

Systemic Illness and Prosthetic Joint Infection: How Often Does Sepsis or Systemic Inflammatory Response Syndrome Occur and Do they Affect Debridement, Antibiotics, and Implant Retention Outcomes?

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INTRODUCTION:

Prosthetic Joint Infection (PJI) is a devastating complication of total joint arthroplasty (TJA), often presenting with a prolonged course of joint dysfunction and pain. However, patients can present with acute systemic symptoms of infection that can be life threatening, resulting in systemic inflammatory response syndrome (SIRS) or even sepsis. Such presentations necessitate urgent surgical debridement, antibiotics, and implant retention (DAIR). Previous studies based on small patient cohorts have determined that sepsis or a positive blood culture is associated with poor outcomes following DAIR. The purpose of the current study was to evaluate the effect of blood cultures, SIRS, and sepsis on DAIR outcomes in the largest related patient cohort collected to date.

METHODS:

A total of 275 patients underwent DAIR for PJI (defined by 2011 Musculoskeletal Infection Society [MSIS] criteria) at a single institution between January 2017 to January 2021. The presence of SIRS involved at least two of the following: body temperature $<36^{\circ}\text{C}$ or $>38^{\circ}\text{C}$, heart rate >90 beats/minute, respiratory rate >20 breaths/min, and serum leukocyte count >120000 or <4000 /microliter. Sepsis was defined as SIRS plus a positive blood culture. DAIR treatment success was defined at 1-year postoperatively according to the 2019 MSIS working group tiers¹. Multivariable logistic regressions were calculated to investigate the association between SIRS, blood culture, sepsis, and treatment success while adjusting for PJI chronicity, C-reactive protein, synovial white blood cells (WBC) count, positive tissue culture, body mass index (BMI), sex, and Charlson Comorbidity Index (CCI).

RESULTS:

Forty-seven (17.1%) PJI patients presented with SIRS on admission, 18 (6.5%) had a positive blood cultures, and 6 (2.2%) presented with sepsis. DAIR treatment success at 1-year (MSIS Tiers 1 and 2) was achieved in 174 (63.3%) patients. In regression analysis, patients with BMI >40 (OR 3.1 95% CI (1.1-9.0), $p=0.049$) were more likely to present with SIRS. SIRS, positive blood culture, and sepsis had no significant association with DAIR treatment success. CCI ≥ 3 , diabetes, and synovial WBC $>10,000$ were significantly associated with DAIR treatment failure.

DISCUSSION AND CONCLUSION:

This is the largest study to date to investigate the association between systemic PJI and DAIR outcomes. Over 1 in 6 patients requiring DAIR presented with SIRS, while only 1 in 50 with sepsis. The presence of SIRS, positive blood culture, and sepsis on admission were not associated with poorer infection control, suggesting that DAIR is an appropriate treatment in the context of these urgent clinical situations.