

Risk Factors and Characteristics of Recalcitrant Osteomyelitis Following Appropriate Initial Surgical and Antibiotic Treatment

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Purpose: Posttraumatic osteomyelitis is a known complication of fracture fixation that can result in a protracted treatment course involving multiple surgeries and prolonged antibiotic therapy. The purpose of this study was to evaluate which injury, patient, and microbiological characteristics place patients at risk for recalcitrant osteomyelitis despite appropriate initial treatment.

Methods: Patients undergoing surgical debridement and antibiotic therapy for osteomyelitis from 2003 to 2019 were identified using databases at three Level I trauma centers. Patients were categorized as having undergone serial bone debridement if they had two procedures a minimum of 6 weeks apart with a full course of appropriate antibiotics in between. Patient records were reviewed for age, injury location, body mass index (BMI), smoking status, comorbidities, and culture results including the presence of multidrug resistant organisms (MDROs). Multivariate regression was used to identify independent associations between the aforementioned variables and serial debridement events.

Results: A total of 244 patients were identified; 52% (n = 127) had a successful index treatment, and 48% (n = 117) underwent repeat debridement for osteomyelitis. At the index treatment, the most common organisms in both groups were methicillin-resistant (MRSA) and methicillin-sensitive *Staphylococcus aureus* (MSSA). Negative cultures at the index procedure were obtained in 24% (n = 31) of patients treated successfully and in 16% (n = 19) of patients treated unsuccessfully. The most common organisms at the time of repeat saucerization remained MRSA and MSSA; however, the same organism was cultured from both the index and repeat procedure in only 18% (n = 21) of cases. Of the patients with a positive culture following initial debridement, 34% (n = 40) had a negative culture at the time of repeat procedure. While intravenous drug use, smoking, peripheral vascular disease, BMI, polymicrobial infection, MDRO, and culture-negative infections were not associated with repeated treatment, diabetes (odds ratio [OR] 1.2, P = 0.02), open fractures (OR 1.2, P = 0.04), and injuries of the lower extremity (OR 1.3, P < 0.001) were.

Conclusion: To our knowledge, this study is the first to examine the implications of patient, organism, and injury characteristics on the treatment of osteomyelitis. Successful eradication of posttraumatic osteomyelitis is difficult to achieve despite appropriate surgical and antibiotic therapy. Diabetic patients and open fractures of the lower extremity are independent risk factors for failure of initial treatment. While MRSA and MSSA continue to be the most common organisms, patients presenting for repeat saucerization rarely culture the same organism. These findings will help clinicians identify patients who require more careful management prior to definitive reconstruction due to their risk of recalcitrant infection.

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