

Surgical and Microbiological Characteristics Associated With Reoperation to Promote Bone Healing After Fracture-Related Infection Diagnosis

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Purpose: Although fracture-related infections (FRI) have been associated with a higher rate of non-union, data on how surgical factors and independent microbes in FRIs impact non-union have been poorly described. The purpose of this study was to compare the surgical and microbiological characteristics of patients with FRI who had union and those that required subsequent surgery to promote bone healing. We hypothesize that patients infected with methicillin-resistant *Staphylococcus aureus* (MRSA) will have a higher risk of requiring reoperations to promote bone healing.

Methods: This was a retrospective study at a single Level I trauma center from 2013 to 2021. Patients older than age 18 years with FRIs were identified via an institutional database on musculoskeletal infections maintained by the infectious disease and the orthopaedic surgery departments. Inclusion criteria encompassed surgically managed fractures with evidence of FRI and at least 6 months of follow up postdiagnosis. Cases of osteomyelitis without surgical fixation were excluded. The primary outcomes assessed were surgical and microbiological characteristics of fractures that required reoperation to promote bone healing after diagnosis and treatment of FRI. A 5% significance level was used for all statistical analyses.

Results: Of 247 included patients, 55 (22.2%) required reoperations to promote bone healing after diagnosis of FRI. Patients who received topical antibiotics at closure (30.8%) during fracture fixation had higher risk for requiring reoperations to promote bone healing ($p = 0.028$). Infection with *Pseudomonas aeruginosa* was associated with a lower risk for requiring reoperations to promote bone healing (0%, $p = 0.027$). Rates of patients requiring reoperations to promote bone healing in patients infected with MRSA were similar to those infected with methicillin-sensitive *S aureus* (MSSA) (19.6% vs 20.9%, $p = 0.874$) and other pathogens (19.6% vs 23%; $p = 0.591$).

Conclusion: Use of topical antibiotics during initial fixation of fracture increases the risk of requiring reoperation to promote bone healing, while infection with *P aeruginosa* decreases said risk. Infection with MRSA or MSSA did not increase risk for requiring surgical intervention to promote bone healing after an FRI diagnosis. Further prospective studies should examine the impact of topical antibiotics during fracture surgery on development of FRI.