Single-Stage Exchange Results in Lower Cost and Equivalent Outcomes following Periprosthetic Hip and Knee Infection

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INTRODUCTION:
While increasing data support the use of single stage exchange for select patients with periprosthetic joint infection (PJI) following total hip arthroplasty (THA) and knee arthroplasty (TKA), whether it is cost-effective compared to two stage revision has yet to be addressed in the literature. This study aimed to compare itemized facility costs and perioperative outcomes of single-stage and two-stage exchange.
METHODS:
This was a retrospective cohort study of 118 consecutive patients who were diagnosed with chronic PJI and underwent revision THA or TKA at a single high-volume academic institution. Of 63 (53.4%) hip patients, 38 (60.3%) underwent single-stage revision, and 25 (39.7%) underwent two-stage revision. From 55 (46.6%) knee patients, 19 (34.5%) underwent single-stage revision, and 36 (65.5%) underwent two-stage exchange. Patients were excluded if they had soft tissue coverage requirement, or extensive bone loss requiring endoprosthesis. Facility costs were calculated using time-driven activity-based costing methodology. Clinical outcomes were assessed following Musculoskeletal Infection Society (MSIS) reporting criteria. Costs were combined for the two hospital admissions for a two-stage exchange.
RESULTS: Patients undergoing single-stage revision TKA had lower personnel ($46,397 vs. $78,765, P<0.001), implant ($19,822 vs $85,605, P<0.001) and overall costs ($79,548 vs. $171,592, P<0.001) when compared to two-stage revision. Similarly, patients undergoing single stage revision THA had lower personnel ($46,718 vs. 99,255, P<0.001), implant (19,936 vs. 73,372, P<0.001), and overall costs (79,349 vs. 187,251, P<0.001) than two-staged procedures. Implant costs demonstrated the highest variation between two-stage and one-stage revisions for TKA (4.3 times) and THA (3.7 times) subgroups. Total operative time was significantly longer in two-staged THA (365 vs. 175 minutes, P<0.001) and TKA (256 vs. 162 minutes, P<0.001) revisions. Successful outcomes defined by MSIS criteria were comparable in single and two-stage revisions for THA (84.2% vs. 76%, P=0.329) and TKA (84.2% vs. 63.9%, P=0.183) patients.
DISCUSSION AND CONCLUSION:
To our knowledge, this is the first study that analyzes PJI revision costs using the more patient-specific time-driven activity-based costing approach. Single-stage revisions cost significantly less than two-stage procedures for first-time, chronic PJI when using strict surgical indications. Given the growing emphasis on value-based care, if single-stage arthroplasty is at least as effective as two-stage exchange in some PJI settings, the cost savings of this procedure would be tremendous.