

# ДИАГНОСТИКА И ЛЕЧЕНИЕ ПОСТТРАВМАТИЧЕСКОЙ ПНЕВМОНИИ У БОЛЬНЫХ С ЗАКРЫТОЙ ТРАВМОЙ ГРУДИ

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ДИАГНОСТИКА И ЛЕЧЕНИЕ ПОСТТРАВМАТИЧЕСКОЙ ПНЕВМОНИИ У БОЛЬНЫХ С ЗАКРЫТОЙ ТРАВМОЙ ГРУДИ.ЖКМП.-2024.-Т.1.-№1.-С

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**Аннотация:** Авторами изучены результаты диагностики и лечения 542 больных с травмами грудной клетки, среди которых у 72 (13,2%) пациентов развились посттравматические осложнения. Пневмония, основными причинами развития посттравматической пневмонии были множественные переломы ребер с плевральными осложнениями, гемопневмоторакс и ушиб легкого. Характерной особенностью посттравматической пневмонии является многоэтажность патологических процессов, протекающих в легочной ткани. Развитие пневмонии у пострадавших с травмами грудной клетки ухудшает общее состояние больных, осложняет течение основной патологии. Основными профилактическими мерами развития посттравматической пневмонии при травме грудной клетки являются адекватное обезболивание, своевременная ликвидация гемопневмоторакса, ателектазов легких, комплексные мероприятия по борьбе с дыхательной недостаточностью.

**Ключевые слова:** травма грудной клетки, переломы ребер, геморрагия, пневмоторакс, ушиб легкого.

## KO'KRAK QAFASINING YOPILGAN JAROXATLANISHI BILAN OG'RIGAN BEMORLARDA SHIKASTLANISHDAN KEYINGI PNEVMONIYA DIAGNOSTIKASI VA DAVOSI

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**Аннотация:** Му'alliflar ko'krak qafasi shikastlangan 542 bemorning diagnostikasi va davolash natijalarini o'rganishdi, shulardan 72 (13,2%) bemorda travmadan keyingi asoratlar paydo bo'ldi. Zotiljam, post-travmatik pnevmoniya rivojlanishining asosiy sabablari plevral asorat, gemo-pnevмotoraks va o'pka kontuziyasi bilan ko'p qovurg'a sinishi edi. Shikastlanishdan keyingi pnevmoniyaning o'ziga xos xususiyati o'pka to'qimalarida yuzaga keladigan patologik jarayonlarning qavatlar sonidir. Ko'krak qafasidagi jarohatlar bilan jabrlanganlarda pnevmoniya rivojlanishi bemorlarning umumiy ahvolini yomonlashtiradi, asosiy patologiya kursini murakkablashtiradi. Ko'krak qafasi travmasida post-travmatik pnevmoniya rivojlanishining asosiy profilaktika choralarini etarli darajada og'riqni yo'qotish, gemo-pnevмotoraks, o'pka atelektazini o'z vaqtida bartaraf etish va nafas olish etishmovchiligiga qarshi kompleks chora-tadbirlardir.

**Калит so'zlar:** ko'krak qafasining shikastlanishi, qovurg'a sinishi, gemo, pnevмotoraks, o'pka kontuziyasi.

## DIAGNOSIS AND TREATMENT OF POST-TRAUMATIC PNEUMONIA IN PATIENTS WITH CLOSED CHEST INJURIES

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**Annotation:** The authors studied the results of diagnosis and treatment of 542 patients with chest injuries, among which 72 (13.2%) patients developed post-traumatic complications. pneumonia. The main reasons for the development of post-traumatic pneumonia were multiple rib fractures with pleural complication, hemo-pneumothorax, and pulmonary contusion. A characteristic feature of post-traumatic pneumonia is the number of stories of pathological processes occurring in the lung tissue. The development of pneumonia in victims with chest injuries worsens the general condition of patients, and complicates the course of the underlying pathology. The main preventive measures for the development of post-traumatic pneumonia in chest trauma are adequate pain relief, timely elimination of hemopneumothorax, lung atelectasis, and a comprehensive measure to combat respiratory failure.

**Keywords:** chest injury, rib fractures, haemo, pneumothorax, pulmonary contusion.

**Relevance:** In connection with the growth of road injuries and the worsening of the criminal situation in recent years, there has been a noticeable increase in the number of victims with closed injuries of the chest, in particular with fractures of the ribs, which leads to a violation of the integrity of the chest, deterioration of lung ventilation and the development of post-traumatic pneumonia. According to UN statistics, annually in the world over 250,000 people die in road traffic accidents, and about 1 million are fatally injured [1,2,5,7,8,11,]. Chest injuries - a group of injuries that includes injuries to the ribs, sternum and internal organs located in the chest cavity. Such injuries can vary greatly both in nature and severity, however, due to the potential danger to the life of the patient, at the initial stage they are always considered by doctors as serious, requiring detailed examination of the patient [3,4,6,8,11,14]. This group of injuries is characterized by high mortality in the absence of medical care and a fairly high percentage of favorable outcomes with timely delivery of the patient to a specialized medical facility. institution. Mortality is 5-6%, with the majority of deaths occurring in open injuries (wounds), as well as multiple fractures of the ribs with rupture of the lung. According to statistics, mechanical injury is the most common (especially due to the importance of road traffic injuries: 68% of the total number of chest injuries) [13,14]. The issue of post-traumatic pneumonia in a number of guidelines on chest trauma is not discussed at all, although this complication occurs in 5.8-14.5 cases [1,4,7,13].

**Materials and methods:** Based on clinical data, the incidence of post-traumatic pneumonia was studied in case of chest trauma with lesions of a different nature: damage to the ribs, stump in the chest or hemothorax, pulmonary contusion in 542 patients hospitalized in the 2nd surgery department (thoracic post) in 2018-2022. The age of patients varied from 18 to 64 years, the average age of patients was 55.6 ± 12.2 years. 366 (67.5%) patients were male, 176 (32.5%) female. Of the 542 victims of chest trauma, 72 (13.2%) developed post-traumatic complications of pneumonia, which was one of the reasons for the worsening of the patients' condition. Injury to the chest according to the nature of severity can be varied.

**Results:** In 542 patients with chest injuries, the following lesions were noted:  
A) Wall damage:  
B) Injuries of the soft parts of the chest were observed in 182 (33.5%) patients (and in particular the muscular

component) and are usually associated with bone damage; negatively affecting lung function.

C) Bruises, bruising of the soft tissues of the chest was observed in 75 (14%) patients.

1. Rib fractures without pleural complication were observed in 56 (10.3%) patients;

2. Rib fractures with pleural complication in 48 patients, of which 16 patients had multiple rib fractures;

3. Pneumothorax was observed in 42 (7.8%) patients, of which open pneumothorax in - 14 closed - in - 25, and valvular in - 3 patients;

4. Hemothorax of varying degrees was noted in 22 (4%) patients, of which 2 patients underwent thoracotomy for suturing a lung rupture associated with an increase in the volume of hemothorax;

5. Injuries of the mediastinum: Mediastinal hematoma occurs as a result of hemorrhage into the tissue noted in -2 patients;

6. Pulmonary contusions were observed in 125 (23%) patients;

7. Post-traumatic pneumonia was observed in 72 (13.2%) patients;

Pulmonary contusion, occurs mainly with closed injuries. Pulmonary contusion may be the only manifestation of a chest injury. The presence of crepitant rales on auscultation, hypoxemia, and limited chest excursion may be a manifestation of hemorrhage and subsequent pulmonary edema leading to respiratory failure. Lung CT reveals limited infiltrates that tend to coalesce in the first few days [12]. With combined injuries that increase the risk of developing respiratory distress syndrome, mortality can reach 24% [23]. Considering these factors, it is recommended to hospitalize patients with a combined injury to maintain adequate oxygenation, airway clearance, and ventilation, while the use of mechanical ventilation is possible [12]. The effectiveness of prophylactic antibiotics and corticosteroids in such situations has not been proven. There are a huge number of factors contributing to the development of infectious, purulent-septic complications from the respiratory organs. In the group of victims who underwent an isolated severe chest injury, infectious complications were detected in 20-25% of cases [12]. The above listed were the main factors influencing the development of post-traumatic pneumonia in affected patients with chest injuries. Results of diagnostics and treatment of patients with chest injuries. If a lung injury is suspected, the patient must be examined by a thoracic surgeon or traumatologist.

The circumstances of the injury are specified. On examination, it is necessary to pay attention to the color of the skin, the presence of hematomas, abrasions in the chest and back, and the posture of the victim. Due to the pain syndrome with a unilateral bruise, the patient spares the injured half of the chest, supports it with his hand. Respiratory failure forces the patient to take a sitting position with legs down (orthopnea). To clarify the diagnosis, it is required to conduct: x-ray, computed tomography, ultrasound examination of the chest.

**Physical research.** The patient is pathologically determined by the increase in pain when pressing on the chest or back in the projection of the bruise. It is often possible to feel the places of fractures of the ribs. On auscultation, small and medium bubbling rales are heard in the damaged lung. Laboratory analyses. A clinical blood test is not very informative immediately after an injury. Performed to exclude concomitant. Pulmonary injury may be indicated by the presence of red blood cells in a sputum test. The study of the gas composition of the blood allows you to clarify the degree of hypoxemia. Pulse oximetry is used to quickly determine blood oxygen saturation [HYPERLINK "https://www.krasotai-medicina.ru/treatment/somnology/pulse-oximetry"](https://www.krasotai-medicina.ru/treatment/somnology/pulse-oximetry).

**Beam techniques.** Areas of infiltration of the lung tissue corresponding to the bruised area are determined on the radiograph 24-48 hours after the injury. X-ray of the lungs reveals pneumo- and, damage to the bone frame, and signs of post-traumatic pneumonia. In severe respiratory trauma, it is preferable to perform. It helps to determine the presence of pneumocele, and, from differentiating a bruise from a lung rupture and the development of pneumonia.

**Bronchial endoscopy.** Bronchoscopy is an auxiliary method. appointed according to indications. In the presence of hemoptysis, it helps to identify the source of bleeding. Edema and hyperemia of the mucous membranes of the bronchi are indirect signs of bruising of the respiratory organs. At the same time, therapeutic sanitation of the bronchi is performed. All victims should be divided into 4 groups: 1. Victims in an extremely serious condition (sometimes in a state of clinical death) with injuries leading to life-threatening violations of vital functions (damage to the heart, large vessels, lung root, severe concomitant injury). Diagnosis includes examination and identification of clinical symptoms of damage. The task

of the surgeon is to perform the operation as quickly as possible and complete the final stop of bleeding. The main methods of chest trauma are X-ray, computed tomography, and ultrasound examination of the chest.

Victims in serious condition, but without lives and threatening violations. Diagnosis includes a minimum examination: examination, chest x-ray, ECG, and pleural puncture. Further examination is carried out after the final stop of bleeding and stabilization of the victim's condition. The victims are in a state of moderate severity, without life-threatening disorders and stable hemodynamics. The entire necessary volume of examination (examination, fluoroscopy, radiography) of the chest, ECG, clinical and biochemical tests, pleural puncture, thoracoscopy, and consultation of related specialists is carried out). The victims are in satisfactory condition. The entire examination is carried out. The clinical symptomatology of chest injuries in our patients was varied and developed: signs of shock; bleeding symptoms; signs of respiratory and circulatory disorders. Local symptoms: pain; the presence and nature of the wound; external bleeding; signs of a fracture of the bones of the chest; Percussion and auscultation data. Specific symptoms: pneumothorax; hemothorax; subcutaneous emphysema; mediastinal emphysema; lung atelectasis; and Hemoptysis. Rib fractures. By the nature of the fractures, the ribs are single and multiple (3 ribs or more). With a complete fracture of the rib, as a rule, there occurs a displacement of bone fragments with entry along the long rib during exhalation and straightening during inhalation. In the diagnosis of pulmonary contusion, the most informative are fibro bronchoscopy (hemorrhages in the bronchial wall are visible), ultrasound (ultrasound), and chest CT, Radiographic confirmation of isolated rib fractures is obtained with conventional chest x-rays. The availability of CT has made this method routine in patients with severe chest trauma, as it has been shown that CT has advantages in the diagnosis of associated injuries, as well as in dynamic monitoring of patients with rib fractures. Pneumonia in victims with chest trauma can develop both on the side of the lesion and on the opposite side. The main reasons for the development of post-traumatic pneumonia are a violation of bronchial patency against the background of aspiration of blood and the development of atelectasis; deterioration of the drainage function of the bronchi; suppression of the cough reflex due to pain, loss of consciousness with excessive accumulation of sputum and mucus in the tracheobronchial tree.

Against the background of hypovolemia, acute microcirculation disorders in the pulmonary circulation also create favorable conditions for the development of complications. A certain contribution is made by a decrease in the overall immune resistance of the body of the victims and concomitant diseases. Pneumonia in victims with chest injuries is predominantly focal with localization in the lower lobes and manifests itself on the 3rd–5th day after injury with further progression of the clinical and radiological picture. Pneumonia due to atelectasis in chest injuries is most often bilateral and is localized in the basal segments. Finally, in severe concomitant wounds of the chest and neck, right-sided upper lobe pneumonia often develops due to aspiration of blood into the right main bronchus. Physical examination data are very modest and depend on the nature of pneumonia and its localization. Most often it is possible to detect hard breathing and wet rales of various sizes in the lower lobes of the lungs. According to E. A. Wagner, a clear clinical picture of pneumonia appears later than the X-ray data. Small-focal rounded shadows in the segments of the lower lobes, often merging, are considered characteristic. However, it should be recognized that against the background of post-traumatic changes in the lung parenchyma, especially with gunshot wounds, it is much more difficult to recognize pneumonia than in individuals with intact lungs. The development of pneumonia is easier to ascertain in dynamics, when, compared with the previous study, CT shows an increase in the infiltration zone, an increase in its density and uniformity. These zones are located, as a rule, in the peripheral parts of the lung parenchyma and are segmental. During x-ray examination: the areas of infiltration of the lung tissue corresponding to the bruised area are determined, they are determined on the radiograph 24-48 hours after the injury. X-ray of the lungs reveals pneumo- and, damage to the bone frame, and signs of post-traumatic pneumonia. In severe respiratory trauma, it is preferable to perform. It helps to determine the presence of pneumocele, and, from differentiating a bruise from a lung rupture and the development of pneumonia. Bronchial endoscopy. Bronchoscopy is an auxiliary method. appointed according to indications. In the presence of hemothysis, it helps to identify the source of bleeding. Edema and hyperemia of the mucous membranes of the bronchi are indirect signs of bruising of the respiratory organs. At the same time, therapeutic sanitation of the bronchi is performed. All victims should be divided into 4 groups: 1. Vic-

tims in an extremely serious condition (sometimes in a state of clinical death) with injuries leading to life-threatening violations of vital functions (damage to the heart, large vessels, lung root, severe concomitant injury). Diagnosis includes examination and identification of clinical symptoms of damage. The task of the surgeon is to perform the operation as quickly as possible and complete the final stop of bleeding. The main methods of chest trauma are X-ray, computed tomography, and ultrasound examination of the chest. Victims in serious condition, but without lives and threatening violations. Diagnosis includes a minimum examination: examination, chest x-ray, ECG, and pleural puncture. Further examination is carried out after the final stop of bleeding and stabilization of the victim's condition. The victims are in a state of moderate severity, without life-threatening disorders and stable hemodynamics. The entire necessary volume of examination (examination, fluoroscopy, radiography) of the chest, ECG, clinical and biochemical tests, pleural puncture, thoracoscopy, and consultation of related specialists is carried out). The victims are in satisfactory condition. The entire examination is carried out. The clinical symptomatology of chest injuries in our patients was varied and developed: signs of shock; bleeding symptoms; signs of respiratory and circulatory disorders. Local symptoms: pain; the presence and nature of the wound; external bleeding; signs of a fracture of the bones of the chest; •percussion and auscultation data. Specific symptoms: pneumothorax; hemothorax; subcutaneous emphysema; mediastinal emphysema; lung atelectasis; and •hemothysis. Rib fractures. By the nature of the fractures, the ribs are single and multiple (3 ribs or more). With a complete fracture of the rib, as a rule, there occurs a displacement of bone fragments with entry along the long rib during exhalation and straightening during inhalation. In the diagnosis of pulmonary contusion, the most informative are fibro bronchoscopy (hemorrhages in the bronchial wall are visible), ultrasound (ultrasound), and chest CT, Radiographic confirmation of isolated rib fractures is obtained with conventional chest x-rays. The availability of CT has made this method routine in patients with severe chest trauma, as it has been shown that CT has advantages in the diagnosis of associated injuries, as well as in dynamic monitoring of patients with rib fractures. Pneumonia in victims with chest trauma can develop both on the side of the lesion and on the opposite side.



The main reasons for the development of post-traumatic pneumonia are a violation of bronchial patency against the background of aspiration of blood and the development of atelectasis; deterioration of the drainage function of the bronchi; suppression of the cough reflex due to pain, loss of consciousness with excessive accumulation of sputum and mucus in the tracheobronchial tree. Against the background of hypovolemia, acute microcirculation disorders in the pulmonary circulation also create favorable conditions for the development of complications. A certain contribution is made by a decrease in the overall immune resistance of the body of the victims and concomitant diseases. Pneumonia in victims with chest injuries is predominantly focal with localization in the lower lobes and manifests itself on the 3rd–5th day after injury with further progression of the clinical and radiological picture. Pneumonia due to atelectasis in chest injuries is most often bilateral and is localized in the basal segments. Finally, in severe concomitant wounds of the chest and neck, right-sided upper lobe pneumonia often develops due to aspiration of blood into the right main bronchus. Physical examination data are very modest and depend on the nature of pneumonia and its localization. Most often it is possible to detect hard breathing and wet rales of various sizes in the lower lobes of the lungs. According to E. A. Wagner, a clear clinical picture of pneumonia appears later than the X-ray data. Small-focal rounded shadows in the segments of the lower lobes, often merging, are considered characteristic. However, it should be recognized that against the background of post-traumatic changes in the lung parenchyma, especially with gunshot wounds, it is much more difficult to recognize pneumonia than in individuals with intact lungs. The development of pneumonia is easier to ascertain in dynamics, when, compared with the previous study, CT shows an increase in the infiltration zone, an increase in its density and uniformity. These zones are located, as a rule, in the peripheral parts of the lung parenchyma and are segmental.

**During x-ray examination:** the areas of infiltration of the lung tissue corresponding to the bruised area are determined, they are determined on the radiograph 24-48 hours after the injury. X-ray of the lungs reveals pneumo- and, damage to the bone frame. In severe respiratory trauma, it is preferable to perform. It helps to determine the presence of pneumoceles, and, differentiate bruise from lung rupture. Hemo pneumothorax is noted in 30% of cases of

rib fractures. A large hemothorax is a consequence of damage to the intercostal artery, and a small one is the result of venous bleeding, more often from the intercostal vein or the spongy tissue of the rib. On a radiograph taken in a vertical position, at least 400-500 ml of blood can be recorded. On an x-ray taken in a horizontal position -1 liter or more. Hemothorax may be detected 2-4 days after injury, indicating the need for a dynamic chest x-ray.

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In the complex treatment of pneumonia, non-steroidal anti-inflammatory drugs, immune and restorative therapy, oxygen, and stimulation of the drainage function of the bronchi should be used. In the treatment of pneumonia, a well-known set of measures is also used, among which one of the central places belongs to de-escalation antibiotic therapy. Features of the treatment of pneumonia in victims with chest injuries are the use of antibiotics in large doses intravenously; respiratory therapy should be multicomponent and include oxygen therapy, drug-aerosol inhalations, and breathing sessions with positive end-expiratory pressure. Bronchodilators and antihistamines are used; if possible, percussion and vibration massage. Bronchial obturation, the exclusion of a significant part of the lungs from breathing with the development of blood shunting is an indication for therapeutic fibrobronchoscopy

Lethal outcome was observed in 36 (6.6%) patients. The main cause of death was multiple bilateral rib fractures, acute respiratory failure, post-traumatic shock, mediastinal trauma: mediastinal hematoma resulting from hemorrhage due to damage to mediastinal vessels

### Conclusions:

1. With a closed chest injury, rib fractures, according to our data, post-traumatic pneumonia occurs in (13.2% ) of the total number of victims;
2. The main factors contributing to the development of post-traumatic pneumonia are: - inadequate anesthesia, - Bilateral multiple fractures of the ribs, hemo, pneumothorax;
3. A characteristic feature of post-traumatic pneumonia is the number of stories of pathological processes occurring in the lung tissue. During the first 12 hours, venous

and capillary plethora is expressed. After 12-24 hours, edema is expressed in the focus of the bruise, atelectasis, and foci of emphysema occur;

4. The development of pneumonia in those suffering from chest injuries worsens the general condition of patients and complicates the course of the underlying pathology of the respiratory organs;

5. The main preventive measure for the development of post-traumatic pneumonia in chest trauma is adequate pain relief, timely elimination of hemopneumothorax, lung atelectasis, a comprehensive measure to combat respiratory failure.

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