

# Forensic Examination of Living Persons with Blunt Trauma of Some External Respiration Organs

Vasil Olkhovsky<sup>1</sup>, Oleksandr Kliuiev<sup>2</sup>, Mykola Gubin<sup>3</sup>, Simakova-Yefremian Ella<sup>4</sup>, Khosha Vadym<sup>5</sup>

<sup>1</sup>Professor, Head of the Department of Forensic Medicine, Medical Law, Kharkiv National Medical University, Kharkiv, Ukraine, <sup>2</sup>Professor, Doctor of Sciences of Law, Honored Lawyer of Ukraine, Director of Hon. Prof. M. S. Bokarius Kharkiv Research Institute of Forensic Examinations of the Ministry of Justice of Ukraine, Kharkiv, Ukraine, <sup>3</sup>PhD, Associate Professor of the Department of Forensic Medicine, Medical Law, Kharkiv National Medical University, Kharkiv, Ukraine, <sup>4</sup>Senior Scientist, Doctor of Sciences of Law, Deputy Director on Scientific Work, Hon. Prof. M. S. Bokarius Kharkiv Research Institute of Forensic Examinations of the Ministry of Justice of Ukraine, Kharkiv, Ukraine, <sup>5</sup>Candidate of Sciences of Law (PhD), Head of postgraduate department, Hon. Prof. M. S. Bokarius Kharkiv Research Institute of Forensic Examinations of the Ministry of Justice of Ukraine, Kharkiv, Ukraine

## Abstract

Based on retrospective morphological and clinical analysis of archival materials of Kharkiv Regional Bureau of Forensic Medical Examination, the frequency and types of injuries of some external respiration organs were determined at the examination of living persons. Peculiarities of forensic expert evaluation in determining the severity of bodily injuries associated with injuries of external respiration organs were described. Ways of improving the quality of forensic expert diagnostics of specified trauma were determined.

**Keywords** : Forensic medical examination, bodily injuries, respiratory tract injuries, severity of bodily injuries.

## Introduction

The normal functioning of the human body is ensured, first and foremost, by the continuous and uninterrupted functioning of the organs of external respiration (OER), namely airways, lungs, chest cavity with muscles [1]. However, injuries of abovementioned organs are characterized by the appearance of a large variety of injuries, such as ruptures of organs walls and parenchyma, fractures of larynx cartilages and ribs [2-4]. These injuries are often complicated by life-threatening phenomena, primarily the appearance of acute respiratory failure [5-7]. The consequences of OER injuries (cicatricial changes, respiratory failure, dysphonia, etc.) lead to a significant loss of earning

capacity [3,4]. In this case, victims of non-lethal OER injury become the subject of forensic examination of living persons, which is conducted in the course of pre-trial and judicial investigation [8-10].

An analysis of literary sources [11-14] regarding the forensic assessment of these injuries in determining the severity of bodily injuries showed that views of forensic specialists regarding the application of certain qualifying signs of the severity of bodily injuries differed. In particular, there were controversial views on the kind of OER injuries that have caused by blunt objects, should be considered as dangerous to life. In some cases, it was proposed to classify all blunt injury with fractures of larynx cartilage and trauma with hemo- and pneumothorax as a grave life-threatening bodily injuries, regardless of its peculiarities, severity, presence of life-threatening phenomena. In other cases, in particular, in accordance with the "Rules of forensic determination of the severity of bodily injuries" (order of the Ministry of Health of Ukraine No. 6), such injuries should be attributed to severe bodily injuries only in the presence of life-threatening phenomena.

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**Corresponding author,**  
**Edgar Grygorian**

Work address: 14/16, Dmytrivska st., Kharkiv, Ukraine;  
email: 8520148@gmail.com) – Postgraduate Student  
of the Department of Forensic Medicine, Medical Law,  
Kharkiv National Medical University, Kharkiv, Ukraine.

**The purpose of this work** was the morphological and clinical analysis and characterization of bodily injuries in blunt trauma of some external respiration organs during the forensic examination of living persons, in order to identify ways to increase the efficiency of forensic diagnosis of this injury.

**Material and methods.** A retrospective analysis of 16100 forensic reports for three years, conducted in the department of forensic examination of victims, accused and other persons of the Kharkiv Regional Bureau of Forensic Medical Examination (KRBFME), was conducted. According to the typological principle, 74 forensic reports containing blunt trauma of OER had been selected.

During the study, the following methods were used: registration - received data were entered into specially developed registration cards, which included the corresponding list of morphological and clinical signs; method of mathematical and statistical analysis; morphological method – determination of damage characteristics; clinical - analysis of OER dysfunction, the duration of dysfunction; forensic - evaluation of the severity of bodily injuries by forensic experts.

**Results and their discussion.** As shown by the analysis of the conducted observations, the examination of blunt OER trauma, which was 0.46% of the total annual number of forensic reports in department of forensic examination of victims, accused and other persons of the KRBFME. Trauma of OER prevailed in males (71% of observations), more than half of persons were at their working age - 20-50 years (65% of cases). Among causes of damage to OER, domestic injuries were the most frequent.

According to the mechanism of damage - in 67 cases (89.9% of observations) there was a shock effect of blunt objects on neck and chest area (more often, hits by fingers clenched into a fist and by other blunt objects), in 5 cases (6.7 % of observations) there was a neck compression with hands, in two cases (2.7% of observations) - neck compression with hands and a loop.

In OER injuries, the predominate damage to bone carcass of chest, namely fractures of one or several ribs, occurred in 62 cases (83.2% of observations). Among them, fractures of several ribs were found in 55 cases (73.8% of observations), fractures of only one rib - in 7 cases (9.4% of observations). The larynx injuries were less frequent - 10 cases (13,4% of observations). Lung

injury and its contusion, without rib's damage, which complicated with the development of post-traumatic pneumonia, was described in one case (1.3% of observations). Closed traumas of the chest with fractures of several ribs complicated by the development of both hemo- and pneumothorax occurred in 22 cases (29.5% of observations); pneumothorax - in 7 cases (9.4% of observations); hemothorax - in 5 cases (6.7% of observations). In a chest injury with a single rib fracture, a pneumothorax was diagnosed in 3 cases (4.0% of observations). In cases of rib fractures, the presence of lung rupture was determined in 5 cases (6.7% of observations). In 4 cases (5.4% of observations), chest trauma with rib fractures accompanied by hemo- and pneumothorax was complicated by the development of post-traumatic pneumonia. The development of acute respiratory failure was indicated in 5 cases (6.7% of observations) of closed chest trauma with fractures of several ribs and hemo-, pneumothorax; and in one case (1.3% of observations) of closed blunt trauma of neck with larynx damage, the large post-traumatic hematoma and a 2-degree stenosis. In 3 cases (4.0% of observations) closed blunt neck injury with laryngeal damage was accompanied by the mechanical asphyxiation. In addition, in all cases of larynx injuries in victims, the acute post-traumatic laryngitis was observed.

At the forensic expert assessment of the data obtained, the experts defined the following bodily injuries' severity:

1) Severe bodily injuries were defined, according to "Rules..." "Danger to Life" criterion, in 5 cases (6.7% of observations) of closed blunt trauma of the chest, with closed fractures of several ribs, contusion, rupture of lungs, hemo- and pneumothorax, severe traumatic shock; and in 3 cases (4.0% of observations) - with a closed blunt neck injury with larynx damage accompanied by mechanical asphyxiation;

2) Moderate severity injuries were defined, according to "Rules..." "Duration of Health Disorder" criterion, in 51 cases (68.5% of observations) of the chest trauma with several ribs' fractures, in 7 cases (10.7% of observations) - with fracture of one rib. Combined hemo- and pneumothorax was diagnosed in 16 cases (21.5% of observations), pneumothorax - in 7 cases (9.4% of observations), hemothorax - in 5 cases (6.7% of observations). In addition, according to the abovementioned criterion, lung contusion complicated by the development of post-traumatic pneumonia, which

occurred in one case (1.3% of observations) and closed blunt injury to the neck with damage to the larynx, large post-traumatic hematoma and the 2-degree stenosis - in one case (1.3% of observations) were assessed by forensic experts as moderate severity injuries.

Forensic experts used the physical examination results and the pathological changes in the dynamics, in order to confirm the duration of health disorder in these forensic medical examinations. At the same time, in 6 cases (8.1% of observations) in the presence of acute respiratory failure (in 1 person with blunt neck injury and 5 - with chest trauma), indicated in expert reports, bodily injuries may still be attributed to severe, according to "danger to life" criterion because of the presence of life-threatening phenomena;

3) Light bodily injuries were defined in 5 cases of laryngeal injuries (6,7% of observations) with the development of acute post-traumatic laryngitis. In these evaluations, forensic experts did not have sufficient data on outcomes of laryngeal injuries which are necessary for a forensic assessment of trauma. Additional control diagnostic studies, such as stroboscopy of larynx, and phoniatic examination were not carried out by experts. In these cases, in absence of information on the final traumas' outcome and inability to conduct additional researches by experts, it was necessary to refuse to determine the severity of these injuries.

In addition, during the retrospective analysis of the expert material, it has been found that, in some cases, the character of inflammatory process in laryngeal injuries (i.e. catarrhal, purulent, purulent-necrotic) was not completely described on the medical documentation which was provided to experts. In medical documentation, signs of acute respiratory failure were not always recorded, which, subsequently, does not allow the expert to justify existence of a danger to life and could lead to an underestimation of bodily injuries' severity. There was no emphasis placed on the presence of cartilage larynx fractures. As concerning the diagnostic procedures in medical institutions and in course of forensic examinations, a computer tomography, which allows to detect lesions of cartilage larynx, was not always performed. In some examinations, any additional researches, including those aimed at determination of the degree of traumatized organs' damage and persistent consequences of trauma, were not carried out as well.

**Conclusion.** Thus, based on studies conducted, we came to following conclusions:

1) In the expert practice of the Forensic Medical Examination Department of victims, accused and other persons of the KRBFME, the injuries of the organs of external respiration were 0.46% of the total annual number of examinations;

2) Until these days, regulatory documents do not propose precise technology and methodics for forensic examination of living persons with injuries of organs of external respiration;

3) In forensic examination of external respiration organs' injuries, there is no clear list of diagnostic tests that would allow experts to substantiate diagnostic criteria more objectively, while assessing results of trauma and presence of life-threatening events accompanying trauma;

4) The further perspective of this study is a detection and grounding of clear diagnostic criteria for forensic medical evaluation of external respiration organs' injuries caused by blunt, sharp objects, guns (gunshot wounds), chemicals, high temperature. Obtained results should provide the basis for specialists in forensic medicine increasing the objectivity and probative value of expert conclusions and, thus, improving the quality of forensic medical diagnostics of external respiration organs' injuries during the examination of living persons.

**Conflict of Interest** - none.

**Source of Funding**- The study is self-funded.

**Ethical Clearance** – The study is based on archival documents; authors met ethical requirements on confidentiality of information received in the course of research.

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