Neutrophil-Lymphocyte Ratios Predict Optimal Surgical Timing in Patients Undergoing Hemiarthroplasty for Femoral Neck Fracture

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Purpose: Femoral neck fractures are highly morbid injuries, and patients with greater perioperative risk and lower functional reserve are commonly treated with hemiarthroplasty (HA). A neutrophil-lymphocyte ratio (NLR) is an inflammatory biomarker that has been used to predict adverse surgical outcomes. We hypothesize that delayed HA for femoral neck fracture in patients presenting with dysregulated inflammatory responses (measured via NLR) is associated with lower inpatient mortality rates.

Methods: The Premier Healthcare Database was retrospectively reviewed for older adult patients (age ≥60) with femoral neck fractures who underwent HA and had a complete blood count (CBC) with differential to calculate NLR values. As NLR values down-trended until after surgery, the marginal effect of a 2- versus 0-day delay in surgery on the probability of inpatient mortality across NLR values was determined. A threshold NLR where mortality significantly decreased in the 2-day delay group was identified in this manner. Patients with an above-threshold NLR were identified, and those with a 2-day delay were matched 1:1 to those without a delay on the propensity for delayed surgery. The adjusted odds ratios (aORs) of inpatient mortality were determined via multivariable models, accounting for potential confounding. Significance was defined as $P<0.05$.

Results: A threshold NLR of 6.9 was identified. 2106 patients with an NLR >6.9 two days prior to surgery were matched to 2106 patients with an NLR >6.9 on the day of surgery. Matching achieved good balance, with a standardized mean difference of <0.10 for all covariates. The average age of both groups was 79 years, with the majority of patients being white, female, and Medicare-insured. NLR values were significantly lower on the day of surgery for the delay cohort than the no-delay cohort (4.91 [standardized difference (SD) = 1.25] vs 11.06 [SD = 3.22]). A significantly lower inpatient mortality rate was observed in the delay cohort (1.47% vs 3.04%; aOR =0.49 [95% confidence interval = 0.31-0.79]).

Conclusion: NLR can be used to identify patients with femoral neck fractures who would benefit from further optimization prior to undergoing HA to reduce the risk of postoperative mortality.