

Organ Dysfunction Corresponds to Number of Unstable Pelvis and Lower Extremity Long Bone Fractures in Polytraumatized Patients

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Purpose: Polytraumatized patients who sustain unstable fractures of the pelvis and lower extremities are at risk of developing organ dysfunction. The association between organ dysfunction with fracture burden is poorly understood. The purpose of this study was to quantify the magnitude and distribution of organ dysfunction with the number and types of acetabular, pelvis, femur, and tibial shaft fractures in polytrauma patients.

Methods: This is an a priori planned secondary analysis of the multicenter PRECISE prospective observational trial of polytrauma patients (18-55 years old) with pelvis, acetabulum, femur, and/or tibia shaft fractures across 10 Level I North American trauma centers from 2018-2022. The primary outcome was the Marshall Organ Dysfunction Score (MODS) averaged over post-injury days 2-5 (aMODS2-5). Organ dysfunction was compared in polytrauma patients with 1, 2, or ≥ 3 fractures and between patients with isolated individual types of fractures. Secondary outcomes included pulmonary dysfunction, resource utilization, and time to recovery, defined as time to complete organ dysfunction resolution.

Results: 322 polytrauma patients were enrolled (mean age = 36.2 years). The mean ISS increased in patients from 1 fracture (22.8) to 2 fractures (25.9) and ≥ 3 fractures (29.5; $P = 0.050$). Increased fracture numbers were associated with higher aMODS2-5 (1 fracture: 1.4; 2 fractures: 2.5; ≥ 3 fractures: 4.3; $P < 0.001$), mean time to recovery (1 fracture: 6.9 days, 2 fractures: 9.1 days, ≥ 3 fractures: 11.7 days; $P < 0.001$), and pulmonary dysfunction based on MODS (1 fracture: 0.24; 2 fractures: 0.38; ≥ 3 fractures: 0.60; $P = 0.003$). There were no differences in organ dysfunction with single fractures among the 4 types. Although insignificant, patients with 1 fracture spent fewer days in intensive care (5.4 days) compared to 2 (7.6 days) and ≥ 3 fractures (11.5 days; $P = 0.064$). Patients with 1 fracture required less mechanical ventilation (1.1 day) compared to those with 2 (2.1 days) or ≥ 3 fractures (3.6 days; $P < 0.001$).

Conclusion: Multiple fractures were associated with greater extent and longer duration of organ dysfunction, especially in polytrauma patients with ≥ 3 fractures. There were no differences in organ dysfunction in patients with single pelvis, acetabular, femur, or tibia fractures.