Comparison of Treatment Strategies for Periprosthetic Joint Infections of the Shoulder

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INTRODUCTION:
Periprosthetic joint infection (PJI) of the shoulder is a major cause of patient morbidity following shoulder arthroplasty. The diagnosis and treatment of shoulder PJI remains a challenging and controversial topic. Until recently, a standardized definition of shoulder PJI did not exist**.** The 2018 International Consensus Meeting (ICM) established a new diagnostic criteria for shoulder PJI. While no consensus exists on the optimal treatment, one-stage revision, two-stage revision, and permanent antibiotic spacers have all been shown to effectively eradicate PJIs with some variations in functional outcomes. The purpose of this study was to describe the treatment efficacies of single-stage revision with partial component exchange, single-stage revision with complete component exchange, two-stage revision, and permanent antibiotic spacers for the treatment of shoulder PJIs in patients who met the 2018 ICM criteria for shoulder PJI. In addition, we analyzed the impact of organism virulence on treatment decision and outcome.
METHODS: A retrospective review of a single institution shoulder arthroplasty database was performed utilizing CTP codes 23473 and 23474 to identify all patients who underwent revision shoulder arthroplasty between 2010 - 2020. Inclusion criteria were any patient who underwent a revision shoulder arthroplasty, had a complete operative report, and had a clinical presentation or laboratory data that met ICM shoulder PJI criteria. The 2018 ICM shoulder PJI criteria was utilized to classify patients as “unlikely,” “possible,” “probable,” or “definite” shoulder PJI based on clinical presentation and laboratory data. All patients classified as “definitive” or “probable” shoulder PJI were classified as having a PJI. The electronic medical records for all associated patients were reviewed for demographic variables, type of previous shoulder arthroplasty, type of revision surgery, reoperations, reinfections, and other objective clinical data. Patients were divided into four cohorts: single-stage with partial component exchange, single-stage with complete component exchange, two-stage, and permanent spacer based upon the procedure performed. arthroplasty. Organism virulence was determined from intraoperative cultures and consultation with consensus agreement among three board-certified infectious disease physicians. Patients were contacted for functional outcome scores. The American Shoulder and Elbow Surgeons Standardized Shoulder Assessment (ASES), Single Assessment Numeric Evaluation of shoulder function (SANE), and Veterans RAND 12 Item Health Survey (VR-12 Mental and Physical) were included for analysis.
RESULTS:
There were 460 cases of revision shoulder arthroplasty performed during the study period and 74 (16.1%) were diagnosed as a “definite” or “probable” PJI according to the 2018 ICM criteria. Of these patients, 15 (20.3%) underwent single-stage revision with partial component exchange, 6 (8.1%) underwent single-stage revision with complete component exchange, 29 (39.2%) underwent two-stage revision, and 24 (32.4%) had permanent antibiotic spacers. There were no differences in any demographic variables, previous arthroplasty type, or time from the index surgery to revision for PJI amongst the treatment groups ($p>0.05$). Overall, 29 (39.2%) had positive cultures for a virulent organism, 33 (44.6%) had positive cultures for a non-virulent organism, and 12 (16.2%) had negative cultures at the time of revision for PJI. There was no significant difference in organism virulence between the treatment cohorts ($p=0.327$). The overall infection recurrence rate was 16.2% and the overall reoperation rate was 31.3% with no significant differences between the treatment cohorts ($p>0.05$). There was no difference in infection recurrence between the treatment cohorts when stratified according to organism virulence ($p>0.05$). There was a significant difference in SANE scores between the cohorts with the single-stage parital component exchange cohort having the highest score (72.7 ± 17.9) and the permanent spacer cohort having the lowest score (36.3 ± 27.2, $p=0.015$). There were no significant differences in ASES and VR-12 scores between the cohorts ($p>0.05$).
DISCUSSION AND CONCLUSION: Treatment of shoulder PJI with single-stage revision with partial component exchange, single-stage revision with complete component exchange, two-stage revision, or permanent antibiotic spacer were all equivalent in infection eradication and recurrence. Patients who retained or were reimplanted with a shoulder arthroplasty prosthesis had better postoperative function. Organism virulence did not affect the reinfection or reoperation rates regardless of treatment strategy.