Midterm Performance of Tantalum in High-Risk Bone Defect Reconstruction

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Purpose: The use of metal alloys for structural substitution for defects or deformity is an atypical technique for managing bone loss and has not been widely reported in trauma applications. Tantalum (Zimmer) is a metal structurally similar to cancellous bone and optimized for bone in-growth and immediate stability. We have used tantalum in patients who have declined or failed traditional treatments, cannot comply with limited weight-bearing, and with poor regeneration potential. Our purpose was to review the durability and efficacy of tantalum implants for bone defects. We hypothesized that tantalum implants will maintain stability with low secondary procedure rate.

Methods: After IRB approval, we conducted a retrospective chart review of our trauma database to identify cases with use of a tantalum implant by a single, senior orthopaedic trauma surgeon. Demographic information was obtained. The clinical course was reviewed including injury radiographs and interventions, intervention during which tantalum was implanted, need for additional procedures, and clinical/radiographic outcome at last follow-up. When able, we assigned the AO-OTA fracture classification and Gustilo-Anderson (GA) fracture classification.

Results: 14 patients were identified for inclusion with average age of 46.9 years at the date of tantalum implantation (range, 21-65 years). Fractures included 7 of the femur, 6 of the tibia, and 1 of the humerus. The original injury was closed in 6 and open in 8. In 6 patients, the tantalum was used as an adjunct to an osteotomy and in 8 patients, the tantalum was used to treat bone loss. 12 (86%) retained the tantalum at last follow-up. Six (43%) were diagnosed with a septic nonunion, which was treated, prior to insertion of the tantalum. Five of these (83%) have retained the tantalum at last follow-up (average 29.3 months). Two patients had a secondary procedure. Those with retained tantalum have maintained alignment with no loosening. At last follow-up, all patients with retained tantalum described improved pain and function (average 7.9 months).

Conclusion: Nonunion/malunion is a significant problem that leads to pain, disability, and increased costs. The use of tantalum provides an alternative option for defect management, especially in compromised host situations. Tantalum is biocompatible and allows for osseointegration, making it an ideal material for the treatment of bone defects. Precise sizing and interface loading are required for immediate stability. This early review of patients treated with tantalum for bone loss and/or deformity is promising. The majority of the patients have retained the tantalum at last follow-up with subjective improvement in pain and function. This series provides early evidence regarding the safety and efficacy of the use of tantalum to treat bone loss in challenging or high-risk clinical situations.