

The Early Immunologic Response in Multiply Injured Patients with Orthopaedic Injuries Is Associated with Organ Dysfunction

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Purpose: Hemodynamic stability, acidosis (pH, base deficit, lactate), and physiologic status guide timing and extent of fracture fixation in multiply injured patients (MIPs). An exaggerated inflammatory response following trauma has been implicated in the development of nosocomial infection (NI) and organ dysfunction. This study sought to correlate the acute immunologic response to short-term complications in MIPs with destabilizing orthopedic injuries.

Method: 61 MIPs, ages 18-55, admitted to the ICU with operative femur, tibia, and all pelvic/acetabular fractures were prospectively evaluated. Blood was collected at 0, 8, 24, and 48 hours post-injury. Serum analyses were performed using a panel bioassay of 20 cytokines. Clinical data including Marshall Multiple Organ Dysfunction (MOD) score and NI were recorded. Cytokine levels were compared in groups of patients with an average MOD score on days 2-5 of ≤ 3 or > 3 and in patients with/without NI.

Results: MODS > 3 (n=33) had higher concentrations of IL-6, IL-8, IL-10, and MCP-1 than MODS ≤ 3 (n=28) (Fig. 1). Patients with NI (n = 24) had elevated levels of MCP-1 and IL-10 compared to patients without NI (n = 37).

Conclusion: Progression of an exaggerated immunologic response 48 hours following injury, evidenced by higher circulating concentrations of IL-6, IL-8, IL-10, and MCP-1 identified patients at risk for MOD and NI. Biomarker patterns may offer important information to titrate both initial and staged fracture surgery.

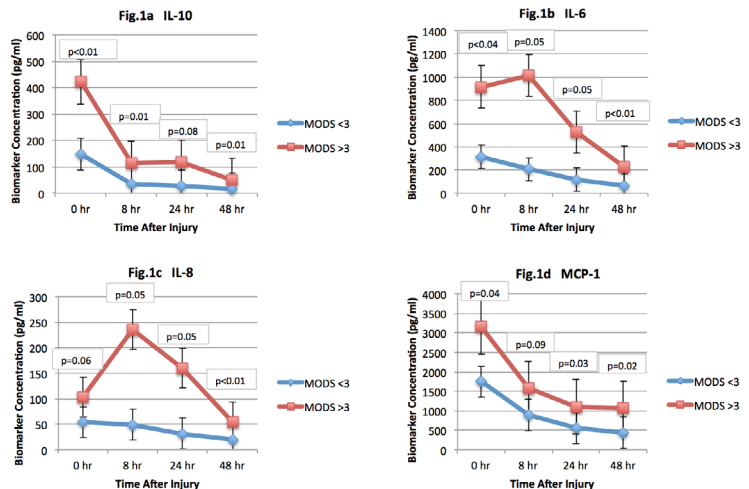


Figure 1 a-d. Multiply Injured Patients with orthopaedic injuries that developed a greater degree of organ dysfunction (MODS > 3) demonstrated an exaggerated inflammatory response over the first 48 hours following trauma compared to patients with less organ dysfunction (MODS ≤ 3).