Determining the Diagnostic Thresholds of Synovial Markers in Acute PJI: A Multicenter Retrospective Study

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INTRODUCTION:
The diagnosis of periprosthetic joint infection (PJI), particularly during the early postoperative period, remains challenging. The purpose of this multicenter study was to assess the utility of synovial white blood cell (WBC) count and polymorphonuclear leukocyte percentage (PMN%) in the diagnosis of acute PJI at 45-days and 90-days following primary total knee arthroplasty (TKA).
METHODS:
This retrospective study identified 236 patients that underwent a joint aspiration within 90-days of their primary TKA at three institutions. PJI was defined as reoperation within 1-year following aspiration for infection. Patients were considered aseptic if they had no reoperation for up to 1-year after arthrocentesis. Receiver operator characteristic (ROC) curves were used to assess the utility of white blood cell (WBC) count and polymorphonuclear leukocyte percentage (PMN%) in the diagnosis of acute PJI at 45-days and 90-days. Pairwise comparison was utilized to compare between the area under the curve (AUC) of the two markers.
RESULTS:
225 patients were included. Of these, 76 (33.7%) were infected and 149 (66.3%) were aseptic. The optimal cutoff within 90-days was 2,790 cells/mL (AUC 0.888, sensitivity 77.6%, specificity 86.9%) for WBC count and 79.1% (AUC 0.768, sensitivity 65.3%, specificity 81.1%) for PMN%. Although reducing the acute period from 90 to 45-days had no impact on the threshold for PMN% (79.1% vs. 80.0%, respectively), it caused the cutoff for WBC count to increase to 10,475 cells/mL (AUC 0.865 sensitivity 67.9%, specificity 97.4%). Using pairwise comparison, the AUC for WBC count was higher than that of PMN% at both 90-days (p=0.005) and 45-days (p=0.0011).
DISCUSSION AND CONCLUSION:
We found that reducing the acute period from 90 to 45-days resulted in an optimal cutoff for WBC count that was more than three times as high. Due to the absence of a validated definition for acute PJI, diagnostic confidence in this setting remains low.