ORIGINAL ARTICLE

Post-traumatic visual sequelae from a forensic medicine perspective: A retrospective analysis of 10 years of data

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ABSTRACT

BACKGROUND: Vision is one of the most fundamental functions required for a quality life. In this context, eye trauma is frequently subject to medico-legal evaluation to determine both the severity of the injury and the presence of any sequelae, and, if present, the extent of visual function loss. This study examines the medico-legal assessment process following ocular trauma. The aim is to reduce potential confusion by providing explanations that offer standardization and guidance in forensic assessments.

METHODS: Between January 1, 2014 and January 1, 2024, the files and reports of 210 cases (210 eyes) were retrospectively analyzed. These cases involved forensic medico-legal assessments conducted by the Department of Forensic Medicine, Dokuz Eylul University Faculty of Medicine, focusing on the severity of the injury and the presence of visual function impairment or loss following eye trauma in the context of criminal proceedings. Sociodemographic data, type and cause of trauma, initial diagnosis, classification of injury according to the Birmingham Eye Trauma Terminology System (BETTS), anatomical site of injury, injury severity, and whether visual function impairment or loss had occurred were evaluated. Statistical analysis was performed using the IBM SPSS 29.0 software package.

RESULTS: Of the 210 patients, 171 (81.4%) were male and 39 (18.6%) were female. Ocular trauma was most frequently observed in the 19-30 age group (n=62, 29.5%). There were 157 (74.8%) closed globe injuries and 53 (25.2%) open globe injuries. Subconjunctival hemorrhage (n=132, 62.9%) was the most common finding at the initial ophthalmological examination following trauma. An injury outside Zone 1 was identified as the strongest negative prognostic factor for visual impairment or loss.

CONCLUSION: From a forensic medicine perspective, eye trauma alone is not considered a life-threatening condition. However, a multidisciplinary approach, including forensic medicine specialists and ophthalmologists, should be adopted in the assessment of visual sequelae, that is, the impairment or loss of visual function, following eye trauma related to criminal proceedings. First, it must be determined whether the healing process is complete and whether there is a causal link between the trauma and vision loss. Once healing is complete, the visual function of each eye should be assessed individually. The assessment method should be chosen based on whether visual acuity loss, visual field defects, or any other diagnoses are present in one eye alone or in both eyes.

Keywords: Globe injury; visual sequelae; visual function impairment/loss; criminal case; forensic medicine.

INTRODUCTION

Visual function is one of the most essential functions for leading a quality life, from performing daily tasks to engaging in employment and social participation. Consequently, vision loss imposes a significant burden on both individuals and society, with medical, functional, and socioeconomic consequences. In this respect, it has negative impacts at both personal and societal levels.[1-3]

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Ocular trauma is one of the leading causes of partial or total visual loss.[4,5] On average, one in every five adults experiences ocular trauma at some point in their life.[6] Eye injuries account for approximately 7% of all bodily injuries and 10-15% of eye-related diseases.[7] These injuries can range from minor corneal and conjunctival trauma to severe, penetrating ocular injuries.[1]

In this context, ocular trauma is often subject to forensic evaluation to determine both the severity of the injury and the degree of visual function loss, if sequelae are present.[8]

Eye injuries are addressed in two tables of the "Guideline for the Evaluation of Injury Crimes Defined in the Turkish Criminal Code from the Perspective of Forensic Medicine" published in 2019. This guideline serves as the primary reference for all physicians in Türkiye involved in forensic medical assessments related to "severity of injury" and "weakness/loss of visual function" (in the remainder of this article, this resource will be referred to simply as the "Guideline") (Tables 1 and 2).[8,9]

In this study, cases for which medico-legal evaluation reports were prepared by our department following eye trauma are reviewed within the scope of the "Guideline," and the forensic medical evaluation process for visual sequelae following eye trauma is discussed. The aim is to eliminate potential confusion by providing explanations that offer standardization and guidance for physicians involved in forensic assessments.

MATERIALS AND METHODS

The study population consisted of cases that underwent forensic evaluation for the severity of injury and impairment or loss of visual function following ocular trauma related to criminal proceedings. These evaluations were conducted at the Department of Forensic Medicine, Dokuz Eylül University Research and Application Hospital, between 01.01.2014 and 01.01.2024. The records and reports of 210 cases (210 eyes) were retrospectively analyzed. Eyes in which patients reported visual complaints were included in the study. In cases of bilateral injury, the clinically better eye (if the patient reported no visual complaints) was excluded from the evaluation. Sociodemographic data, the side of the injured eye, type and cause of trauma, initial diagnosis, classification of the injury according to the Birmingham Eye Trauma Terminology System (BETTS), anatomical site of injury (Table 3),[10-12] injury severity as defined by the Guideline, and the presence of visual function impairment or loss were evaluated. This research was conducted with the approval of the Ethics Committee of the Faculty of Medicine, Dokuz Eylül University (Date: 08.05.2024, Decision No: 2024/16-26), and adhered to the principles of the Declaration of Helsinki.

Statistical Analysis

Statistical analysis was performed using the Statistical Sciences Package (SPSS) version 29.0 (IBM; International Business Machines, New York, USA). Descriptive statistics were used to report means and standard deviations for continu-

Table 1. Eye lesions as defined in the Guideline[9]

Eye Lesion Classification	
Ecchymosis/hematoma on/around the eyelid; superficial lacerations	Minor – manageable with simple medical intervention
Conjunctival injuries (e.g., subconjunctival hemorrhage without visual impairment and without affecting the shape or function of the eye)	Minor – manageable with simple medical intervention
Simple lesions that do not cause corneal perforation (e.g., abrasion, contusion)	Minor – manageable with simple medical intervention
Iris, uveal, or vitreous injuries (e.g., intraocular hemorrhage)	Major – not manageable with simple medical intervention
Traumatic lesions of the lens (e.g., subluxation, luxation, cataract, hyphema)	Major – not manageable with simple medical intervention
Enucleation or evisceration	Major – not manageable with simple medical intervention
Traumatic lesions of the lacrimal ducts	Major – not manageable with simple medical intervention
Choroidal rupture	Major – not manageable with simple medical intervention
Traumatic retinal lesions (e.g., edema, laceration, detachment, hemorrhage)	Major – not manageable with simple medical intervention
Scleral and/or conjunctival perforation	Major – not manageable with simple medical intervention
Globe perforation	Major – not manageable with simple medical intervention
Traumatic persistent epiphora	Major – not manageable with simple medical intervention
Traumatic ptosis	Major – not manageable with simple medical intervention
Trichiasis, entropion, or ectropion	Major – not manageable with simple medical intervention
Traumatic strabismus (not due to intracranial pathology)	Major – not manageable with simple medical intervention
Optic nerve injury (not due to intracranial pathology)	Major – not manageable with simple medical intervention

Table 2. Common conditions frequently associated with permanent weakening or loss of eye function as defined in the Guideline [9]

Eye	
Each eye is evaluated as a separate sensory organ.	
Visual defects	
Light perception, hand motion, counting fingers, and visual acuity of 1/10, 2/10, or 3/10	Loss of function
Visual acuity of 4/10, 5/10, 6/10, or 7/10	Weakening of function
Traumatic strabismus	Weakening of function
Hemianopsia	Weakening of function
Traumatic persistent epiphora	Weakening of function
Traumatic total ptosis	Weakening of function
Diplopia	Weakening of function

Table 3. Type of injury according to the Birmingham Eye Trauma Terminology System (BETTS) and zone of injury

Closed Globe Injury	
Contusion	Zone 1: External anterior segment (bulbar conjunctiva, sclera, cornea)
Lamellar laceration	Zone 2: Internal anterior segment (anterior chamber, iris, angle, lens, pars plicata)
Superficial foreign body	Zone 3: Posterior segment (ciliary body, choroid, vitreous, retina, optic nerve)
Open Globe Injury	
Rupture	Zone 1: Cornea and limbus
Laceration	Zone 2: Posterior to the limbus, extending up to 5 mm into the sclera
Penetrating injury	Zone 3: Posterior to Zone 2
Perforating injury	
Intraocular foreign body	

ous variables, and percentages for categorical variables. Categorical independent variables were analyzed in relation to the dependent variable using the Pearson Chi-square test and the Fisher-Freeman-Halton Exact test. The relationship between the dependent variable (classified into two groups) and independent variables was assessed using univariate and multivariate binary logistic regression. A p value of <0.05 was considered statistically significant.

RESULTS

Of the 210 patients included in the study, 171 (81.4%) were male and 39 (18.6%) were female. The mean age was 35.34±15.87 years (range: 1-85 years). When analyzed by age group, the most common group affected by ocular trauma was 19-30 years (n=62, 29.5%) (Fig. 1). In 91 patients (43.3%) the right eye was injured; in 94 (44.8%) the left eye; and in 25 (11.9%) both eyes. The mean time between the first and last examination was 15.75±7.91 months.

A total of 101 patients (48.1%) sustained injuries due to non-traffic accidents, while 109 patients (51.9%) were injured in traffic accidents. Among the non-traffic accidents, the most common cause of injury was assault (n=67, 31.9%), followed by occupational accidents (n=17, 8.1%). When analyzing the types of traffic accidents, the most common was in-vehicle traffic accidents (n=45, 21.4%), followed by motorcycle accidents (n=35, 16.7%) (Fig. 2).

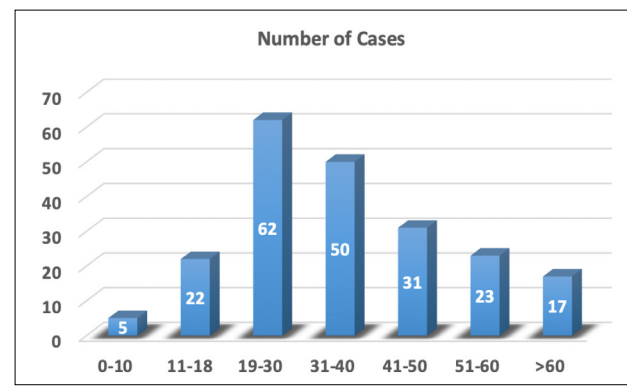

Figure 1. Distribution of cases by age group.

Table 4. Summary of globe injury cases

	CGI (n=157, 74.8%)	OGI (n=53, 25.2%)
Type of Injury	Contusion (n=143, 91.1%)	Rupture (n=1, 1.9%)
	Lamellar laceration (n=9, 5.7%)	Laceration (n=52, 98.1%)
	Surface foreign body (n=5, 3.2%)	• Penetrating (n=19, 36.5%)
		• Perforating (n=16, 30.8%)
		• IOFB (n=17, 32.7%)
Initial Diagnoses	Eyelid edema/ecchymosis (n=77, 49%)	Eyelid incision (n=2, 3.8%)
	Eyelid incision (n=6, 3.8%)	SCH (n=8, 15.1%)
	SCH (n=124, 79%)	Hyphema (n=13, 24.5%)
	Conjunctival incision/laceration (n=2, 1.3%)	Corneal injury (n=7, 13.2%)
	Chemosis (n=24, 15.3%)	Scleral injury (n=15, 28.3%)
	Corneal edema (n=4, 2.5%)	CSI (n=25, 47.2%)
	CEDE (n=15, 9.6%)	LSI (n=1, 1.9%)
	Corneal incision (n=1, 0.6%)	Traumatic cataract (n=17, 32.1%)
	Hyphema (n=8, 5.1%)	Lens dislocation (n=2, 3.8%)
	Traumatic cataract (n=1, 0.6%)	Lens injury (n=8, 15.1%)
	Iris injury (n=1, 0.6%)	Iris prolapse (n=8, 15.1%)
	Vitreous hemorrhage (n=3, 1.9%)	Iris injury (n=6, 11.3%)
	Vitreous detachment (n=1, 0.6%)	Uveal hemorrhage (n=1, 1.9%)
	Retinal hemorrhage (n=2, 1.3%)	Vitreous hemorrhage (n=17, 32.1%)
	Retinal detachment (n=1, 0.6%)	Vitreous prolapse (n=1, 1.9%)
	Choroidal rupture (n=4, 2.5%)	Retinal hemorrhage (n=1, 1.9%)
	Optic nerve injury (n=19, 12.1%)	Retinal detachment (n=12, 22.6%)
	Traumatic uveitis (n=2, 1.3%)	Choroidal prolapse (n=2, 3.8%)
	Other (n=4, 2.5%)	Choroidal detachment (n=1, 1.9%)
		Traumatic macular hole (n=2, 3.8%)
		Optic nerve injury (n=2, 3.8%)
		Corneoscleral rupture (n=1, 1.9%)
		Other (n=2, 3.8%)
Zone of Injury	Zone 1 (n=121, 77.1%)	Zone 1 (n=1, 1.9%)
	Zone 2 (n=1, 0.6%)	Zone 2 (n=11, 20.8%)
	Zone 3 (n=15, 9.6%)	Zone 3 (n=4, 7.5%)
	Zones 1-2 (n=7, 4.5%)	Zones 1-2 (n=11, 20.8%)
	Zones 1-3 (n=11, 7%)	Zones 2-3 (n=17, 32.1%)
	Zones 2-3 (n=1, 0.6%)	Zones 1-2-3 (n=9, 17%)
	Zones 1-2-3 (n=1, 0.6%)	

Abbreviations: CGI: Closed globe injury; OGI: Open globe injury; IOFB: Intraocular foreign body; SCH: Subconjunctival hemorrhage; CEDE: Corneal epithelial defect/erosion; CSI: Corneoscleral injury; LSI: Limboscleral injury.

Closed globe injuries were observed in 157 cases (74.8%) and open globe injuries in 53 cases (25.2%). The most common type of injury among closed globe injuries (CGIs) was contusion (n=143, 91.1%), while the most common type among open globe injuries (OGIs) was laceration (n=52, 98.1%). Among lacerations, penetrating injuries were the most frequent subtype (n=19, 36.5%).

Regarding trauma type, the distribution was as follows: blunt force trauma (n=145, 69%), sharp-penetrating force trauma (n=58, 27.6%), and multiple trauma (n=7, 3.3%). Closed globe injuries were most commonly caused by blunt trauma

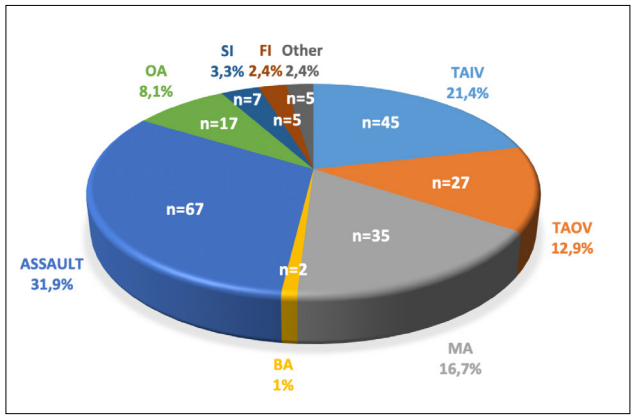

Figure 2. Distribution of cases by cause of injury. *Abbreviations: OA: Occupational accident; SI: Sharp injury; FI: Firearm injury; TAIV: Traffic accident (inside vehicle); TAOV: Traffic accident (outside vehicle); MA: Motorcycle accident; BA: Bicycle accident.*

(n=144, 91.7%), whereas open globe injuries were predominantly caused by sharp-penetrating trauma (n=49, 92.5%).

At the initial ophthalmological examination following trauma, subconjunctival hemorrhage (n=132, 62.9%) was the most common finding across all cases, followed by eyelid edema/ecchymosis (n=77, 36.7%). Among closed globe injury cases, subconjunctival hemorrhage (n=124, 79%) was the most frequent finding, followed by eyelid edema/ecchymosis (n=77, 49%). In OGI cases, the most common finding was corneoscleral injury (n=25, 47.2%).

The most common injury location was Zone 1 (n=121, 77.1%) in CGI cases and Zones 2-3 (n=17, 32.1%) in OGI cases. Across the entire population, Zone 1 was the most frequently affected area (n=122, 58.1%). The characteristics of CGI and OGI cases are summarized in Table 4.

It was determined that the injuries resulting from ocular trauma were mild and manageable with simple medical intervention in 119 cases (56.7%), and not mild, requiring more than simple medical intervention, in 91 cases (43.3%). In the majority of CGI cases (n=119, 75.8%), the injuries were mild and could be managed with simple medical intervention, whereas in all OGI cases (n=53, 100%), the injuries were not mild and required more than simple medical intervention. Similarly, the majority of blunt force ocular injuries (n=107, 73.8%) were mild, while the majority of sharp-penetrating injuries (n=49,

Table 5. Simple medical intervention and sensory/organ function status by injury type and trauma type

	Simple Medical Intervention		
	Manageable with Simple Intervention	**Not Manageable with Simple Intervention**	**Total**
Type of Injury			
CGI	119 (75.8%)	38 (24.2%)	157 (100%)
OGI	-	53 (100%)	53 (100%)
Type of Trauma			
Blunt objects	107 (73.8%)	38 (26.2%)	145 (100%)
Sharp objects	9 (15.5%)	49 (84.5%)	58 (100%)
Both	3 (42.9%)	4 (57.1%)	7 (100%)
Total (%)	119 (56.7%)	91 (43.3%)	210 (100%)

	Assessment Results of Eye-Related Sensory/Organ Function			
	Functional Weakening	**Functional Loss**	**No Functional Weakening or Loss**	**Total**
Type of Injury				
CGI	7 (4.5%)	20 (12.7%)	130 (82.8%)	157 (100%)
OGI	8 (15.1%)	42 (79.2%)	3 (5.7%)	53 (100%)
Type of Trauma				
Blunt objects	7 (4.8%)	21 (14.5%)	117 (80.7%)	145 (100%)
Sharp objects	7 (12.1%)	39 (67.2%)	12 (20.7%)	58 (100%)
Both	1 (14.3%)	2 (28.6%)	4 (57.1%)	7 (100%)
Total (%)	15 (7.1%)	62 (29.5%)	133 (63.3%)	210 (100%)

CGI: Closed globe injury; OGI: Open globe injury.

Table 6. Results of univariate (above) and multivariate (below) logistic regression analyses of prognostic factors associated with functional weakening or loss

Prognostic Factors	p value	Odds Ratio	Confidence Interval (95%)
Localized outside Zone I	<0.001	346.154	75.981-1577.000
Hyphema	<0.001	6.715	2.351-19.178
Corneoscleral injury	<0.001	27.898	6.355-122.464
Vitreous hemorrhage	<0.001	19.983	4.491-88.919
Retinal detachment	0.002	24.369	3.101-191.487
Localized outside Zone I	<0.001	315.259	62.664-1586.064
Hyphema	0.099	0.322	0.084-1.235
Corneoscleral injury	0.145	3.589	0.643-20.022
Vitreous hemorrhage	0.814	1.230	0.218-6.931
Retinal detachment	0.452	2.400	0.245-23.474

84.5%) were not mild and could not be managed with simple medical intervention (Table 5).

A sequela is broadly defined as a functional or tissue disorder that persists after a disease. Among all patients assessed for visual sequelae, i.e., impairment or loss of visual function, 15 (7.1%) had visual function weakening (impairment), and 62 (29.5%) had visual function loss. The majority of patients with CGI (n=130, 82.8%) had no visual function weakening or loss, whereas the majority of patients with OGI (n=50, 94.3%) experienced some degree of visual function impairment. Similarly, most patients with blunt force injuries (n=117, 80.7%) had no visual function weakening or loss, while most patients with sharp-penetrating injuries (n=46, 79.3%) did (Table 5).

A statistically significant relationship was found between injury type (closed/open and blunt/sharp-penetrating) and the presence or absence of visual function weakening or loss (p<0.001).

Univariate logistic regression analysis was performed to identify prognostic factors associated with the occurrence of visual function weakening or loss. Variables found to be significant in this analysis were then included in a multivariate logistic regression analysis to determine whether they were independent risk factors, and to evaluate the strength of their effect.

Accordingly, injury location outside Zone I, hyphema, corneoscleral injury, vitreous hemorrhage, and retinal detachment were identified as negative prognostic factors in the univariate analysis. Among these, injury location outside Zone I was found to be the strongest predictor of poor prognosis. In the multivariate analysis, only injury location outside Zone I was found to be a negative prognostic factor (Table 6).

It was found that 75 of 88 patients (85.2%) with injuries located outside Zone I experienced visual function weakening or loss, whereas 120 of 122 patients (98.4%) with injuries confined to Zone I did not experience visual function weakening or loss.

DISCUSSION

Globe injuries are significant because they are a major cause of visual loss and are often preventable. They are frequently the subject of criminal proceedings, particularly when determining the severity of the injury and the extent of visual functions loss, if sequelae are present. In this context, exploring and clarifying the forensic medical aspects of ocular injuries can serve as a valuable guide for physicians involved in legal evaluations. Additionally, identifying the causes and types of injuries, as well as the populations affected by and at risk of such injuries, can support the development and implementation of preventive strategies.

In our study, globe injuries were found to occur predominantly in males (n=171, 81.4%). This finding is consistent with other studies in the literature, which also report a higher incidence of globe injuries in males.[13-20] This trend may be explained by greater male participation in occupational and social activities, as well as gender-related behavioral factors.

The most common age group for ocular trauma in our population was 19-30 years (n=62, 29.5%). These findings are consistent with previous studies reporting that ocular trauma most frequently occurred between the ages of 20-29 years (21.9%) and 21-30 years (26%).[21,22]

In our study, the mean time between the first and last examination was 15.75±7.91 months. Similarly, other studies have reported a median follow-up of 12 months (range: 4-36) after ocular trauma. The time since injury at the initial examination ranged from two weeks to more than six years, with a median of two months.[20,23]

When the type of trauma was analyzed, the distribution was as follows: blunt trauma (n=145, 69%), sharp-penetrating injury (n=58, 27.6%), and multiple trauma (n=7, 3.3%). Çelik Dülger et al. reported that 67.3% of ocular trauma cases were due to blunt trauma and 32.7% were due to penetrating trauma.[24] Similarly, Lin et al. found that blunt trauma was the most common type in their study of 519 ocular trauma cases.[25] Many studies in the literature indicate that closed globe injuries are usually caused by blunt objects, while open globe injuries are typically caused by sharp objects.[13,16,17,25-27] Similarly, in our study, closed globe injuries were most commonly caused by blunt trauma (n=144, 91.7%), and open globe injuries were most commonly caused by sharp penetrating trauma (n=49, 92.5%).

Yıldırım Can et al. reported that the most common cause of injury was traffic accidents (78.1%) in their study, which investigated ocular traumas from a forensic medicine perspective.[21] In our study, the most common cause of injury overall was traffic accidents (51.9%). Among non-traffic-related cases, the most common cause was assault (31.9%), followed by occupational accidents (8.1%). However, other studies in the literature have reported assaults and work-related injuries as the most frequent causes of ocular trauma.[22,28-30]

In our study, closed globe injuries (74.8%) were more common than open globe injuries (25.2%). This finding is consistent with previous studies, which also reported closed globe injuries to be more prevalent than open globe injuries.[18,30,31]

Studies have indicated that the incidence of subconjunctival hemorrhage in ocular trauma cases ranges from 18.8% to 43.5%.[24,32,33] In the same studies, eyelid edema/ecchymosis was reported as the most common examination finding following ocular trauma.[32,33] In our study, subconjunctival hemorrhage (n=132, 62.9%) was the most common finding in the initial ophthalmological examination, followed by eyelid edema/ecchymosis (n=77, 36.7%).

There are studies in the literature suggesting that open globe injuries most commonly occur in Zone 1, while closed globe injuries are most frequent in Zone 2.[13,29,34] Arslanhan et al. reported that closed globe injuries were most common in Zone 1 (45.2%), whereas open globe injuries were most common in Zone 3 (55%).[18] In our study, Zone 1 (n=121, 77.1%) and Zones 2-3 (n=17, 32.1%) were the most common injury locations in patients with CGI and OGI, respectively. Overall, the most common injury location in the entire population was Zone 1 (n=122, 58.1%).

In our study, it was determined that the injuries resulting from ocular trauma were minor and could be relieved by simple medical intervention in 119 cases (56.7%), while in 91 cases (43.3%), the injuries were more severe and could not be treated with simple medical intervention. Yıldırım Can et al. reported that 34 cases (23.3%) were minor and manageable with simple medical intervention, while 91 cases (62.3%) were more severe and could not be treated with simple medical intervention.[21] Similarly, Doğan et al. found that 98 eye injuries (49.5%) were minor and could be relieved by simple medical intervention, while 100 injuries (50.5%) were more severe and could not be treated with simple medical intervention.[28]

Yıldırım Can et al. reported that eye injuries resulted in visual function weakening or loss in 49.6% of patients (n=65), while 50.4% (n=66) showed no such impairment.[21] Doğan et al. found the rate of visual function weakening or loss to be 7.6% (n=15), with 92.4% (n=183) of patients unaffected.[28] In our study, visual function weakening or loss was observed in 36.6% of all patients (n=77), while 63.3% (n=133) had no visual impairment.

In criminal proceedings, the evaluation of traumatic eye injury cases in terms of visual sequelae, namely, permanent weakening or loss of visual function, is carried out in accordance with paragraphs 1 and 2 of Article 87 of the Turkish Penal Code (TPC). If "permanent weakening" has occurred in a sense or organ of a person following an injury, the penalty is increased by one fold; if "loss" has occurred, the penalty is increased by two folds.[35]

Therefore, based on the principle of "equal penalty for equal offence" in criminal law, standard approaches should be established and adopted in assessments related to functional weakening or loss. Similar lesions occurring in different individuals should be evaluated in the same manner.[8] In this way, issues that may arise in criminal cases due to the discretion of the evaluating physician can be avoided, and potential violations of legal rights can be prevented.

At this point, a multidisciplinary approach should be adopted, bringing together forensic and ophthalmological specialists, and the assessment should be carried out in several stages. First, it should be determined how long after the trauma the assessment will be performed, and whether the healing process has been completed. This is important because an assessment based on a control examination conducted before the end of the healing period may result in an unjustified conclusion that a functional weakening or loss has occurred. To address this, further studies should be conducted to determine the average medical recovery time based on initial examination findings and diagnoses in patients evaluated for visual function weakening or loss after eye trauma. Standard guidelines should then be developed accordingly. The second step is to establish the causal connection between the trauma and the loss of vision, if visual function weakening or loss has occurred following eye trauma.

In the final stage, the evaluation method should be based on the findings of an examination conducted after it is confirmed that the healing process is complete. Although there are various diagnoses listed in the "Guideline" currently used by physicians in the evaluation of visual function in criminal proceedings in our country, visual acuity defect is predominantly considered. However, the current guideline does not allow

for adequate assessment when there is a combination of visual acuity loss, visual field defects, and other diagnoses in the same eye following trauma. The same guideline states that a forensic medical assessment of the rate of loss (anatomical or functional) in an organ or limb between 10% and 50% (including 50%) is considered "permanent functional weakening." If the rate exceeds 50%, it is considered "functional loss." In cases where a definitive decision cannot be made, the rate can be calculated using the invalidity/disability tables commonly used in civil court proceedings.[9,36]

Among the available options, the Regulation on the Assessment of Disability for Adults and the Schedule of Disability Rates annexed to this regulation offer a more comprehensive framework for evaluating visual function than other tables and charts. In this context, it is important to note that this regulation can be used in cases where visual acuity loss, visual field defects, and other diagnoses are present simultaneously in one eye following trauma. A final point to emphasize is that, in the assessment of visual function weakening or loss for criminal proceedings, unlike in civil cases, the visual function resulting from both eyes combined should not be evaluated as a single function. Instead, the visual function of each eye should be assessed separately, excluding parameters such as binocular visual acuity and visual field, and eliminating the positive or negative influence of one eye on the function of the other.[36]

CONCLUSION

Eye trauma is not a life-threatening condition from a forensic medicine perspective. However, in the context of criminal proceedings, a multidisciplinary approach, bringing together forensic medicine specialists and ophthalmologists, should be adopted when assessing visual sequelae, namely, visual function weakening or loss following eye trauma. First, it should be determined whether the healing process has been completed and whether a causal connection exists between the trauma and the vision loss. If only a visual acuity defect or certain specific diagnoses are identified in the examination after healing, the assessment should be made within the framework of the applicable guidelines. It should also be borne in mind that if visual acuity, visual field defects, and other diagnoses are collectively present in one eye, the adult disability list may be used. In assessments based on the disability list, the visual function of each eye should be evaluated separately. Parameters such as binocular visual acuity and visual field should be excluded, and the positive or negative influence of one eye on the visual function of the other should be disregarded.

Ethics Committee Approval: This study was approved by the Dokuz Eylül University Ethics Committee (Date: 08.05.2024, Decision No: 2024/16-26).

Peer-review: Externally peer-reviewed.

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ORİJİNAL ÇALIŞMA - *ÖZ*

Adli tıp bakış açısıyla posttravmatik görme sekelleri; 10 yıllık verilerin retrospektif analizi

AMAÇ: Görme işlevleri kişilerin kaliteli bir hayat sürmesinde en temel fonksiyonlardan biridir. Bu yönüyle göz travmaları gerek yaralanmanın ağırlık derecesinin gerekse sonrasında sekel kalıp kalmadığı, kalmış ise görme işlevlerinin kayıp derecesinin belirlenebilmesi amacıyla sıklıkla adli tıbbi değerlendirme sürecine konu olmaktadır. Bu çalışmada göz travması sonrası adli tıbbi değerlendirme süreci tartışılacaktır. Böylelikle adli değerlendirmede standardizasyonu/yol göstericiliği sağlayacak açıklamalar paylaşılarak oluşabilecek kafa karışıklıklarının giderilmesi amaçlanmıştır.

GEREÇ VE YÖNTEM: 01.01.2014-01.01.2024 tarihleri arasında ceza davası sürecine konu olarak göz travması sonrası yaralanmanın ağırlık derecesi ve görme işlevlerinin zayıflığı/yitimi yönünden Dokuz Eylül Üniversitesi Tıp Fakültesi Adli Tıp Anabilim Dalında adli tıbbi değerlendirmesi yapılan 210 olgunun (210 göz) dosyaları ve raporları geriye dönük olarak incelenmiştir. Sosyodemografik veriler, travma türü, yaralanma nedeni, ilk konulan tanı, Birmingham Göz Travması Terminoloji Sistemi'ne (BETTS) göre yaralanma tipi, yaralanan anatomik bölge, adli tıbbi açıdan yaralanmanın ağırlık derecesi ve görme işlev zayıflığı/yitimi meydana gelip gelmediği değerlendirilmiştir. Verilerin istatistiksel analizi SPSS 29.0 paket programı kullanılarak yapılmıştır.

BULGULAR: Toplam 210 olgunun, 171'i (%81.4) erkek, 39'u (%18.6) kadındı. Oküler travmaların en sık 19-30 yaş aralığında (n=62, %29.5) olduğu görüldü. Olguların 157'sinde (%74.8) kapalı, 53'ünde (%25.2) açık glob yaralanması vardı. Travma sonrası ilk göz muayenesinde tüm olgular genelinde en sık subkonjoktival hemoraji (n=132, %62.9) saptandı. Görme işlev zayıflaması/yitimi meydana gelmesi üzerinde yaralanmanın zon I dışına lokalize olması en kuvvetli kötü prognostik faktör olarak ortaya çıkmıştır.

SONUÇ: Göz yaralanmaları adli tıbbi açıdan tek başlarına yaşamsal tehlike oluşturmamaktadır. Ceza dava süreçlerine ilişkin göz travması sonrası görme sekeli, diğer bir deyişle görme işlev zayıflaması/yitimi yönünden yapılacak değerlendirmede adli tıp ve göz uzmanının dahil olduğu multidisipliner bir yaklaşım benimsenmeli, öncelikle iyileşme sürecinin tamamlanıp tamamlanmadığı ve görme kaybı ile travma arasındaki illiyet bağı sorgulanmalıdır. İyileşme sürecinin tamamlanması sonrasında her bir gözün görme işlevi kendi içerisinde ayrı bir fonksiyon olarak ele alınmalı ve görme keskinlik, görme alan kusuru ve diğer tanıların bir gözde tek başına veya toplu olarak bulunup bulunmamasına bağlı olarak kullanılacak değerlendirme metodu seçilmelidir.

Anahtar sözcükler: Adli tıp; ceza davası; glob yaralanması; görme sekeli; görme işlev zayıflaması/yitimi.

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