Baseline Clinical Factors Are More Predictive of Ventilator-Free Days Than Operative or Nonoperative Treatment of Acute Unstable Chest Wall Injuries: Results from a Previous Randomized Controlled Trial

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Purpose: Unstable chest wall injuries are associated with high rates of morbidity and mortality. The purpose of this study was to evaluate the clinical factors associated with the number of ventilator-free days (VFDs) within 28 days from injury following operative or nonoperative treatment for these injuries.

Methods: Data from a previous randomized controlled trial were analyzed. Patients who had sustained an acute, unstable chest wall injury were randomized to operative or nonoperative treatment. The number of VFDs in the first 28 days following randomization were analyzed. A multiple linear regression analysis was performed to determine variables associated with the number of VFDs during that time. The variables included in the analysis were treatment type (operative vs nonoperative), age, sex, smoking status, Charlson Comorbidity Index (CCI), intubation status at randomization, ISS, Glasgow Coma Scale (GCS) at randomization, total number of broken ribs, presence of a flail segment, bilateral versus unilateral fractures, number of surgical interventions within 28 days, axial spine injury requiring surgery, intra-abdominal injury requiring laparotomy, need for a chest tube, and presence of a head injury.

Results: 207 patients were randomized—99 patients to nonoperative treatment and 108 to operative treatment. The mean number of VFDs across the study was 21.7 days (standard deviation = 8.7). Four patients in the nonoperative group were deceased within the first 28 days from injury. The results of the regression analysis demonstrated that patients intubated at randomization (estimate = –7.9, 95% confidence interval [CI] = –11.6 to –4.2, P<0.0001), patients with more rib fractures (interquartile range [IQR] estimate = –2.1, 95% CI = –3.6 to –0.6, P = 0.005), older patients (IQR estimate = –1.7, 95% CI = –2.7 to –0.07, P<0.001), and patients with higher CCI scores (IQR estimate = –1.2, 95% CI = –2.3 to –0.07, P = 0.025) had fewer VFDs in the 28 days following their injury. Type of treatment (operative vs nonoperative) was not predictive of VFDs.

Conclusion: This study demonstrated that patients who were intubated at randomization, had more rib fractures, were older, and had more comorbidities had fewer VFDs following operative or nonoperative treatment for an unstable chest wall injury. Poorer outcomes and greater need for mechanical ventilation can be anticipated in patients with these clinical factors and further research is needed to optimize their treatment.