BRONCHOPULMONARY COMPLICATIONS IN COMBINED INJURIES OF THE CHEST AND ABDOMINAL ORGANS: MODERN ASPECTS OF THE PROBLEM

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Abstract. *Combined injuries of the thoracic and abdominal cavities represent one of the most severe categories of injury in emergency surgery, characterized by extremely high mortality rates. A significant proportion of lethal outcomes is associated with the development of postoperative complications affecting the bronchopulmonary system. This review analyzes and systematizes recent studies by domestic and international authors regarding the epidemiology of concomitant injuries, the pathophysiological features leading to respiratory disorders, and key organizational, diagnostic, and tactical approaches to patient management. Special emphasis is placed on minimally invasive surgical technologies, such as video-assisted thoracoscopic surgery (VATS) and videolaparoscopy, as promising methods for minimizing surgical trauma and preventing respiratory complications. Furthermore, the review highlights the necessity of developing unified diagnostic algorithms and tailoring surgical strategies based on individual risk factors for bronchopulmonary complications.*

Keywords: *concomitant injury; chest; abdominal cavity; bronchopulmonary complications; respiratory failure; videothoracoscopy; videolaparoscopy; emergency surgery.*

БРОНХОЛЁГОЧНЫЕ ОСЛОЖНЕНИЯ ПРИ СОЧЕТАННЫХ РАНЕНИЯХ ОРГАНОВ ГРУДНОЙ КЛЕТКИ И БРЮШНОЙ ПОЛОСТИ: СОВРЕМЕННЫЕ АСПЕКТЫ ПРОБЛЕМЫ

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Аннотация. *Совместные травмы грудной и брюшной полостей представляют собой одни из самых тяжелых повреждений в сфере экстренной хирургии, характеризующиеся крайне высоким уровнем смертности. Значительная часть летальных исходов связана с возникновением послеоперационных осложнений, затрагивающих бронхолегочную систему. В данном обзоре проанализированы и систематизированы последние исследования отечественных и зарубежных авторов, посвященные эпидемиологии сочетанных травм, их патофизиологическим особенностям, вызывающим дыхательные расстройства, а также важнейшим организационным, диагностическим и тактическим подходам к лечению пациентов с такими травмами. В качестве перспективного метода минимизации операционной агрессии и предотвращения респираторных осложнений особое внимание уделяется малоинвазивным хирургическим технологиям, таким как видеоторакоскопия и видеолапароскопия. Важно также подчеркнуть необходимость разработки унифицированных диагностических алгоритмов и корректировки хирургической стратегии с учетом индивидуальных факторов риска развития бронхолегочных осложнений.*

Ключевые слова: *сочетанная травма; грудная клетка; брюшная полость; бронхолёгочные осложнения; дыхательная недостаточность; видеоторакоскопия; видеолапароскопия; экстренная хирургия.*

KO‘KRAK QAFASI VA QORIN BO‘SHLIG‘I A’ZOLARINING QO‘SHMA JAROHATLARIDA BRONX-O‘PKA ASORATLARI: MUAMMONING ZAMONAVIY TAMOYILLARI

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Xotima. *Ko'krak va qorin bo'shliqlarining qo'shma jarohatlari shoshilinch xirurgiya sohasida eng og'ir shikastlanishlardan biri hisoblanib, o'lim ko'rsatkichining o'ta yuqoriligi bilan tavsiflanadi. O'lim ko'rsatkichlarining salmoqli qismi bronx-o'pka tizimiga daxldor bo'lgan operatsiyadan keyingi asoratlarning yuzaga kelishi bilan bog'liqdir. Ushbu sharhda mahalliy va xorijiy mualliflarning qo'shma jarohatlar epidemiologiyasi, nafas olish buzilishlarini keltirib chiqaruvchi patofiziologik xususiyatlar, shuningdek, ushbu turdagi jarohatlarga ega bemorlarni davolashga oid muhim tashkiliy, diagnostik va taktik yondashuvlariga bag'ishlangan so'nggi tadqiqotlari tahlil qilingan va tizimlashtirilgan. Operatsion agressiyani minimallashtirish va respirator asoratlarning oldini olishda istiqbolli usul sifatida videotorakoskopiya va videolaparoskopiya kabi kam invaziv xirurgik texnologiyalarga alohida e'tibor qaratilgan. Shuningdek, bronx-o'pka asoratlari rivojlanishining individual xavf omillarini hisobga olgan holda, unifikatsiyalashgan diagnostik algoritmlarni ishlab chiqish va xirurgik strategiyani korreksiya qilish zarurligini ta'kidlash muhim.*

Kalit so'zlar: *qo'shma jarohat; ko'krak qafasi; qorin bo'shlig'i; bronx-o'pka asoratlari; nafas yetishmovchiligi; videotorakoskopiya; videolaparoskopiya; shoshilinch xirurgiya.*

Introduction. One of the most pressing medical and social problems in modern healthcare is the tropical epidemic. Injuries remain the third leading cause of death in all age groups, behind only cardiovascular diseases and malignant neoplasms [9, 11]. These data were obtained from global epidemiological studies. Similar changes are observed in post-Soviet countries, where injuries continue to impact demographics and economic losses to the healthcare system [1, 6].

In the structure of peacetime trauma, the proportion of injuries to the chest and abdominal cavity continues to increase. Penetrating abdominal wounds account for 20 to 45 percent, while chest injuries account for 30 to 35 percent [4, 12, 16]. Combined injuries to these anatomical regions have particular clinical and prognostic value and account for an average of 13.7–16.4% of the total number of corresponding injuries; however, their share in the structure of fatal outcomes is 80–82% [1, 6, 15].

The development of severe systemic disturbances, rapid depletion of adaptive and compensatory mechanisms, and the development of multiple organ dysfunction are the result of the combined nature of the injuries. In this situation, bronchopulmonary complications are one of the main causes of mortality and an unfavorable early postoperative period in these patients [3, 7, 13].

Epidemiological and clinical features of combined chest and abdominal wounds. Combined injuries to the chest and abdominal organs are characterized by significant clinical variability and polymorphic symptoms. This makes early diagnosis and objective assessment of the severity of the illness extremely difficult. Multiple foci of injury, massive blood loss, traumatic shock, and hypoxia create a complex clinical picture, in which the main symptoms are often hidden by less visible, but clinically significant, injuries [10, 11].

Mortality rates for combined chest and abdominal wounds range from 25% to 69.7%, even with specialized care, indicating the systemic nature of the problem [2, 6, 18]. Postoperative bronchopulmonary complications, which can occur in 40 to 60% or more cases, are a significant contributor to adverse outcomes, particularly in the elderly and those with complicated medical conditions [3, 7, 14].

Pathophysiological mechanisms of formation of bronchopulmonary complications. In cases of combined chest and abdominal injuries, multiple interrelated pathophysiological mechanisms contribute to the development of bronchopulmonary complications. Significant disturbances in ventilation-perfusion relationships are observed already in the first hours after injury. These disturbances are associated with lung contusions, hemothorax or pneumothorax, diaphragmatic damage, and limited chest expansion [7, 17].

Respiratory dysfunction is also worsened by systemic metabolic disturbances such as hypoxia, metabolic acidosis, microcirculatory disorders, and electrolyte imbalances. In such situations, the compensatory responses of the respiratory system are significantly impaired, leading to the development of respiratory failure and the emergence of infectious and inflammatory complications [13, 14].

Compensatory mechanisms operate under extreme stress, which is typical for this group of patients. Against a background of severe catabolism, a systemic inflammatory response, and immunosuppression, the body is forced to maintain vital functions. Acute respiratory distress syndrome (ARDS) and deterioration of respiratory function can result from even minor additional factors, such as mechanical ventilation and surgical trauma [7, 14].

Preoperative restrictions and risk factors. The potential for comprehensive preoperative correction of homeostasis disorders is significantly limited by extraordinary surgical interventions for combined chest and abdominal wounds. Surgical treat-

ment is generally performed in the context of ongoing hypovolemia, hemodynamic instability, hypoxia, and significant electrolyte imbalances [3, 7].

Associated risk factors, such as old or senile age, obesity, chronic respiratory diseases and generalized infectious processes, significantly reduce the body's adaptive capacity and increase the risk of developing bronchopulmonary complications, even with properly performed surgical interventions [3, 8, 14].

Diagnostic and organizational aspects. The effectiveness of first aid for patients with combined chest and abdominal wounds significantly determines treatment outcomes. The American Committee on Surgeons of Trauma has developed a trauma center concept that works well when resources are focused, a multidisciplinary approach is used, and treatment algorithms are standardized [18].

The network of multi-level trauma centers is growing in several countries, such as Russia and Uzbekistan. However, the ability to detect injuries early and predict bronchopulmonary complications remains limited by the lack of standardized diagnostic criteria at the prehospital stage and the insufficient use of comprehensive diagnostic algorithms [5, 6].

Existing surgical techniques and the importance of minimally invasive technologies. In cases of combined chest and abdominal wounds, traditional surgical approaches are characterized by high invasiveness and a large number of diagnostically unjustified interventions. The risk of postoperative complications, particularly respiratory complications, increases significantly. These figures include "negative" laparotomies ranging from 19 to 32 percent and thoracotomies from 10 to 15 percent [6, 18].

Today, the use of video-assisted thoracoscopy and video laparoscopy is an important step in the development of emergency surgery. These technologies provide highly accurate diagnostics, allow for therapeutic interventions with minimal surgical trauma, and help reduce the incidence of infectious and bronchopulmonary complications [15, 16].

However, minimally invasive technologies have not yet been established as an endpoint in the emergency care of multiple trauma patients. Their impact on gas exchange, ventilation-perfusion relationships, and the incidence of postoperative bronchopulmonary complications has not yet been adequately studied, meaning that additional clinical trials are needed [11, 18].

Conclusion. In combined chest and abdominal injuries, there is a complex multifactorial interaction, including severe primary trauma, systemic metabolic disorders, limited preoperative correction options, and additional risk factors.

Key areas aimed at reducing mortality and improving treatment outcomes for this complex group of patients include improving the organizational model of emergency care, implementing standardized diagnostic algorithms, and rational use of minimally invasive surgical technologies.

REFERENCES

1. Abakumov M.M. Traumatic disease: modern concepts of pathogenesis and treatment. Surgery. Journal named after N.I. Pirogov. 2013; No. 10: 4–11.

2. Tulupov A.N., Sinenchenko G.I. Combined chest and abdominal trauma: modern approaches to diagnosis and treatment. Grekov Surgery Bulletin. 2015; 174(4): 32–38.

3. Gelfand B.R., Protsenko D.N., Yaroshetsky A.I. Postoperative complications in critically ill patients. Anesthesiology and reanimatology. 2014; No. 6: 4–10.

4. Gareev R.N., Fakhretdinov D.Z. Modern aspects of diagnosis and treatment of penetrating abdominal wounds. Kazan Medical Journal. 2013; 94(6): 857–863.

5. Amarantov D.G., Lebedev N.V., Sokolov V.A. Organization of medical care for victims with severe combined trauma. Traumatology and Orthopedics of Russia. 2018; 24(3): 7–15.

6. Kotiv B.N., Samokhvalov I.M., Zvezkina E.A. Mortality in combined chest and abdominal injuries and ways to reduce it. Surgery. N.I. Pirogov Journal. 2019; No. 8: 38–45.

7. Volkov V.E., Orlova O.A., Akimkin V.G. Bronchopulmonary complications in patients with combined trauma. General Reanimatology. 2017; 13(4): 25–33.

8. Polvonov Sh.B. Postoperative bronchopulmonary complications in emergency surgery. Clinical surgery. 2015; No. 9: 45–49.

9. Haagsma JA, Graetz N., Bolliger I., Naghavi M., Higashi H., Mullany EC, Abera SF, Abraham JP, Adofo K., Alsharif U. et al. he global burden of injury: incidence, mortality, disability-adjusted life years and time trends from the Global Burden of Disease study 2013. Injury. 2016; 47(1): 3–18. doi: 10.10 16/j.injury.2015.08.040

10. D'Souza N., Civil I., Peden M., Smith M. Thoracoabdominal trauma: patterns, management and outcomes. World Journal of Surgery. 2016; 40(2): 290–298. doi:10.1007/s00268-015-3291-4

11. Yücel M., Özpek A., Baş G., Karamercan M.A. Management of combined thoracic and abdominal injuries. European Journal of Trauma and Emergency Surgery. 2017; 43(2): 215–222. doi:10.1007/s000 68-016-0672-4

12. Gao Jian-Min, Du Da-Yu, Li Hao, Jiang Jin-Yu. Penetrating abdominal trauma: trends and outcomes in modern trauma care. International Journal of Surgery. 2015; 20:9–13. doi: 10.1016/j.ijsu.2015.05.039

13. Patel Kunal, Allen Christopher, HaiderAdil H., Haut Elliott R. Pulmonary complications following major trauma. Journal of Trauma and Acute Care Surgery. 2016; 81(4): 733–741. doi:10.1097/TA.0000000000001195

14. VermaSurbhi, Slutsky Arthur S., Villar Jesús. Acute lung injury and ARDS in trauma patients. Critical Care. 2018; 22: 212. oi:10.1186/s13054-018-2147-5

15. FurákJózsef, AthanassiadiKalliopi. Thoracoscopy in the management of chest trauma. European Journal of Cardio-Thoracic Surgery. 2019; 55(5): 823–829.doi:10.1093/ejcts/ezy406

16. Kim Jung Kyu, Kim Yong Hoon, Lee Jae Hoon. Role of minimally invasive surgery in trauma patients. Surgical Endoscopy. 2020; 34(5): 1965–1972. doi:10.1007/s00464-019-06972-1

17. GülsenAkif, Kılıç Murat, TuncerErdal. Lung contusion in trauma patients: pathophysiology and outcomes. Respiratory Medicine. 2020; 171: 106 095.doi: 10.1016/j.rmed.2020.106095

Kirkpatrick Andrew W., Ball Chad G., D'Amours Scott K., Zygun David A. Damage control surgery and minimally invasive approaches in trauma. Trauma surgery & Acute Care Open. 2018; 3(1):