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Clinical Characteristics and Prognostic Factors Associated with Poor Ocular Trauma Score Categories: A Tertiary Referral Center Experience from Türkiye

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Abstract

Background

Ocular trauma is a leading cause of preventable visual impairment worldwide. Although the Ocular Trauma Score (OTS) and Pediatric Ocular Trauma Score (POTS) are widely used for prognostic assessment, studies evaluating factors associated with poor OTS/POTS categories across the full spectrum of ocular trauma remain limited. Therefore, this study aimed to characterize the full spectrum of ocular trauma in a tertiary referral center by evaluating demographic characteristics, injury patterns, clinical findings, and predictors of poor OTS/POTS categories in both adult and pediatric patients.

Methods

This retrospective cohort study included 500 consecutive patients presenting with ocular trauma between January 2023 and December 2025. Demographic characteristics, injury causes and mechanisms, injury-causing agents, ocular findings, treatment modalities, and OTS/POTS categories were recorded. Adult patients were assessed using the OTS, whereas pediatric patients were assessed using the POTS. Poor ocular trauma severity was defined as OTS/POTS categories 1–2. Univariable analyses and multivariable logistic regression were performed to identify independent predictors of poor OTS/POTS categories.

Results

A total of 500 patients (72.0% male; mean age, 32.35 ± 20.14 years) were included. OTS was applied to 403 (80.6%) adults and POTS to 97 (19.4%) pediatric patients. Accidents (35.4%) and assaults (24.2%) were the leading causes of injury, while blunt trauma was the predominant mechanism (68.6%). In univariable analyses, retinal detachment (OR, 115.2; 95% CI, 45.4–292.6), open-globe injury (OR, 68.6; 95% CI, 30.5–154.2), vitreous hemorrhage (OR, 58.8; 95% CI, 26.6–129.9), traumatic cataract (OR, 53.1; 95% CI, 24.3–116.4), hyphema (OR, 24.6; 95% CI, 12.1–50.0), and endophthalmitis (OR, 21.5; 95% CI, 3.8–121.0) were significantly associated with poor OTS/POTS categories (all $p \leq 0.001$). In multivariable analysis, retinal detachment (OR 15.29, 95% CI 3.15–74.09; $p = 0.001$) and open-globe injury (OR 10.36, 95% CI 2.44–43.90; $p = 0.002$) remained independent predictors of poor OTS/POTS categories. Overall, nine patients (1.8%) underwent evisceration or enucleation.

Conclusions

This study provides a comprehensive overview of ocular trauma in a large cohort of adult and pediatric patients. Retinal detachment and open-globe injury were identified as independent predictors of poor

OTS/POTS categories. Early recognition of these high-risk features may facilitate risk stratification, optimize clinical decision-making, and improve patient counseling.

Introduction

Ocular trauma remains one of the leading causes of preventable monocular visual impairment and blindness worldwide and continues to represent a major public health problem. Although the global age-standardized incidence of ocular trauma has gradually declined over recent decades, its absolute burden remains substantial because of population growth and aging. (1–3) Ocular trauma predominantly affects children and economically active adults and is frequently associated with emergency department visits, surgical interventions, prolonged follow-up, and substantial socioeconomic burden. (1–4) The epidemiology and severity of ocular injuries vary according to age, sex, mechanism of injury, and geographic region, highlighting the importance of regional epidemiological studies for understanding injury patterns and developing preventive strategies. (2–4)

The clinical spectrum of ocular trauma ranges from minor superficial injuries to devastating globe disruption that may result in permanent visual impairment or even loss of the eye. Accurate early assessment of injury severity is therefore essential for predicting visual prognosis, guiding treatment decisions, prioritizing surgical intervention, and counseling patients and their families. (5) To provide a standardized method for prognostic evaluation, Kuhn et al. developed the Ocular Trauma Score (OTS), which estimates the probability of final visual outcomes based on clinical findings at initial presentation. (5) Because the OTS was originally designed for adults and relies heavily on the assessment of initial visual acuity, the Pediatric Ocular Trauma Score (POTS) was subsequently introduced to improve prognostic assessment in children, particularly in cases where reliable visual acuity testing is challenging. (6–8) Both scoring systems have subsequently been validated in several clinical studies and are widely used in clinical practice and ocular trauma research for risk stratification and prognostic evaluation. (9–10)

Several clinical and ocular factors have been reported to influence visual prognosis following ocular trauma. Previous studies have identified retinal detachment, open-globe injury, relative afferent pupillary defect, vitreous hemorrhage, endophthalmitis, injury zone, and poor presenting visual acuity as important predictors of unfavorable visual outcomes. (10–15) However, the reported prognostic factors have varied considerably across studies because of differences in study populations, injury characteristics, outcome measures, and follow-up duration. Moreover, most published studies have focused primarily on open-globe injuries or specific patient subgroups, whereas data evaluating a broad spectrum of ocular trauma in both adult and pediatric patients remain relatively limited. (10–16) Despite these advances, considerable heterogeneity exists among published studies regarding patient populations, injury characteristics, and outcome definitions. Further evaluation of demographic characteristics, injury patterns, and clinical predictors in large, real-world cohorts may improve early risk stratification and contribute to better management of patients with ocular trauma.

Although previous studies have substantially improved the understanding of prognostic factors in ocular trauma, important knowledge gaps persist. Most available studies have evaluated either open-globe injuries or pediatric ocular trauma separately, whereas comprehensive analyses including both adult and pediatric patients across the full spectrum of ocular trauma are scarce. (10–16) Furthermore, few studies have simultaneously examined poor OTS/POTS categories together with demographic characteristics, injury patterns, and treatment requirements in both adult and pediatric populations. Eye-sacrificing procedures, including evisceration and enucleation, represent the most severe outcomes of ocular trauma; however, the clinical characteristics associated with these procedures have been less extensively investigated. (17) A comprehensive evaluation of demographic characteristics, injury mechanisms, clinical findings, and prognostic indicators in routine clinical practice may provide additional evidence for early risk stratification and management of ocular trauma.

Therefore, this study aimed to comprehensively evaluate the demographic characteristics, injury patterns, clinical findings, treatment modalities, and factors associated with poor OTS/POTS categories in a large cohort of adult and pediatric patients presenting with ocular trauma to a tertiary eye emergency department. In addition, factors associated with the need for surgical intervention and eye-sacrificing procedures were explored.

Methods

Study Design and Patients

This retrospective cohort study included consecutive patients of all ages who presented with ocular trauma to the Eye Emergency Department of Ankara Etlik City Hospital between January 2023 and December 2025. The study cohort was initially identified through the hospital electronic medical record system using the ICD-10 diagnostic code S05.8 (Other injuries of eye and orbit), which is routinely used to code ocular trauma presentations at our institution. The medical records of all potentially eligible patients were subsequently reviewed manually by one investigator to verify the diagnosis of ocular trauma, determine eligibility for inclusion, and extract demographic characteristics, injury mechanisms, ocular findings, treatment modalities, and study variables.

The study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Institutional Ethics Committee of Ankara Etlik City Hospital. The requirement for informed consent was waived because of the retrospective design of the study.

Patients with documented ocular trauma were eligible for inclusion regardless of age. Patients with incomplete medical records or missing data required for Ocular Trauma Score (OTS) or Pediatric Ocular Trauma Score (POTS) calculation were excluded.

Clinical Evaluation and Data Collection

The medical records of all eligible patients were manually reviewed by one of the investigators to verify the diagnosis of ocular trauma and extract the study variables. The collected variables included age, sex, cause of injury, mechanism of injury, documented injury-causing agent, presenting visual acuity, ocular findings, treatment modality, and Ocular Trauma Score (OTS)/Pediatric Ocular Trauma Score (POTS) category.

Presenting visual acuity was recorded at the initial examination using Snellen visual acuity charts and converted to logarithm of the minimum angle of resolution (logMAR) values for statistical analyses. Non-numeric visual acuities (counting fingers, hand motion, light perception, and no light perception) were converted to logMAR values according to previously published methods. (18)

Ocular findings included open-globe injury, retinal detachment, vitreous hemorrhage, hyphema, traumatic cataract, intraocular foreign body, and endophthalmitis. Treatment modality was categorized as medical management or surgical intervention, and eye-sacrificing procedures (evisceration or enucleation) were recorded separately.

The Ocular Trauma Score (OTS) was calculated for adult patients according to the original scoring system described by Kuhn et al. (5), whereas the Pediatric Ocular Trauma Score (POTS) was calculated for pediatric patients using the original published scoring system. (19) Patients were subsequently classified into five OTS/POTS categories, and poor ocular trauma severity was defined as OTS/POTS categories 1 and 2.

Outcome Measures

The primary outcome was poor ocular trauma severity, defined as OTS/POTS categories 1–2. Additional outcomes included the need for surgical intervention and eye-sacrificing procedures (evisceration or enucleation).

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp., Armonk, NY, USA). The distribution of continuous variables was assessed using the Shapiro–Wilk test. Continuous variables are presented as mean ± standard deviation (SD) or median (interquartile range [IQR]), as appropriate. Categorical variables are presented as frequencies and percentages.

Comparisons between groups were performed using the independent-samples t-test or Mann–Whitney U test for continuous variables, as appropriate. Categorical variables were compared using Pearson's chi-square test or Fisher's exact test when expected cell counts were less than five.

Variables that were statistically significant in the univariable analyses and considered clinically relevant were entered into a multivariable binary logistic regression model to identify independent predictors of poor OTS/POTS categories. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated. For

univariable categorical comparisons, ORs were derived from contingency table risk estimates. A two-sided p value < 0.05 was considered statistically significant.

Results

Patient Characteristics

A total of 500 patients with ocular trauma were included in the study. The mean age was 32.35 ± 20.14 years. Of the patients, 360 (72.0%) were male and 140 (28.0%) were female. The mean age was 32.29 ± 18.74 years in males and 32.52 ± 23.43 years in females. According to the trauma scoring system applied, 403 (80.6%) patients were evaluated using the Ocular Trauma Score (OTS) and 97 (19.4%) using the Pediatric Ocular Trauma Score (POTS). The mean age was 38.04 ± 18.21 years in the OTS group and 8.71 ± 4.21 years in the POTS group (Table 1).

Table 1
Demographic and Baseline Characteristics of the Study Population

Variable	Overall (n = 500)
Age, years, mean ± SD	32.35 ± 20.14
Male sex, n (%)	360 (72.0)
Female sex, n (%)	140 (28.0)
Adult patients (OTS), n (%)	403 (80.6)
Pediatric patients (POTS), n (%)	97 (19.4)
Age of OTS group, years, mean ± SD	38.04 ± 18.21
Age of POTS group, years, mean ± SD	8.71 ± 4.21

Injury Characteristics

The causes, mechanisms, and documented injury-causing agents are summarized in Table 2. Accidental injuries represented the most common cause of ocular trauma (177 patients, 35.4%), followed by assault (121, 24.2%), falls (63, 12.6%), and traffic-related injuries (59, 11.8%). Occupational injuries accounted for 23 cases (4.6%), whereas sports-related injuries comprised 22 cases (4.4%). Earthquake-related injuries, thermal/explosion injuries, animal-related injuries, chemical injuries, and firearm injuries were less frequent. Regarding the mechanism of injury, blunt trauma was the predominant mechanism, occurring in 343 patients (68.6%), followed by penetrating injuries in 135 patients (27.0%). Chemical and thermal injuries accounted for 19 (3.8%) and 3 (0.6%) cases, respectively. Among the documented injury-causing agents, unspecified objects were the most frequently recorded (171, 34.2%), followed by the human body (150, 30.0%), metal objects (30, 6.0%), household objects (28, 5.6%), wooden objects (21, 4.2%), and

sports equipment or toys (20, 4.0%). Less common agents included sharp/penetrating objects, chemical agents, thermal/explosion agents, glass/ceramic objects, animals, stone/concrete objects, and firearms (Table 2).

Table 2
A. Cause of injury

Cause of injury	n	%
Accidental injuries	177	35.4
Assault	121	24.2
Falls	63	12.6
Traffic-related injuries	59	11.8
Occupational injuries	23	4.6
Sports/Recreational injuries	22	4.4
Earthquake-related injuries	9	1.8
Thermal/Explosion injuries	9	1.8
Animal-related injuries	7	1.4
Chemical injuries	6	1.2
Firearm injuries	4	0.8
Total	500	100.0

Table 2
B. Mechanism of injury

Mechanism of injury	n	%
Blunt	343	68.6
Penetrating	135	27.0
Chemical	19	3.8
Thermal	3	0.6
Total	500	100.0

Clinical Findings

Orbital fracture was the most frequent clinical finding (37.2%), followed by periorbital ecchymosis (24.0%) and subconjunctival hemorrhage (18.8%). Open-globe injury was identified in 52 patients (10.4%), vitreous hemorrhage in 49 (9.8%), traumatic cataract in 48 (9.6%), retinal detachment in 39 (7.8%), intraocular foreign body in 18 (3.6%), and endophthalmitis in six patients (1.2%). Surgical intervention was performed in 122 patients (24.4%), and nine patients (1.8%) ultimately underwent evisceration or enucleation (Table 3).

Table 3
Clinical Findings

Clinical finding	**n (%)**
Orbital fracture	186 (37.2)
Periorbital ecchymosis	120 (24.0)
Subconjunctival hemorrhage	94 (18.8)
Eyelid injury	78 (15.6)
Hyphema	55 (11.0)
Open-globe injury	52 (10.4)
Vitreous hemorrhage	49 (9.8)
Traumatic cataract	48 (9.6)
Retinal detachment	39 (7.8)
Commotio retinae	39 (7.8)
Intraocular foreign body	18 (3.6)
Endophthalmitis	6 (1.2)
Evisceration/Enucleation	9 (1.8)
Values are presented as n (%).	

Factors Associated with Poor OTS/POTS Categories

Patients with poor OTS/POTS categories (categories 1–2) were significantly more likely to have retinal detachment, open-globe injury, vitreous hemorrhage, traumatic cataract, hyphema, and endophthalmitis than patients in OTS/POTS categories 3–5 (all $p \leq 0.001$). In addition, poor OTS/POTS categories were more frequent in male patients than in female patients (10.8% vs. 5.0%, $p = 0.043$), whereas no significant difference was observed between pediatric and adult patients (13.4% vs. 8.2%, $p = 0.111$).

In the univariable analyses, contingency table risk estimates demonstrated that retinal detachment showed the strongest association with poor OTS/POTS categories (OR, 115.2; 95% CI, 45.4–292.6; p < 0.001), followed by open-globe injury (OR, 68.6; 95% CI, 30.5–154.2; p < 0.001), vitreous hemorrhage (OR, 58.8; 95% CI, 26.6–129.9; p < 0.001), traumatic cataract (OR, 53.1; 95% CI, 24.3–116.4; p < 0.001), hyphema (OR, 24.6; 95% CI, 12.1–50.0; p < 0.001), and endophthalmitis (OR, 21.5; 95% CI, 3.8–121.0; p = 0.001) (Table 4).

Table 4. Factors Associated with Poor OTS/POTS Categories

Univariable Analysis

Variable	Odds Ratio (95% CI)*	p value
Retinal detachment	115.2 (45.4–292.6)	<0.001
Open-globe injury	68.6 (30.5–154.2)	<0.001
Vitreous hemorrhage	58.8 (26.6–129.9)	<0.001
Traumatic cataract	53.1 (24.3–116.4)	<0.001
Hyphema	24.6 (12.1–50.0)	<0.001
Endophthalmitis	21.5 (3.8–121.0)	0.001

Multivariable Binary Logistic Regression

Variable	Adjusted OR (95% CI)	p value
Retinal detachment	15.29 (3.15–74.09)	0.001
Open-globe injury	10.36 (2.44–43.90)	0.002

Model Performance

Statistic	Value
Omnibus test	$\chi^2 = 159.812$, p <0.001
Nagelkerke R^2	0.596
Overall classification accuracy	95.6%

* Odds ratios in the univariable analysis were derived from contingency table risk estimates based on Pearson's chi-square or Fisher's exact test.

Adjusted odds ratios were obtained from a multivariable binary logistic regression model including variables that were statistically significant in the univariable analyses and considered clinically relevant.

Abbreviations: OR, odds ratio; CI, confidence interval.
Variables that were statistically significant in the univariable analyses and considered clinically relevant were entered into a multivariable logistic regression model. Retinal detachment (OR, 15.29; 95% CI, 3.15–74.09; p = 0.001) and open-globe injury (OR, 10.36; 95% CI, 2.44–43.90; p = 0.002) remained independent predictors of poor OTS/POTS categories. The final model demonstrated good overall performance (Omnibus test: χ^2=159.812, p < 0.001), with a Nagelkerke R^2 of 0.596 and an overall classification accuracy of 95.6% (Table 4).

Association of Sex and Age Group with Ocular Trauma Severity and Clinical Outcomes

Male patients had significantly higher rates of poor OTS/POTS categories than female patients (10.8% vs. 5.0%, p = 0.043). Open-globe injury (12.5% vs. 5.0%, p = 0.014) and the need for surgical intervention (28.3% vs. 14.3%, p = 0.001) were also significantly more frequent in male patients.

Although pediatric patients showed higher frequencies of poor OTS/POTS categories (13.4% vs. 8.2%), open-globe injury (12.4% vs. 9.9%), and retinal detachment (9.3% vs. 7.4%) than adults, none of these differences reached statistical significance (all p > 0.05) (Table 5).

Table 5. Association of Sex and Age Group with Ocular Trauma Severity and Clinical Outcomes

a. Sex

Outcome	Female (%)	Male (%)	p value
Poor OTS/POTS	5.0	10.8	0.043
Open-globe injury	5.0	12.5	0.014
Surgical intervention	14.3	28.3	0.001

b. **Age Group**

Outcome	Pediatric (%)	Adult (%)	p value
Poor OTS/POTS	13.4	8.2	0.111
Open-globe injury	12.4	9.9	0.479
Retinal detachment	9.3	7.4	0.545

Pearson's chi-square test was used for all comparisons.

Values are presented as percentages.

Poor OTS/POTS was defined as OTS/POTS categories 1–2.

Clinical Factors Associated with Evisceration/Enucleation

Nine patients (1.8%) underwent evisceration or enucleation. Patients requiring eye-sacrificing procedures had significantly higher rates of poor OTS/POTS categories (88.9% vs. 7.7%, $p < 0.001$), open-globe injury (77.8% vs. 9.2%, $p < 0.001$), and retinal detachment (66.7% vs. 6.7%, $p < 0.001$) than those who did not undergo evisceration or enucleation (Table 6).

Table 6
Clinical Characteristics Associated with Evisceration/Enucleation

Variable	**No Evisceration/Enucleation (%)**	**Evisceration/Enucleation (%)**	**p value**
Poor OTS/POTS	7.7	88.9	< 0.001
Open-globe injury	9.2	77.8	< 0.001
Retinal detachment	6.7	66.7	< 0.001
Pearson's chi-square test or Fisher's exact test was used for categorical comparisons, as appropriate.			
Values are presented as percentages.			
Poor OTS/POTS was defined as OTS/POTS categories 1–2.			

Discussion

In this retrospective cohort study of 500 patients presenting with ocular trauma to a tertiary eye emergency department, several important findings were identified. Accidental injuries and assault were the leading causes of ocular trauma, while blunt trauma represented the predominant injury mechanism. Male patients had higher rates of poor OTS/POTS categories, open-globe injury, and surgical intervention than female patients. Furthermore, retinal detachment and open-globe injury emerged as independent

predictors of poor OTS/POTS categories. Patients who underwent evisceration or enucleation also had markedly higher frequencies of poor OTS/POTS categories, retinal detachment, and open-globe injury.

The distribution of injury causes and mechanisms observed in our cohort deserves particular attention. Accidental injuries were the leading cause of ocular trauma overall, whereas assault represented a major cause among adults. Previous epidemiological studies have demonstrated substantial geographic variation in the mechanisms of ocular trauma, largely reflecting differences in socioeconomic conditions, occupational exposure, recreational activities, and healthcare systems. In many developed countries, falls and sports-related injuries are among the leading causes of pediatric ocular trauma, whereas occupational injuries and road traffic accidents are more frequently reported in adults. In contrast, assault represents a major cause of ocular trauma in several low- and middle-income countries, particularly among young adult males. These findings support the concept that preventive strategies should be tailored according to regional epidemiological characteristics rather than adopting a universal approach. (1–4, 20) The relatively high proportion of assault-related injuries observed in our study may partly reflect the referral pattern of our tertiary eye emergency department, which serves as a regional trauma center and therefore receives a greater number of severe interpersonal violence- and disaster-related ocular injuries than primary or secondary healthcare facilities. Human body and unspecified objects constituted the most frequently documented injury-causing agents. The high proportion of unspecified objects likely reflects the limitations of retrospective documentation in routine clinical practice.

An additional finding unique to our cohort was the presence of earthquake-related ocular trauma. Türkiye is located in one of the world's most seismically active regions, and the study period included the devastating February 6, 2023 Kahramanmaraş earthquakes. As a tertiary referral center, our hospital received patients transferred from the affected provinces, and earthquake-related injuries accounted for 2.2% of all ocular trauma cases. Although this proportion was relatively small, the inclusion of disaster-related injuries may have influenced the spectrum of trauma mechanisms observed in our cohort. Earthquake-associated ocular injuries are typically characterized by blunt orbital trauma, periocular lacerations, orbital fractures, and injuries caused by falling debris or building collapse, findings that are consistent with previous reports from the February 2023 Türkiye earthquakes. These observations underscore the importance of disaster preparedness and multidisciplinary ophthalmic emergency services in earthquake-prone countries such as Türkiye. (21) Within the blunt trauma group, injuries were most frequently caused by human body contact, wooden sticks, stones, and metallic objects. Similar injury patterns have been reported previously, with wooden sticks, stones, metallic objects, and fists representing the leading causes of blunt ocular trauma in both pediatric and adult populations. (22)

Male predominance in ocular trauma observed in our cohort is consistent with previous epidemiological studies. Males accounted for 72.0% of all patients and had significantly higher rates of poor OTS/POTS categories, open-globe injury, and surgical intervention than females. Occupational and sports-related injuries were also observed predominantly in males, reflecting differences in occupational exposure and recreational activities. Occupational injuries occurred exclusively in adults, whereas sports-related

injuries were observed only in males, further supporting the influence of occupational exposure and recreational activities on the epidemiology of ocular trauma. These findings are consistent with previous reports demonstrating that males sustain the majority of ocular injuries, particularly those related to occupational exposure, sports, and high-energy trauma, whereas differences in injury mechanisms largely reflect age- and sex-related patterns of daily activities and risk exposure rather than biological sex alone. (4, 20) Orbital fracture was the most common clinical finding in our cohort, occurring in more than one-third of patients. This relatively high frequency likely reflects the referral pattern of our tertiary eye emergency department, which receives a considerable number of patients with orbital trauma, including blow-out and other orbital wall fractures requiring detailed ophthalmic and neuro-ophthalmic evaluation. Unlike many previous studies focusing primarily on open-globe injuries, our cohort included the entire spectrum of ocular trauma, including orbital trauma, adnexal injuries, and closed-globe injuries.

One of the principal findings of the present study was that retinal detachment and open-globe injury remained independent predictors of poor OTS/POTS categories after multivariable adjustment. These findings are consistent with previous studies identifying posterior segment involvement, particularly retinal detachment, and open-globe injury as major determinants of poor visual prognosis following ocular trauma. Retinal detachment generally reflects severe posterior segment damage requiring complex surgical management and is frequently associated with unfavorable anatomical and functional outcomes. Likewise, open-globe injuries are characterized by extensive disruption of ocular structures and carry a substantially higher risk of irreversible visual loss and ocular complications than closed-globe injuries. (9, 11–14) Although several additional clinical findings, including vitreous hemorrhage, traumatic cataract, hyphema, and endophthalmitis, were significantly associated with poor OTS/POTS categories in the univariable analyses, only retinal detachment and open-globe injury remained independent predictors in the final multivariable model, suggesting that these factors may represent the most robust indicators of injury severity within our cohort.

The Ocular Trauma Score (OTS) and Pediatric Ocular Trauma Score (POTS) are widely used prognostic tools for estimating visual outcomes after ocular trauma. Previous studies have demonstrated that both scoring systems correlate well with final visual outcomes. Irawati et al. reported strong correlations between both OTS and POTS and final visual acuity in pediatric globe injuries, while also showing that OTS was applicable across all pediatric age groups and that POTS remained useful even when presenting visual acuity could not be reliably assessed. (6) More recently, Rezaei et al. demonstrated in a systematic review and meta-analysis that ocular trauma scoring systems, particularly the Ocular Trauma Score, provide good predictive performance for final visual outcomes after open-globe injury, supporting their continued use in clinical practice. (8) Rather than validating these scoring systems, our study focused on the clinical characteristics associated with poor OTS/POTS categories in a cohort that included both adult and pediatric patients across the full spectrum of ocular trauma.

Another noteworthy finding of the present study was the close association between eye-sacrificing procedures and markers of severe ocular injury. Patients who underwent evisceration or enucleation had markedly higher frequencies of poor OTS/POTS categories, retinal detachment, and open-globe injury

than those managed without eye-sacrificing procedures. These findings are in agreement with previous studies showing that severe globe disruption and posterior segment involvement substantially increase the risk of globe loss following ocular trauma. (9, 23) Although only a small proportion of patients required evisceration or enucleation, recognizing these high-risk clinical characteristics at presentation may assist clinicians in surgical planning and improve patient counseling regarding the likelihood of globe preservation.

The strengths of this study include the relatively large sample size, the inclusion of both pediatric and adult patients, and the comprehensive evaluation of demographic characteristics, injury mechanisms, clinical findings, and prognostic factors in a real-world tertiary eye emergency setting. In addition, unlike many previous studies focusing exclusively on open-globe injuries or specific age groups, our cohort encompassed the full spectrum of ocular trauma encountered in routine clinical practice.

This study also has several limitations. First, its retrospective single-center design may have introduced selection and information bias. Second, some clinical variables were unavailable or incompletely documented because of the retrospective review of medical records. Third, because this study was conducted at a tertiary referral center, the findings may not be fully generalizable to other healthcare settings or populations. In addition, the classification of injury causes and injury-causing agents was based on information documented in the medical records and may have been affected by incomplete documentation in some patients. Fourth, because final visual acuity data were unavailable for a substantial proportion of patients, the predictive performance of the OTS and POTS for final visual outcomes could not be evaluated. Instead, this study focused on identifying clinical characteristics associated with poor OTS/POTS categories. Finally, only nine patients underwent evisceration or enucleation; therefore, analyses related to eye-sacrificing procedures should be interpreted with caution and require confirmation in larger cohorts.

In conclusion, this study provides a comprehensive overview of ocular trauma across the full spectrum of injuries in a large tertiary eye emergency cohort including both adult and pediatric patients. The distribution of injury causes and mechanisms differed according to age and sex. Retinal detachment and open-globe injury emerged as independent predictors of poor OTS/POTS categories, while patients requiring evisceration or enucleation exhibited substantially more severe ocular injuries. These findings may facilitate early risk stratification, support clinical decision-making, and improve patient counseling in routine ophthalmic emergency practice.

Declarations

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None.

Author contributions

SCD: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft.

GBK, KS, TŞ, BBA: Data curation, Writing – review & editing, Supervision.

All authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available because they contain information that could compromise participant privacy but are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Ankara Etlik City Hospital. Due to the retrospective design of the study, the requirement for informed consent was waived by the Ethics Committee. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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