

Epidemiological and clinical characteristics of pediatric globe injuries

 Raşit Kılıç,  Şerife Gülhan Konuk

Department of Ophthalmology, Faculty of Medicine, Tokat Gaziosmanpaşa University, Tokat, Türkiye

Cite this article as: Kılıç R Konuk ŞG. Epidemiological and clinical characteristics of pediatric globe injuries. *J Compr Surg.* 2025;3(3):49-52.

Received: 06.04.2025

Accepted: 26.04.2025

Published: 29.08.2025

ABSTRACT

Aims: The aim of this study was to perform a retrospective analysis of the outcomes of childhood globe injuries diagnosed and treated at our hospital.

Methods: A retrospective review of the medical records of patients under 18 years of age, diagnosed and treated for globe injuries, was conducted at our clinic. Globe injuries were categorized into open globe injuries (OGI) and closed globe injuries (CGI). Visual acuity scores were converted into LogMAR units for standardization.

Results: A total of 29 pediatric cases were included in the study. Of these, 23 were male (79.3%) and 6 were female (20.7%). The mean age was 10.2 ± 4.1 years. Following trauma, OGI occurred in 17 cases (58.6%), while CGI occurred in 12 cases (41.4%). The initial mean best-corrected visual acuity (BCVA) was 0.96 ± 1.05 logMAR, and the mean BCVA at the last follow-up visit was 0.18 ± 0.52 logMAR for all cases ($p=0.001$). Contusion (91.7%) was the predominant injury type in CGI cases, while penetrating injury (58.8%) was the most common type of OGI. Pencil tips, wood, glass, and plastic objects were the leading causes of globe injuries. Hyphema, traumatic cataract, and iris prolapse were the most frequent associated findings.

Conclusion: Although many globe injuries in children can be prevented, they still have the potential to lead to significant physical and psychological consequences. The findings of our study may contribute to a deeper understanding of the patterns of eye injuries in children.

Keywords: Cataract, intraocular foreign body, globe injuries, trauma

INTRODUCTION

The childhood period is a phase of rapid physical, emotional, and cognitive development, and it is also a dynamic time filled with exploration and learning. During this period, various accidents and traumas are frequently encountered.¹ The active and curious nature of children makes them more vulnerable to eye injuries compared to adults.^{1,2} Eye injuries represent one of the significant health issues encountered during this period and require special attention due to their potential effects on visual function.^{1,2} These injuries typically occur as a result of sports activities, play, or household accidents and can range from superficial abrasions to severe penetrating trauma.^{1,3,4,5} Common findings associated with these injuries include corneal damage, cataracts, hyphema, intraocular hemorrhages, retinal tears, and detachments.^{3,6} Early diagnosis and appropriate treatment play a critical role in preserving visual function and preventing permanent damage.

Eye injuries are one of the leading causes of unilateral blindness in childhood. Vision loss occurring during this period can lead to psychosocial issues in addition to functional impairment.^{1,4,6,7} Furthermore, due to the long-life expectancy, vision loss imposes a socio-economic burden on both the individual and society.^{6,8,9}

It is of great importance for healthcare professionals, policymakers, and parents to be knowledgeable about the causes, types, diagnostic methods, and treatment approaches for pediatric eye injuries. Therefore, this study will focus on the causes, frequency, treatment methods, and visual outcomes of pediatric eye injuries.

METHODS

This study, carried out from 2020 to 2025 at the Department of Ophthalmology, Faculty of Medicine, Tokat Gaziosmanpaşa University, adhered to the principles outlined in the Helsinki Declaration. The study was carried out with the permission of the Tokat Gaziosmanpaşa University Non-interventional Researches Ethics Committee (Date: 05.03.2025, Decision No: 25-MOBAEK-089).

A retrospective analysis of the medical records of patients under 18 years of age, diagnosed and treated for ocular trauma, was conducted at our clinic. Data were extracted from the patient files, which included details such as age, gender, trauma cause, best corrected visual acuity (BCVA), findings from both anterior and posterior segment examinations, presence of intraocular foreign bodies, intraocular pressure

Corresponding Author: Raşit Kılıç, kilicrasit@gmail.com



This work is licensed under a Creative Commons Attribution 4.0 International License.

measurements, ultrasonic posterior segment examination findings, treatments administered, surgical interventions, and follow-up duration. The visual acuity scores were converted into LogMAR units for standardization.

Patients under 18 years of age with globe injuries were included in the study. However, patients with insufficient follow-up duration and incomplete file records were excluded. Globe injuries were categorized based on the system established by the Ocular Trauma Classification Group.⁵

Descriptive statistics were employed to analyze the data, with results expressed as mean±standard deviation and percentages. Paired sample comparisons were performed using the Wilcoxon test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

In this study, a total of 29 pediatric cases were included. Among these cases, 23 were male (79.3%) and 6 were female (20.7%). The mean age was found to be 10.2±4.1 years. Following trauma, OGI occurred in 17 cases (58.6%), while CGI occurred in 12 cases (41.4%). The initial mean BCVA was 0.96±1.05 logMAR, and the mean BCVA at the last follow-up visit was 0.18±0.52 logMAR in the total cases (p=0.001). The initial BCVA was 1.48±0.99 logMAR in OGI, while it was 0.32±0.74 logMAR in CGI (p=0.002). The BCVA at the last follow-up visit was 0.32±0.66 logMAR in OGI, while it was 0 logMAR in CGI (p=0.41). All cases in the CGI group had 20/20 BCVA at the last follow-up visit. The BCVA significantly improved in patients with CGI and OGI. The mean follow-up was 10±9.8 months.

Contusion constituted nearly all of the CGI cases. Penetrating injury was found to be the most common type of OGI, followed by rupture and intraocular foreign body. Perforating injury was not observed in this study. Zone 1 was the most affected zone in OGI. **Table 1** shows the demographic characteristics and features of the injuries.

Table 1. Demographic characteristics and features of injuries in children with ocular trauma

Variables	n	%
Gender		
Female	6	20.7
Male	23	79.3
Age (mean±SD)	10.2±4.1	
Closed globe injuries		
Contusion	11	91.7
Lamellar laceration	1	8.3
Open globe injuries		
Rupture	4	23.5
Penetrating injury	10	58.8
Perforating injury	0	0
Intraocular foreign body	3	17.6
Zone of open globe injuries		
Zone 1	15	88.2
Zone 2	1	5.9
Zone 3	1	5.9

SD: Standard deviation

When the etiological causes of globe injuries were evaluated, it was observed that pencil tips, wood, glass and plastic objects were the most common causes. **Table 2** indicates the causes of globe injuries.

Table 2. The etiological causes of globe injuries

Cause	n	%
Sharp objects		
Pencil tip	4	13.8
Glass	2	6.9
Fork	1	3.4
Wire	1	3.4
Nail	1	3.4
Utility knife	1	3.4
Thorn	1	3.4
Bar	1	3.4
Blunt trauma		
Wood	3	10.3
Plastic object	2	6.9
Firecracker explosion	2	6.9
Confetti explosion	1	3.4
Stone	1	3.4
Traffic accident	1	3.4
Toy	1	3.4
Metal bar	1	3.4
Ball	1	3.4
Pencil case	1	3.4
Fall	1	3.4
Key	1	3.4
Other/unknown	1	3.4

It was determined that hyphema, traumatic cataract, and iris prolapse were the most frequent associated findings with globe injuries. Commotio retina, conjunctival and eyelid lacerations, and pupillary sphincter rupture were observed only in CGI. Iris prolapse; intraocular foreign body, vitreous hemorrhage, vitreous loss, and iris defect were seen only in OGI. **Table 3** displays the anterior and posterior segment findings associated with globe injuries.

Table 3. Anterior and posterior segment findings associated with globe injuries

Findings n (%)	OGI n (%)	CGI n (%)
Traumatic cataract	9 (31)	1 (3.4)
Hyphema	4 (13.8)	8 (27.6)
Iris prolapse	8 (27.6)	-
Intraocular foreign body	3 (10.3)	-
Commotio retina	-	4 (13.8)
Conjunctiva laceration	-	1 (3.4)
Eyelid laceration	-	1 (3.4)
Vitreous hemorrhage	1 (3.4)	-
pupillary sphincter rupture	-	1 (3.4)
Vitreous loss	1 (3.4)	-
Iris defect	1 (3.4)	-

OGI: Open globe injuries, CGI: closed globe injuries

A patient with CGI who had eyelid and conjunctival laceration underwent primary suturing. The other cases with CGI were treated with medication. All cases with OGI underwent surgery. Primary suturing was performed on all patients. Intraocular foreign bodies were removed from the eyes of three cases. Lens clearance with phacoemulsification and intraocular lens implantation was performed in three cases during the first surgery. Pupilloplasty was carried out for one patient in a second procedure. Intraocular pressure was controlled with anti-glaucomatous medication in four hyphema cases with CGI. In three other hyphema cases with CGI, anterior chamber lavage was added to the anti-glaucomatous medication to achieve intraocular pressure control.

DISCUSSION

According to various studies, the global incidence of severe vision loss or blindness due to ocular trauma in children is considerable.¹⁰⁻¹² Despite the fact that many eye injuries can be prevented through simple precautions, a significant number of children still experience visual impairment, which can impact their psychosocial development.^{1,4} To effectively design prevention strategies, it is essential to have a comprehensive understanding of the characteristics of children who sustain ocular injuries. We believe that the results of this study may contribute to the understanding of the characteristics of globe injuries in children in our region.

Pediatric globe injuries present with diverse epidemiological and clinical features. In our study, we observed that these injuries were more prevalent in male children (79.3%) compared to females (20.7%), with a mean age of 10.2±4.1 years. This pediatric population of globe injuries was similar to others.^{2,7,8} Pirhan et al.² reported that 82% of their pediatric ocular trauma population were boys. Niyaz⁸ found a 73.3% predominance of boys in her study on childhood ocular trauma. These results are similar to those in adults when comparing gender distribution.^{11,12} When we evaluated the age distribution in our population, the results were consistent with those reported in the literature.¹⁴⁻⁷ Çetin et al.⁷ reported the mean age as 9.9±4.5 years, while Küsbeci et al.¹⁴ found it to be 9.2±4.7 years. Akça Bayar et al.⁶ reported a slightly lower mean age of 8.5±3.4 years.

The initial mean BCVA was 0.96±1.05 logMAR, which significantly improved to 0.18±0.52 logMAR at the last follow-up visit in all cases. When we divided the cases into OGI and CGI for comparison, the cases with CGI had better initial and final BCVA. All cases with CGI had 20/20 or better final visual acuity. On the other hand, some cases with OGI experienced permanent vision loss. In general, OGI results in poor visual acuity, while CGI results in better final visual acuity in children.^{11,12}

Contusion was predominantly observed in patients with CGI in our study. Akça Bayar et al.⁶ also reported a predominance of contusions in their comparative study of CGI and OGI. Contusion is generally associated with CGI in the literature.^{6,13} We primarily observed penetrating injuries in OGI in this study, which is commonly reported as the most frequent injury type in the literature.^{13,17} Additionally, we observed zone 1 injuries most frequently in this retrospective study, consistent with other studies in the literature.^{2,9,14,17,18}

The etiological causes of pediatric globe injuries are generally associated with sharp objects.^{6,9,10,18} Metal objects such as

scissors, knives, forks, glass, and pens/pencils are reported as the most common sharp objects, while wood, toys, balls, and stones are frequently cited as causes of blunt trauma in the literature.^{2,6,9,10,13,18} In this study, we observed pencil tips, wood, glass, and plastic objects as common causes of injury. Canleblebici et al.¹⁹ reported a case series of penetrating injuries caused by pencils in a study conducted in Türkiye.

When examining concomitant intraocular injuries, hyphema, traumatic cataract, iris prolapse, and commotio retina are commonly reported in the literature.¹³⁻¹⁸ In our study, traumatic cataract and iris prolapse were frequently associated with OGI, while hyphema and commotio retina were more common in CGI. These findings are similar to those reported in other studies.¹³⁻¹⁸

CONCLUSION

Although many eye injuries in children can be prevented, they still have the potential to lead to significant physical and psychological consequences. The findings of our study may contribute to a deeper understanding of the patterns of eye injuries in children. It is essential to raise public awareness and provide education about the causes of eye injuries, as well as preventive strategies, to help reduce the incidence of traumatic eye injuries in children.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of the Tokat Gaziosmanpaşa University Non-interventional Researches Ethics Committee (Date: 05.03.2025, Decision No: 25-MOBAEK-089).

Informed Consent

Because the study was designed retrospectively, no written informed consent form was 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 declared that this study has received no financial support.

Author Contributions

All of 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.

REFERENCES

1. Kaur A, Agrawal A. Paediatric ocular trauma. *Curr Sci*. 2005;89(1):43-46.
2. Pirhan D, Subaşı S, Küçük TD. Pediatrik hastalarda oküler travmaların etiyolojik özellikleri ve görsel sonuçları. *KOU Sag Bil Derg*. 2022;8(3):213-217.
3. Li X, Zarbin MA, Bhagat N. Pediatric open globe injury: a review of the literature. *J Emerg Trauma Shock*. 2015;8(4):216-223. doi:10.4103/0974-2700.166663
4. Matsa E, Shi J, Wheeler KK, McCarthy T, McGregor ML, Leonard JC. Trends in US emergency department visits for pediatric acute ocular injury. *JAMA Ophthalmol*. 2018;136(8):895-903. doi:10.1001/jamaophthalmol.2018.2062

5. Pieramici DJ, Sternberg P Jr, Aaberg TM Sr et al. A system for classifying mechanical injuries of the eye (globe). The Ocular Trauma Classification Group. *Am J Ophthalmol.* 1997;123(6):820-831. doi:10.1016/s0002-9394(14)71132-8
6. Akça Bayar S, Kayaarası Öztürker Z, Yılmaz G. Clinical characteristics and outcomes of ocular injuries in pediatric patients. *Ulus Travma Acil Cerrahi Derg.* 2022;28(5):654-661. doi:10.14744/tjtes.2021.54524
7. Çetin EN, Saraç G, Kaşıkçı A, Yaylalı V, Yıldırım C, Avunduk AM. Çocukluk çağı açık göz yaralanmalarının epidemiyolojik ve klinik özellikleri. *Türk J Ophthalmol.* 2012;42(1):16-19.
8. Niyaz L. Open globe injuries in childhood: etiology and results. *Abant Med J.* 2017;6(2):59-63. doi:10.5505/abantmedj.2017.93764
9. Acar U, Tök ÖY, Acar DE, Burcu A, Örnek F. Çocukluk çağı delici göz yaralanmalarının epidemiyolojik ve klinik değerlendirilmesi. *Türk J Ophthalmol.* 2010;40(2):62-66.
10. Puodžiuvienė E, Jokūbauskienė G, Vieversytė M, Asselineau K. A five-year retrospective study of the epidemiological characteristics and visual outcomes of pediatric ocular trauma. *BMC Ophthalmol.* 2018;18(1):10. doi:10.1186/s12886-018-0676-7
11. Al-Mahdi H, Bener A, Hashim S. Clinical pattern of pediatric ocular trauma in fast developing country. *Int Emerg Nurs.* 2011;19(4):186-191. doi:10.1016/j.ienj.2011.06.008
12. Lee CH, Su WY, Lee L, Yang ML. Pediatric ocular trauma in Taiwan. *Chang Gung Med J.* 2008;31(1):59-65.
13. Kadappu S, Silveira S, Martin F. Aetiology and outcome of open and closed globe eye injuries in children. *Clin Exp Ophthalmol.* 2013;41(5):427-434. doi:10.1111/ceo.12034
14. Küsbeci T, Yiğit T, Demirhan E, Çatal Ç, Tezcan S. Çocukluk çağı göz travmalarının epidemiyolojik değerlendirilmesi. *Kocatepe Med J.* 2012;13(3):153-159.
15. Altıntaş L, Altıntaş Ö, Yüksel N, Pirhan D, Özkan B, Çağlar Y. Türkiye'nin kuzeybatısındaki açık göz yaralanma paterni: retrospektif bir çalışma. *Ulus Travma Acil Cerrahi Derg.* 2011;17(4):334-339. doi:10.5505/tjtes.2011.78861
16. Özbek S, Yalnız Akkaya Z, Şingar Özdemir E, Örnek F, Burcu A. Delici göz yaralanması ile acil servise başvuran hastaların epidemiyolojik ve klinik verileri. *MN Oftalmoloji.* 2018;25(2):71-75.
17. Saksiriwutto P, Charuchinda P, Atchaneeyasakul LO, Surachatkumtonekul T, Phamonvaechavan P. epidemiology of pediatric open globe injuries in a university hospital in Thailand. *Cureus.* 2021;13(11):e19366. doi:10.7759/cureus.19366
18. Kirmaci Kabakci A, Kemer Atik B, Livan EH, Yurttaser Ocak S, Elcioglu MN. Pediatric open-globe injuries: clinical characteristics and outcomes of repair in a tertiary center in Istanbul, Turkey. *Beyoglu Eye J.* 2024;9(4):213-219. doi:10.14744/bej.2024.19577
19. Canleblebici M, Yildirim H, Balbaba M. Clinical aspects of pediatric penetrating corneal eye injuries with pencil. *Firat Med J.* 2022;27(1):38-42.