THE NEUTROPHIL-TO-LYMPHOCYTE RATIO AS A PREDICTOR OF HAEMORRHAGIC TRANSFORMATION AND FUNCTIONAL OUTCOME: A COMPARATIVE ANALYSIS BEFORE AND AFTER 6 HOURS IN A MONOCENTRIC STUDY.

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BACKGROUND

Systemic inflammation is gaining attention as a modulator of ischemic damage and reperfusion injury. The neutrophil-to-lymphocyte ratio (NLR), biomarker of systemic immune activation, has shown prognostic value in acute ischemic stroke (AIS), particularly for haemorrhagic transformation and functional outcome. However, the differential predictive role of NLR in early vs. late endovascular treatment remains unclear.

AIMS

This study aims to compare the prognostic relevance of NLR in MCA stroke patients treated with thrombectomy either within or beyond 6 hours from onset.

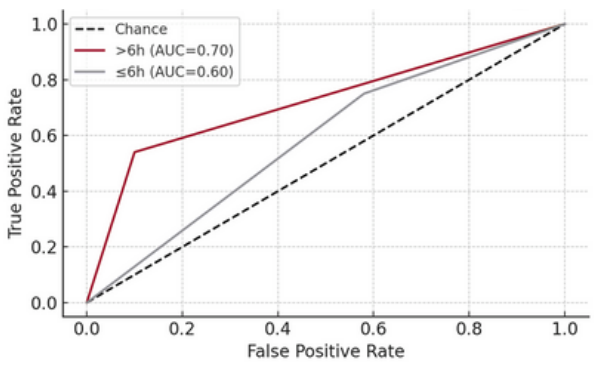
METHODS

We retrospectively included patients with MCA (M1 tract) stroke admitted to our Stroke Unit between 2021-2024. Admission NLR values were compared with clinical, radiological, and procedural variables. We evaluated in particular associations with any intracerebral haemorrhages (ICH), early clinical improvement (ΔNIHSS at 24h) and mRS at 3 months. Regression models and ROC curves were conducted separately for each time window to assess the predictive power of NLR on ICH and long-term disability.

RESULTS

478 patients with MCA occlusion treated with thrombectomy, 412 within 6 hours and 66 beyond, were enrolled. NLR showed no association with procedural time, number of thrombectomy passes, TICI, or collateral status. However, it was significantly higher in patients with ICH in both groups (≤6h: p = 0.006; >6h: p = 0.004). In the >6h group, there was a trend toward greater 24-hour clinical improvement in patients with lower NLR (p = 0.09), not observed in the ≤6h group (p = 0.977). NLR resulted independently associated with worse 3-month mRS only in the >6h group (p = 0.044). Logistic regression confirmed NLR as a predictor of ICH in both groups (≤6h: p = 0.007; >6h: p = 0.005), with stronger significance in the >6h cohort (Nagelkerke R^2 = 0.179 vs. 0.035). ROC curve analysis showed superior discriminative ability for NLR in the >6h group (AUC = 0.70; cut-off >6.78; sensitivity 53.8%, specificity 91.7%) compared to the ≤6h group (AUC = 0.60; cut-off >2.43; sensitivity 75.0%, specificity 42.0%).

ROC CURVES



DISCUSSION

Our results highlight the distinct prognostic role of systemic inflammation in patients undergoing thrombectomy beyond 6 hours. In this subgroup, NLR more accurately predicts both early haemorrhagic complications and late functional outcomes, possibly reflecting the increased vulnerability of ischemic tissue to inflammatory damage after delayed reperfusion.

CONCLUSION

NLR is a valuable and accessible biomarker in AIS, with enhanced predictive value for ICH and clinical outcome in patients selected for late-window endovascular therapy. These findings support its integration into extended time-window triage protocols.