ORIGINAL ARTICLE

Ocular trauma presentations to a tertiary emergency department: Demographic characteristics, injury mechanisms, and clinical outcomes

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ABSTRACT

BACKGROUND: This study aimed to evaluate the demographic characteristics, etiological factors, associated injuries, and clinical outcomes of patients presenting to a tertiary emergency department with ocular trauma.

METHODS: This retrospective observational study included 6,557 patients who presented to the Emergency Department of Süleyman Yalçın City Hospital with ocular trauma between 2022 and 2025. Demographic data, trauma mechanisms, physical examination findings, associated injuries, need for surgical intervention, and clinical outcomes were evaluated. Categorical variables were analyzed using the chi-square test, while Student's t-test and the Mann–Whitney U-test were used for continuous variables.

RESULTS: Of the patients, 85.4% (n=5,598) were male, and 52.9% were aged between 20 and 39 years. The most common reason for presentation was ocular foreign body injury (88.9%), and the most frequent physical examination finding was corneal abrasion (30.9%). Computed tomography (CT) was performed in 8.6% of cases. In 95.9% of patients, ocular trauma occurred without associated injuries, and 1.5% required surgical intervention. Overall, 97.9% of patients were discharged from the emergency department. Ocular foreign body injury (p<0.001), falls (p<0.001), traffic accidents (p=0.004), penetrating or sharp object injuries (p<0.001), and chemical injuries (p=0.002) were more frequent in males. Female sex (p<0.001), age over 60 years (p<0.001), Glasgow Coma Scale (GCS) score below 13 (p<0.001), and the presence of associated injuries (p<0.001) were associated with increased surgical intervention. Female sex (p<0.001), age under 9 years (p<0.001) and over 60 years (p<0.001), GCS score ≤13, presentation due to falls (p<0.001) or traffic accidents (p<0.001), and the presence of orbital or extraocular bone fractures (p<0.001) were associated with higher hospitalization rates.

CONCLUSION: Ocular trauma predominantly affected young males and was most commonly caused by foreign bodies. Corneal abrasion was the most frequent finding. Most cases involved isolated ocular trauma, did not require CT, and were discharged from the emergency department. Female sex, pediatric and geriatric age groups, low GCS scores, and trauma related to falls or traffic accidents were associated with increased surgical intervention and hospitalization.

Keywords: Concomitant injuries; eye trauma; hospitalization; mechanism; outcome; outpatient discharge; surgical intervention.

INTRODUCTION

Ocular trauma is one of the most common causes of visual impairment and preventable blindness and has become a public health problem. Worldwide, approximately 1.6 million people suffer from blindness due to ocular injuries.[1] While serious complications such as blindness are less frequent in developed countries, ocular trauma has been reported as one of the major causes of monocular blindness in African countries.[2,3]

Depending on the severity of trauma, mild injuries such as

Cite this article as: Demir H, Behcet Al. Ocular trauma presentations to a tertiary emergency department: demographic characteristics, injury mechanisms, and clinical outcomes. Ulus Travma Acil Cerrahi Derg 2026;32:1201-1210.

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Ulus Travma Acil Cerrahi Derg 2026;32(10):1201-1210 DOI: 10.14744/tjtes.2026.62393

Submitted: 10.01.2026 Revised: 10.03.2026 Accepted: 03.04.2026 Published: 06.10.2026

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corneal abrasions, eyelid lacerations, and foreign body penetration are frequently observed; however, ocular trauma may also lead to severe complications, including significant loss of visual function and blindness.[4] As with all types of trauma, patients with traumatic eye injuries most commonly present first to emergency departments. In the United States, ocular injuries account for approximately 3% of all emergency department visits.[5] These injuries result from various mechanisms, including motor vehicle accidents, falls from height, industrial accidents, violence, and domestic accidents. In addition, ocular trauma may be accompanied by injuries to other organ systems. Ocular injuries have been reported to accompany approximately 84% of head trauma cases.[6]

The most common ocular injuries occur due to blunt trauma and are generally treated conservatively. In contrast, penetrating ocular injuries usually require surgical intervention and are, therefore, managed with hospital admission.[7]

Young males are more frequently exposed to ocular trauma.[8] The most affected structures are the conjunctiva, retina, cornea, and sclera. Conjunctival injuries are usually minor, such as subconjunctival hemorrhage and conjunctival laceration, whereas optic nerve and retinal injuries threaten visual function and may result in vision loss.[9]

In patients with ocular trauma, ocular evaluation is performed after life-threatening injuries are stabilized within the scope of primary care.[10] However, in patients with major trauma, ocular injuries may be overlooked during the evaluation of life-threatening injuries involving large anatomical regions, such as the head and neck, abdomen, and chest. Factors including altered mental status, distracting injuries, and limited experience in ocular examination may also contribute to delayed recognition of ocular injuries.[11] Systematic evaluation and management of patients with ocular trauma are therefore vital for preserving visual function and preventing morbidity. The ability of emergency physicians to recognize ocular trauma during the initial assessment and manage it appropriately contributes significantly to patient prognosis.

In this study, the demographic characteristics, trauma mechanisms, physical examination findings, presence of associated injuries, radiological findings, surgical interventions, and clinical outcomes of consecutive patients presenting with ocular trauma to the emergency department of Süleyman Yalçın City Hospital between August 1, 2022, and August 1, 2025, were evaluated. The findings are expected to contribute to the identification and reduction of regional risk factors. In addition, this study aims to contribute to the literature on patients presenting to emergency departments and to provide a scientific basis for future preventive and corrective health policies. However, large-scale emergency department-based data guiding clinical decision-making regarding imaging, surgical intervention, and hospitalization in patients with ocular trauma remains limited. Therefore, this large case series study focuses on identifying trauma mechanisms, imaging requirements, associated injuries in adjacent regions, the need for surgical intervention, and factors associated with hospitalization among patients with ocular trauma presenting to a tertiary emergency department.

MATERIALS AND METHODS

Study Design

This study was designed as a retrospective observational study and conducted in the Emergency Department of Süleyman Yalçın City Hospital, a tertiary-level center. Ethical approval was obtained from the Ethics Committee of Süleyman Yalçın City Hospital (Date: 28.08.2025, Decision no: 2025/0142). The study was designed in accordance with the STROBE guideline.

Inclusion and Exclusion Criteria

All patients who presented to the Emergency Department of Süleyman Yalçın City Hospital with ocular trauma between August 1, 2022, and August 1, 2025, were included, except for those with incomplete data in the hospital registry system.

Data Collection

During the study period, a total of 8,890,676 patients presented to all units of Süleyman Yalçın City Hospital, and 1,592,402 patients presented to the emergency department. Among emergency department admissions, 6,623 patients (0.4%) presented with ocular trauma. Patient data were obtained retrospectively through the hospital electronic information system (Nucleus). The collected data were recorded on predefined study forms and subsequently transferred to Excel files.

For consecutive patients presenting with ocular trauma between August 01, 2022, and August 01, 2025, the following variables were evaluated: Demographic characteristics (age, sex, and occupation), Glasgow Coma Scale (GCS) score at presentation, trauma mechanism (traffic accident, penetrating or sharp object injury, assault, foreign body injury, chemical injury, etc.), physical examination findings (complete or partial vision loss, conjunctival hemorrhage, eyelid laceration, eyelid incision, hyphema, retinal detachment, corneal abrasion, lens dislocation, periorbital edema, etc.), presence of associated injuries, radiological findings, ophthalmology consultations, surgical interventions performed, and patient outcomes (hospitalization, discharge, and death).

Trauma mechanisms were classified according to the primary cause of injury recorded in the hospital information system. Foreign body injury refers to superficial or intraocular foreign material entering the ocular surface during occupational or environmental exposure. Blunt trauma refers to impact-related injury without penetration of ocular tissues, whereas penetrating or sharp object injury indicates direct penetration of ocular tissues by sharp instruments.

As this was a retrospective observational study, the prima-

ry outcome was defined as the description of demographic characteristics, clinical findings, and clinical outcomes of patients presenting with ocular trauma.

Sample Size

Previous studies have reported the incidence of ocular trauma to range between 2% and 5%.[7,12] In this study, the expected ocular trauma rate was assumed to be 5%. Using a two-sided standard normal distribution value of 1.96 for a 95% confidence interval and an effect size of 5%, the estimated sample size was calculated as 72. After adding a 10% margin of error, the target sample size was determined to be 80. The sample size calculation was performed to ensure methodological adequacy; however, all eligible patients during the study period were included in the analysis.

Statistical Analysis

Categorical variables are presented as frequencies and percentages. Continuous variables were assessed for normality using the Shapiro–Wilk test. Normally distributed variables are presented as mean±standard deviation, whereas non-normally distributed variables are presented as median (25th–75th percentiles). The Chi-square test was used for categorical variables, Student's t-test for normally distributed continuous variables, and the Mann–Whitney U-test for non-normally distributed continuous variables. For all analyses, $p<0.05$ was considered statistically significant. Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0; Armonk, NY: IBM Corp.).

RESULTS

Between August 1, 2022, and August 1, 2025, 6,623 patients presented to the emergency department with ocular trauma. Sixty-six patients were excluded due to missing data, and 6,557 patients were included in the analysis.

Of the patients, 85.4% (n=5,598) were male, and 52.9% were aged between 20 and 39 years. The vast majority of patients had a GCS score of 15 (99.8%); only 11 patients had a GCS score ≤13. The most common trauma mechanisms were ocular foreign body injury (88.9%) and falls (5.2%). In 8 patients (0.1%), the trauma mechanism could not be determined. The most frequently observed physical examination findings were corneal abrasion (30.9%), conjunctival hyperemia (25.6%), and epithelial damage (21.2%). Detailed findings according to sex, age, GCS score at presentation, trauma mechanism, and physical examination findings are presented in Table 1.

During the initial emergency department evaluation, computed tomography (CT) was not required in 91.4% of cases. CT was performed in 567 patients (8.6%). Among those who underwent CT, no pathological findings were detected in 378 patients (66.6%). Overall, the most common CT abnormality in the entire cohort was orbital floor fracture (n=88, 1.3%). In 6,289 cases (95.9%), no associated injury in regions adjacent to the eye was identified. Overall, surgical intervention was

Table 1. Demographic characteristics, trauma mechanisms, and physical examination findings of patients with ocular trauma

Variable	All patients (n=6557)/n (%)
Sex	
Male	5598 (85.4)
Female	959 (14.6)
Age (years)	
0–9	187 (2.9)
10–19	597 (9.1)
20–39	3467 (52.9)
40–59	1879 (28.7)
60–80	427 (6.5)
GCS	
15	6546 (99.8)
13–15	5 (0.1)
10–13	1 (0.01)
8–10	0 (0)
<8	5 (0.1)
Trauma mechanism	
Ocular foreign body	5832 (88.9)
Fall	342 (5.2)
Blunt trauma	227 (3.5)
Traffic accident	71 (1.1)
Penetrating or sharp object injury	47 (0.7)
Chemical injury	29 (0.4)
Unknown mechanism	8 (0.1)
Burn	1 (0.01)
Identified findings	
No finding	30 (0.5)
Any finding	6527 (99.5)
Corneal abrasion	2023 (30.9)
Conjunctival hyperemia	1679 (25.6)
Epithelial injury	1391 (21.2)
Subconjunctival hemorrhage	851 (13)
Periorbital edema	388 (5.9)
Eyelid incision	63 (1)
Eyelid laceration	51 (0.8)
Chemosis	30 (0.5)
Full-thickness eyelid laceration	23 (0.4)
Corneal punctate epitheliopathy	16 (0.2)
Hyphema	6 (0.1)
Gaze limitation	3 (0.04)
Full-thickness corneal laceration	2 (0.03)
Lens dislocation	1 (0.01)

Table 2. Radiological findings, associated injuries, surgical interventions, and clinical outcomes

Variable	All patients (n=6557)/n (%)
Images	
No CT performed	5990 (91.4)
Radiological findings detected in the eye	567 (8.6)
No pathological finding	378 (5.8)
Orbital floor fracture	88 (1.3)
Orbital lateral wall fracture	49 (0.7)
Orbital medial wall fracture	26 (0.4)
Orbital roof fracture	21 (0.3)
Globe perforation	4 (0.1)
Lens dislocation	1 (0.01)
Associated injuries in adjacent regions	
No associated injury	6289 (95.9)
Any associated injury	268 (4.1)
Nasal bone fracture	97 (1.5)
Maxillary fracture	88 (1.3)
Zygomatic fracture	32 (0.5)
Cranial fracture	32 (0.5)
Facial laceration	19 (0.3)
Surgical intervention	
Surgery performed	98 (1.5)
No surgery	6459 (98.5)
Outcome	
Discharge from ED	6421 (97.9)
Hospital admission	136 (2.1)
ICU Admission	10 (0.2)
Ward admission	126 (1.9)
Ophthalmology ward	48 (0.7)
Admission to other clinics	78 (1.2)

required in 98 patients (1.5%) of the entire cohort. Among patients requiring surgical treatment, the most common procedures included repair of full-thickness eyelid lacerations, repair of corneal lacerations, repair of globe perforations, and removal of intraocular foreign bodies. Following emergency department management, 6,421 patients (97.9%) were discharged, while 136 patients (2.1%) required hospitalization, including 10 intensive care unit admissions and 126 ward admissions. Detailed information regarding CT findings, associated injuries, surgical interventions, and patient outcomes is presented in Table 2.

When trauma mechanisms were analyzed by sex, ocular foreign body injury ($p<0.001$), falls ($p<0.001$), traffic accidents ($p=0.004$), penetrating or sharp object injuries ($p<0.001$), and chemical injuries ($p=0.002$) were more frequent in males. A detailed comparison of trauma mechanisms by sex is shown in Table 3.

Surgical intervention was more frequently required in patients who were female ($p<0.001$), aged over 60 years ($p<0.001$), had a GCS score below 13 ($p<0.001$), presented with almost all trauma mechanisms except chemical injuries ($p<0.001$), had positive physical examination findings ($p<0.001$), had direct ocular injury ($p<0.001$), and had associated injuries ($p<0.001$). Except for subconjunctival hemorrhage, chemosis, and corneal punctate epitheliopathy, the presence of positive physical examination findings significantly increased the need for surgical intervention (Table 4). In particular, the presence of an orbital floor fracture was a significant factor associated with surgical treatment. Among extraocular injuries, maxillary and cranial fractures were most frequently associated with surgical intervention (Table 4).

Regarding clinical outcomes, higher hospitalization rates were observed in female patients ($p<0.001$), pediatric patients under 9 years of age ($p<0.001$), geriatric patients over 60 years of age ($p<0.001$), patients with a GCS score of 13 or lower, those presenting due to falls ($p<0.001$) or traffic accidents ($p<0.001$), and patients with orbital or extraocular bone frac-

Table 3. Trauma mechanisms according to sex

Mechanism	Male (n=5598)/n (%)	Female (n=959)/n (%)	p-value
Ocular foreign body	5083 (90.8)	749 (78.1)	<0.001
Falls	216 (3.9)	126 (13.1)	<0.001
Blunt trauma	191 (3.4)	36 (3.8)	0.592
Traffic accidents	52 (0.9)	19 (2)	0.004
Penetrating or sharp object injury	30 (0.5)	17 (1.8)	<0.001
Chemical injuries	18 (0.3)	11 (1.1)	0.002
Unknown mechanism	7 (0.1)	1 (0.1)	1
Burns	1 (0.01)	0 (0)	-

Table 4. Factors associated with surgical intervention in patients with ocular trauma

Variable	Surgical group (n=98)/n (%)	Non-surgical group (n=6459)/n (%)	p-value
Sex			
Male	72 (73.5)	5526 (85.6)	<0.001
Female	26 (26.5)	933 (14.4)	
Age (years)			
0–9	5 (5.1)	182 (2.8)	0.205
10–19	7 (7.1)	590 (9.1)	0.496
20–39	43 (43.9)	3424 (53)	0.072
40–59	25 (25.5)	1854 (28.7)	0.488
60–80	18 (18.4)	409 (6.3)	<0.001
GCS			
15	90 (91.8)	6456 (99.9)	<0.001
13–15	3 (3.1)	2 (0.01)	<0.001
10–13	1 (1)	0 (0)	0.015
8–10	0 (0)	0 (0)	-
<8	4 (4.1)	1 (0.01)	<0.001
Trauma mechanism			
Ocular foreign body	6 (6.1)	5826 (90.2)	<0.001
Falls	43 (43.9)	299 (4.6)	<0.001
Blunt trauma	20 (20.4)	207 (3.2)	<0.001
Traffic accidents	21 (21.4)	50 (0.8)	<0.001
Penetrating or sharp object injury	8 (8.2)	39 (0.6)	<0.001
Chemical injuries	0 (0)	29 (0.4)	1.000
Physical examination findings corneal abrasion	6 (6.1)	2017 (31.2)	<0.001
Conjunctival hyperemia	0 (0)	1679 (26)	<0.001
Epithelial damage	0 (0)	1391 (21.5)	<0.001
Subconjunctival hemorrhage	14 (14.3)	837 (13)	0.698
Periorbital edema	34 (34.7)	354 (5.5)	<0.001
Eyelid incision	8 (8.2)	55 (0.9)	<0.001
Eyelid laceration	4 (4.1)	47 (0.7)	0.007
Chemosis	0 (0)	30 (0.5)	1
Full-thickness eyelid laceration	23 (23.5)	0 (0)	<0.001
Corneal punctate epitheliopathy	0 (0)	16 (0.2)	1
Hyphema	4 (4.1)	2 (0.01)	<0.001
Gaze restriction	2 (2)	1 (0.01)	0.001
Full-thickness corneal laceration	2 (2)	0(0)	<0.001
Ocular injuries			
Orbital floor fracture	20 (20.4)	68 (1.1)	<0.001
Orbital lateral wall fracture	14 (14.3)	35 (0.5)	<0.001
Orbital medial wall fracture	12 (12.2)	14 (0.2)	<0.001
Orbital roof fracture	6 (6.1)	15 (0.2)	<0.001
Globe perforation	4 (4.1)	0 (0)	<0.001
Lens dislocation	1 (1)	0 (0)	0.015
Associated injuries (adjacent regions)			
Nasal bone fracture	3 (3.1)	94 (1.5)	0.177
Maxillary fracture	26 (26.5)	62 (1)	<0.001
Zygomatic fracture	9 (9.2)	23 (0.4)	<0.001
Cranial fracture	16 (16.3)	16 (0.2)	<0.001
Facial laceration	1 (1)	18 (0.3)	0.249

Table 5. Factors associated with hospitalization in patients with ocular trauma

Variables	Hospitalized (n=136)/n (%)	Discharged (n=6421)/n (%)	p-value
Sex			
Male	100 (73.5)	5498 (85.6)	<0.001
Female	36 (26.5)	923 (14.4)	
Age (years)			
0–9	10 (7.4)	177 (2.8)	0.005
10–19	14 (10.3)	583 (9.1)	0.626
20–39	54 (39.7)	3413 (53.2)	0.002
40–59	33 (24.3)	1846 (28.7)	0.252
60–80	25 (18.4)	402 (6.3)	<0.001
GCS			
15	125 (91.9)	6421 (100)	<0.001
13–15	5 (3.7)	0 (0)	<0.001
10–13	1 (0.7)	0 (0)	0.021
8–10	0 (0)	0 (0)	-
<8	5 (3.7)	0 (0)	<0.001
Trauma mechanism			
Ocular foreign body	6 (4.4)	5826 (90.7)	<0.001
Falls	56 (41.2)	286 (4.5)	<0.001
Blunt trauma	27 (19.9)	200 (3.1)	<0.001
Traffic accidents	39 (28.7)	32 (0.5)	<0.001
Penetrating or sharp object injury	8 (5.9)	39 (0.6)	<0.001
Chemical injuries	0 (0)	29 (0.5)	1
Physical examination findings			
Corneal abrasion	6 (4.4)	2017 (31.4)	<0.001
Conjunctival hyperemia	0 (0)	1679 (26.1)	<0.001
Epithelial damage	0 (0)	1391 (21.7)	<0.001
Subconjunctival hemorrhage	20 (14.7)	831 (12.9)	0.545
Periorbital edema	61 (44.9)	327 (5.1)	<0.001
Eyelid incision	11 (8.1)	52 (0.8)	<0.001
Eyelid laceration	6 (4.4)	45 (0.7)	0.001
Chemosis	0 (0)	30 (0.5)	1
Full-thickness eyelid laceration	23 (16.9)	0 (0)	<0.001
Corneal punctate epitheliopathy	0 (0)	16 (0.2)	1
Hyphema	4 (2.9)	2 (0.01)	<0.001
Gaze restriction	2 (1.5)	1 (0.01)	0.001
Full-thickness corneal laceration	2 (1.5)	0 (0)	<0.001
Ocular injuries			
Orbital floor fracture	29 (21.3)	59 (0.9)	<0.001
Orbital lateral wall fracture	19 (14)	30 (0.5)	<0.001
Orbital medial wall fracture	13 (9.6)	13 (0.2)	<0.001
Orbital roof fracture	17 (12.5)	4 (0.1)	<0.001
Globe perforation	4 (2.9)	0 (0)	<0.001
Lens dislocation	1 (0.7)	0 (0)	0.021
Associated injuries (adjacent regions)			
Nasal bone fracture	8 (5.9)	89 (1.4)	0.001
Maxillary fracture	34 (25)	54 (0.8)	<0.001
Zygomatic fracture	11 (8.1)	21 (0.3)	<0.001
Cranial fracture	32 (23.5)	0 (0)	<0.001
Facial laceration	2 (1.5)	17 (0.3)	0.058

tures ($p<0.001$). Detailed comparisons of demographic characteristics, trauma mechanisms, physical examination findings, ocular injuries, associated injuries in adjacent regions, and clinical outcomes are presented in Table 5.

DISCUSSION

Including 6,557 patients, this study represents one of the largest emergency department-based investigations evaluating demographic characteristics, clinical findings, surgical requirements, and hospitalization associated with ocular trauma. In this cohort, 136 patients were admitted to inpatient wards, 10 patients required intensive care unit admission, and surgical treatment was performed in 98 patients. Surgical intervention was more frequently required in patients who were female, of advanced age, had low GCS scores, or sustained ocular injuries related to traffic accidents, falls, penetrating or sharp object injuries, and blunt trauma. The findings indicate that foreign body-related injuries were very common, whereas surgical interventions were mainly associated with high-energy trauma. Advanced age, falls, traffic accidents, orbital fractures, associated injuries, and low GCS scores were important factors influencing hospitalization. From a trauma and emergency medicine perspective, these findings highlight that although ocular trauma is frequently encountered in the emergency department, only a small proportion of patients require advanced imaging, surgical intervention, or hospitalization. Because the primary aim of this study was to provide a descriptive epidemiological overview of ocular trauma presentations in the emergency department, multivariable predictive modeling was not performed.

In our study, CT was required in a small proportion of patients, and the majority of scans revealed no pathological findings. These findings suggest that imaging decisions in ocular trauma should be guided by clinical examination, trauma mechanism, and the presence of associated injuries rather than routine CT.

Previous studies have consistently reported that ocular trauma is most commonly observed in young adults. Many recent studies have shown that patients are predominantly between 20 and 50 years of age and that males constitute the most frequently affected sex.[13-16] In our study, more than half of the patients were between 20 and 39 years of age, which is consistent with the existing literature. Male patients comprised 85% of our cohort, confirming that young males remain the population at highest risk for ocular trauma. However, when trauma mechanisms were analyzed, ocular trauma caused by foreign bodies was more common in males, whereas injuries due to falls, blunt trauma, traffic accidents, penetrating or sharp object injuries, and chemical injuries were more frequent in females. This difference may be related to occupational exposure, as young males are more often employed in labor-intensive jobs.

Studies conducted in different populations have identified several causes of ocular trauma, including penetrating foreign bodies, traffic accidents, falls, occupational accidents, and domestic accidents.[17-21] Lu et al. retrospectively analyzed 1,019 ocular injuries in 2025 and reported that metallic objects were the most common cause requiring surgical treatment.[8] In another retrospective study including 83 patients, foreign bodies accounted for 40% of cases, whereas falls accounted for 22%.[21] In our study, trauma mechanisms were defined in detail, and foreign body injury was identified as the reason for presentation in 88% of cases. In a study by Anguita et al. evaluating intraocular foreign bodies in patients presenting to an ocular trauma unit, 57% of patients underwent surgical removal.[22] In contrast, in our cohort, foreign bodies were removed during ophthalmology consultation in the emergency department in 99% of 5,832 patients presenting with foreign-body injuries, and surgical removal was required in only six patients. The relatively low number of globe perforation cases in our cohort may be explained by the predominance of superficial foreign body injuries presenting to the emergency department.

Numerous positive physical examination findings were documented in patients presenting with ocular trauma. Approximately one-third of patients had corneal abrasion, one-quarter had conjunctival hyperemia, and one-fifth had epithelial damage. The cornea and conjunctiva were the most commonly affected anatomical structures, likely related to the high proportion of foreign-body-related injuries. A retrospective study published in 2024 reported corneal abrasion and contusion as the most frequent findings in 855 patients with ocular trauma.[23] These pathologies generally do not require surgical treatment. Consistent with this, 99% of patients with corneal abrasion and all patients with conjunctival hyperemia or epithelial damage in our study were treated conservatively and discharged after ophthalmology consultation in the emergency department. In contrast, all patients with full-thickness eyelid lacerations, full-thickness corneal lacerations, globe perforations, and lens dislocations underwent surgical treatment. Surgical treatment rates in ocular trauma vary widely depending on the study population.[24,25] In a recent study conducted in our country by Erkan Pota et al., surgical treatment was required in 8.5% of 380 patients with open-globe injuries.[25] In our study, surgical treatment was performed in 1.5% of patients, a lower rate that may be explained by the large sample size and the predominance of foreign body-related injuries.

Orbital fractures were detected in 2.7% of patients in our study, which is consistent with previous reports. Ostadian et al. retrospectively evaluated ocular trauma over 10 years and reported orbital fractures in 2.5% of 927 patients.[26] Peacock et al. put forward that high-energy trauma involving the maxillofacial region may also result in fractures of adjacent facial bones.[27] They reported nasal bone fractures in 58% of patients with bilateral orbital fractures, maxillary fractures in 38%, zygomatic fractures in 27%, and frontal bone fractures

in 20%. In that study, the high rate of associated injuries was attributed to severe maxillofacial trauma. In contrast, our cohort, which included a more heterogeneous patient population and a substantially larger sample size, identified nasal bone fractures in 1.5% of patients, with lower rates of maxillary, zygomatic, and cranial fractures accompanying ocular injuries.

The overall hospitalization rate in our study was 2.1%. Hospitalized patients were more likely to have sustained high-energy trauma mechanisms, including blunt trauma, penetrating or sharp object injuries, falls, and traffic accidents. Previous studies have shown that more than half of orbital injuries caused by high-energy trauma are accompanied by adjacent injuries, which increases the likelihood of hospitalization.[28] A higher proportion of elderly patients was also observed among hospitalized cases in our study. This may be explained by increased bone fragility and delayed protective reflexes in older individuals,[29] and our findings are consistent with the existing literature.

The proportion of female patients among those requiring hospitalization was significantly higher than that of males, suggesting a potential influence of sex on trauma severity and outcomes. This finding may be related to the increased risk of osteoporosis with advancing age in female patients. Werning et al. demonstrated that osteoporosis is an independent risk factor for fracture development in patients with maxillofacial trauma.[30] Furthermore, osteoporosis rates are known to increase significantly in postmenopausal women, contributing to bone fragility.[31] In our study, while foreign body-related ocular injuries were more frequent in males, high-energy trauma mechanisms such as falls, traffic accidents, and penetrating or sharp object injuries were more common in females. The higher hospitalization rates observed among female patients may be explained by the greater exposure to high-energy trauma mechanisms, such as falls and traffic accidents, combined with an increased risk of osteoporosis. In addition, age-related factors, including reduced bone density and delayed protective reflexes, may contribute to greater injury severity and subsequent hospitalization, particularly in elderly patients.

Only 11 patients in our cohort had a GCS score of 13 or lower, and all required hospitalization. The low proportion of such cases reflects the predominance of isolated ocular trauma, particularly foreign body injuries. Nevertheless, these findings indicate that ocular trauma, although infrequent, may be associated with severe adjacent injuries. Previous studies have also shown that low GCS scores are associated with facial trauma and increased morbidity.[32] This underscores the importance of systematic trauma evaluation in patients presenting with ocular injuries, in addition to focused orbital assessment.

The retrospective design, single-center setting, predominance of foreign body-related ocular trauma, and lack of data on hospitalization duration and long-term outcomes should be considered limitations of this study. Standardized ocular trauma classification systems such as the Birmingham Eye Trauma Terminology and the Ocular Trauma Score could not be applied because the retrospective registry data did not consistently include the clinical parameters required for these classifications. Furthermore, because the study relied on retrospectively recorded hospital registry data, coding inaccuracies or documentation bias cannot be completely excluded. Visual acuity measurements and long-term visual outcomes were not consistently available in the emergency department registry system and, therefore, could not be analyzed in this study.

CONCLUSION

This large emergency department-based study demonstrates that the majority of ocular trauma patients can be managed without advanced imaging, surgical intervention, or hospitalization. High-energy trauma mechanisms, older age, and female sex were associated with increased injury severity and the need for hospitalization. These findings may assist emergency physicians in risk stratification and in the more efficient use of imaging and hospital resources in the management of ocular trauma.

Ethics Committee Approval: This study was approved by the Ethics Committee of Süleyman Yalçın City Hospital (Date: 28.08.2025, Decision No: 2025/0142).

Peer-review: Externally peer-reviewed.

Authorship Contributions: Concept: H.D., B.A.; Design: H.D., B.A.; Supervision: H.D., B.A.; Resource: H.D., B.A.; Materials: H.D., B.A.; Data collection and/or processing: H.D., B.A.; Analysis and/or interpretation: H.D., B.A.; Literature review: H.D., B.A.; Writing: H.D., B.A.; Critical review: H.D., B.A.

Informed Consent: This retrospective observational study.

Conflict of Interest: None declared.

Financial Disclosure: The author declared that this study has received no financial support.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Üçüncü basamak bir acil servise başvuran oküler travmalar: Demografik özellikler, yaralanma mekanizmaları ve klinik sonuçlar

AMAÇ: Bu çalışmanın amacı, üçüncü basamak bir acil servise oküler travma nedeniyle başvuran hastaların demografik özelliklerini, etiyolojik faktörlerini, eşlik eden yaralanmalarını ve klinik sonuçlarını değerlendirmektir.

GEREÇ VE YÖNTEM: Bu retrospektif gözlemsel çalışmaya, 2022–2025 yılları arasında Süleyman Yalçın Şehir Hastanesi Acil Servisi'ne oküler travma nedeniyle başvuran toplam 6.557 hasta dâhil edildi. Hastaların demografik verileri, travma mekanizmaları, fizik muayene bulguları, eşlik eden yaralanmaları, cerrahi müdahale gereksinimi ve klinik sonuçları değerlendirildi. Kategorik değişkenlerin analizinde ki-kare testi kullanılırken, sürekli değişkenler için Student t-testi ve Mann–Whitney U testi uygulandı.

BULGULAR: Hastaların %85.4'ü (n=5.598) erkekti ve %52.9'u 20–39 yaş aralığındaydı. En sık başvuru nedeni oküler yabancı cisim yaralanması (%88.9) olup, en yaygın fizik muayene bulgusu korneal abrazyon (%30.9) olarak saptandı. Olguların %8.6'sına bilgisayarlı tomografi çekildi. Hastaların %95.9'unda oküler travma izole olarak görülürken, %1.5'inde cerrahi müdahale gereksinimi oluştu. Olguların %97.9'u acil servisten taburcu edildi. Oküler yabancı cisim yaralanması ($p<0.001$), düşmeler ($p<0.001$), trafik kazaları ($p=0.004$), penetran veya kesici-delici alet yaralanmaları ($p<0.001$) ve kimyasal yaralanmalar ($p=0.002$) erkek hastalarda daha sık görüldü. Kadın cinsiyeti ($p<0.001$), 60 yaşın üzerinde olmak ($p<0.001$), Glasgow Koma Skoru'nun 13'ün altında olması ($p<0.001$) ve eşlik eden yaralanmaların varlığı ($p<0.001$) cerrahi müdahale gereksinimi ile ilişkili bulundu. Kadın cinsiyeti ($p<0.001$), 9 yaşın altında olmak ($p<0.001$) ve 60 yaşın üzerinde olmak ($p<0.001$), Glasgow Koma Skoru ≤13, düşme ($p<0.001$) veya trafik kazası ($p<0.001$) nedeniyle başvuru ve orbital ya da ekstraoküler kemik kırıklarının varlığı ($p<0.001$) daha yüksek hastaneye yatış oranları ile ilişkiliydi.

SONUÇ: Oküler travmalar en sık genç erkek hastaları etkilemekte olup, en yaygın neden yabancı cisim yaralanmalarıdır. Korneal abrazyon en sık saptanan klinik bulgudur. Olguların büyük çoğunluğu izole oküler travma niteliğinde olup, bilgisayarlı tomografi gereksinimi olmadan acil servisten taburcu edilmiştir. Kadın cinsiyet, pediatrik ve geriatrik yaş grupları, düşük Glasgow Koma Skoru ve düşme veya trafik kazalarına bağlı travmalar, artmış cerrahi müdahale gereksinimi ve hastaneye yatış ile ilişkili bulunmuştur.

Anahtar sözcükler: Ayaktan taburculuk; cerrahi müdahale; eşlik eden yaralanmalar; göz travması; hastaneye yatış; klinik sonuçlar; mekanizma.

Ulus Travma Acil Cerrahi Derg 2026;32(10):1201-1210 DOI: 10.14744/tjtes.2026.62393