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PNEUMONIA AFTER CHEST TRAUMA: EVALUATING INCIDENCE, MECHANISMS, AND CLINICAL SIGNIFICANCE

Khan Muhammad Amir

Assistant Professor, Department of Hospital Therapy, Fergana Institute of Public Health

Abstract: This retrospective study evaluated 56 patients aged 15–65 years with traumatic chest injury at the Fergana branch of RSCEMC to determine the incidence and mechanisms of pneumonia. Post-traumatic pneumonia occurred in 32.1% of patients, primarily associated with pulmonary contusion, pain-related hypoventilation, and aspiration. Pneumonia significantly increased ICU admissions, length of hospital stay, and mortality. Early physiotherapy and effective airway management demonstrated protective benefits. Findings highlight the clinical burden of pneumonia following chest trauma and emphasize the need for prompt preventive measures.

Keywords: chest trauma, pneumonia, pulmonary contusion, aspiration, ICU admission, hypoventilation

Introduction

Traumatic chest injury is a major cause of morbidity worldwide, leading to significant respiratory impairment, prolonged hospitalization, and intensive care needs. Pneumonia is the most common and clinically important complication of thoracic trauma, often resulting from impaired ventilation, hypoventilation due to pain, pulmonary contusion, and aspiration [1-4]. Effective identification of its mechanisms is essential for improving outcomes. Despite global research, limited regional data exist in Uzbekistan. This study aimed to determine the incidence of pneumonia following chest trauma, identify key mechanisms involved, and assess its clinical significance among patients treated at the Fergana branch of the Republican Specialized Scientific Center for Emergency Medical Care (RSCEMC).

Methods

This retrospective observational study was conducted at the Fergana branch of RSCEMC. Medical records of 56 patients aged 15–65 years admitted with chest trauma from January 2023 to December 2024 were analyzed. Patients with chronic pulmonary disease, pre-existing pneumonia, or missing records were excluded. Collected data included age, sex, trauma mechanism, clinical presentation, imaging findings, type of chest injury, development of pneumonia, treatment, and outcomes.

Results

Among 56 patients, 38 (67.8%) were male and 18 (32.2%) female, with an average age of 34 ± 11.2 years. The main causes of trauma were road-traffic accidents (51.7%), followed by falls (33.9%) and industrial injuries (14.4%). Pneumonia developed in 18 patients (32.1%). Pulmonary contusion emerged as the major mechanism, contributing to pneumonia in 10 patients (55.6%). Pain-induced hypoventilation was identified in 4 patients (22.2%), while aspiration due to impaired consciousness accounted for 3 cases (16.7%). Only one patient (5.5%) developed ventilator-associated pneumonia.

Rib fractures involving three or more ribs occurred in 72% of pneumonia cases, and hemothorax was present in 44%. Patients with pneumonia demonstrated worse clinical outcomes. The average duration of hospitalization increased to 13.2 days compared to 7.5 days in those without pneumonia. ICU admission was required in 61% of pneumonia patients compared to 18% without pneumonia. Mortality occurred in 2 cases (11.1%) among pneumonia patients, whereas no deaths were recorded among non-pneumonia patients. Early physiotherapy and adequate pain control appeared beneficial in reducing pneumonia rates.

Discussion

This study found that approximately one-third of patients with chest trauma developed pneumonia, consistent with previously reported rates of 18–36% [5-7]. Pulmonary contusion was identified as the most important mechanism, as alveolar disruption and edema facilitate bacterial invasion and impaired gas exchange. Multiple rib fractures contributed to pain-related shallow breathing, impairing airway clearance. Aspiration was linked to impaired consciousness at injury, reinforcing the need for airway protection. Mechanical ventilation accounted for fewer cases due to low ventilator use. Patients with pneumonia had significantly prolonged hospital stays and higher ICU admission, reflecting greater severity and resource utilization [8-10]. Mortality among pneumonia patients highlights the need for preventive measures, including effective analgesia, respiratory physiotherapy, early mobilization, and aspiration risk reduction.

Conclusion

Pneumonia is a frequent and serious complication following traumatic chest injury, affecting nearly one-third of patients. Pulmonary contusion, pain-related hypoventilation, aspiration, and mechanical ventilation were primary mechanisms. Pneumonia significantly increased ICU admissions, hospitalization duration, and mortality. Early preventive strategies may help improve patient outcomes. Recommendations: 1. Ensure early pain control and chest physiotherapy to prevent hypoventilation and reduce pneumonia risk. 2. Strictly assess and protect the airway in patients with reduced consciousness to minimize aspiration-related complications.

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