Time to Growth of *Cutibacterium acnes* in Shoulder Prosthetic Joint Infections

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INTRODUCTION:

Cutibacterium acnes (*C. acnes*) is a gram-positive anaerobic bacillus frequently found on the skin. *C. acnes* is implicated in the majority of shoulder prosthetic joint infections (PJIs). Unlike other common bacterial wound infections, infection with *C. acnes* usually follows an indolent course—often presenting weeks to months after shoulder arthroplasty. Shoulder pain may be the sole presenting sign or symptom as patients can have normal erythrocyte sedimentation rate or C-reactive protein levels and minimal to no pyrexia. Due to the limited clinical findings and conventional diagnostic methods, diagnosis of postoperative infection with *C. acnes* is heavily reliant upon tissue cultures. Unlike staphylococci and other common bacteria implicated in postoperative infections, cultures of *C. acnes* may require an extended incubation time to diagnose infection. The optimal time for holding cultures remains debated and varies among institutions and across regions.

The purpose of this study was to characterize the timing of positive culture results for *C. acnes* in shoulder PJIs at a single tertiary-referral institution.

METHODS: All bacterial culture logs were reviewed at a single tertiary-referral institution from July 2018 to March 2024. All positive cultures for *C. acnes* were reviewed and only those cultures obtained from the shoulder were further investigated. The previous institutional protocol was to hold cultures for a minimum of 14 days or until positive cultures resulted. Non-tissue samples including culture swabs, aspirates, and fluid samples were excluded. Operative notes were reviewed to identify only those positive cultures that were taken after shoulder arthroplasty to include in further chart review and final analysis. Patient demographics, comorbidities, surgical history, and smoking status were recorded. Multivariate and comparative analyses were then performed using R software (version 4.4.1) to assess the relationship between time to growth and patient/surgical variables.

RESULTS: We identified 388 cultures positive for *C. acnes* during the specified timeframe. There were 46 shoulder tissue cultures that met the inclusion criteria from 23 patients and 24 surgeries (one patient had positive cultures from two separate surgeries). The mean time to growth across all samples was 6.72 days (95% CI: 6.05 - 7.38 days) with a median of 6 days. No positive culture was observed beyond day 11. Cultures from diabetic patients had a mean time to growth of 8.1 days compared to 6.5 days for non-diabetic patients (p = 0.007). Cultures from current smokers (6.7 days) and former smokers (6.9 days) had a shorter time to growth than lifetime non-smokers (8.3 days) (p = 0.001).

DISCUSSION AND CONCLUSION: At a single institution, the majority of tissue cultures taken after shoulder PJIs that were positive for *C. acnes* became positive in under 7 days. Furthermore, no cultures demonstrated positivity for *C. acnes* beyond day 11. Time to growth varied based on the presence of diabetes and whether or not patients were current or former smokers.