How Accurate are Positive Preoperative Aspiration Cultures in Shoulder Periprosthetic Joint Infection? A Concordance Study.

Ian D. Hutchinson MD; Joshua Mathew BS, Samuel A. Taylor MD, Michael C. Fu MD, David M. Dines MD, Lawrence V. Gulotta, MD.

Shoulder and Elbow Division of the Sports Medicine Institute, Hospital for Special Surgery, New York.

Background: The concordance between preoperative synovial fluid culture and intraoperative tissue cultures for identifying pathogenic microorganisms in shoulder periprosthetic joint infection (PJI) remains unknown. The purpose of our study is to examine the diagnostic accuracy of positive synovial fluid cultures in early pathogen identification for shoulder PJI.

Methods: A total of 35 patients who met Musculoskeletal Infection Society criteria for PJI following primary anatomic or reverse arthroplasty and study inclusion criteria were identified from retrospectively from a single institution (multiple surgeons) over 10 years. Inclusion criteria required a positive preoperative intra-articular synovial fluid sample within 90 days analyzed within the same institution and intraoperative tissue cultures at the time of arthrotomy. Concordance was determined when the organism(s) identified from the aspirate correlated with the intraoperative specimens.

Results: Overall concordance was identified in 28/35 (80%) patients; similar for anatomic (21/24, 88 %) and reverse (7/11, 64%) shoulder arthroplasties (p= 0.172). Culture discordance occurred in 7/35 (20%) patients: of these, 5 (14%) had no corresponding intraoperative culture growth and 2 patients (6%) had polymicrobial intraoperative cultures. Monomicrobial Cutibacterium Acnes (C. Acnes) PJI cases were the most common (24/35, 69%) and had an overall concordance of 79%. 2/5 of the discordant C. Acnes patients were polymicrobial and 3/5 had negative intraoperative cultures; all the patients with negative intraoperative cultures had received antibiotics between the time of aspiration and surgery. Considered separately, concordance in patients who had a positive aspirate for C. Acnes that did not receive antibiotics prior to surgery was 19/21 (90%) with a sensitivity of 100%, 95% confidence interval CI [82-100%] and with corresponding positive predictive value of 90.5% CI [58-93%].

Conclusion: Preoperative aspiration culture demonstrated favorable sensitivity and specificity when compared to intraoperative tissue culture in identifying pathogenic microorganisms in shoulder PJI patients. These findings are congruent with literature from hip and knee arthroplasty. Ultimately, confidence in the accuracy of aspiration culture in PJI may facilitate investigation of targeted preoperative antimicrobial treatment and optimization of DAIR (debridement, antibiotics and implant retention) strategies in select patients with low virulence organism (eg. C. Acnes) infection.