Journal of Comprehensive Surgery

Original Article

DOI: 10.51271/JOCS-0020

Closed globe injuries in children

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Cite this article: Özcanlı Çay Ö, Uzel M. Closed globe injuries in children. *J Compr Surg.* 2023;1(4):82-84.

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Received: 01/11/2023 ◆ **Accepted**: 29/11/2023 ◆ **Published**: 30/11/2023

ABSTRACT

Aims: Our study aims to investigate the etiology of pediatric closed-globe injuries (CGI) according to gender differences.

Methods: This retrospective study includes patients with closed-globe injuries. Demographic data of the patients, type of injury, location of the injury, object causing injury, initial visual acuity, and anterior and posterior segment findings were recorded. Findings were compared according to gender.

Results: Out of 114 pediatric ocular trauma patients, 28 (24.5%) had open-globe injuries, and 86 (75.6%) had CGI. The most common cause was home in 26 (30.2%). Trauma was caused by striking a thrown object in 22 (25.5%) patients. 68 (79%) of the CGIs were contusions and 18 (21%) were lamellar lacerations. The injury zone was zone 1 in 54 (62.7%) patients, zone 2 in 28 (32.5%) patients, and zone 3 in 4 (4.6%) patients.

Conclusion: CGU can cause severe and permanent vision damage. Injuries that may occur can be prevented by taking the necessary protective measures.

Keywords: Pediatric, ocular trauma, injury

INTRODUCTION

Eye trauma is the most crucial cause of monocular vision loss in developed countries.[1] Loss of workforce and rehabilitation costs caused by people with vision loss due to these injuries are high.[2-4] It is possible to minimize these injuries with various simple precautions. Therefore, understanding the types and causes of injury is crucial for developing the measures.

Ocular trauma in children is a condition that needs to be managed promptly and adequately because of the damage caused by the injury and the predisposition of this age group to amblyopia. 8%-14% of traumas in children are eye trauma.[5] Although some studies indicate that open globe injuries (OGI) are more common in children, many studies claim the opposite. Many studies have addressed pediatric OGI and evaluated their prognosis.[10-12] Children are more prone to eye traumas by nature, and closed traumas are also high in these injuries.

Our study aims to investigate the etiology of pediatric closed globe injuries (CGI according to gender differences.

METHODS

This retrospective study includes patients who applied to Balıkesir University Faculty of Medicine Ophthalmology Department with eye trauma between January 2020 and December 2022. The study was started after the approval of the Balıkesir University Non-invasive Clinical Researches Ethics Committee (Date: 04.01.2023, Decision No: 2023/11) and was carried out in accordance with the Declaration of Helsinki.

Closed globe injury was defined as a contusion or lamellar laceration by ocular trauma classification.[13] Demographic data of the patients, type of injury, location of the injury, object causing injury, initial visual acuity, and anterior and posterior segment findings were recorded. Findings were compared according to gender.

Categorical data were expressed as numbers and percentages, and continuous variables as mean and standard deviation. Categorical data were evaluated with the chi-square test, and intergroup variables were evaluated with the one-way ANOVA (post hoc Tukey) test. Statistical analysis was performed using the Statistical Package for Social Science (SPSS 21.0, SPSS, Chicago, IL). A p-value of <0.05 was considered statistically significant.

RESULTS

Of 114 pediatric ocular trauma patients, 28 (24.5%) had OGI and 86 (75.6%) had CGI. 37 (43%) of the female CGI patients had a mean age of 8.37±4.17; 49 (57%) years, males were 8.55±3.78 years. 38 (44.1%) of the patients had the right eye, 31 (36%) had the left eye, and 17 (19.9%) had bilateral trauma.

When the trauma place was examined, the most common cause was home in 26 (30.2%) patients and school in 25 (25%)

patients. Other causes were playgrounds in 18 (21%) patients and streets in 17 (19.8). Trauma location by gender is shown in Table 1. Trauma was caused by striking a thrown object in 22 (25.5%) patients. It was sports injury in 20 (23.2%) patients, self/friend injury and animal/pet in 18 (20.9%) patients, and airgun toy in 4 (4.6%) patients. In Table 2, the causes of Trauma are classified according to gender. The most common object causing trauma was body parts in 18 (20.9%) patients, toys in 16 (18.6) patients, and stationery items such as pencils and erasers in 12 (13.%) patients. Other objects were animal rakes, wood, glass, and fiery fireworks, sparklers.

Table 1. Injury locations by gender

	Female	Male
Home	16 (43.2%)	10 (20.4%)
School	10 (27%)	15 (30.6)
Park /playground	7 (18.9)	11 (22.4%)
Street	4 (10.8%)	13 (26.5%)
p=0.090		

Table 2. Mechanism of injury by gender

	Female	Male
Self-injury, injury by friend	11 (29.7%)	7 (14.3%)
Object thrown	12 (32.4%)	14 (28.6%)
Sport-related	7 (18.9%)	13 (26.5%)
Animal/pet	7 (18.9%)	11 (22.4%)
Airgun/toy	0 (0%)	4 (8.2%)
p=0.186		

According to the OTCS, 68 (79%) of the CGI were contusions, and 18 (21%) were lamellar lacerations. The injury zone was zone 1 in 54 (62.7%) patients, zone 2 in 28 (32.5%) patients, and zone 3 in 4 (4.6%) patients. Zone 1 injuries were in the form of corneal abrasion and subconjunctival hemorrhage. Zone 2 injuries were traumatic hyphema, traumatic cataract, and traumatic iridocyclitis; zone 3 injuries were vitreous hemorrhage, retinal tear, and commotio retina.

DISCUSSION

Closed eye injuries constitute a vital group among pediatric eye traumas. In our study, CGI most commonly occurred at home due to the thrown object. It was usually in the form of contusion and zone 1 localization.

Male predominance was also present in our study, similar to the literature.[7,14-16] The fact that boys prefer more aggressive games and their reflexes are not sufficiently developed are the most critical factors in this situation. In terms of gender, injury locations and forms may also differ. The injury location in females tended to be more outdoors. Falls due to sports and injuries with febrile substances were also more common in boys. Generally speaking, most eye injuries occur due to accidentally striking or poking an object during casual play. These injuries can generally be prevented by more frequent supervision of children or by removing objects that may cause an accident.

In the literature, initial visual acuity, injury zone and concomitant pathologies are associated with prognosis in open globe injuries.[10-12] There are few studies on prognostic markers in closed-globe traumas.[14,15] Few studies indicate that initial visual acuity is also associated with prognosis in CGI. CGI inherently have a better prognosis than OGI.

The most common type of injury in CGI is contusion. In our study, subconjunctival hemorrhage was observed most frequently. In one study, the most common injury site was stated as the conjunctiva.[15] The most common cause of subconjunctival hemorrhage in adults is nontraumatic; in children, it is due to trauma.[17,18] One of the most severe conditions resulting from contusion is hyphema. Several studies have reported that hyphema is most common in CGI patients.[7-9] Correct management of the hyphema is essential regarding damage to the corneal endothelium and irreversible optic nerve damage that may occur due to its severity. This difference between studies can be attributed to the population differences in which the studies were conducted and the ease of access to the hospital. In cases such as a retinal tear, vitreous hemorrhage and commotio retina, vision can be severely affected, and permanent damage may occur. Zone 3 injuries are generally seen as sports injuries. This risk can be minimized with appropriate clothing and protective equipment that will ensure the safety of the children.

The most important limitation of our study was its retrospective design. In addition, many patients' follow-up and long-term visual results were unavailable. However, since our study aimed at CGI's etiology, our study design is independent of the long-term results.

CONCLUSION

Closed-eye traumas can cause severe and permanent vision damage. Significantly younger children can harm themselves or their playmates. Sports injuries can progress with zone 3 damage. Injuries that may occur can be prevented by taking the necessary protective measures.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of the Balıkesir University Non-invasive Clinical Researches Ethics Committee (Date: 04.01.2023 Decision No: 2023/11).

Informed Consent: Since the study was designed retrospectively, no written informed consent forms were obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declare that this study has received no financial support.

Author Contributions: All the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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