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FORENSIC EVALUATION OF CLINICAL OBSERVATIONS OF INJURIES OF SOME EXTERNAL RESPIRATORY ORGANS

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In the structure of injuries of the external respiratory system, closed chest injury occupies a leading place. Such injuries in victims may be a reason for forensic medical examinations. The aim of the work was to establish a forensic medical assessment of the severity of injuries of the respiratory system based on clinical observations of closed blunt trauma of the chest to determine additional diagnostic criteria for its seriousness.

The material for the study was medical records of 126 patients of the Kharkiv Institute of General and Emergency Surgery, named after V.T. Zaitseva, who had chest injuries. According to the materials of clinical observations of closed chest injuries, the severity of injuries in the victims was assessed. In 24 (19%) cases of closed chest injuries, severe injuries were found mainly with acute respiratory failure as a life-threatening condition.

In 72 (57.2%) cases of closed chest injuries, mainly with rib fractures, moderate injuries were found in the absence of danger to life. In 30 (23.8%) cases of chest injuries without rib fractures with intrapleural injuries and complications and mild chest injuries without any complications, assessed as minor injuries.

It is established that in the forensic medical examination of closed chest injuries, it is necessary to consider additional diagnostic criteria: the presence of life-threatening phenomena, the dynamics and duration of recovery of post-traumatic morpho-functional changes of injured organs.

Key words: forensic medical examination, chest injury, diagnostic criteria, severity of injuries.

Relationship of the publication with the planned research works. The scientific work is a fragment of the research "determination of the age of death and the severity of injuries on forensic diagnostic signs" (№ state registration 0121u110929).

Introduction. The uninterrupted functioning of the external respiratory system, which includes the airways, lungs, chest, and muscles, ensures the normal functioning of the human body [1, 2]. At the same time, closed chest trauma is a frequent type of damage to the external respiratory system, one of the leading causes of life-threatening consequences, both in peacetime and wartime [3-6]. Victims with non-fatal closed blunt trauma of the chest (BTT) become the object of forensic medical examination to determine the severity of injuries [7-10].

During the forensic medical examination of these injuries in determining the severity of injuries, the approaches of forensic doctors differ in the use of certain qualifying features of the severity of injuries. This is evidenced by studying particular literature sources [11-15]. Forensic assessment of BTT in classifying them as life-threatening is contradictory. Some experts suggest organizing as severe life-threatening injuries all BTT with the occurrence of intrapleural injuries, including hemopneumothorax, regardless of its nature and severity and the presence or absence of life-threatening phenomena [10-12]. However, according to other scientists and by current regulations of Ukraine, in particular, according to the "Rules of forensic determination of the severity of injuries" (enacted by order of the Ministry of Health of Ukraine №6 from 17.01.1995), severe injuries it is necessary to establish only in the presence of life-threatening phenomena listed in paragraph 2.1.3 "o" [13-15].

The purpose of the work – is a forensic assessment of the severity of injuries of the respiratory system based on clinical observations of closed blunt chest trauma to determine additional diagnostic criteria for its severity.

Object and methods of research. The material for the analysis was medical records of patients who were treated for the last ten years at the Kharkiv Institute of General and Emergency Surgery, named after V.T. Zaitseva. A total of 126 patients' medical records were processed retrospectively. The study material was divided into 3 groups depending on the dynamics of morpho-functional post-traumatic changes in the thoracic organs responsible for respiratory function, the final results, and the presence of life-threatening phenomena in patients. The first group included patients with complete recovery of chest function and disappearance of post-traumatic morphological changes in the period up to 6 days (subgroup "a") and in the period from 7 to 21 days (subgroup "b"). The second group included patients with positive dynamics but incomplete recovery of chest function and disappearance of post-traumatic morphological changes: up to 6 days (subgroup "a"), between 7 and 21 days (subgroup "b"), for a period of more than 21 days to 31 days (subgroup "c"), for a period of more than 1 month up to 2 months (subgroup "d"), for a period of more than 2 months up to 3 months (subgroup "e"), for a period of more than 3 months up to 1 year (subgroup "f"), for more than 1 year (subgroup "g"). The third group included patients who had an acute life-threatening condition in the background of BTT, namely acute respiratory failure. The following methods were used in the study: registration method – the obtained data were entered into specially developed registration cards; standard method of descriptive statistics; forensic

Table – Morpho-clinical variants of closed chest injuries

The nature of the injury	Observation groups										Total	%
	I		II							III		
	a	b	c	d	e	f	g	h	i			
BTT, rib fractures			4	12							16	12,7
BTT, rib fractures, the presence of intrapleural lesions and complications:												
- hemothorax				7	1			1		1	10	7,9
- curled hemothorax					3	3				2	8	6,3
- pneumothorax			2	5		1				3	11	8,7
- hemopneumothorax			3	7		2	2	1		6	21	16,7
- encysted pleurisy, hydrothorax						1	1				2	1,6
- posttraumatic ribs chondroma								1			1	0,8
- bronchopleurothoracic fistula										1	1	0,8
- pneumonia, sternal fracture						1					1	0,8
BTT, without rib fractures, the presence of intrapleural injuries and complications:												
hemothorax			2	3	1	1					7	5,6
curled hemothorax				1		1					2	1,6
- pneumothorax	1		2	1	1	1				1	7	5,6
- hemopneumothorax			1	1	1					2	5	3,9
- posttraumatic pleural empyema					1						1	0,8
- relaxation of the diaphragm dome										1	1	0,8
- post-traumatic lung abscess						1					1	0,8
- diaphragmatic hernia								1	1		2	1,6
- encysted pleurisy						1		1			2	1,6
- sternal fracture										1	1	0,8
BTT, slaughter without complications	2	3	4	6	1						16	12,7
BTT, slaughter, the presence of intrapleural lesions:												
- lung contusion, pulmonary hemorrhage												
- post-traumatic pneumonia				1							1	0,8
- slaughter, lung gangrene, hemothorax				4	1						5	3,9
BTT, scapular fracture, the presence of intrapleural complications and injuries:					1						1	0,8
- fracture of the thoracic vertebra												
- pleurisy						1					1	0,8
- pneumothorax										1	1	0,8
										1	1	0,8
Total	3	3	18	48	11	14	3	5	1	20	126	100

– determined the nature of the injuries and determined the severity of injuries.

Research results and their discussion. The observations showed that annually at the Kharkiv Institute of General and Emergency Surgery, named after V.T. Zaitseva, which is an emergency clinic, is treated an average of 18 patients with BTT, which is 0.3% of the total number of patients receiving treatment in the clinic. BTT prevailed in men – 108 (85.7%) cases, working age 20-50 years, had 59 (46.8%) patients. Among the causes of BTT in the first place are domestic injuries. According to the mechanism of damage, there was a shock effect of blunt solid objects on the chest in all cases.

The lesions detected in patients in the observation groups were systematized, and morpho-clinical variants of BTT were identified **(table).** The table shows that more than half of the patients with the studied injury – 71 (56.3%) observations, most patients in the second group had rib fractures. Intrapleural injuries and complications occurred in 55 (43.6%) patients with rib fractures. It is noteworthy that the first group patients had no damage to skeletal bones. In 23 (8.3%) cases of BTT in the absence of rib fractures, mainly in patients of the second, in 1 (0.8%) case in patients of the first group, and 5 (3.9%) cases in patients of the third group there were intrapleural injuries and complications. In 16 (12.7%) cases of BTT in patients of the first and second groups, the presence of chest slaughter was noted, without any complications. In 7 (5.6%) patients of the second group there was a chest contusion with intrapleural lesions. In most patients of the third group – 13 (10.3%) observations, there were fractures of the ribs.

Post-traumatic morphological changes were detected mainly by X-ray examination of the chest performed on all patients. This study revealed fractures of the ribs, air, blood, fluid in the pleural cavity, and changes in the parenchyma of lung tissue. Computed tomography was performed in 17 (13.5%) cases to clarify the X-ray examination results, or in cases where the X-ray examination was not informative enough.

Among the medical care provided to patients in the observation groups, conservative therapy was provided in 53 (42.1%) cases. Among surgical treatment, the largest number of manipulations was performed on the pleural cavity drainage according to Bülau – 57 (45.2%) observations. Drainage of the pleural cavity, according to Seldinger has performed in 6 (4.8%) cases. More severe surgical interventions, such as lobectomy,

diaphragm plastics, unilateral pneumonectomy, decortication, resection of the lobe, lung apex and others, were performed in 9 (7.1%) cases.

According to the results of forensic medical evaluation of clinical observations of BTT, we have established the following degree of severity of injuries. Serious bodily injuries according to the criterion of "danger to life" item 2.1.3 of item "o" of the "Rules..." were found in 20 (15.9%) patients with BTT who had signs of acute respiratory failure. In 13 (10.3%) patients, there were fractures of the ribs, there were intrapleural complications and injuries: in 1 (0.8%) case of hemothorax, in 2 (1.6%) cases of collapsing hemothorax, in 3 (2.4%) cases of pneumothorax, in 6 (4.8%) cases hemopneumothorax, in 1 (0.8%) case bronchopleurothoracic fistula. In 5 (3.9%) patients, there were no rib fractures, but there were intrapleural injuries and complications: in 1 (0.8%) case of pneumothorax, in 2 (1.6%) cases of hemopneumothorax, in 1 (0.8) %) case of relaxation of the dome of the diaphragm, in 1 (0.8%) case of sternal fracture. Two (1.6%) patients had a scapular fracture, 1 (0.8%) had pleurisy, and 1 (0.8%) had a pneumothorax.

We also found severe bodily injuries in 4 (3.2%) cases of BTT according to the criterion "health disorder associated with permanent disability of at least one third" of paragraph 2.1.6 of the "Rules...". At the same time, 1 (0.8%) patient had a lung contusion, pulmonary hemorrhage and underwent surgery – "Left lobectomy". In 1 (0.8%) patient, there was a contusion, lung gangrene, collapsed hemothorax, pleural empyema, surgery was performed – "Unilateral pneumonectomy". In 1 (0.8%) patient there was a rupture of the apex of the lung, total right-sided pneumothorax, surgery – "Resection of the apex of the lung". In 1 (0.8%) patient there were multiple rib fractures, hematoma, concussion, pulmonary hemorrhage, surgery – "Resection of the lower lung".

As moderate injuries that caused a long-term health disorder lasting more than 3 weeks (more than 21 days), paragraph 2.2.1 "c" of the "Rules...", we estimated: 16 (12.7%) cases BTT with rib fractures, without complications; 41 (33.3%) cases of BTT with rib fractures, the presence of intrapleural complications and combined injuries, of which 9 (7.2%) cases of hemothorax, 5 (3.9%) cases of collapsed hemothorax, 8 (6.3%)) cases of pneumothorax, 15 (11.9%) cases of hemopneumothorax, 2 (1.6%) cases of encapsulated pleurisy, 1 (0.8%) case of rib chondroma, 1 (0.8%) case of sternal fracture, pneumonia.

Also, 13 (10.3%) cases of BTT, without fractures of the ribs, with the presence of intrapleural injuries and complications of the same severity were attributed to moderate injuries: 2 (1.6%) cases of diaphragmatic hernia, 1 (0.8) %) case of curled hemothorax, 2 (1.6%) cases of hemothorax, 1 (0.8%) case of hemopneumothorax, 3 (2.4%) cases of pneumothorax; 1 (0.8%) case of pleural empyema, 1 (0.8%) case of lung abscess, 2 (1.6%) cases of encysted pleurisy. In addition, 1 (0.8%) case of thoracic slaughter with pneumonia and 1 (0.8%) BTT with scapular and thoracic vertebral fractures were assigned to the same severity.

As minor bodily injuries that caused a short-term health disorder lasting more than 6 days, but less than 3 weeks (21 days) in paragraph 2.3.2 "b" of the "Rules...", estimated 9 (7.2%) cases BTT, without rib fractures, the presence of intrapleural injuries and complications, of which: 5 (3.9%) cases of hemothorax, 1 (0.8%) case of curled hemothorax, 1 (0.8%) case of pneumothorax; 2 (1.6%) cases of hemopneumothorax. Also, of the same severity were 14 (11.1%) cases of uncomplicated chest slaughter, 4 (3.2%) cases of chest slaughter, the presence of intrapleural complications, of which 2 (1.6%) cases of pneumonia, 2 (1.6%) cases of pneumonia, pleurisy.

Two (1.6%) cases of chest slaughter without complications, 1 (0.8%) case of BTT, without fractures of the ribs, the presence of pneumothorax was assessed as minor injuries in paragraph 2.3.2 "b" of "Rules...".

Thus, the study allowed us to draw the following **conclusions:**

1) Patients with injuries of the respiratory system, namely BTT, average 0.3% of their total annual number in a specialized surgical hospital.

2) According to their morphology, patients with inpatient BTT are dominated by injuries with fractures of the costal skeleton of the chest (56.3%), including the presence of intrapleural injuries and complications (43.7%). Damage to life-threatening injuries is 15.9%.

3) In the structure of forensic medical assessment of BTT, according to clinical observations, serious injuries account for 19% of cases and are established mainly in acute respiratory failure. In 57.2% of cases of BTT, mainly with rib fractures in the absence of danger to life, are classified as moderate injuries. In 23.8% of cases of BTT without fractures of the ribs with the presence of intrapleural injuries and complications or minor injuries without any complications are classified as bodily injuries.

4) The available scientific and methodological literature does not contain apparent diagnostic morpho-clinical features for qualitative forensic assessment and prediction of the final results of BTT.

5) Additional diagnostic criteria for the assessment of BTT, which must be considered when determining the severity of injuries, should be considered: the dynamics and duration of recovery of post-traumatic morpho-functional changes of injured organs, life-threatening phenomena.

Prospects for further research are to perform scientific work to study all possible morpho-clinical manifestations of the studied injury, followed by developing a precise algorithm for forensic expert research in these cases.

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СУДОВО-МЕДИЧНА ОЦІНКА КЛІНІЧНИХ СПОСТЕРЕЖЕНЬ ТРАВМ ДЕЯКИХ ОРГАНІВ АПАРАТУ ЗОВНІШНЬОГО ДИХАННЯ

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Резюме. Закрита травма грудної клітки є частим видом ушкоджень органів апарату зовнішнього дихання. Постраждалі з такою травмою можуть стати об'єктом судово-медичної експертизи. Метою роботи стала судово-медична оцінка за ступенем тяжкості тілесних ушкоджень травм органів апарату зовнішнього дихання за матеріалами клінічних спостережень закритої тупої травми грудної клітки для визначення додаткових діагностичних критеріїв її тяжкості. Проаналізовано 126 медичних карт стаціонарного хворого, пацієнтів з травмами грудної клітки, які лікувались у Харківському інституті загальної та невідкладної хірургії імені В.Т. Зайцева. Виникнення травм органів грудної клітки відбувалось за ударним механізмом тупих твердих предметів на грудну клітину. Проведено судово-медичну оцінку закритих травм органів грудної клітки за ступенем тяжкості тілесних ушкоджень за матеріалами клінічних спостережень. Тяжкі тілесні ушкодження встановлені в 24 (19 %) спостереженнях переважно у випадках травм з виникненням небезпечних для життя явищ, а саме гострої дихальної недостатності. Ушкодження середньої тяжкості встановлені в 72 (57,2 %) випадках травм грудної клітки переважно з переломами ребер за відсутністю небезпеки для життя. Легкі тілесні ушкодження встановлено в 30 (23,8 %) випадках травм грудної клітки без переломів ребер з наявністю інтраплевральних ушкоджень та ускладнень або легких травм грудної клітки без будь яких ускладнень. Встановлено, що у наявній науково-методичній літературі відсутні діагностичні морфо-клінічні ознаки для якісної судово-медичної оцінки та прогнозування кінцевих результатів закритих травм грудної клітки. Визначено, що додатковими діагностичними критеріями закритих травм грудної клітки, які необхідно враховувати при визначенні ступеня тяжкості тілесних ушкоджень, слід вважати: динаміку та тривалість відновлення посттравматичних морфофункціональних змін травмованих органів, виникнення небезпечних для життя явищ. Визначено шляхи подальшого вдосконалення судово-медичної діагностики при оцінці вказаних тілесних ушкоджень за ступенем їх тяжкості.

Ключові слова: судово-медична експертиза, травма грудної клітки, діагностичні критерії, ступінь тяжкості тілесних ушкоджень.

FORENSIC EVALUATION OF CLINICAL OBSERVATIONS OF INJURIES OF SOME EXTERNAL RESPIRATORY ORGANS

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Abstract. Closed chest trauma is a common type of damage to the external respiratory system. Victims of such injuries may be subject to forensic examination.

Purpose of work. forensic assessment of the severity of injuries of the respiratory system on the basis of clinical observations of closed blunt chest injuries to determine additional diagnostic criteria for the severity of these injuries.

Object and methods. 126 history diseases of patients with chest injuries who were treated at the Kharkiv institute of general and emergency surgery named after V.T. Zaitseva were analyzed.

Results. The occurrence of chest injuries occurred by the mechanism of impact blunt solid objects on the chest. A forensic medical assessment of closed injuries of the chest organs according to the severity of injuries according to the materials of clinical observations was performed. Severe bodily injuries were estimates in 24 (19%) cases of injuries with life-threatening phenomena, namely acute respiratory failure. Moderate bodily injuries were estimates in 72 (57.2%) cases of chest injuries, mostly with rib fractures in the absence of danger to life. Simple bodily injuries were estimates in 30 (23.8%) cases of chest injuries without rib fractures with intrapleural injuries and complications or light chest injuries without any complications. It is established that in the available scientific and methodological literature there are no diagnostic morpho-clinical signs for qualitative forensic assessment and prediction of the outcomes of closed chest injuries.

Conclusions. It is determined that additional diagnostic criteria for chest injuries, which must be taken place when determining the severity of bodily injuries, should be considered: the dynamics and duration of recovery of post-traumatic morpho-functional changes of the chest, life-threatening phenomena. Ways to further improve forensic medical diagnostics in assessing these injuries by severity were identified.

Key words: forensic medical examination, chest injury, diagnostic criteria, severity of injuries.