Plasma D-Dimer is a Promising Screening Test for Culture-Negative Periprosthetic Joint Infection

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INTRODUCTION:

Blood tests, such as erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), are the first line investigations in patients suspected of periprosthetic joint infection (PJI). Serum D-dimer and fibrinogen have been investigated as an additional inflammatory blood test in recent years. This prospective study evaluates the utility of these blood tests in diagnosis of culture negative PJI.

METHODS:

This prospective study enrolled 420 patients undergoing revision hip or knee arthroplasty. PJI was defined using the modified 2018 International Consensus Meeting (ICM) criteria. Plasma D-dimer, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and fibrinogen were measured preoperatively. Receiver operating characteristic curves were used to assess the utility of different markers in the diagnosis of PJI. Pairwise comparison with Bonferroni correction was performed to determine whether the differences in areas under the curve (AUCs) was significant.

RESULTS:

Of the 412 patients included, 317 (76.9%) were ICM negative and 95 (23.1%) were ICM positive. All 4 serological markers, D-dimer (AUC 0.860), CRP (AUC 0.862), ESR (AUC 0.833), and fibrinogen (AUC 0.798) demonstrated comparable accuracy for the diagnosis of PJI (all p >0.05). However, D-dimer (AUC 0.866, sensitivity 87.0%, specificity 81.7%) demonstrated superior diagnostic utility to CRP (AUC 0.819, sensitivity 78.3%, specificity 83.3%), ESR (AUC 0.785, sensitivity 65.2%, specificity 85.2%), and fibrinogen (AUC 0.768, sensitivity 60.9%, specificity 90.0%) for cases of culture-negative PJI. When maximizing sensitivity to 100%, D-dimer (specificity 44.1%) outperformed ESR (specificity 5.6%), fibrinogen (specificity 5.6%), and CRP (specificity 0%). A plasma D-dimer level of ³269 ng/mL was identified as the optimal cutoff for use as a screening test.

DISCUSSION AND CONCLUSION:

Although plasma D-dimer demonstrated similar diagnostic accuracy as ESR and CRP, it outperformed other serum markers in the diagnosis of culture-negative PJI, particularly when used as a screening test.