

Risk Factors for Systemic Complications in Patients with Fracture-Related Infection

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Purpose: Fracture-related infections (FRIs) place a large burden on patients and place them at high risk for medical complications during their treatment. Knowing which risk factors and presenting symptoms are associated with developing systemic complications may provide physicians with guidance in treating these patients.

Methods: After IRB approval was obtained, a retrospective study was performed at a single Level I trauma center that included all extremity FRIs over a 7-year period (2013-2020). Information on demographics, comorbidities, original fracture characteristics, infection presentation, treatment, and resolution were collected. Patients who developed systemic complications (cerebrovascular accident [CVA], myocardial infarction [MI], acute respiratory distress syndrome [ARDS], venous thromboembolism [VTE], acute kidney injury [AKI], sepsis, mortality) following presentation with FRI were grouped and compared to those who had an uneventful recovery. As not all patients had an ESR/CRP (erythrocyte sedimentation rate/C-reactive protein) performed on presentation prior to treatment/operation, a separate analysis was done for patients who had these data available.

Results: A total of 301 patients were included in this study, 73 (24.3%) upper extremity and 228 (75.7%) lower extremity. The overall rate of systemic complications was 25.6% (77 patients). The most common complication was sepsis (13.0%) followed by AKI (8.3%), VTE (4.0%), death (2.7%), ARDS (2.0%), MI (1.0%) and CVA (1.0%). Patients who experienced complications were significantly older (60.0 vs 43.7 years; P = 0.001) and had a higher Charlson Comorbidity Index (CCI) score (2.25 vs 1.16; P = 0.001). Following adjustment for age, binary logistic regression demonstrated that CCI (odds ratio [OR], 1.43; P = 0.001), fever (>100.4°F) (OR, 3.50; P = 0.001), and positive blood cultures (OR, 5.21; P = 0.001) were independently associated with patients developing systemic complications. Logistic regression also demonstrated CRP (n = 145; OR, 1.018; P = 0.001) to be a significant predictor for patients experiencing systemic complications during their treatment course.

Conclusion: FRI is a burdensome disease process with a high frequency of systemic complications. Patients with a higher CCI score, fever, positive blood cultures, and elevated CRP are at higher risk for developing systemic complications after a diagnosis of FRI. These characteristics can help physicians identify at-risk patients and allow them to intervene on systemic complications more rapidly.

| Logistic Regression | Odds Ratio | p-Value |
|----------------------------------|------------|---------|
| CCI | 1.43 | 0.001 |
| Fever | 3.50 | 0.001 |
| Positive Blood Cultures | 5.21 | 0.001 |
| <i>Patients with CRP (n=131)</i> | | |
| Preoperative CRP | 1.018 | 0.001 |

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device they wish to use in clinical practice.