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Managing Large Bone Defects with Custom Spacers in Patients with Musculoskeletal Infections

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Introduction: In patients requiring two-stage procedures, stabilizing large skeletal defects after radical debridement for infection is challenging. Skeletal and soft-tissue stabilization must be attained in order to successfully treat the infection. With the use of standard rod plus antibiotic impregnated PMMA spacers limb salvage may be attempted with satisfactory results.

Purpose: Can patients with large skeletal defects being treated for musculoskeletal infections be adequately temporarily stabilized with readily made antibiotic spacers and standard intramedullary nails?

Methods: Between 1992 and 2014, 23 patients were treated for hip, knee, or shoulder musculoskeletal infections resulting in an average skeletal defect of 22 cm. There were 13 males and 10 females. Twelve patients had infected tumor prostheses, seven patients had an infected total joint arthroplasty, and four patients had a primary infection involving a large skeletal defect. The mean time from the index procedure until infection was 22 months. Following debridement, the defect was stabilized with Tobramycin and Vancomycin impregnated PMMA and intramedullary nails. Patients were treated with IV and oral antibiotics for six weeks each. In 18 patients who had resection about the knee stabilization was achieved with a single femoral or tibial nail in nine patients and with two nails joined by a screw or cerclage wire in the other nine. In four patients a cephalomedullary femoral nail was used for stabilization after resection of the proximal or total femur. One patient had a custom total humeral prosthesis using threaded Steinmann pins and 16-gauge wire.

Results: The organisms cultured were gram positive in 19 cases, mixed gram positive and fungal in one, mixed gram negative and mycobacterium in one, and two patients had no growth on cultures but histologic evidence of acute infection. Of the 23 patients, 16 were successfully reimplanted following the initial two-stage procedure (70%) and seven patients had recurrent infections. Three patients with recurrent infections were successfully reimplanted after an additional one-stage procedure and four patients were not reimplanted. Two of these four patients required an amputation and the other two have retained their spacers. Other complications included a broken spacer, three periprosthetic fractures, two contractures, and one case of aseptic loosening. Successful limb salvage in regards to infection control occurred in 19/23 patients (83%). One patient required an amputation for an oncologic complication (local recurrence), so the overall limb salvage rate was 18/23 (78%).

Conclusion: Stable temporary antibiotic laden cement spacers, made in conjunction with standard intramedullary nails, can provide the necessary limb stability to treat musculoskeletal infections and allow for reimplantation of tumor prostheses for limb salvage.