Results of the first 700 patients treated with a one-stage revision for PJIs

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Significance & Hypothesis/Techniques: Periprosthetic joint infections (PJI's) are observed after approximately 1-3% of primary total joint arthroplasties, representing a significant clinical challenge for some patients. Treatments in the past have been focused on the two-stage revision, with reported infection eradication rates up to 85%. However, some patients with substantial local and systemic comorbidities are poor candidates for the two-stage procedure. We hypothesize that the one-stage revision provides equivalent PJI control to the two-stage revision while reducing operative burden and enabling faster mobilization.

Innovation: This study assesses a large cohort of one-stage revisions utilizing a standardized dual-setup technique with radical debridement (the complete removal of all infected soft tissue and bone) and antibiotic-loaded cement. It challenges the conventional reliance on two-stage revision by evaluating one-stage revision as a limb-salvaging alternative, particularly in medically complex patients.

Approach: We reviewed the treatment and results of 700 patients who underwent a one-stage revision for PJI between 2005 and 2023, with at least a two-year follow-up. The patients were staged according to the McPherson classification system for PJI. All one-stage revisions were done by one surgeon and utilized a dual setup technique. Surgical protocol consisted of open biopsy, removal of the prosthetic device and cement, and radical debridement. This was followed by a total joint revision with antibiotic-loaded cement and biodegradable antibiotic pellets

Results: The study consists of 352 males and 348 females with a mean patient age of 62 years. 99% of PJIs were classified as McPherson III-C-3. Historically, the patients had on average 6 operations prior to referral. The anatomical distribution of the cohort included 509 knees, 135 hips, 5 hip-femur-knees, 27 shoulders, 22 elbows, and 2 shoulder-humerus-elbows. For the cases reviewed, one-stage revision procedures demonstrate an 83% rate of infection eradication. Comparison using Fisher's exact test (p-value = 0.21) indicates no significant differences between one-stage and two-stage revisions. 17% of patients experienced recurrence of infection. Among those recurrences, 35% required amputation, while 65% were re-enacted with one-stage for further infection control. Dislocation was the most common adverse event, accounting for 24% of all local recurrences of infection. The overall death rate for the cohort was 1.7%.

Discussion & Impact: The results of one-stage revisions in this clinical study group are similar to the "gold standard" two-stage with no statistically significant differences. Radical debridement with a dual setup appears to be the key to doing a successful one-stage revision. Dislocation in this series was associated with high instances of local recurrence, which stems from the lack of soft tissue. Upon recurrence, re-enactment with the one-stage revision was associated with success in eradication of infection. We feel the use of soft tissue void fillers with antibiotic-loaded cement and biodegradable antibiotic pellets, gives better control for the contaminated fields. We recommend the management for patients with large soft tissue defects be done at the index procedure. The one-stage approach is cheaper, allows for quick mobilization of the patient, and, based on the data above, represents a viable limb salvage strategy.