

Incidence of Unexpected Positive Sonication Results in Presumed Aseptic Hip and Knee Revision Arthroplasty

Alan Edward Wilson, Stuti Patel, Johannes F Plate, Michael O'Malley, Brian A Klatt¹

¹University of Pittsburgh/Upmc

INTRODUCTION: Most revision total knee arthroplasty (TKA) and total hip arthroplasty (THA) surgeries are performed for aseptic causes. There is an approximately 9% prevalence of unexpected positive intraoperative tissue cultures (UPC) in revision THA and TKA with data suggesting reduced revision-free survival and infection-free survival in patients with greater than two UPCs. Cultures from sonication of explanted components can be used as an adjunct diagnostic tool for identification of infectious organisms at the time of revision surgery and have been shown to improve diagnostic sensitivity for detecting prosthetic joint infection (PJI). However, the incidence and significance of isolated positive sonication results in patients undergoing presumed aseptic revisions remains unclear. In this study, we evaluated the rate of positive sonication culture results in patients undergoing presumed aseptic THA or TKA revision and its relation to the incidence of subsequent rerevision.

METHODS: A retrospective single-center study was performed that included patients who underwent aseptic revision TKA or THA from 2016-2019. Medical records were reviewed to collect patient demographics, surgical history, preoperative laboratory values, and outcome data. Primary outcome was incidence of positive sonication culture results. Secondary outcome included all-cause rerevision as well as incidence of PJI requiring revision surgery or chronic antibiotic suppression at a minimum follow up of 1 year.

RESULTS: A total of 424 patients undergoing aseptic revision arthroplasty were reviewed. Incidence of unexpected positive sonication results growing 1 or more colony forming units (CFU) was 21%. In 5% of cases, > 5CFU (7% for revision THA and 3 % TKA) were found. We identified 208 patients (96 THA, 112 TKA) with 1 year follow up for outcome analysis. The rate of all-cause rerevision was noted to be higher in the positive group but not statistically significant (29 vs. 22.5%, $p = 0.34$). Additionally, the rate of subsequent PJI was noted to be 6.25% in patients with positive sonication results compared to 2.75% in those with negative sonication ($p = 0.43$). Incidence of infection was found to be 12.5% for patients with sonication culture growing >5CFU (12.5% for >5CFU vs. 4% with neg or <5CFU, $p=0.44$).

DISCUSSION AND CONCLUSION:

To our knowledge this is the largest study to report the incidence of positive sonication results in aseptic revision arthroplasty cases. Our study showed a 21% incidence of unexpected positive sonication results, which is higher than the incidence of unexpected positive tissue culture results that has previously been reported. This could be due to the increased sensitivity of sonication technique in identifying a broader spectrum of infectious organisms. However, taking into account a previously established threshold of 5 CFU for identification of positive sonication culture results, the true incidence of positive sonication in our dataset was 5%. Our cohort showed a higher incidence of all-cause revision as well as subsequent PJI diagnosis in patients with these unexpected positive sonication cultures. However, given the low number of cases with subsequent infection-related failure, further studies with a larger sample size are needed to better evaluate the true prognosis of isolated positive sonication results in aseptic revision cases. Also, this study shows how every single data point in the Musculoskeletal Infection Society (MSIS) criteria is crucial thereby highlighting the importance of a diligent preoperative work-up to rule out PJI and the need for collection of multiple samples for culture intraoperatively to avoid a diagnostic dilemma with a single positive finding.