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"Predictors of adverse outcomes in patients suffering multiple rib fractures from blunt chest trauma: a single-center retrospective analysis"

Introduction: Proper triage and management of patients presenting with blunt chest trauma and resultant rib fractures have been highly debated topics for many years. Rib fractures are associated with high morbidity and mortality rates, yet the exact mechanisms contributing to complications remain unclear as it is difficult to determine which factors independently contribute to adverse outcomes. This study aims to identify such predictors as a baseline for development of a scoring system and treatment protocol.

Patients and Methods: In this single-center retrospective cohort study (10/2022-9/2023), data was collected from 305 patients meeting the following inclusion criteria: $\geq$ 18 years of age and presenting with > 2 acute rib fractures resulting from blunt chest trauma. Exclusion criteria included patients younger than 18 years of age and those pregnant or incarcerated.

Results: The results of this study found a variety of factors significantly associated with increased morbidity and mortality. Data was collected from 305 patients using the trauma registry through Our Lady of the Lake Regional Medical Center database. Median age was 55 (IQR 37, 68) and median ISS was 14 (IQR 10, 19). Univariate analysis identified the following factors associated with 30-day mortality: presence of traumatic brain injury ($p = 0.010$), presence of spinal injury ($p = 0.031$), number of extremities injured ($p < 0.001$), number of total rib fractures ($p = 0.001$), number of displaced rib fractures ($p < 0.001$), and number of bicortical rib fractures ($p < 0.001$). In the multivariable regression analysis, the presence of pulmonary contusion (OR 4.23; 95% CI:1.42-12.97) was an independent predictor of morbidity, as defined by unplanned ICU admission. The presence of pulmonary contusion (OR 5.75; 95% CI: 1.99-19.00), and number of rib fractures (OR 1.24; CI: 1.05, 1.48) were independent predictors of morbidity, as defined by unplanned intubations.

Conclusion: Determining predictors of poor outcomes in patients presenting with rib fractures due to blunt chest trauma remains a crucial task in order to develop proper triage and management protocols. Based on the findings presented in the study, we propose that a scoring system based on age, rib fracture number and pattern, presence of associated injuries, and presence of pulmonary contusion may be worthy of further investigation. Data from this study will be utilized to develop and prospectively test the scoring system's ability to properly predict poor outcomes in blunt chest trauma patients.