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THE STRUCTURE OF ORBITAL INJURIES AND ASSESSMENT OF THE SEVERITY OF INJURIES

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ABSTRACT

The article reflects a comprehensive analysis of aspects of forensic-medical expertise of orbital trauma. The issues related to the peculiarities of forensic-medical assessment of isolated and combined orbital trauma at the present stage are presented. The difficulties of expertise in these conditions are considered, which are determined, on the one hand, by the interdisciplinary nature of this pathology, and on the other hand, by the imperfection of the legal framework. The necessity of reviewing and reforming the existing legislative basis of forensic-medical expertise is substantiated.

Key words: orbital trauma, forensic-medical expertise, degree of injury severity.

INTRODUCTION

Orbital injuries with involvement of the visual organ and its auxiliary organs account for 36% to 64% of all facial skeletal injuries. The most common causes of mechanical injuries are motor vehicle accidents and falls from heights [1, 2]. Orbital injuries, especially as a result of road traffic accidents, are rarely isolated. As a rule, they are combined with injuries to the facial and cranial bones, where one type of injury may dominate over another. Therefore, orbital trauma affects the professional activities of doctors in at least five specialties - ophthalmologists, maxillofacial surgeons, neurosurgeons, otolaryngologists, and radiologists [6, 7, 12]. In addition, the social significance of orbital trauma is determined by the high visual impairment in working-age men [3]. Often, these injuries lead to facial

disfigurement, which negatively affects the mental well-being of the victims [4, 8, 11].

Accurate expert assessment of the severity of health damage caused by orbital trauma is currently a complex interdisciplinary problem. A whole range of social factors - the increase in the frequency of man-made disasters, the increase in the number of road traffic accidents, as well as the emergence of high-precision diagnostic and therapeutic technologies - all this, on the one hand, creates numerous new difficulties, and on the other hand, provides new opportunities for the forensic examination of orbital trauma at the present stage [7, 9, 10].

To date, there is little information in the available literature about the practical prevalence of orbital trauma in forensic medicine and its structure. There is no standard or unified methodological approach to forensic-medical examination of orbital trauma. In the works devoted to the expert assessment of the zygomatico-orbital complex and the eyeball, only individual aspects of the problem have been studied. In the investigation of crimes directed against human life and health, forensic-medical expertise plays an important role, without which it is impossible to establish the mechanism and timing of inflicted injuries, as well as the nature and degree of injury severity [2, 5].

The existing contradiction between the increasing practical need for expert studies to determine the severity of bodily injuries in orbital trauma and the absence of comprehensive scientific research on this problem determined the relevance of this study.

Research objective is to study the criteria for clinical-instrumental assessment of the severity of bodily injuries in forensic-medical examination of orbital trauma.

Materials and Methods: The subject of the study is the problem of improving the criteria for clinical assessment of orbital trauma in determining the severity of bodily injuries.

The methodological basis of the research consists of the sequential application of clinical-expert assessment methods, medico-legal analysis, as well as comprehensive ophthalmological examination of the victims. The work was conducted in the design of a retrospective and prospective study using clinical, instrumental, and statistical methods.

The object of the study was 611 archival conclusions of forensic medical examinations of living individuals, out of which 143 conclusions of individuals with orbit trauma were selected. Furthermore, out of the selected 143 conclusions, 28 medical histories were chosen for the study. Additionally, 41 patients diagnosed with orbit trauma were examined.

The statistical analysis was based on descriptive statistical methods, such as determining mean values and standard deviation, and was performed using the SPSS Statistics 20.0 program.

Results and Discussion. The study was conducted in two consecutive stages, each using different materials (forensic medical reports, medical histories, living individuals) and methods (analytical, clinical, and instrumental).

During the first stage, a retrospective analysis of expert opinions (n=143) was conducted in the Department of Forensic Medical Examination of the victims, defendants, and other individuals at the Center for Forensic Medical Examination in Tashkent. The examination of forensic medical reports revealed the following: the age of the victims at the time of injury ranged from 9 to 76 years (mean age 34.1±1.2 years); there were 128 adults and 15 children (under 18 years old); 105 males and 38 females (ratio 2.7:1).The following mechanisms of injury were observed among the victims: injuries caused by blunt objects - n=89; 62.2%; road traffic accidents - n=44; 30.8%; domestic injuries - n=4; 2.8%; falls from height - n=3; 2.1%; explosive injuries - n=3; 2.1%. Among the examined forensic medical reports, both primary cases (111 cases, 77.6%) and additional cases (15 cases, 10.5%) were present. In 11.9% of cases (n=17), repeated (commissioned) forensic medical examinations were conducted involving an ophthalmologist in 12 cases and other specialists (neurosurgeons, dentists, maxillofacial surgeons, radiologists) in 5 cases.

The time intervals between the occurrence of injuries and the initiation of examinations were as follows: in 56.6% of cases, the examinations were initiated within 3 months, in 29.4% of cases, the intervals were 3-6 months, in 8.4% of cases, the intervals were less than 1 month, and in 5.6% of cases, the intervals were between 6 months and 1 year. Based on the forensic medical examination data (n=143), the severe bodily injuries were qualified for 69 individuals (48.3%), injuries of moderate severity - for 62 individuals (43.4%), and minor bodily injuries - for 12 individuals (8.4%).

The analysis revealed three variants of orbital injuries in the forensic medical reports: isolated injuries, combined with traumatic brain injury (TBI), and combined with injuries in other body areas.

In 6.3% of cases (9 individuals) with combined orbital injuries and TBI, life-threatening conditions such as grade III-IV shock, hemothorax, and polytrauma (severe associated traumatic injuries) were observed. The combination of TBI and orbital injury without other injuries was observed in 118 victims (82.5%), while isolated orbital injury was present in 16 individuals (11.2%).

For a more detailed study of the issues related to forensic medical examination in orbital injuries and the research tasks, the data from the medical histories of 143 victims who underwent forensic medical examination were subjected to detailed analysis. Twenty-eight medical histories from healthcare institutions in Tashkent were obtained for analysis.

In the final stage, 41 individuals with injuries to the bony structures and soft tissues of the orbit were examined. The causes of injuries were distributed as follows: 24 patients (58.5%) received injuries as a result of a head strike, 11 patients (26.8%) fell from their own height, and 4 patients (9.8%) were involved in road traffic accidents. The combination of TBI (concussion) and orbital injury without other injuries was observed in 23 victims (67.6%). Isolated orbital trauma without cranio-cerebral injury was found in 18 individuals (32.4%).

During the second stage, clinical and special examination methods were employed. Ophthalmological examination included: collecting complaints and a history of life and illness to determine the timing and mechanism of the injury, assessing visual acuity, studying pupillary reactions, determining the range of eye movements and the position of the eyeball in the orbit, tonometry, biomicroscopy, ophthalmoscopy, and orbital ultrasound scanning.

Clinical variants of orbital trauma based on the findings of forensic medical examination of living individuals (n=143) varied significantly in terms of severity, localization of the damage, condition of the eyeball, and treatment strategies.

The analysis of traumatic injuries (n=143), taking into account anatomical variations of orbital wall fractures and radiodiagnostic methods, showed a predominance of isolated fractures of the inferior wall, zygomatico-orbital fractures, and multiple fractures.

Ophthalmological examination data were recorded in only 98 reports (68.5%). In this case, ophthalmologists limited their examination methods to the following: visual acuity determination - 65%; external examination (description of hematomas and abrasions) - 93%; biomicroscopic examination - 67%; ophthalmoscopy - 78%; determination of eye movements - 31%; intraocular pressure measurement - 16%; visual field determination - 13%; ultrasound echography of the eyeball - 7%.

Orbital trauma in the conclusions of forensic experts was mostly represented by fractures of the bony walls (90.9%). Only a small number of cases were accompanied by contusion of the soft tissues of the orbit. In half of the affected individuals (53.8%), the condition of the eyeball itself was assessed as normal or mildly contused.

The distribution of the severity of bodily injuries and the determining forensic qualifying signs, described as “bodily injury dangerous to human life”, was established in 62 cases (43.4%), which indicates a severe bodily injury.

In nearly half of the cases (n=68, 47.6%), forensic experts used the qualifying sign of "duration of health disorder" to determine the severity of bodily injuries. However, this qualifying sign has the least reliable objectivity, primarily because it does not reflect the immediate severity of the inflicted injuries.

A retrospective analysis of forensic conclusions (n=143) revealed that in the majority of cases, forensic medical examination dealt with a combination of orbital trauma with head and other body injuries and cranio-cerebral trauma (Groups A and B, respectively). Isolated orbital trauma is a relatively rare clinical situation (Group B).

Group A (n=10) included cases of severe combined trauma in which orbital injuries were combined with life-threatening conditions, which in itself posed a danger to life and qualified as a severe bodily injury.

Group B encompasses cases of orbit trauma combined with craniocephalic trauma (n=117, 81.8%). Post-traumatic brain injuries included concussion (n=45; 38.5%), brain contusion (n=38; 32.4%), intracranial hematomas - subdural (n=1; 0.9%), epidural (n=8; 6.8%), intracerebral (n=1; 0.9%), and subarachnoid hemorrhage (n=24; 20.5%).

Undoubtedly, from the perspective of forensic medical examination, the combination of craniocephalic trauma and orbit trauma presents a challenging situation for the expert. According to Appendix No.2 of the Rules for forensic medical determination of the severity of bodily injuries, approved by Order No. 153 of the Minister of Health of the Republic of Uzbekistan dated June 1, 2012, craniocephalic trauma such as moderate and severe brain contusion, intracranial hematomas, with the presence of general cerebral, focal, and brainstem symptoms, corresponds to the qualifying criterion of life-threatening danger, which immediately determines it as a severe bodily injury. In these conditions, it is impossible to assess the severity of bodily injury caused by orbit damage.

Taking the above into account, 55 observations were selected from Group B, in which craniocephalic trauma (concussion and mild brain contusion) did not predominate over the severity of orbit trauma and did not significantly affect the results of the examination. This sample (n=55) was combined with patients with isolated orbit trauma - Group A (n=16) for further scientific evaluation of the correctness of the examination in the newly formed group, which amounted to a total of 71 cases. In this group (n=71), severe bodily injury was established in 9

individuals (12.7%), moderate bodily injury in 51 individuals (71.8%), and mild bodily injury in 11 individuals (15.5%).

First and foremost, the localization of the orbital wall fracture was evaluated, followed by the diagnostic imaging method used to diagnose it, and finally, the degree of damage to the eyeball. Radiography or computed tomography (CT) served as the radiological diagnostic methods in the archival material under consideration. In cases related to moderate and mild injuries, the examination relied solely on the results of radiographic imaging, which raises doubts about the reliability and validity of such examinations.

Regarding the examination of cases with severe bodily injury (n=9), it should be noted that when fractures of the orbital walls and severe contusion of the eyeball are combined, contusion becomes the dominant injury. Therefore, to accurately assess the inflicted bodily injury, consultation with an ophthalmologist must be conducted.

In situations where the trauma to the eyeball can be evaluated as moderate in severity, the choice of the radiological diagnostic method for orbit wall injuries becomes crucial, favoring CT.

In 51 cases, the health damage was determined as moderate in severity based on the qualifying criteria of "significant and persistent loss of general working capacity" (only 6 cases), while in the remaining 45 cases, the criterion of “duration of health disorder” was applied. Thirteen victims suffered fractures of the upper wall of the orbit and the orbital grid, which determine severe bodily injury posing a threat to human life. Apparently, the significance of the anatomical localization of orbit fractures as injuries that can be qualified as life-threatening was underestimated by forensic experts. Furthermore, in 10 cases, there were obvious discrepancies between the results of radiography and subsequent CT in this group.

In conjunction with cases where the experts chose the criterion of the duration of health impairment and the radiographic method as the determining factor, all the examinations under consideration raised doubts about the accurate assessment of the severity of bodily injuries.

The assessment of the quality of ophthalmological examinations in cases of moderate health damage showed that in 50% of the cases, they were uninformative. In 50% of the cases, the measurement of eye movement and the presence of diplopia were not determined, and in 46% of the cases, there was no information provided on the maximum corrected visual acuity, nor was the condition of the anterior and posterior segments of the eye evaluated. In 9 expert opinions, there was a complete absence of information regarding the consultation with an ophthalmologist. The main traumatic changes to the eyeball in the group

with moderate health damage were mild contusions (n=24) and moderate contusions (n=10).

In 11 examinations, mild health damage was qualified solely based on the criterion of the duration of health impairment.

In 5 out of 11 examinations, the conclusions were based solely on radiographic data. In two cases, there were discrepancies between the diagnoses based on the radiographic and computed tomography data. Fractures of the orbital walls were complicated by limitations in eye mobility (n=2), which may be associated with the presence of "silent" orbital fractures. In 4 out of 11 cases, there was no information available on the ophthalmological examination, while in the remaining 7 cases, the traumatic injuries to the eyeballs were mild contusions.

Conclusions. Thus, the examination of orbital trauma presents a challenging task. The frequent combination of orbital trauma with traumatic brain injury (TBI) and injuries to other organs (88.8%) forces the expert to determine the dominant injury. According to the analysis, orbital trauma acts as the dominant injury in cases where it is combined with specific types of TBI (mild concussion and contusion) or in cases of isolated orbital trauma (which is rare).

The methodology of forensic medical expertise prioritizes the medical criterion of permanent loss of general working capacity over the criterion of the duration of health impairment. According to the conducted analysis, in half of the cases, experts use the medical criterion of the duration of health impairment (47.6%) for various reasons.

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