UDC 61624-002153+6168331-001

DIAGNOSIS AND TREATMENT OF STATIONARY PNEUMONIA IN PATIENTS WITH SEVERE CRANIO-BRAIN INJURY

OG'IR MIYA SHIKASTLANISHI BO'LGAN BEMORLARDA STATSIONAR PNEVMONIYANI TASHXISLASH VA DAVOLASH

ДИАГНОСТИКА И ЛЕЧЕНИЕ СТАЦИОНАРНОЙ ПНЕВМОНИИ У ПАЦИЕНТОВ С ТЯЖЕЛОЙ ЧЕРЕПНО-МОЗГОВОЙ ТРАВМОЙ

Makhmudov N.I., Rakhmonov B.B., Makhamadaliev A.Sh.
Fergana Medical Institute of Public Health
nurill@fjstigmail.com +998905621111

Abstract. *Severe traumatic brain injury (TBI) in patients often leads to the development of hospital-acquired pneumonia (HAP). This purulent-septic complication is one of the main causes of high mortality. This article discusses the issues of diagnosis and treatment of hospital-acquired pneumonia (HAP). Of the 182 patients with TBI who were hospitalized, 41 developed HAP, requiring prolonged mechanical ventilation. The main pathogens were resistant strains such as Streptococcus pneumoniae, Staphylococcus aureus, and Acinetobacter baumanii. Diagnosis was based on clinical symptoms, radiographic data, and bacteriological analyses. Preventive measures helped reduce complications, shorten the duration of intensive care unit stays, and lower treatment costs. Risk factors included age, prolonged mechanical ventilation, and a comatose state. Optimizing diagnosis and antimicrobial therapy can significantly improve outcomes for these critically ill patients.*

Key words: *Severe traumatic brain injury, prolonged artificial ventilation of the lungs, stationary pneumonia, respiratory distress syndrome.*

Annotatsiya. *Og'ir bosh miya shikastlanishi (OBMS) bo'lgan bemorlarda ko'p hollarda stasionar pnevmoniya (SP) rivojlanadi. Bu yiringli-septik asoratlar sababli yuqori o'lim holatlarining asosiy sababidir. Ushbu maqolada stasionar pnevmaniya (SP) diagnostikasi va davolash masalalari ko'rib chiqiladi. Shifoxonaga yotqizilgan 182 nafar OBMS bo'lgan bemorlarning 41 nafari SP rivojlanib, uzoq muddatli sun'iy nafas olishni talab qildi. Asosiy patogenlar Streptococcus pneumoniae, Staphylococcus aureus va Acinetobacter baumanii kabi ko'prezistent shtammlar edi. Diagnostika klinik simptomlar, rentgenografik ma'lumotlar va bakteriologik tahlillarga asoslangan. Profilaktik chora-tadbirlar asoratlar, reanimatsiyada qolish muddati va davolash xarajatlarini kamaytirishga yordam berdi. Xavf omillari orasida yosh, uzoq muddatli sun'iy nafas olish va hushsiz holat mavjud edi. Diagnostika va antimikrob terapiyasini optimallashtirish ushbu og'ir ahvoldagi bemorlar uchun natijalarni sezilarli darajada yaxshilashi mumkin.*

Kalit so'zlar: *og'ir travmatik miya shikastlanishi, o'pkaning uzoq muddatli sun'iy ventilyatsiyasi, statsionar pnevmoniya, nafas olish qiyinlishuvi sindromi.*

Аннотация. *Тяжелая черепно-мозговая травма (ЧМТ) у пациентов часто приводит к развитию госпитальной пневмонии (ГП). Это осложнение гнойно-септического характера является одной из основных причин высокой смертности. В данной статье рассматриваются вопросы диагностики и лечения госпитальной пневмонии (ГП). Из 182 пациентов с ЧМТ, госпитализированных в стационар, у 41 развилась ГП, требовавшая длительной искусственной вентиляции легких. Основными патогенами были резистентные штаммы, такие как Streptococcus pneumoniae, Staphylococcus aureus и Acinetobacter baumanii. Диагностика основывалась на клинических симптомах, данных рентгенографии и бактериологических анализах. Профилактические меры способствовали снижению*

осложнений, сокращению продолжительности пребывания в реанимации и снижению расходов на лечение. Среди факторов риска выделялись возраст, длительная искусственная вентиляция легких и состояние комы. Оптимизация диагностики и антимикробной терапии может значительно улучшить результаты лечения этих тяжелобольных пациентов.

Ключевые слова: *тяжелая черепно-мозговая травма, длительная искусственная вентиляция легких, стационарная пневмония, респираторный дистресс-синдром.*

Introduction. Stationary pneumonia (SP) is a significant complication in patients with severe traumatic brain injury (STBI), contributing to high mortality rates due to purulent-septic complications. Patients with STBI often require prolonged mechanical ventilation, which predisposes them to nosocomial infections caused by multiresistant pathogens. SP can exacerbate respiratory distress, complicating the recovery process and increasing the length of intensive care unit (ICU) stays. Effective diagnosis, prevention, and management of SP are critical to improving patient outcomes. This article analyzes the development, etiology, and treatment of SP in STBI patients, emphasizing risk factors, diagnostic challenges, and the role of antimicrobial therapy.

Literature review

Over the past decades, the frequency of severe craniocerebral trauma (STBI) is steadily increasing. Mortality in severe isolated and combined TBI remains at a high level, occupying a place in the structure of general injuries.

One of the main reasons for the high mortality rate in severe TBI is the development of purulent-septic complications, in the structure of which the leading place is occupied by inpatient pneumonia (SP). A special type of SP is ventilator associated pneumonia (VAPI), which develops 48 hours or more after mechanical ventilation (ALV) [2, 3, 5].

Among the risk factors for the development of SP in the ICU are: the duration of mechanical ventilation, reintubation, prophylactic use of antibiotics, the severity of the patient's condition, concomitant diseases of the respiratory system, burns, neurosurgical and cardiac surgery, trauma, acute respiratory distress syndrome (ARDS), myalgia, enteral nutrition, etc. [3, 6, 9]. C P occupies the 3rd place in the structure of all hospital infectious complications after soft tissue and urinary tract infections and accounts for 15–18% of cases [2, 8]. C P occupies the 3rd place in the structure of all hospital infectious complications after infection of soft tissues and urinary tract and accounts for 15–18% of cases [4, 5, 8, 10]. Insertion of an endotracheal tube into the upper respiratory tract adversely affects the natural mechanisms preventing the penetration of microorganisms into the lower respiratory tract [7, 9]. The endotracheal tube disrupts mucociliary clearance with the formation of bacterial biofilms on the polymer of the tube, promotes micro aspiration , and the oropharyngeal secret accumulates around the cuff of the endotracheal tube [3, 7, 9]. These phenomena are aggravated due to positive ventilation pressure, which is accompanied by the flow of secretions and microorganisms into the distal respiratory tract. The upper respiratory tract of most ventilated patients is colonized by potentially pathogenic microorganisms. This was first established in a study in 1969, which reported the presence of intestinal gram-negative bacteria in the oropharynx in 75% of patients in serious condition [8].

It is customary to distinguish three groups of specific risk factors stationary pneumonia. 1. Risk factors associated with the patient, 2. Risk factors due to infection 3. Risk factors associated with various interventions [5].

Severe traumatic brain injury (STBI) and the relevance of intensive care (IT) are not in doubt due to the high mortality rate at the hospital stage of treatment, as well as due to the high degree of disability as an outcome of STBI. However, at the moment there are a number of features in the management of this category of patients and the issue of specific therapy for pulmonary complications, especially those caused by hospital strains of infections, remains unresolved. This problem is of particular relevance in neuroreanimatology, since a high percentage of patients who are on mechanical ventilation for a long time. As is known, STBI is always accompanied by gas exchange disorders, which are associated both with a violation of the central mechanisms of respiration regulation, and with parenchymal pulmonary complications. However, pneumonia associated with

artificial lung ventilation (ALV) is a severe complication, the frequency of which ranges from 9 to 70%, and mortality is from 25 to 70% [1, 3, 4, 6].

In patients who underwent mechanical ventilation for a long time (before the introduction of bacteriological filters into practice) , mortality from pneumonia was significantly higher than in patients who were on spontaneous breathing [2, 4]. There is a direct relationship between the incidence of pneumonia and the duration of mechanical ventilation [5]. A multicenter study conducted in 17 European countries in 9565 patients showed that in the ICU hospital pneumonia ranks first among all infectious complications (47%). While in general departments the incidence of SP does not exceed 6.5-0.7%, in the ICU this figure is, according to various sources, from 15 to 40% [3, 4, 8].

Purpose of the study: to analyze the features of the development, etiology and treatment of nosocomial pneumonia (HP) in patients with severe traumatic brain injury (STBI).

Methods and results: A retrospective analysis of the case histories of patients with severe traumatic brain injury was carried out. hospitalized in the intensive care unit of the FFRRCEMMP for the period 2020-2022. In just three years, 182 patients with STBI of varying severity were hospitalized , of which 128 were men , which is 70.3 % , and 54 women (29.7 %). The mean age of the patients was 44.3±2.3 years.

The condition of the patients according to the pathology complex and according to the Glasgow scale in all cases was assessed as severe. Of these, 41 (22.5%) patients developed nosocomial pneumonia. This group of patients was on a ventilator for a long time 8-more than a day. The diagnosis of pneumonia was made on the basis of the clinical picture, fever, purulent discharge from the respiratory tract, auscultator wheezing, weakened vesicular breathing on the corresponding side and radiological data (infiltration in the lung) and a complete blood count, indicating the presence of an active inflammatory process. Chest x-ray is the most important diagnostic criterion for establishing the diagnosis of pneumonia (1- image).

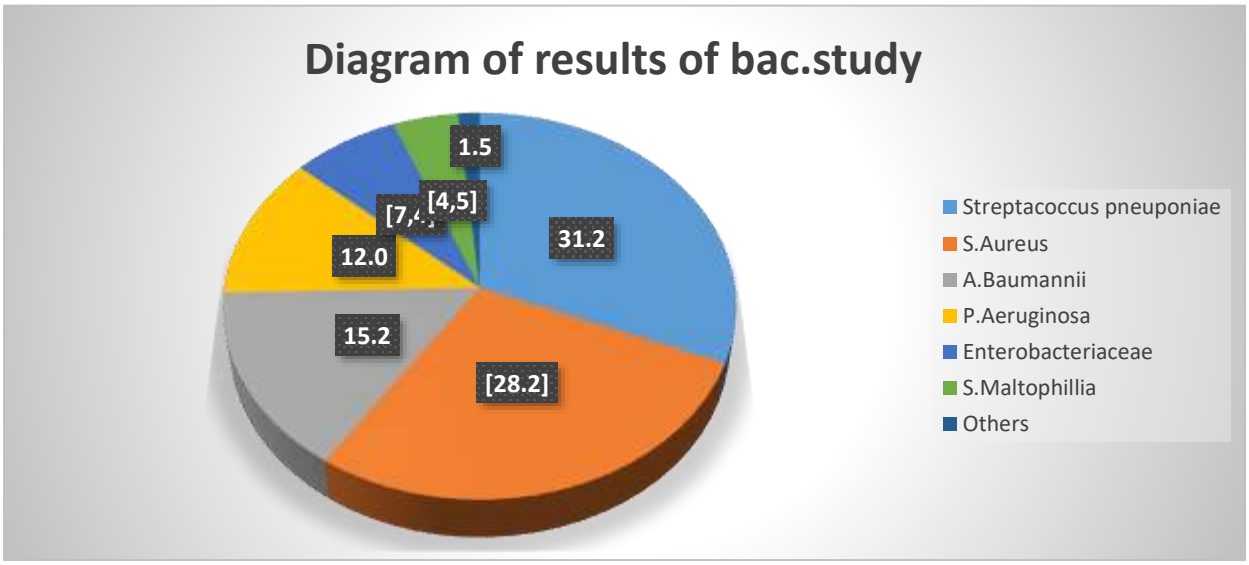
1- Image: This image depicts a chest X-ray of patient a 48-year-old individual diagnosed with right-sided pneumonia. The radiograph shows infiltrative changes in the right lung, which are indicative of pneumonia.

The diagnosis of SP almost always requires the detection of focal infiltrative changes in the lungs in combination with the corresponding symptoms of respiratory damage.
However, radiography cannot be considered as an absolutely sensitive and specific method, since a number of factors can lead to false negative or false positive evaluation.

Stationary pneumonia with prolonged mechanical ventilation is caused by various microorganisms, including gram-negative and gram-positive pathogens. Usually, the duration of mechanical ventilation is regarded as one of the most important factors that determine the composition of pathogens.

In all patients, in accordance with the development of the pathological process in the lungs, a swab was taken from the trachea for bacteriological examination, and at the next stage of the study, it is planned to decipher the microbial landscape and antibiotic resistance of pneumonia pathogens. The course and prognosis of late inpatient pneumonia is very serious.

Bacteriological studies of swabs from the trachea, the frequency of isolation of various pathogens of nasocomial pneumonia in the neuro-reanimation department of the FFRNCEM showed the following results (2-image):



2-image. Bar Chart: This chart illustrates the frequency of isolation of various pathogens responsible for nosocomial pneumonia in the neuro-reanimation department of the Fergana Medical Institute of Public Health.

The data highlights the prevalence of different multiresistant pathogens, including Streptococcus pneumoniae, Staphylococcus aureus, and Acinetobacter baumannii, among others. According to numerous literature data, such serious consequences of SP associated with mechanical ventilation, especially in patients with STBI, are associated with the fact that pulmonary infection is a complication of a critical condition already present in the patient, which required the use of life-saving substitution of the respiratory function It is obvious that the optimization of diagnosis, antimicrobial treatment and prevention of inpatient pneumonia associated with artificial lung ventilation can significantly improve the prognosis in this group of patients with this severe infectious complication.

The problem of stationary pneumonia is being intensively developed both in our country and abroad. However, as unsuccessful results of treatment testify, it is far from permission. The main "white spots" of the issue include the following

1) There are no clear ideas about the diagnostic significance of various methods for detecting SP, an algorithm for diagnostic search in patients with suspected SP has not been developed;

2) The ideas about the spectrum of SP pathogens obtained in studies in ICU patients of a "general" profile cannot be fully transferred to patients with STBI. In addition, even in various surgical institutions, the microbial spectrum of pathogens
and their antibiotic resistance have their own characteristics; The microbial "landscape" of ICU is also not the same in different hospitals.

The presence of a new and progressive infiltrate on a chest x-ray in association with two of the 3 clinical features (t ° > 38°C, leukocytosis/leukopenia, purulent airway discharge) is most definitive clinical criteria for initiation of empiric antibiotic therapy Reassessment of the need for antibiotic therapy is based on clinical assessment (in dynamics) and the results of a quantitative study

ActaCAMU
№8 (8) 2024
ISSN: 2181-4155

of the material from the LDP on the 3rd day of therapy (or earlier, at the discretion of the attending physician) (recommendation grade B).

Results and discussions: Antibacterial therapy (ABT) is one of the most important components of the treatment of patients in intensive care units (ICUs). The use of ABT in the NICU usually pursues two goals: treatment of the leading pathological process or prevention of stationary infection. In both cases, the effectiveness of ABT can significantly affect the course and outcome of the disease. III generation cephalosporin without anti-pseudomonas activity (ceftriaxone, cefotaxime), or fluoroquinolone (levofloxacin, moxifloxacin, ofloxacin), or piperacillin / tazobactam, or carbapenem without anti-pseudomonas activity (ertapenem) Carbapenem with anti-pseudomonas activity (meropenem, imipenem, doripenem), or a protected β-lactam inhibitor with antipseudomonal activity (cefoperazone / sulbactam, piperacillin/tazobactam), or a third-generation cephalosporin with antipseudomonal activity (cefepime, ceftazidime) 4 plus (in the presence of MRSA risk factors) linezolid or vancomycin indicate the potential benefits of using combinations. In 32 patients, we performed tracheal intubation and the patients were transferred to the ventilator mode, followed by the introduction of antibiotics into the tracheobronchial tree (TBD through incubation tubes and tracheobronchial tree lavage was performed in parallel. substrate, broad-spectrum antibiotics (ceftriaxone, cefatoxime, zinacef, etc.) and hormonal preparations are instilled. B bronchoscopy was used in case of airway obstruction with a thick secret - to diagnose airway obstruction.

Despite the complexity of intensive care aimed at maintaining the vital functions of the body, lethal cases were noted in patients. The main causes of death were severe traumatic brain injury in combination with nosocomial pneumonia, multiple organ failure.

A preventive measure to prevent the development of nosocomial pneumonia in patients with severe traumatic brain injury aimed at eliminating risk factors and including a set of interrelated measures of an organizational, technical and medical nature that enhance the anti-infective protection of the patient himself, reduce life-threatening complications and deaths

Conclusions:

1. Stationary pneumonia in patients with severe traumatic brain injury is a serious complication accompanied by high mortality.

2. The most significant risk factors for the development of hospital pneumonia in patients with severe traumatic brain injury are: advanced age; unconscious state; aspiration; emergency intubation and prolonged (more than 48 hours) mechanical ventilation; probe feeding; horizontal position; operations and anesthesia; ARDS; chronic obstructive pulmonary disease (COPD).

3. In the etiology of stationary pneumonia in patients with severe traumatic brain injury, the main role is played by multiresistant pathogens: Streptococcus pneumonia (31.2%) Aureus (28.2%), A.baumanii (15.2%), K. pneumonia (15.0%), P. aeruginosa (12.0%), Enterobacteriaceae (7.4%).

4. Prevention of inpatient pneumonia in patients with STBI helps to reduce the incidence of life-threatening complications, reduces the duration of respiratory support and the length of stay in the ICU, as well as the cost of treatment.

References:

1. Busl, K. M. (2019). Healthcare-Associated Infections in the Neurocritical Care Unit. Current Neurology and Neuroscience Reports, 19(10), 87.
2. Wagener, B. M., & Bastarache, J. A. (2017). Acute brain trauma, lung injury, and pneumonia: more than just altered mental status. American Journal of Physiology-Lung Cellular and Molecular Physiology, 313(1), L1–L15.
3. Ziaka, M., & Exadaktylos, A. (2021). Brain–lung interactions and mechanical ventilation in patients with isolated brain injury. Critical Care, 25(1), 358.
4. Esnault, P., Nguyen, C., Bordes, J., et al. (2017). Early-Onset Ventilator-Associated Pneumonia in Patients with Severe Traumatic Brain Injury: Incidence, Risk Factors, and Consequences in Cerebral Oxygenation and Outcome. Neurocritical Care, 27(2), 187–198.

ActaCAMU
№8 (8) 2024
ISSN: 2181-4155

5. Kumral, A., & Kitis, O. (2023). Ventilator-associated pneumonia in neurocritically ill patients: insights from the ENIO international prospective observational study. Respiratory Research, 24(1), 56.
6. Zhang, J., & Zhang, F. (2018). Coagulopathy induced by traumatic brain injury: systemic manifestation of a localized injury. Blood, 131(18), 2001–2006.
7. Kesinger, M. R., Kumar, R. G., Wagner, A. K., et al. (2015). Hospital-acquired pneumonia is an independent predictor of poor global outcome in severe traumatic brain injury up to 5 years after discharge. Journal of Trauma and Acute Care Surgery, 78(2), 396–402.
8. Lefranc, V., & Puybasset, L. (2015). Prehospital Airway Management in Severe Traumatic Brain Injury. Air Medical Journal, 34(3), 144–149.
9. Wang, F., & Bo, L. (2019). Incidence, Risk Factors, and Outcomes of Ventilator-Associated Pneumonia in Traumatic Brain Injury: A Meta-Analysis. Neurocritical Care, 30(2), 419–428.
10. Kumar, R. G., & Kesinger, M. R. (2015). Hospital-acquired pneumonia is an independent predictor of poor global outcome in severe traumatic brain injury up to 5 years after discharge. Journal of Trauma and Acute Care Surgery, 78(2), 396–402.