

Too Late to Matter? Time-to-Positivity Beyond 5 Days Still Identifies Clinically Relevant PJI

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INTRODUCTION:

Introduction:

The conventional 5-day incubation threshold for diagnosing periprosthetic joint infection (PJI) may miss slow-growing organisms, leading to culture-negative diagnoses and empiric treatment. This study evaluates whether culture positivity beyond 5 days remains clinically meaningful and compares outcomes across early-positive, late-positive, and culture-negative PJIs.

METHODS:

Methods:

We retrospectively reviewed **4,127** patients diagnosed with PJI by MSIS criteria between **2014–2024**. Among these, **3,125** were culture-positive and stratified by time-to-positivity into:

Early-positive (≤ 5 days)

Late-positive (>5 days)

Culture-negative cases were analyzed separately. The primary outcome was failure, defined as infection-related reoperation or the need for chronic suppressive antibiotics within 1 year. Multivariate logistic regression adjusted for organism type, host status, Charlson Comorbidity Index, and surgical strategy.

RESULTS:

Results:

Among culture-positive PJIs, **42.3%** turned positive after day 5. Commonly identified slow-growing organisms included *Cutibacterium acnes*, anaerobes, and coagulase-negative staphylococci. Failure rates were similar between late- and early-positive groups ($p = 0.78$), and on adjusted analysis, delayed positivity was not associated with increased failure (OR: **1.1**, 95% CI: **0.7–1.7**, $p = 0.82$).

The overall failure rate among culture-positive PJIs was **31.4%**, compared to **60.1%** in **culture-negative cases** ($p < 0.001$).

DISCUSSION AND CONCLUSION:

Conclusion:

Nearly half of culture-positive PJIs declared after day 5, yet outcomes were equivalent to early-positive cases. In contrast, culture-negative infections had nearly double the failure rate. These findings strongly support extending incubation protocols and caution against initiating definitive therapy before cultures have fully matured—especially when slow growing organisms are suspected.