Leukocyte Esterase in the Diagnosis of Periprosthetic Joint Infection: A Comprehensive Analysis

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INTRODUCTION: No single test has demonstrated absolute accuracy in the diagnosis of periprosthetic joint infection (PJI). Leukocyte esterase (LE) is a synovial marker that has proven utility in the diagnosis of PJI. The purpose of this prospective study was to (1) identify the optimal cutoff for the use of LE in the diagnosis of PJI and (2) determine whether performance of the LE strip test varied by infecting organism.

METHODS:

This prospective study enrolled 1,267 patients undergoing hip or knee revision arthroplasty at a single institution from 2009 to September 2021. PJI was defined using a modified version of 2018 International Consensus Meeting (ICM) criteria that excluded LE when calculating the ICM score. Receiver operating characteristic curves were used to assess the utility of the LE strip test in the diagnosis of PJI. Pairwise comparison with Bonferroni correction was utilized to compare the area under the curve (AUC).

RESULTS:

973 patients were included in the analyses. 246 (25.4%) were classified as ICM-positive and 727 (74.6%) were classified as ICM-negative. An LE cutoff of "1+" (AUC 0.819, sensitivity 73.2%, specificity 90.6%) had superior accuracy to an LE cutoff of "2+" (AUC 0.713, sensitivity 43.9%, specificity 98.8%) in the overall diagnosis of PJI (p<0.001). When stratifying by organism type, an LE cutoff of "1+" had the best diagnostic utility for PJI caused by methicillin resistant *Staphylococcus aureus* (AUC 0.888, sensitivity 87.0%, n=23) followed by *Streptococcus spp.* (AUC 0.882, sensitivity 85.7%, n=28), coagulase negative *Staphylococci* (AUC 0.836, sensitivity 76.6%, n=47), methicillin sensitive *Staphylococcus aureus* (AUC 0.806, sensitivity 70.6%, n=34), culture negative (AUC 0.793, sensitivity 67.9%, n=56), and gram negative rods (AUC 0.763, sensitivity 61.9%, n=21).

DISCUSSION AND CONCLUSION: To our knowledge, this is the largest study to date evaluating the utility of the LE strip test in the diagnosis of PJI. Based on our findings, it appears that a "1+" cutoff has higher diagnostic utility than a cutoff of "2+". We also found that the performance of the LE test varied by infecting organism.