

## CBC-Based Ratios Predict the Risk of Adverse Events Following Total Hip Arthroplasty

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**INTRODUCTION:** Postoperative complications and protracted hospital stay commonly occur following routine total hip arthroplasty (THA). Complete blood count based ratios (CBRs), including Neutrophil-Lymphocyte Ratio (NLR), Monocyte-Lymphocyte Ratio (MLR), Platelet-Lymphocyte Ratio (PLR), and Systemic Immune-Inflammation Index (SII) are inflammatory markers that have been associated with postoperative outcomes. This study evaluated the utility of CBRs in predicting postoperative complications, protracted hospital admission, and mortality following THA.

**METHODS:** The Premier Healthcare Database was queried for adult patients who underwent primary, elective THA. Multivariable models accounting for potential confounding covariates were created for primary and secondary outcomes. Approximate cut point values were identified via bootstrap simulation using Youden's index. Using the predicted cutpoint value as the threshold for odds of outcomes, restricted cubic splines were created to identify final threshold values (TVs) associated with increased adjusted odds ratios (aOR) of study outcomes.

**RESULTS:** 12,807 THAs were identified with an average patient age of 65.15±11.44 years. All indices predicted odds of aggregate postoperative complications (NLR: TV=4.6, p<0.001, above TV aOR=2.35; PLR: TV=163.4, p<0.001, above TV aOR=1.32; MLR: TV=0.4, p=0.012, above TV aOR=2.02; SII: TV=977.0, p<0.001, above TV aOR=1.95). A length of stay ≥3 days was associated with TV of MLR>0.4 (p<0.001, above TV aOR=1.54). No association between CBRs and inpatient mortality was observed.

**DISCUSSION:** Increasing NLR, MLR, PLR, and SII was associated with adverse outcomes. NLR had the highest specificity for total complications. MLR was most specific for protracted length of stay. To our knowledge, this study is the first to describe these associations and establish threshold values that can guide perioperative risk stratification in patients undergoing primary elective THA. However, the study is not without its limitations, including its retrospective nature and that preoperative CBC with differential may not be the standard of care at all surgery centers.

**SIGNIFICANCE/CLINICAL RELEVANCE:** CBRs such as NLR, MLR, PLR, and SII are able to predict increased risk of complications following THA. The NLR performed particularly well at predicting adverse events, with above threshold values increasing the adjusted odds by more than two fold.