Clinical Article

Prognostic significance of platelet-to-lymphocyte and platelet-to-neutrophil ratios in patients with mechanical thrombectomy for acute ischemic stroke

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Objective: The present study aimed to analyze the correlation between platelet-to-lymphocyte ratio (PLR) and platelet-to-neutrophil ratio (PNR) with prognosis of patients who underwent mechanical thrombectomy (MT).

Methods: A total of 432 patients was included, PLR and PNR were calculated from laboratory data on admission. Prognosis was evaluated with a modified Rankin Scale at 3 months after MT. Using receiver operating characteristic (ROC) analysis, optimal cutoff values of PLR and PNR were identified to predict the prognosis after MT. Multivariate analyses were performed to identify the relationship of PLR and PLR with prognosis of MT.

Results: Patients with favorable outcomes had a lower mean PLR (135.0, standard deviation [SD] 120.3) with a higher mean PNR (47.1 [SD] 24.6) compared with patients with unfavorable outcomes (167.6 [SD] 139.3 and 35.4 [SD] 22.4) (<0.001 and <0.001, respectively). In ROC analyses, the optimal cutoff value of PLR and PNR to predict the 3 months prognosis were 145 and 41, respectively (p<0.001 and p=0.006). In multivariate analysis, PLR less than 145 (odds ratio [OR] 1.29, 95% confidence interval [CI] 1.06–2.06; p=0.016) and PNR greater than 41 (OR 1.22, 95% CI 1.10–1.62; p=0.022) were predictors of favorable outcome at 3 months.

Conclusions: In patients with MT, PLR and PNR on admission could be predictive factors of prognosis and mortality at 3 months. Decreased PLR and increased PNR were associated with favorable clinical outcome 3 months after MT.

Keywords Leukocytes, Lymphocytes, Neutrophils, Platelets, Thrombectomy

INTRODUCTION

Stroke is a major cause of mortality and morbidity, and ischemic stroke accounts for about 80% of all stroke. Among the types of stroke, acute ischemic stroke (AIS) caused by large vessel occlusion (LVO) can cause severe disabilities and life threatening
**MATERIALS AND METHODS**

**Study population**

In our retrospective study, prospectively collected data from each institution’s stroke data base were reviewed, after obtaining approval of the local Institutional Review Board. From January 2014 to February 2020, a total of 432 patients who underwent MT by LVO was identified. The inclusion criteria was AIS patients who underwent MT for LVO at each institution. Exclusion criteria were as follows: (1) patients with missing laboratory data, or loss to follow up within 3 months; (2) history of infection or surgery within 4 weeks prior to AIS onset; (3) history of autoimmune disease (e.g. rheumatic autoimmune disease, lupus), or malignancy; and (4) known underlying hematologic disorders and severe kidney or liver dysfunction. Pretreatment infection was defined as pneumonia, urinary tract infections, or fever or other typical clinical manifestations, during the pre-interventional period. Before the MT, intravenous thrombolysis (IVT) with a tissue plasminogen activator (alteplase) was applied within 4.5 hours after stroke onset at a maximum dose of 0.9 mg/kg in accordance with the European Cooperative Acute Stroke Study (ECASS) III trial. All of MT procedures were performed with a stent retriever or a combined technique. LVO included occlusion of the intracranial carotid artery, middle cerebral artery, anterior cerebral artery, or posterior circulation (vertebral artery, or basilar artery), as established with computed tomography angiography.

**Clinical data and laboratory measurements**

Clinical characteristics of the patients included demographic findings; age, gender, risk factors, stroke etiology by TOAST criteria, target occlusion site, laboratory findings on admission, IVT, alberta stroke program early CT score (ASPECTS), national institutes of health stroke scale (NIHSS) (range, 0–42, with higher score indicating more severe neurologic deficit), and time from symptom onset to groin puncture. Risk factors constituted history of hypertension, diabetic mellitus, atrial fibrillation, coronary artery disease, prior stroke or transient isch-
emic attack (TIA), smoking, dyslipidemia, and body mass index (BMI). Laboratory findings contained red blood cells, WBC differentials, hemoglobin, hematocrit, platelets, prothrombin time, activated partial thromboplastin time, high-sensitivity C-reactive protein (hsCRP), erythrocyte sedimentation rate (ESR), total protein, blood urea nitrogen (BUN), creatinine (Cr), BUN/Cr ratio, glycated hemoglobin (HbA1c), serum glucose, total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG). All laboratory findings were evaluated using the peripheral venous blood samples collected on admission to the emergency department. PLR, PNR, and PWR were calculated by dividing the platelet count by the lymphocyte count, the platelet count by the neutrophil count, and the platelet count by the WBC count, respectively.4200

Procedure details and clinical outcomes
Procedure time was determined as time from groin puncture to reperfusion. Based on the final angiogram, a successful recanalization was defined, according to the modified treatment in the cerebral infarction (m-TICI) scale of 2b or 3,39 and the first-pass reperfusion indicated an m-TICI of 2b or 3 reperfusion with the first pass of the stent retriever.28 Clinical outcomes comprised the modified Rankin Scale (mRS) score at 3 months (a favorable functional outcome means 3 months mRS score of 0 to 2), symptomatic intracerebral hemorrhage (sICH), hemorrhagic transformation (HT) of infarct, and mortality at 3 months. sICH was defined as any hemorrhage on a computed tomography taken after the procedure with an increase of ≥4 points on the initial NIHSS score. HT of infarct was confirmed by susceptibility weighted imaging at 7 days after MT.

Statistical analysis
All data were processed using Stata Statistical Software, release 15 (Stata, College Station, TX, USA). All of the patients were dichotomized according to the mRS at 3 months (favorable 0-2 vs unfavorable 3-6). Categorical variables were analyzed with χ² test or Fisher’s exact test, and Student’s t-test or Mann-Whitney U test was used to compare continuous variables. Receiver operating characteristic (ROC) curves were used to determine the optimal cutoff values of PLR, PNR, and PWR to predict the prognosis of patients with MT. Univariate and multivariate logistic regression analyses were used to verify factors that correlated with clinical outcomes, and to compute odds ratio (OR) with 95% confidence interval (CI) estimates for each endpoint. The variables with p<0.20 in univariate analysis were entered into a backward multivariate logistic regression analysis, and a two-tailed p-value ≤0.05 was considered to indicate a significant difference.

RESULTS
Baseline characteristics and outcomes
A total of 432 patients, 240 showed favorable outcomes at 3 months (mRS score 0-2, 56.7% were male), and unfavorable outcomes at 3 months (mRS score 3-6, 50.5% were male) were found in the other 192 patients. Patients with unfavorable outcomes (mean 73.4 yrs [SD] 11.8) were older than those with favorable outcomes (mean 66.0 yrs [SD] 13.5) (p=<0.001). There were no significant differences in risk factors, stroke etiology, and distribution of occlusion site between the groups. Compared with the unfavorable outcome group, the favorable outcome group showed lower mean levels of neutrophils and hsCRP, but higher mean lymphocyte level (p=0.032, 0.010, and 0.030, respectively). A lower mean value of PLR (135.0 [SD] 120.3) with higher mean value of PNR (47.1 [SD] 24.6) and PWR (27.7 [SD] 12.1) were found in favorable outcome patients, compared with those of unfavorable outcome patients (167.6 [SD] 139.3, 35.4 [SD] 22.4, and 22.4 [SD] 10.8, respectively) (p=<0.001, <0.001, and 0.009) (Fig. 1). In addition, the favorable outcome patients had a higher median ASPECT (9 [inter interquartile range, IQR] 8-10), lower mean initial NIHSS (8.1 [SD] 5.1), and shorter mean symptom to puncture time (212 [SD] 98) than patients with unfavorable outcomes (8 [IQR] 6-10, 13.9 [SD] 6.6, and 298 [SD] 133, respectively) (p=0.014, <0.001, and <0.001).
The differences in other baseline characteristics and laboratory findings between the groups not statistically significant. Patients with favorable outcomes had shorter procedure times with greater achievement of successful recanalization and first pass reperfusion, than patients with unfavorable outcomes \( (p=0.002, <0.001, \text{ and } 0.015, \text{ respectively}) \). In terms of clinical outcomes, lower occurrence of sICH and HT of infarct was found in the favorable outcome group, compared with the unfavorable outcome group \( (p=0.001 \text{ and } <0.001, \text{ respectively}) \) (Table 1).

Association of PLR, PNR, and PWR with 3 months clinical outcomes

According to ROC analysis, the optimal cutoff value of PLR level was 145 to predict the 3 months prognosis \( (\text{area under the curve [AUC]} 0.663, 95\% \text{ CI } 0.611–0.715; \ p<0.001) \). In addition, the optimal cutoff values of PNR and PWR to differentiate between favorable \( (\text{mRS } 0-2) \) and unfavorable \( (\text{mRS } 3-6) \) outcomes at 3 months were identified as 41 and 25, respectively \( (\text{AUC } 0.616, 95\% \text{ CI } 0.572–0.660; \ p=0.001, \text{ and AUC } 0.583, \text{ CI } 0.521–0.645; \ p=0.006) \) (Fig. 2).

Predictors of favorable clinical outcome after MT

Binary univariate and multivariate logistic regression
Table 1. Baseline characteristics and outcomes of patients, according to functional outcomes at 3 month

| Variables                        | Favorable       | Unfavorable    | p-value  |
|----------------------------------|-----------------|----------------|----------|
| **Demographics**                 |                 |                |          |
| Number of patients (%)           | 240 (55.6)      | 192 (44.4)     | <0.001*  |
| Age, mean±SD                     | 66.0±13.5       | 73.4±11.8      |          |
| Men, n (%)                       | 136 (56.7)      | 97 (50.5)      | 0.203    |
| **Risk factors, n (%)**          |                 |                |          |
| Hypertension                     | 136 (56.7)      | 117 (60.9)     | 0.279    |
| Diabetic mellitus                | 61 (25.4)       | 52 (27.1)      | 0.695    |
| Atrial fibrillation              | 86 (35.8)       | 76 (39.6)      | 0.287    |
| Coronary artery disease          | 41 (17.1)       | 26 (13.5)      | 0.138    |
| Prior stroke or TIA              | 26 (10.8)       | 30 (15.6)      | 0.141    |
| Smoking                          | 47 (19.6)       | 39 (20.3)      | 0.850    |
| Dyslipidemia                     | 104 (43.3)      | 74 (38.5)      | 0.315    |
| Body mass index ≥25 kg/m²        | 65 (27.1)       | 55 (28.6)      | 0.719    |
| **Stroke etiology, n (%)**       |                 |                |          |
| Cardio-embolic                   | 104 (43.3)      | 76 (39.6)      | 0.401    |
| Atherosclerosis                  | 75 (31.3)       | 70 (36.5)      | 0.374    |
| Dissection                       | 4 (1.7)         | 2 (1.0)        | 0.288    |
| Other or undetermined            | 57 (23.8)       | 44 (22.9)      | 0.408    |
| **Occlusion site, n (%)**        |                 |                |          |
| Middle cerebral artery           | 138 (57.5)      | 99 (51.6)      | 0.327    |
| Distal internal carotid artery   | 42 (17.5)       | 41 (21.4)      | 0.309    |
| Proximal internal carotid artery | 34 (14.2)       | 31 (16.1)      | 0.411    |
| Anterior cerebral artery         | 4 (1.7)         | 3 (1.6)        | 0.889    |
| Posterior circulation            | 22 (9.2)        | 18 (9.4)       | 0.851    |
| **Laboratory findings, mean±SD** |                 |                |          |
| Red blood cells, ×10¹²/L         | 4.45±0.75       | 4.55±1.61      | 0.363    |
| White blood cells, ×10¹²/L       | 8.35±3.29       | 9.68±3.73      | 0.104    |
| Neutrophils, ×10⁹/L              | 6.77±3.38       | 7.43±3.81      | 0.032*   |
| Lymphocytes, ×10⁹/L              | 1.99±1.03       | 1.72±1.37      | 0.030*   |
| Monocytes, ×10⁹/L                | 0.56±0.24       | 0.61±0.29      | 0.251    |
| Hemoglobin, g/dL                 | 13.79±1.97      | 13.55±2.79     | 0.299    |
| Hematocrit, %                    | 42.0±16.79      | 39.4±13.28     | 0.129    |
| Platelets, ×10⁹/L                | 229.1±86.6      | 220.1±64.5     | 0.232    |
| PLR                              | 135.0±120.3     | 167.6±139.3    | <0.001*  |
| PNR                              | 47.1±24.6       | 35.4±22.4      | <0.001*  |
| PWR                              | 27.7±12.1       | 22.4±10.8      | 0.009*   |
| Prothrombin time, sec            | 13.4±5.78       | 13.6±6.28      | 0.421    |
| Activated partial thromboplatinin time, sec | 36.4±12.4 | 37.1±14.5 | 0.537 |
| High-sensitivity C-reactive protein, mg/L | 0.65±1.65 | 1.18±2.61 | 0.010* |
| Erythrocyte sedimentation rate, mm/h | 19.4±16.9 | 22.7±19.8 | 0.107 |
| Total protein, g/dL              | 6.7±0.69        | 6.8±0.68       | 0.713    |
| Blood urea nitrogen (BUN), mg/dL  | 16.7±9.61       | 17.8±8.37      | 0.224    |
| Creatinine (Cr), mg/dL           | 0.8±0.45        | 0.9±0.67       | 0.500    |
| BUN/Cr ratio                     | 20.6±12.71      | 21.0±10.39     | 0.686    |
| HbA1c, %                         | 6.20±1.23       | 6.19±1.24      | 0.947    |

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analyses were performed to verify the predicting factors that were independently associated with favorable outcomes and mortality at 3 months. Younger age (<70 yrs) (OR 1.39, 95% CI 1.04–1.63; p=0.022), higher ASPECT (>8) (OR 2.24, 95% CI 1.64–4.08; p=0.012), lower NIHSS at admission (<8) (OR 3.64, 95% CI 2.21–6.01; p=0.002), achievement of successful recanalization (OR 2.27, 95% CI 1.17–4.43; p=0.036), lower occurrence of sICH (OR 0.14, 95% CI 0.04–0.52; p=0.003), decreased PLR value (<145) (OR 1.29, 95% CI 1.06–2.06; p=0.016), and increased PNR value (>41) (OR 0.94, 95% CI 0.82–0.96; p=0.042) could be predictive factors for a decrease in 3 month mortality (Table 3).

**DISCUSSION**

In this observational study, lower PLR value with higher PNR and PWR values was identified in patients with favorable prognoses, compared to patients with unfavorable prognoses. The optimal cutoff values of PLR, PNR, and PWR to predict the prognosis of MT were 145, 41, and 25, respectively. Our results revealed that PLR and PNR on admission could be independent predictive factors of prognosis in patients who underwent MT for LVO. Furthermore, there were significant correlations of prognosis after MT with the degree of PLR and PNR.

Atherosclerosis and thrombosis are primarily involved
in the pathogenesis of LVO with AIS, and platelets and WBC subtypes are crucial in these processes. Platelets participate in inflammation and thrombosis by releasing pro-inflammatory chemokines, and its activation plays an important role in thrombus formation in response to atherosclerotic plaque rupture or endothelial cell erosion. Excessive activation and aggregation of platelets may lead to thrombosis with vascular occlusion, and result in cardiovascular and cerebrovascular events. Leukocytes also play a significant role in the vascular inflammatory response and brain damage after AIS. In ischemic brain tissue, neutrophils exaggerate edema and promote the death of neurons by releasing inflammatory mediators and toxic-effective substances. In previous studies, leukocytosis and neutrophilia have been reported to be associated with increased infarct volume and recurrence of stroke. On the other hand, lymphocytes are inversely associated with inflammation, and a lower lymphocyte count represents an increased risk of stroke and mortality.

The PLR is a novel biomarker of systemic inflammation, and a number of studies has investigated the association of PLR with prognosis of patients with cerebrovascular diseases. Altintas et al. performed a comparative study to assess the relationship of PLR with clinical outcome and final infarct core volume in patients with endovascular therapy for AIS. The patients were divided into two groups based on a PLR level cut-off value of 145, and m-TICI 3 recanalization was more frequent in the low PLR group. Patients with low PLR had more favorable functional outcomes (mRS 0-2) compared to patients with high PLR. Jin et al. showed the prognostic significance of PLR for 3 months prognosis after AIS. Idil Soylu et al. reported that the rate of carotid

### Table 2. Predictors of favorable clinical outcome in univariate and multivariate logistic regression analyses

|                     | Univariate         | Multivariate       |
|---------------------|--------------------|--------------------|
|                     | OR (95% CI)        | p-value            | OR (95% CI)        | p-value |
| Age (<70 yr)        | 1.58 (1.02-2.07)   | 0.012*             | 1.39 (1.04-1.63)   | 0.022* |
| Gender (male)       | 1.19 (0.68-2.06)   | 0.536              |                   |        |
| Hypertension        | 0.77 (0.44-1.35)   | 0.363              |                   |        |
| Diabetic mellitus   | 0.92 (0.49-1.71)   | 0.802              |                   |        |
| Atrial fibrillation | 1.11 (0.63-1.94)   | 0.715              |                   |        |
| Coronary artery disease | 1.68 (0.70-2.22)   | 0.241              |                   |        |
| Prior stroke or TIA | 0.54 (0.24-1.18)   | 0.224              |                   |        |
| Dyslipidemia        | 1.15 (0.68-1.96)   | 0.594              |                   |        |
| Body mass index ≥25 kg/m² | 0.86 (0.48-1.53)   | 0.613              |                   |        |
| PLR (<145)          | 1.44 (1.04-2.20)   | 0.010*             | 1.29 (1.06-2.06)   | 0.016* |
| PNR (>41)           | 1.32 (1.08-1.88)   | 0.012*             | 1.22 (1.10-1.62)   | 0.022* |
| PWR (>25)           | 1.21 (1.06-1.92)   | 0.039*             | 1.14 (0.82-2.02)   | 0.075  |
| hsCRP (<1 mg/L)     | 1.22 (1.04-1.64)   | 0.042*             | 1.18 (0.96-1.82)   | 0.068  |
| Intravenous thrombolysis | 0.74 (0.43-1.22)   | 0.261              | 1.64 (0.82-3.42)   | 0.202  |
| ASPECTS (>8)        | 2.42 (1.44-5.08)   | 0.008*             | 2.24 (1.64-4.08)   | 0.012* |
| Initial NIHSS (<8)  | 3.76 (2.22-6.34)   | <0.001             | 3.64 (2.21-6.01)   | 0.002  |
| Successful recanalization | 2.42 (1.03-5.22)   | 0.027              | 2.27 (1.17-4.43)   | 0.036  |
| First pass reperfusion | 1.25 (0.54-1.72)   | 0.157              | 1.22 (0.68-1.66)   | 0.180  |
| sICH                | 0.14 (0.03-0.54)   | 0.002              | 0.14 (0.04-0.52)   | 0.003  |
| Hemorrhagic transform | 0.87 (0.68-1.74)   | 0.227              |                   |        |

* Statistically significant

OR, odds ratio; CI, confidence interval; TIA, transient ischemic attack; PLR, platelet-to-lymphocyte ratio; PNR, platelet-to-neutrophil ratio; PWR, platelet-to-white blood cell ratio; hsCRP, high-sensitivity C-reactive protein; ASPECTS, Alberta stroke program early CT score; NIHSS, national institutes of health stroke scale; sICH, symptomatic intracerebral hemorrhage
artery stenosis was higher in patients with a high PLR value (>163), and PLR was an independent predictor of stroke.17 Deser et al. revealed that PLR is a predictor of stroke following carotid endarterectomy, with a threshold level of 145.30.5 These findings were similar to our study in patients who underwent MT, where the optimal cutoff value of PLR to predict a favorable outcome was 145. In addition, PLR less than 145 is an independent predictor of favorable mRS (0-2) and mortality at 3 months, and the proportion of patients with favorable outcome decreased as PLR increased.

There is currently limited amount of research for PNR in patients with stroke. Jin et al. investigated PNR in patients with AIS.20 The PNR level on admission in the good prognosis group (53.7) was significantly higher than that of the poor prognosis group (44.3), and PNR level was associated with 3 months prognosis after AIS.20 In our study, patients with favorable outcome (47.1) had higher PNR than those with unfavorable outcome (35.4). Furthermore, PNR (greater than 41) is an independent predictor of favorable outcome and decrease of mortality at 3 months. In terms of PWR, Chen et al. investigated its association with prognosis in AIS patients with IVT and determined that PWR (>23.52) was a predictor of good 3 month outcome.4 Jin et al. also showed that PWR was correlated with 3 months outcome in patients with AIS, but the accuracy of PWR was lower than that of PNR for predicting prognosis.20 The results of these studies are different from ours. In our study, the PWR value of patients with favorable outcome (27.7) was higher than for patients with unfavorable outcome (22.4), and 25 was the optimal cut-off value for predicting favorable outcome. However, based on our multivariate analysis, PWR is not an independent predictor of clin-

|                 | Univariate | Multivariate |
|-----------------|------------|--------------|
| **OR (95% CI)** | **p-value** | **OR (95% CI)** | **p-value** |
| Age (< 70 yr)   | 0.25 (0.09-0.68) | **0.007** | 0.31 (0.12-0.76) | **0.010** |
| Gender (male)   | 1.56 (0.66-3.72) | 0.310 | | |
| Hypertension    | 1.60 (0.67-3.82) | 0.289 | | |
| Diabetic mellitus | 0.54 (0.19-1.49) | 0.238 | | |
| Atrial fibrillation | 0.83 (0.35-1.98) | 0.682 | | |
| Coronary artery disease | 1.29 (0.47-3.51) | 0.615 | | |
| Prior stroke or TIA | 1.17 (0.40-3.43) | 0.767 | | |
| Dyslipidemia    | 0.97 (0.39-2.09) | 0.818 | | |
| Body mass index ≥25 kg/m² | 0.81 (0.24-2.74) | 0.742 | | |
| PLR (<145)      | 0.81 (0.74-0.88) | **0.010** | 0.83 (0.76-0.92) | **0.018** |
| PNR (>41)       | 0.89 (0.80-0.98) | **0.034** | 0.94 (0.82-0.96) | **0.042** |
| PWR (>25)       | 0.88 (0.80-1.38) | 0.082 | 1.04 (0.89-1.36) | 0.135 |
| hsCRP (<1 mg/L) | 0.72 (0.62-0.98) | **0.014** | 0.82 (0.68-1.10) | 0.082 |
| Intravenous thrombolysis | 0.98 (0.42-2.27) | 0.973 | | |
| ASPECTS (>8)    | 0.60 (0.42-1.44) | 0.130 | 0.61 (0.44-1.28) | 0.144 |
| Initial NIHSS (<8) | 0.36 (0.15-0.88) | **0.025** | 0.37 (0.16-0.86) | **0.021** |
| Successful recanalization | 3.18 (0.51-6.99) | 0.220 | | |
| First pass reperfusion | 0.54 (0.26-1.14) | 0.217 | | |
| sICH             | 2.52 (1.05-6.05) | **0.038** | 2.23 (1.02-4.96) | **0.040** |
| Hemorrhagic transformation | 1.03 (0.44-2.44) | 0.394 | | |

* Statistically significant

OR, odds ratio; CI, confidence interval; TIA, transient ischemic attack; PLR, platelet-to-lymphocyte ratio; PNR, platelet-to-neutrophil ratio; PWR, platelet-to-white blood cell ratio; hsCRP, high-sensitivity C-reactive protein; ASPECTS, alberta stroke program early CT score; NIHSS, national institutes of health stroke scale; sICH, symptomatic intracerebral hemorrhage
Leukocyte platelet aggregates have been considered as a novel marker of activated platelets, and prior studies have shown that leukocytes can be recruited via platelet secretory components with multiple chemokines and membrane ligands.\(^8\) Similarly, our study revealed that platelet to WBC subtypes ratios reflect the inflammatory response and are associated with prognosis of MT. In addition to the PLR, PNR, and PWR, we previously conducted an analysis of other inflammation-based scores, including neutrophil to lymphocyte ratios and monocyte to high-density lipoprotein cholesterol ratio which are known to reflect the inflammation status after MT.\(^{29}\) The exact mechanism of various hematological factors that reflect the inflammation status have not been clarified, but they are helpful in predicting the prognosis of patients with MT, and further research is needed.

There were some limitations to our study. First, this was a retrospective study with a relatively small sample size, which may induce selection bias and allow for errors in data interpretation. Second, unmeasured laboratory findings, such as platelet distribution width and mean platelet volume, could have contributed to the results of our study, although we adjusted our analyses for possible confounding variables. Third, we only measured laboratory data once on admission and did not evaluate dynamic changes with repeated measurements of laboratory findings at different time points. Fourth, other various disease or past history of drug use that we did not include in this study could affect the inflammatory reaction and results of our analyses. However, every effort was made to adjust for the possibility of confounding factors when we analyzed the data and interpreted the results.

**CONCLUSIONS**

Our study shows the clinical importance of PLR and PNR in MT for LVO. PLR and PNR on admission could be predictive factors of prognosis and mortality at 3 months in patients with MT. Furthermore, decreasing PLR and increasing PNR are independent factors for predicting favorable prognoses of patients who underwent MT. Further investigation is required to verify the results of our study and identify the mechanisms behind these findings.

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**Disclosure**

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

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