# Accuracy of Synovial White Blood Cell Count and Differential in Predicting Failure following Reimplantation

Saad Tarabichi[1], Graham S Goh, Juan David Lizcano[1], Diana Fernandez Rodriguez[1], Colin Baker, Javad Parvizi[1]
[1]Rothman Orthopaedic Institute

INTRODUCTION:
Two-stage exchange arthroplasty remains the preferred treatment for chronic periprosthetic joint infection (PJI). There are no reliable metrics that can help with optimal timing of reimplantation. The purpose of this study was to assess the prognostic utility of conventional synovial biomarkers in predicting successful control of infection following completion of two-stage exchange arthroplasty.
METHODS:
This retrospective study identified 157 patients undergoing second-stage hip or knee reimplantation between January 2013 and March 2021 with minimum 1-year follow up. All patients had an aspiration prior to reimplantation. Treatment success and failure were defined using the Musculoskeletal Infection Society Outcome-Reporting Tool. Receiver operating characteristic curves were used to assess the prognostic utility of white blood cell count (WBC), polymorphonuclear leukocyte percentage (PMN%), as well as the combination of the two markers in predicting failure following reimplantation at minimum 1-year follow up. Pairwise comparison with Bonferroni correction was utilized to compare between the area under the curve (AUC) of the different markers.
RESULTS:
Treatment failure following reimplantation occurred in 35 patients (22.3%) at a mean follow up of 3.4 years (range, 1–5.9). WBC/PMN% combination (AUC 0.722, 65.6% sensitivity, 72.4% specificity) demonstrated the highest prognostic utility followed by PMN% (AUC 0.699, 87.5% sensitivity, 45.7% specificity) and WBC count (AUC 0.649, sensitivity 45.7%, specificity 89.3%). However, the difference in AUC between the three tests was not statistically significant (all $p>0.05$). Using the Youden index, WBC >=1,898 cells/mL and PMN% >=43.0 were identified as the optimal cutoffs that predicted failure following reimplantation.
DISCUSSION AND CONCLUSION:
Although synovial markers could not predict treatment failure with definitive accuracy, the combination of WBC and PMN% appears to have moderate predictive value in this setting. Future studies should explore the role of novel synovial markers for the assessment of infection eradication following two-stage exchange arthroplasty.