclérales dans 25 cas. Un corps étranger intraoculaire a été noté dans 4 cas. Les principales complications étaient les opacités cornéennes (43%) et les synéchies postérieures (28.6%). Une acuité visuelle finale ≥ 5/10 était retrouvée dans 24 cas. Elle était ≤ 1/10 dans 12% des cas.

Conclusion: Les traumatismes oculaires à globe ouvert sont des accidents graves pouvant entrainer une altération fonctionnelle significative. Seule l'application de mesures préventives peut en réduire l'incidence.

Mots-clés
Traumatismes oculaires à globe ouvert, épidémiologie.

SUMMARY

Background: Open globe injuries are a major cause of permanent visual impairment and blindness.

Objectives: In this retrospective study, we identify clinical characteristics and outcome of a series of open globe injuries.

Methods: Operating department records were reviewed to identify all patients who had undergone repair of an open globe injury from January 2006 to November 2013 at the department of ophtalmology in the university hospital of Nabeul in Tunisia. Case notes were examined to determine demographic data, mechanisms and location of injury. The Snellen visual acuity on presentation, initial clinical signs and the final visual acuity were, also, recorded.

Results: In total, 100 cases of open globe injury were identified. The mean age of the patients was 31.9 years. Eighty-two per cent (82%) of patients were male. Domestic accidents, assaults and accidents in the work place were the main etiologies of open globe injuries, representing respectively 30, 29 and 12% of cases. Twenty eight (28) patients had globe ruptures and 72 patients sustained globe lacerations. The injury was corneal in 60 cases, corneoscleral in 15 cases and scleral in 25 cases. An intraocular foreign body has been identified in 4 cases. The main complications were corneal opacity (43%) and posterior synechiae (28.6%). Final visual acuity of 5/10 or better was achieved in 24% of cases. It was ≤1/10 in 12 % of cases.

Conclusion: Open globe injury is a serious accident that can cause significant functional impairment. Only the application of preventive measures can reduce the incidence of these accidents.

Key-words
Open globe injuries; epidemiology

Open Globe Injuries are one of the main reasons for consultation in ophthalmological emergencies. Their overall incidence is estimated at 3.5 / 100,000 person / year, leading to, approximately, 203000 cases of open globe injury per year worldwide [1]. These are serious accidents because they can permanently impair visual function and represent an important cause of morbidity and disability especially in younger patients. A good knowledge of the epidemiological aspects of these accidents may establish preventive measures which alone enable a reduction in prevalence. The aim of our study was to identify the clinical characteristics and outcomes of a series of open globe injuries in the "Cap Bon" region in Tunisia.

METHODS

One hundred patients with open globe injuries who are hospitalized and treated in the Department of Ophthalmology of Mohamed Taher Maamouri university hospital of Nabeul in Tunisian, between January 2006 and November 2013 were evaluated retrospectively in this descriptive study. Cases were examined with regard to age, sex, origin (urban or rural), profession, accompanying pathologies, which eye was traumatized, circumstances of the trauma, nature of the causative agent, and time between injury and operation. A complete ophthalmologic examination was performed in all patients. The results of the initial clinical evaluation recorded included best-corrected Snellen visual acuity (BCVA) on presentation, the presence or absence of a relative afferent pupil defect (RAPD), the presence of anterior segment damage (corneal and/or scleral laceration(s), chemosis, hyphaema, cataract, traumatic mydriasis, an irregular pupil, and iris prolapse), and the presence of posterior segment damage (vitreous haemorrhage, retinal haemorrhage, choroidal rupture or haemorrhage, retinal detachment, and presence of an intraocular foreign body (IOFB)).

The wound characteristics have been specified (location, size and shape). Wound location was defined according to the Ocular Trauma Classification Group proposed by Pieramici and al.[2]. For open globe injuries, zone I injuries were confined to the cornea and limbus. Zone II injuries involved the anterior 5 mm of the sclera (not extending into the retina). Zone III injuries involved full-thickness scleral defects more posterior than 5 mm from the limbus. Craniographies were performed before each operation in all patients. All operations were performed under general anaesthesia. Primary suture was performed in each case. Perforations of the cornea were sutured using 10.0 monofilament nylon, and perforations of the sclera were sutured using 7.0 vicryl. Postoperative treatment involved the use of drops containing corticosteroid and antibiotics for at least 30 days.

After the urgent care and after making the necessary additional tests (B-mode ultrasound and oculo-orbital computer tomography (CT)), injuries were classified by mechanism according to Birmingham Eye Trauma Terminology [3] as rupture or laceration.

Associated lesions were investigated clinically in the initial review, preoperatively and postoperatively with the help of ocular imaging (ultrasound and / or CT).

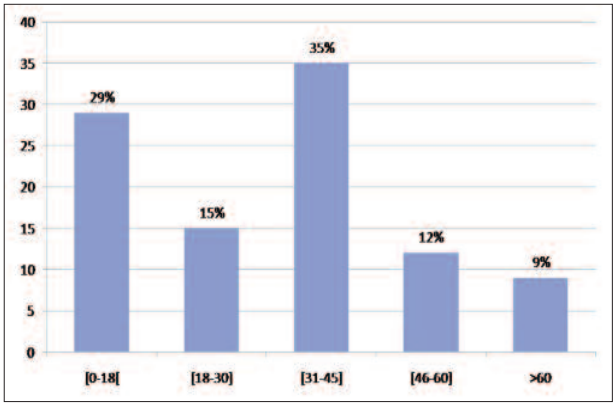
We have defined as complications, ocular lesions occurred secondarily during follow-up. These lesions were discovered by clinical examination and / or ocular imaging. They occurred in the short, medium or long term.

RESULTS

In the study period from January 2006 to November 2013, 100 cases of open globe injuries were hospitalized in the Department of Ophthalmology of Mohamed Taher Maamouri university hospital of Nabeul in Tunisia leading to 1.2% of the patients hospitalized during the same period, and 32% of patients hospitalized for ocular trauma. The mean duration of follow-up was 15.9 months.

The mean age of the patients was 31.9 years (range 2.5-70 years). The number of children (age <18 years) was 29, or 29% of cases. The average age of the children was 7.4 years. Children between 7 and 15 years were the most affected (47.6%). For adults (age> 18 years), those aged between 31 and 45 years were the most affected (Figure 1). Eighty per cent (80%) patients were younger than 40 years. Eighty-two per cent (82%) patients were male with a sex ratio of 4.5. Patients have an urban origin in 68.7% of cases. The study of the monthly distribution of trauma showed three frequency peaks in the months of May, August and November, with respective frequencies of 13.4, 14.9 and 13.4%.

Figure 1: Open globe injuries distribution according to the age of patients.



The majority of ocular trauma occurred in the middle (35.8%) and at the end of the week (17.9%) and between 8 and 14h (56.7%). In 43.3% of cases the profession was not mentioned. Students and workers were most affected, with respective frequencies of 16.4 and 11.9%.

Domestic accidents, assaults and accidents in the work place were the main etiologies of open globe injuries, representing respectively 30, 29 and 12% of cases. Domestic accidents were the primary etiology in children and patents older than 60 years representing respectively, in this case, 42% and 57% of etiologies. For patients aged between 31 and 45, accidents in the work place are responsible for half of all injuries (Figure 2). Sharp objects caused the majority of the ocular injuries accounting for 54% of cases (Table 1). The ocular trauma was unilateral in all cases, 40 cases involved trauma in the right eye and 60 involved trauma in the left eye. Seventy nine cases presented at department of ophthalmology within 24 h of injury, 12 cases presented between 24 and 48 h of injury and 9 cases after more than 48 h of injury. Twenty eight patients had globe ruptures and 72 patients

sustained globe lacerations (65 penetrating injuries, 5 intraocular foreign bodies, and 2 perforating injuries).

Figure 2 : : Etiologies of open globe injuries

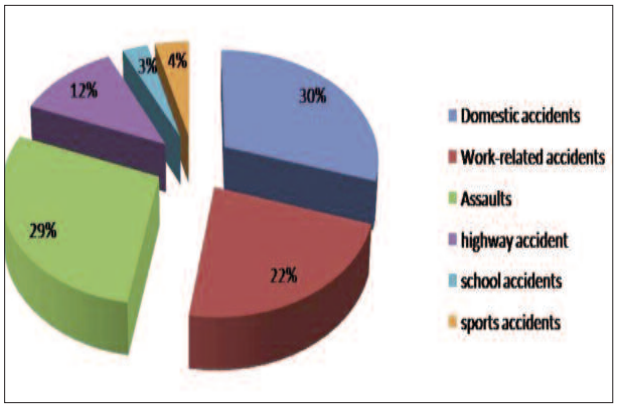


Table 1: Nature of traumatic agents:

Agent	Number of patients	(%)
Glass	12	12
Wire	12	12
Thorn	8	8
Stone	9	9
Knife	3	3
Metal bar	6	6
Firearm	1	1
Piece of wood	6	6
Pen	1	1
Chisel	1	1
Punch	6	6
Nail	3	3
Ceramic	1	1
Tire-ball	1	1
Other sharp agents	11	11
Other blunt agents	19	19

The initial VA was reduced to No light perception (NLP) in 16% of cases and LP in 26.9% of cases. It was ≤ 1/10 in 26.9% of cases, and ≥ 5/10 only in 4.5% of cases. The initial VA was unknown in sixteen cases. The injury was corneal in 60 cases, corneoscleral in 15 cases and scleral in 25 cases (Figure 3). Of the 100 patients included in the study, zone I injuries accounted for 58% of the open globes, and zones II and III injuries accounted for respectively 12 % and 30% of cases. The average size of eye wounds was 5.9 mm with a range of 0.7 to 25 mm (considering the sum of different branches). It was ≤ 5mm in 47.8% and ≥ 10mm in only 9% of cases. Results of the examination of an RAPD were recorded preoperatively in 30% of cases. In 58% of cases, an RAPD was absent, but present in the remaining (42%). Associated lesions were dominated by hyphema (32%) and traumatic cataract (35%) (Table 2).

Figure 3 : Location of wound

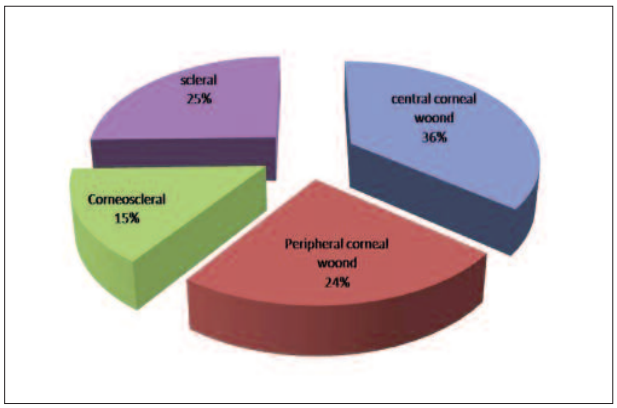


Table 2 : Different associated lesions

Associated lesions	Number of patients	percentage (%)
Hyphema	33	32
Traumatic cataract	36	35
Intense inflammatory reaction	6	5.9
Eyelid wound	6	5.9
vitreous hemorrhage	20	18
Iridodyalisis	12	12
Intraocular foreign body	5	4.4
Vitreous output	30	29
Retinal detachment	6	5.9
Coroidal detachment	15	15
Intraorbital foreign body	2	2.9
Berlin edema	2	2.9
orbital fracture	2	2.9
orbital emphysema	1	1.5
Intra orbital hematoma	1	1.5
Wound of extraocular muscles	1	1.5

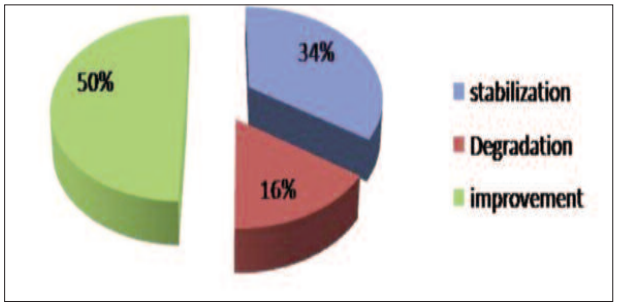
An IOFB has been identified in 4 cases. It was a metallic foreign body in 2 cases, mineral in one case and vegetal in one case. The IOFB was in the anterior chamber in 2 cases, within the wall of the eyeball in one case and in the vitreous in the other case. The average number of hospitalizations was 1.2 times, with extremes of 1 and 4 hospitalizations. The average length of stay was 9.86 days per patient, with a range of 2 to 45 days. The main complications were corneal opacity (43%) and posterior synechiae (28.6%) (Table 3).

Final VA of 5/10 or better was achieved in 24% of cases. It was ≤1/10 in 12 % of cases. In a further 5% of cases, optimal visual function consisted of LP. A final 25% of cases required enucleation of the traumatised eye. Comparing initial and final VA, we noted, among those who had a quantifiable VA, stabilization in 35% of cases, deterioration in 16.4% of cases and improved in 50.7% of cases (Figure 4). Among patients who had an unquantifiable initial VA, 27% of patients had NLP at the end of follow-up, 18% had LP, 33% a final VA between 1/10 and 5/10, and 16% a final VA ≥ 5/10.

Table 3: complications of open globe injuries.

complications	Number of patients	Percentage (%)	Median time to onset (days)
Corneal opacity	6	2.2%	43
posterior synechiae	7	6.9	28.6
anterior synechiae	2	0.02	30
Phthisis bulbi	20	19.8	47.5
Endophthalmitis	3	2.9	2
Retinal detachment	2	1.9	270
Ocular hypertension	3	2.9	18.5
Traumatic cataract	4	3.9	75

Figure 4 : Evolution of visual acuity at the end of follow-up



DISCUSSION

In the study period, 100 cases of open globe injuries were hospitalized in our Department, between January 2006 and November 2013, leading to 1.2% of the patients hospitalized during the same period, and 32% of patients hospitalized for ocular trauma. This latter frequency varies according Karaman and al, from 8.9 to 67% [4].

Open globe injury often occurs in young patients as shown by statistics reported in the literature. Indeed, the rate of patients younger than 40 years was 77% in the series of Entezari and al [5], 64% in that of Scheufele and al [6] and 75.2% in the series of Trigui and al [7]. In our study, this rate was 80%. School-age children are more exposed to open globe injuries than children younger. Mac Ewen and al [8] and Soylu and al [9] reported frequency peaks in the respective age groups 5-14 years and 5-9 years. In our study, 47.6% of children were aged between 7-15 years.

The majority of our patients (82%) were male with a sex ratio of 4.5. This male predominance was found in all studies [7, 10]. It could be explained by the fact that men engage in more violent acts and in manual and hazardous sports activities and by the decline in vigilance under the influence of alcohol [11].

In our series, the rate of patients from urban areas (68.7%) was higher than that of patients from rural areas (31.3%). Our results were not consistent with those of McCarty and al [12] and Franzco and al [13] who have found a higher incidence in rural areas with respective rates of 56.1% and 50.5%.

The study of the monthly distribution of trauma showed three frequency peaks in the months of May, August and November, with respective frequencies of 13.4, 14.9 and 13.4%. In the study of Cakmak and al [14], most accidents occurred in July and August. In another Irish study [15], the frequency peak of these injuries was observed in August. This can be explained by the fact that the warmer and longer days allow more outdoor activities some of them would be at risk. The decrease in the supervision of children by their parents during the summer holidays also increases the risk of eye injury [14].

Eye injuries are more frequent on weekends [15]. In our series, 29% of injuries occurred in this period. This higher frequency in weekend may be explained by more frequent handling of sharp objects for the DIY, by trips to the country promoting accidents by tree branches and finally by the more frequent alcohol consumption that promotes assaults and highway accidents [16]. For Framme and al [17], domestic accidents are the most frequent causes of these injuries (38%), followed by accidents in work place (31%). on the other hand, Karaman and al [4] found that work-related accidents had the first place (27.7%). In our series, domestic accidents were ranked first (30%), followed by assault (29%) and work-related accidents (12%). In the series of Zghal and al about work-related injuries in Tunisia, open globe injury was noted in 8% of caes [18]. The low frequency of highway accidents (2.4% to 12.1%) [4, 15] is probably related to improvements in road safety (laminated windshield, mandatory child seat and wearing of the belt security).

In the literature, a consultation period less than 24 hours was observed in 28.6 to 98% of cases [19]. In developed countries, 98% of patients with open globe injury consult within 24 hours after the trauma [17], while in Africa this rate is much lower (39% in Ivory Coast and 51 % in Senegal) [20]. In our study, 79.1% of patients presented at department in the first 24 hours after trauma and 9% after 48 hours. This could be explained by the proximity of hospitals in cities where occurred the majority of ocular trauma in our series.

In the study by Andrew Smith and al [21], the penetrating injury was the most common mechanism. This represents 71.8% of cases, followed by globe rupture (14.7%), intraocular foreign body (10.5%), and perforating injuries (3%). Other authors [22] found that the most common mechanism was globe ruptures with a variable frequency from 39 to 43.2%. In our study, penetrating trauma was the most frequent type (65.7%), followed by globe rupture (28.4%), intraocular foreign bodies (4.5%) and globe perforation (1.5%). In the Tunisian study of Ben Zina and al, about 136 cases of ocular trauma in children, perforation was twice more frequent than contusions [23].

The most common site of injury, in our study, was the cornea (59,7%) followed by corneoscleral (14,9%) and scleral (25%). A predominance of corneal wounds was reported by all authors with rates ranging from 48-72% [13]. This can be explained by the direct contact of the cornea with the environment. In the majority of studies, Zone I was the most affected area, followed by zone II and zone III [2]. In our study, the wound was limited to Zone I in 58% of cases, extended to Zone II in 10.6% of cases and Zone III in 31.4% of cases. The predominance of reaching the zone I, in our series could be explained by the higher rate of penetrating trauma. RADP deficit has been described by several authors as an important factor in visual prognosis of patients with open

globe injuries. This underlines the importance of systematically evaluating of pupillary responses of these patients at the initial clinical examination [24]. In our study, results of the examination of an RAPD were recorded preoperatively in 30% of cases. In 58% of cases, an RAPD was absent, but present in the remaining (42%). This rate is higher than that of the series of Wai Man and al (39%) [25].

In the literature, final VA is ≥ 5/10 in 14.5 to 61% of the cases [13], ≤ 1/10 within 10 to 68.4% of cases and NLP in 3.5 to 19% of cases [7]. In our study, Final VA of 5/10 or better was achieved in 24% of cases. It was ≤1/10 in 12 % of cases. In a further 5% of cases, optimal visual function consisted of LP. A final 25% of cases required enucleation of the traumatised eye.

The high frequency of functional loss observed in our study may be linked to the importance of the initial visual loss, high frequency of RADP and the high rate of ocular wounds extended to zone III. Indeed, significant risk factors on presentation are associated with eventual enucleation included a blunt mechanism of injury, an initial VA worse than 1/10, a RADP and a central corneal wound and / or extended to zone III. We intend to conduct a study to detail the prognostic factors of open globe injuries.

CONCLUSION

Open glob injury is a serious accident that primarily affects children and young adults. It can cause significant functional impairment. Only the application of preventive measures can reduce the incidence of these accidents. The best way of preventing blindness because of trauma, apart from successful surgery, is prevention of injury. This is especially true in the pediatric population as a large number of these injuries are of a preventable nature. The foremost factor that needs to be employed is education. We believe that educating and warning mothers, fathers, teachers and children about penetrating eye injuries would reduce their occurrence. Further research needs to be undertaken to examine the effect of education on eye injuries.

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