Infection After Internal Fixation: Alternatives in Treatment

Salvatore Frangiamore, MD; Ajinkya Rane, BS; ***Heather A. Vallier, MD****;*
MetroHealth Medical Center, Cleveland, Ohio, USA

Background/Purpose: Infection is a serious complication after internal fixation, characterized by bacterial adherence to implants and facilitated by dampened immune response after local trauma and inherent properties of metal implants. Treatment includes surgical debridement and irrigation, followed by antibiotics with or without implant retention. Currently, standard of care consists of debridement followed by 4-8 weeks of intravenous (IV) antibiotics. Risks of prolonged IV therapy include line sepsis or phlebitis, drug abuse, thrombosis, and mechanical failure, as well as adverse reactions to medications. Outpatient therapy is associated with considerable health-care utilization and cost due to drug acquisition, nursing time, and supplies required for administrating IV antibiotics. To our knowledge, there are no studies regarding efficacy of oral antibiotics for infection after internal fixation. The aim of our study is to assess the efficacy of oral antibiotics in combination with debridement, with or without plate retention, for treatment of infection. We hypothesize that oral antibiotics will effectively treat infection, with fewer adverse events and lower costs. A secondary aim is to determine the frequency of positive culture during treatment of nonunion, and to determine the risk of subsequent clinical infection.

Methods: We retrospectively reviewed a single-surgeon series of 54 patients over 72 months who underwent secondary surgery for infected implants or for nonunion of fracture. This cohort was broken into subgroups based on presentation. 14 patients (25.9%) were treated for a presumed infection and plate colonization, having preoperative indicators including elevated serum inflammatory markers and/or clinical infection (erythema, drainage, etc) and a colonized plate. Each of these patients underwent plate removal when the fracture was clinically and radiographically united. They received a 10-14 day course of oral antibiotics. One patient with iliac plate colonization had a chronic open wound, and plates were not removed during debridement. The second group was composed of 33 patients without any clinical indication of infection who had treatment of nonunion with internal fixation. These were treated with implant revision, with or without bone grafting, and no long-term antibiotics. The third group of 7 patients presented with chronic osteomyelitis, chronic draining wounds, and diffuse bone involvement, and they were excluded from further study.

Results: A total of 27 patients grew positive cultures postoperatively. Mean follow-up was 10.2 (3.1/6.0/15.0 [25th/50th/75th percentile]) months. Of the 33 patients treated for nonunion, 14 (42.4%) grew positive cultures all in broth only postoperatively and had no perioperative indicators of infection. None of them were treated with long-term antibiotics postoperatively, and there were no patients with recurrent infection at latest follow-up. The 13 patients with colonized plates who had plate removal had no recurrence of clinical infection. One patient with a chronic open iliac wound and retained hardware did undergo further treatment for infection, consisting of later debridement and implant removal. Thus, one patient (1/14, 7.1%) had clinical evidence of recurrent infection.

Conclusion: After standard 24-hour perioperative IV antibiotics, oral antibiotics appear effective in preventing recurrent infection after initial debridement of infected plates.

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Removal of metal implants and debridement of surrounding infection and necrotic tissue likely eliminate much of the bacterial load. This should be considered an alternative to prolonged IV therapy. It is likely associated with lower patient risks and less expense. Broth-positive cultures occur commonly at our hospital in patients undergoing treatment of nonunion with no prior history of infection. In the presence of no clinical or laboratory indicators of active infection, patient observation without administration of antibiotics may be a reasonable course of care.

See pages 99 - 147 for financial disclosure information.