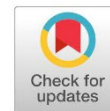


Research Article

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# The Visual Outcome of Gunshot Injury after Last Civil War in Tobruk-Libya: A Retrospective Study

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## Abstract

Ocular trauma is one of the most common causes of acquired blindness. This study aims to determine the epidemiology of ocular trauma in all the age groups in Tobruk Medical Centre- Libya. A retrospective study was conducted in our hospital for one year and all the aged group presenting with ocular trauma in the Ophthalmology and Emergency Departments were enrolled in the study. Age, sex distribution, presentation duration, mode of injury, type of injury, and final visual outcome were analyzed. There were 201 patients, 76% of the patients were male. Injuries usually occurred at home (54%) followed by accidents at workplaces (18%), car accidents (10.5%), fighting (15%), and at school (2.5%). There were 100/201 patients (49%) of cases that required hospital admission and (40.8%) needed surgical interventions. The most common traumas were blunt trauma in 124/201 patients (61.7%). Penetrating trauma with an intraocular foreign body (IOFB) accounted for (11.5%) of cases. The visual outcome was recorded in 200 patients. 22/201 patients (11%) ended with severe impairment of vision (vision hand movement (HM) or less). Blindness with no perception of light (no PL) was the result in 3.5% of trauma cases, while 11/16 patients (86%) with gunshot injuries through fighting have complete irreversible blindness (no PL). We concluded, that most open-globe injuries can cause severe vision impairment. In this study, gunshot injury is the leading cause of permanent loss of vision.

**Keywords:** Ocular Trauma, Open Globe Injuries, Closed Globe Injuries, Gunshot Injury, Tobruk Medical Center-Libya

## INTRODUCTION

Eye injuries are one of the most common ophthalmological emergencies which can lead to anatomical, physiological, and functional effects on the eye (Barry et al., 2019). Eye trauma is one of the most common causes of unilateral permanent loss of vision. Each year about 55 million people suffer eye trauma worldwide (Woreta et al., 2023).

In Blunt trauma, signs include proptosis, decreased visual acuity, pain, lid ecchymosis, chemosis, mydriasis, afferent pupillary defect, increased IOP, and ophthalmoplegia. Treatment requires immediate ophthalmologic consultation. A conservative management with ice packs, pain control, bed rest, control of intraocular pressure, and systemic steroids (Malik et al., 2012).

Management of a ruptured globe requires hospital admission and urgent interventions, such as antibiotics, antiemetics, pain management, and urgent surgical repair of the wound (Sukati, 2011). The



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rupture can occur due to blunt or penetrating sharp objects which leads to injury to the outer coats of the eye (cornea or sclera) causing penetration of the Globe. Usually, the ruptures occur in areas where the sclera is thinnest (at the limbus or the insertions of the extraocular muscles) (Sahraravand et al., 2020). The loss of the aqueous from the anterior chamber and the vitreous or the choroidal tissue through a wound are the most common signs of rupture (Das & Rana, 2020).

The ruptured globe can occur due to sharp objects or a small foreign body. It can be clinically diagnosed and confirmed by CT, ultrasound, or MRI. Delaying medical attention can cause the damaged areas to worsen and can result in permanent loss of vision. To achieve better therapeutic success urgent surgical interventions are needed to prevent significant morbidity and decrease the chance of blindness, which is common in these cases (Puodžiuvienė et al., 2018).

In the last 10 years post the latest civil war in Libya, there was an increase in the amount of trauma. Eye injuries from gunshots are one of the most common injuries, which dramatically increased in our community.

The severity of gunshot eye injuries depends on many factors including, type, size, toxicity of the foreign body, and site of the injury. The bullet enters fast into the eye, penetration or perforation leads to photoreceptors and sensitive areas of the retina and optic being injured and loss of their function.

Furthermore, losing the natural contents of the eyeball and the time delay between the injury and getting a consultation following the injury may result in more destruction of the anatomy and physiology of the eyeball.

**Objective:** This study attempts to inform the government about the risk of gunshot eye injuries and to find possible solutions to this critical problem.

## MATERIALS AND METHODS

In a retrospective study of ocular trauma, we included all new patients with eye injuries treated at the Ophthalmology Department of Tobruk Medical Center in 1 year (between Jan. 2019 - Dec. 2019). The data were from direct history from the patients or their relatives, examinations, and patient questionnaires. We recorded age, gender, laterality, possible previous amblyopia, detailed status findings at the first presentation, time at first consultation after injury, diagnoses, and type of management.

We analyzed the data, presented the distributions (Excel, Microsoft Office 2010, Spss 25), and calculated the percentages from the reported results.

In this study, we identified the patterns of gunshot eye trauma, and late visual and post-traumatic anatomical outcomes and compared them with other types of eye trauma in patients presented at our hospital in the all-age groups.

## RESULTS

There were 201 patients with trauma in Tobruk Medical Center in one year. 76% of the patients were male, and 24% were female. The mean age was 25 years (range 1-80 years). 125 patients (62.2%) were adults aged 18 or more and 76 patients (37.8%) were children < 18 years.

**Table (1).** Shows the distribution of age group with trauma in one year in Tobruk Medical Center:

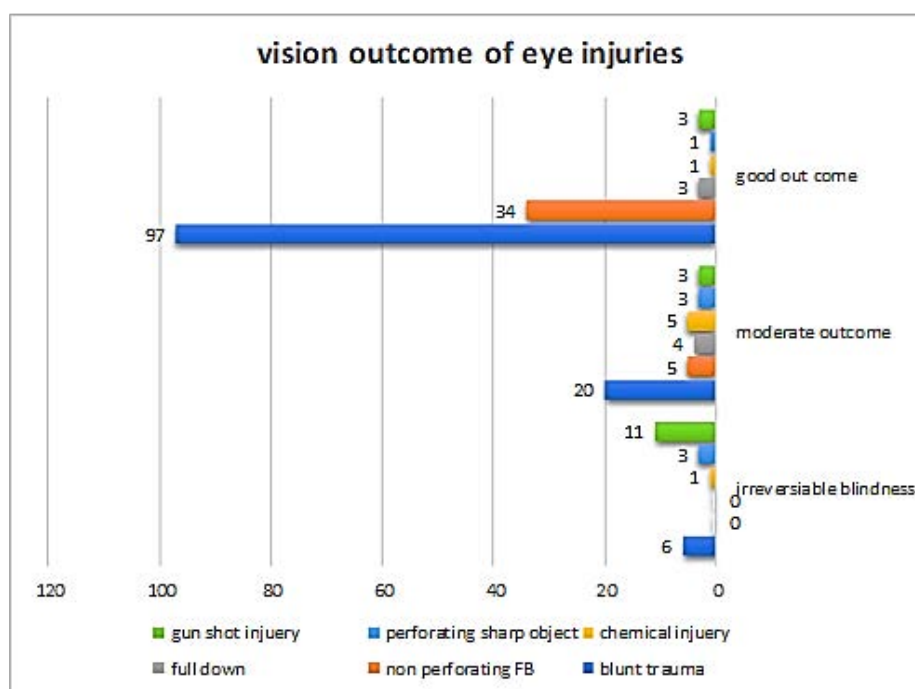
|           | Age average         | Total | Male | Female |
|-----------|---------------------|-------|------|--------|
| Children  | (1-18 years)        | 76    | 52   | 24     |
| Young age | (19-50 years)       | 109   | 89   | 20     |
| Old age   | (Older than 50 yrs) | 16    | 13   | 3      |

Injuries mostly occurred at home (54%) followed by accidents at workplaces (18%), car accidents (10.5%), fighting (15%), and at school (2.5%). Hospital admissions account for around 51% of total eye trauma, and (41%) of the cases needed surgical interventions. The time interval between injury and consultation was in the first three hours in 45% of patients, 51.4% after 24 hours, and 5.5% after 3 days.

The most common traumas were blunt traumas (61.7%), trauma directed with a blunt object, and indirect trauma after falling. The penetrating trauma with gunshots and penetrating with other small sharp objects form (34.3%), and there were (33.5%) of these penetrating cases presenting with IOFB.

The visual outcome was recorded in 200 patients. The majority of non-perforating injuries result in a good visual outcome, as only (4.5%) of blunt trauma cases had significant visual morbidity (irreversible blindness). In the perforating eye injuries, about 58% of cases had significant visual morbidity, most of them resulting from gunshot injuries from fighting.

There were 22 patients (11%) who suffered severe impairment of vision (vision HM or less), in 11 patients complete blindness (no PL) occurred in (5.5%) of trauma cases, irreversible blindness was common in gunshot injury cases, four-fold more than other perforating eye trauma, and two-fold than the blunt trauma cases, i.e irreversible blindness significantly a result of gunshot injury from fighting ( $P < 0.032$ ).

**Figure (1).** Shows different types of eye injury and their grade of vision impairment:

**Table (2).** Shows different types of eye injury in relation to the site of trauma:

|   | Type of trauma                                         | At home | At school | Trauma at street | Work-place | Car accident |
|---|--------------------------------------------------------|---------|-----------|------------------|------------|--------------|
| A | Blunt trauma with a non-sharp object (non-perforating) | 71      | 5         | 13               | 8          | 20           |
|   | Falling down                                           | 7       | -         | -                | -          | -            |
|   | Chemical injury                                        | 4       | -         | -                | 4          | -            |
|   | Perforating trauma with a sharp object                 | 27      | -         | -                | 24         | 1            |
| B | Perforating trauma (gunshot injury)                    | -       | -         | 16               | 1          | -            |

A Non-gunshot injury. B. Gunshot injury.

## DISCUSSION

Eye injury is a common reason for an emergency in the ophthalmology department, the injuries may be due to blunt, penetrating trauma, or due to chemical agents, or ultraviolet radiation (MacEwen et al., 1999). Closed globe injury with blunt objects was the most common eye injury and more common in males. The outcome of blunt trauma cases is usually good, but if trauma is severe leading to a complete transection of the optic nerve or macula scarring, this type of eye injury can cause a significant vision impairment (Mohseni et al., 2024).

Usually, trauma patients presenting with visual acuity correspond with increasing severity of the ocular injury. Trauma with perforating injuries or ruptures usually presents with worse vision than those with a closed eye globe, because the loss of inner content of the eye can lead to worsening its physiological function (Fujikawa et al., 2018).

In perforating eye trauma with a foreign body, severity is considered due to many factors like size, type, sharp or rough edges, toxicity, and fast embedding of the foreign body inside the eye. Furthermore, the long time remaining of the FB inside the eye, can lead to inflammation, toxicity, and more loss of the anatomical eye content and increase eye morbidity (Kannan et al., 2016).

When patients have any type of eye trauma, they should see an ophthalmologist as soon as possible (Patel, 2015). Early consultation can save vision with eye injury (Alem et al., 2019). In the current study, the majority of patients about (98%) presented for consultation after 6 hours post-trauma, this can lead to more damage to the sensitive eye tissue and more impairment of eye function (Fujikawa et al., 2018).

A leading cause of visual loss in this study is mainly due to gunshot injury because bullets lead to significant eye tissue disruption and destruction and sometimes ruptures are severe and not possible to repair (Chopra et al., 2018). Many factors like the point of injury to the eye and the distance of patients from the source of the bullet increase the severity of damage and morbidity of the eye function (Castro et al., 2020). As consistent with other studies, ruptured eye injury results in clinically significant visual impairment (Beshay et al., 2017; Guly et al., 2006).

Patient education and safety measures like wearing glasses during work and sports are very important to decrease the risk of eye trauma. It is highly recommended and important to make the public know the risk causes of eye trauma because most eye injuries can be prevented (Cassen, 1997; Morris et al., 2014).

## CONCLUSION

Ocular trauma is a frequent reason for emergency, its mostly need hospitalization which expensive for patient and Health care service. Most of cases usually come later to get a consultation. Gunshot

injury in fighting is the commonest cause of trauma blindness in our community ( $P < 0.001$ ), eye injury remains a preventable cause ocular morbidity. Therefore, we need early appropriate management and health-prevention strategies.

## ETHICS

"I hereby declare that the clinical research paper titled '**The visual outcome of gunshot injury after last Civil War in Tobruk-Libya: a retrospective study**' has received ethical approval from the relevant regulatory bodies and/or institutional review board, such as the Tobruk Medical Centre Ethics Committee, prior to its initiation. This statement serves as an assurance that the research study conducted for this paper adheres to the highest ethical standards, ensuring the safeguarding of human subjects and upholding the integrity of the research process.

**Duality of interest:** The author declare that have no duality of interest associated with this manuscript

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