What is the concordance rate of preoperative synovial fluid aspiration and intraoperative biopsy in detecting periprosthetic joint infection of the shoulder?

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INTRODUCTION:
The accuracy of preoperative synovial fluid culture for microbe detection in shoulder periprosthetic joint infection is poorly well-described. To evaluate the utility of preoperative culture data for early pathogen identification for shoulder periprosthetic joint infection, we determined the concordance between preoperative synovial fluid culture results and intraoperative tissue culture results.
METHODS:
Fifty patients who met the 2014 Musculoskeletal Infection Society criteria for shoulder periprosthetic joint infection between January 2016 and December 2019 were retrospectively reviewed for clinical and demographic data. This cohort of patients was divided in two groups based on the concordance between preoperative and intraoperative culture results. The pathogens identified on preoperative and intraoperative cultures were classified as high-virulence or low-virulence. Student's t tests and Mann-Whitney U tests were used as appropriate for continuous variables and chi-square and Fisher's exact tests were used as appropriate for categorical variables.
RESULTS:
Concordance between preoperative aspiration and intraoperative tissue culture was identified in 28 patients out of 50 (56%). Preoperative cultures positive for Gram-positive species ($p=0.015$) and *Cutibacterium acnes* ($p=0.022$) were more likely to be concordant than discordant with intraoperative cultures. There were more patients with polymicrobial infection in the discordant group compared to the concordant group ($p<0.001$). *Staphylococcus aureus* and coagulase-negative *Staphylococci* were associated with high specificity and negative predictive value. Preoperative cultures positive for *Cutibacterium acnes* demonstrated sensitivity, specificity, positive predictive value and negative predictive value lower than 0.8.
DISCUSSION AND CONCLUSION:
Preoperative synovial fluid aspiration for shoulder periprosthetic joint infection poorly predicts intraoperative culture results, with discordance of 44%. More favorable concordance was observed for monomicrobial preoperative cultures, particularly for Gram-negative organisms and methicillin-sensitive *Staphylococcus aureus*. The overall high rate of discordance between preoperative and intraoperative culture may prompt surgeons to base medical and surgical management on patient history and other factors and avoid relying solely on preoperative synovial fluid culture data.