Research Article / Araştırma Makalesi

Correlation of Systemic Inflammatory Index and Neutrophil Platelet Ratio with Intracranial Haemorrhage and Mortality After Endovascular Treatment Due to Acute Ischaemic Stroke

Sistemik İnflamatuar İndeks ve Nötrofil Platelet Oranının Akut İskemik İnme Nedeniyle Endovasküler Tedavi Sonrası İntrakranial Hemaroji Ve Mortaliteyle İlişkisi

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Abstract: Many studies in recent years have shown that systemic and local inflammatory responses following various diseases are important markers of tissue damage. We aimed to investigate the correlation of systemic inflamatory index and neutrophil platelet ratio with intracranial haemorrhage and mortality in patients undergoing endovascular treatment due to ischaemic stroke. Between 2022 and 2024, patients who hospitalised in the Antalya Training and Research Hospital Neurology intensive care unit after endovascular treatment were screened. Patients over 18 years of age with a door-needle time of less than 24 hours and who underwent endovascular treatment for successful internal carotid artery ICA, MCA, and basilar artery occlusion due to acute ischaemic stroke were included in the study. A total of 133 patients were included. intracranial haemorrhage was observed in 59 (44.4%) patients, and exitus developed in 38 (28.6%) patients. There was a correlation between the development of intracranial haemorrhage and systemic inflamatory index and neutrophil platelet ratio. A statistically significant difference was observed between the neutrophil platelet ratio and systemic inflamatory index median values according to mortality status, and neutrophil platelet ratio values were higher in patients who developed exitus. In conclusion, our findings indicate the correlation of systemic inflamatory index and neutrophil platelet ratio independently with intracranial haemorrhage and mortality in patients with endovascular treatment. These noninvasive and cost-effective inflammatory markers may constitute a good biomarker for intracranial haemorrhage and mortality after endovascular treatment. In order to confirm these findings, prospective studies with a larger population of patients are needed.
Keywords: Acute Ischaemic Stroke, Endovascular Treatment, Intracranial Haemorrhage, Systemic Inflammatory Index, Neutrophil Platelet Ratio

Özet: Son yıllarda yapılan birçok çalışma, çeşitli hastalıkları takiben oluşan sistemik ve lokal enflamatuar yanıtların doku hasarının önemli belirteçleri olduğunu göstermiştir. Bu çalışmada iskemik inme nedeniyle endovasküler tedavi uygulanan hastalarda sistemik inflamatuvar indeks ve nötrofil platelet oranının intrakranial hemoraji ve mortalite ile ilişkisini araştırmayı amaçladık. 2022-2024 yılları arasında Antalya Eğitim ve Araştırma Hastanesi Nöroloji yoğun bakım ünitesinde endovasküler tedavi sonrası yatan hastalar tarandı. Akut iskemik inme nedeniyle başarılı ICA, MCA ve baziler arter oklüzyonu için endovasküler tedavi uygulanan ve kapı-iğne süresi 24 saatten az olan 18 yaşından büyük hastalar çalışmaya dahil edildi. Toplam 133 hasta çalışmaya dahil edildi. 59 (%44,4) hastada intrakranial kanama gözlendi ve 38 (%28,6) hastada exitus gelişti. İntrakranial hemoraji gelişimi ile sistemik inflamatuvar indeks ve nötrofil trombosit oranı arasında korelasyon vardı. Mortalite durumuna göre nötrofil platelet oranı ve sistemik inflamatuvar indeks medyan değerleri arasında istatistiksel olarak anlamlı bir fark gözlendi ve exitus gelişen hastalarda nötrofil platelet oranı değerleri daha yüksekti. Bulgularımız endovasküler tedavi uygulanan hastalarda sistemik inflamatuvar indeks ve nötrofil platelet oranının bağımsız olarak intrakranial hemoraji ve mortalite ile ilişkili olduğunu göstermektedir. Bu noninvaziv ve uygun maliyetli inflamatuvar belirteçler, endovasküler tedavi sonrası intrakranial kanama ve mortalite için iyi bir biyobelirteç olabilir. Bu bulguları doğrulamak için daha geniş bir hasta popülasyonuyla yapılacak prospektif çalışmalara ihtiyaç vardır.
Anahtar Kelimeler: Akut İskemik İnme, Endovasküler Tedavi, İntrakranial Kanama, Sistemik İnflamatuar İndeks, Nötrofil Platelet Oranı

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1. Introduction

Stroke is the most common acute neurological disorder and a leading cause of mortality and morbidity. Mortality increases up to 80%, especially in ischaemic strokes resulting from large vessel occlusion (1). In recent years, endovascular thrombectomy has become the standard treatment for large vessel occlusion strokes. With appropriate patient selection, the chance of success is quite high, and half of the patients can reach functional independence in 90 days after stroke (2,3).

However, some complications may be inevitable after the operation, both due to the operation and the nature of the disease. One of the most feared complications after the operation is symptomatic intracranial haemorrhage (ICH). Previous studies have shown that 9-49.5% of acute ischaemic stroke patients treated with endovascular treatment (EVT) had haemorrhagic trasnformations, and 2-16% of these patients were symptomatic. This situation significantly affects mortality and morbidity (4,5). Therefore, early prediction of ICH after EVT will be highly beneficial for taking the necessary precautions, predicting the prognosis, and providing the necessary information to the patient's relatives.

After stroke, nitric oxide and reactive oxygen species are produced through cytokines, chemokines, and metalloproteinases, and such an immune response facilitates the development of ICH (6). Many studies conducted in recent years have shown that systemic and local inflammatory responses have been a significant marker in the determination of tissue damage in generally every tissue after various pathogenic stimuli (7). Previous studies reported that neutrophil-lymphocyte ratio (NLR) and platelet-lymphocyte ratio (PLR) could be considered to determine prognosis after ischaemic cerebrovascular diseases. Moreover, in a study by Pikija et al., it was argued that NLR may be a potential biomarker for the development of intracerebral haemorrhage after EVT (8,9).

The systemic inflammatory index (SII), which is another indicator of systemic inflammation, is calculated as platelet x neutrophil/lymphocyte and has been reported to be correlated with the severity of ischaemic stroke and as a predictor of haemorrhagic transformation after stroke in some previous studies (10,11).

While several studies showing the correlation between neutrophil/platelet ratio (NPR) and haemorrhagic transformation after stroke are available, a study investigating its effects on mortality has not been performed yet (12,13).We aimed to investigate the correlation of SII and NPR with ICH and mortality in patients undergoing EVT due to ischaemic stroke.

2. Materials and Methods

The study was approved by the Ethics Committee of the Antalya Training and Research Hospital (No:3/26). All private data of the participants were anonymized and maintained with confidentiality.

Between 2022-2024, 580 patients hospitalised in Antalya Training and Research Hospital Neurology intensive care unit were screened.

133 patients over 18 years of age with a door-needle time of less than 24 hours and who underwent EVT for successful internal carotid artery (ICA), medial cerebral artery (MCA), and basilar artery occlusion due to acute ischaemic stroke were included in the study.

Patients who failed EVT, who did not have blood tests after EVT, who had arrest during EVT, who could not undergo neuroimaging after EVT, as well as patients with a history of malignancy, rheumatic, haematological diseases, or receiving immunosuppressive treatment for any reason, patients with a history of stroke in the last 1 month, and patients with active infection findings at the time of admission were excluded from the study (Figure 1).

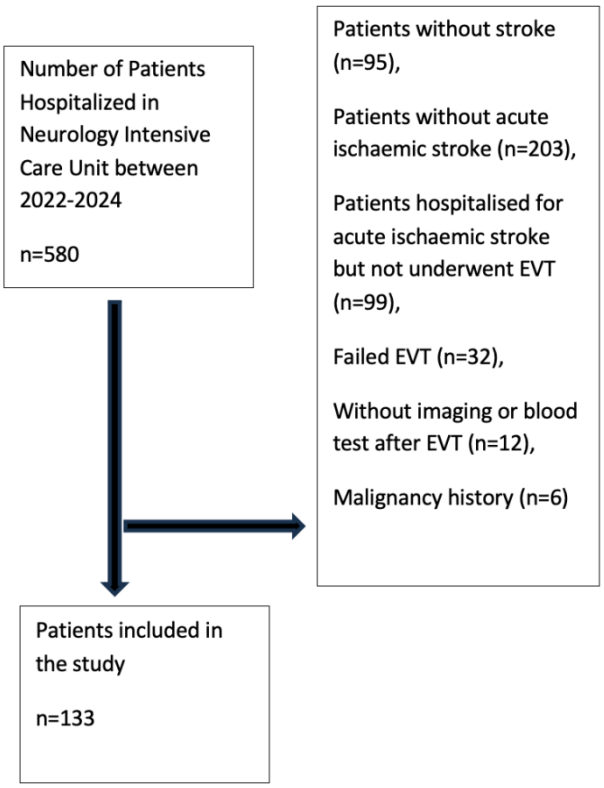

Figure 1. Flow chart of the inclusion of the study population.

In our clinic, complete blood biochemistry and blood coagulation tests are routinely performed in the first 24 hours after EVT. In addition, brain tomography is performed in every patient at the 4th and 24th hours after EVT and if clinical deterioration develops in the patient, the control brain tomography (CT) is repeated. Also, Cranial MRI is requested for all patients without contraindications.

The following details were retrospectively reviewed from the patient's medical records: age, gender, medical history, vascular risk factors, National Institutes of Health Stroke Scale (NIHSS), location of major vessel occlusion, whether or not they received thrombolytic treatment, Alberta Stroke Programme Early CT Score (ASPECT), modified Rankin Score (mRS), and modified Treatment In Cerebral Infarction (mTICI) scores following EVT. mRS scores between 0 - 2 were categorized as good clinical outcomes and between 3 - 6 as poor clinical outcomes. The ASPECT scores of the patients were divided into 2 groups: 0–6 and 7–10. Additionally, Red Blood Cells (RBC), haemoglobin, neutrophil, lymphocyte, monocyte, and platelet counts in peripheral blood samples obtained within 24 hours after EVT were noted. SII and NPR were calculated according to the following equations: SII = (neutrophil count x platelet count)/lymphocyte count, and NPR = neutrophil count/platelet count.

Brain CT and/or cranial MRIs performed within the first 1 month after EVT were examined for the presence of haemorrhagic transformation. If haemorrhagic transformation was present, the epicrisis notes were checked for symptomatic bleeding. The mortality status of the patients was noted.

Haemorrhagic transformations were divided into subtypes according to the European Cooperative Acute Stroke Study (ECASS II) scale. Accordingly, the presence of small petechiae in the infarct area was considered

haemorrhagic transformation type 1 (HT1), the presence of more unified petechiae throughout the infarct area was considered haemorrhagic transformation type 2 (HT2), haemorrhages with mass effect but covering less than 30% of the infarct area were considered Parenchymal haematoma type 1 (PH1), and haemorrhages with mass effect and covering more than 30% of the infarct area were considered Parenchymal haematoma type 2 (PH2) (14). Symptomatic ICH was defined as intracerebral haemorrhage occurring within 36 hours after treatment and associated with neurological deterioration (15).

Statistical Analysis

Data were analysed by IBM SPSS V23. Compliance with the normal distribution was analysed by Shapiro-Wilk and Kolmogorov-Smirnov tests. Yates Correction and Pearson's Chi-Square Test were used to analyse categorical data. In paired groups, Independent Samples t Test was utilized for the comparison of the parameters that complied with the normal distribution, and Mann Whitney U Test was utilized for the comparison of the parameters that did not comply with the normal distribution. Binary Logistic Regression Analysis was applied to analyse the risk factors affecting the presence of bleeding and mortality. ROC Analysis was used to find the cut-off value for the parameters to determine the presence of haemorrhage and mortality. The results of the analyses were presented as frequency (percentage) for categorical variables, mean ± standard deviation, and median (minimum - maximum) for quantitative variables. Significance level was taken as $p<0.050$.

3. Results

The mean age of 133 patients included in the study was 66.39±13.23 years, and 81 (60.9%) patients were male (Table 1). Only EVT was applied to 73 (54.9%) patients, and 60 (45.1%) patients received thrombolytic treatment in addition to EVT.

Table 1. Descriptive Characteristics of Participants

	Frequency	Percentage
Gender		
Male	81	60.9
Female	52	39.1
Haemorrhage		
No	74	55.6
Yes	59	44.4
Mortality		
Exitus	38	28.6
Alive	95	71.4
Operation		
Basilar	14	10.5
Right MCA	33	24.8
Left MCA	42	31.6
Right ICA	18	13.5
Left ICA	26	19.5
TOAST		
Large-vessel Atherosclerosis	31	23.3
Cardioembolic Source	72	54.1
Other 'Determined' Causes	4	3.1
Undetermined	26	19.5
Risk Factors		
Hypertension	79	59.3
Cardiovascular Disease	43	32.3
Atrial Fibrillation	63	47.3
Mechanical Valve Replacement	5	3.7
Diabetes Mellitus	35	26.3
Hyperlipidemia	81	60.9
Previous Cerebral Infarction	21	17.7

	Mean ± S.deviation	Median (min-max)
Age	66,39 ± 13,23	67 (30 - 90)
mRS	3,54 ± 1,84	4 (0 - 6)
ASPECT	7,41 ± 1,71	8 (0 - 10)
NIHSS	14,04 ± 5,2	15 (4 - 24)

NIHSS: National Institutes of Health Stroke Scale, ASPECT: Alberta stroke programme early CT score, mRS: Modified Rankin Score, TOAST: Trial of Org 10172 in Acute Stroke Treatment

ICH was observed in 59 (44.4%) patients, and exitus developed in 38 (28.6%) patients. HT1 was observed in 19 (32.4%), HT2 in 25 (42.3%), PH1 in 5 (8.4%) and PH2 in 10 (16.9%) of the patients who developed intracranial haemorrhage. Symptomatic ICH was observed in 11 (18.7%) of 59 patients who developed intracranial haemorrhagia. Thrombolytic + EVT was applied in 21 (35.5%) of the patients who developed ICH, while only EVT was applied in 38 (64.5%) patients. A statistically significant correlation was observed between the presence of ICH and gender, and the rate of ICH was found to be higher in male patients (p=0.019). In addition, mortality rate was higher in patients with ICH, and statistical significance was detected (p=0.001) (Table 2).

Table 2. Investigation of the correlation between the presence of haemorrhage and gender, mortality and operation

	Haemorrhage		Test Stat.	p
	N/A	Available		
Gender				
Male	38 (51,4)	43 (72,9)	5,518*	**0.019**
Female	36 (48,6)	16 (27,1)		
Mortality				
Exitus	12 (16,2)	26 (44,1)	11,150*	**0.001**
Alive	62 (83,8)	33 (55,9)		
Operation				
Basilar	10 (13,5)	4 (6,8)		
Right MCA	18 (24,3)	15 (25,4)		
Left MCA	19 (25,7)	23 (39)	5,310**	0.257
Right ICA	13 (17,6)	5 (8,5)		
Left ICA	14 (18,9)	12 (20,3)		
TOAST				
Large-vessel atherosclerosis	17 (23)	14 (23,7)		
Cardioembolic source	44 (59,5)	28 (47,5)	3,350**	0.340
Other ‘determined’ causes	1 (1,3)	3 (5,1)		
Undetermined	12 (16,2)	14 (23,7)		

**Yates Correction; **Pearson's Chi-Square Test*
TOAST: Trial of Org 10172 in Acute Stroke Treatment

When blood laboratory parameters were compared according to the presence of ICH, statistical significance was observed between SII and NPR values and SII and NPR values were higher in the presence of ICH (p=0.042, 0.048, respectively) (Table 3).

Table 3. Comparison of quantitative parameters according to the presence of haemorrhage

	Haemorrhage				Test Stat.	p
	N/A		Available			
	Mean ± S.deviation	Median (min-max)	Mean ± S.deviation	Median (min-max)		
Age	66,34 ± 14,15	67,5 (30 - 90)	66,46 ± 12,09	66 (41 - 88)	U= 2138,5	0.840
HB	12,21 ± 2,12	12,05 (6,4 - 17,2)	12,95 ± 1,73	13,4 (7,6 - 16,2)	U= 1623,5	**0.011**
NEU	9,02 ± 3,26	8,41 (3,14 -21,34)	10,37 ± 3,53	10,06 (3,83 - 18,34)	U= 1655,5	**0.017**
LYM	1,5 ± 0,96	1,28 (0,27 - 5,58)	1,27 ± 0,55	1,12 (0,38 - 2,48)	U= 1981,5	0.361
MONO	0,66 ± 0,33	0,65 (0,05 - 1,79)	0,75 ± 0,37	0,71 (0,12 - 2,09)	U= 1902,0	0.203
PLT	232,08 ± 66,69	211 (113 - 507)	232,47 ± 66,17	221 (83 - 420)	U= 2123,5	0.788
SII	2001,38 ± 1885,36	1527,03 (169,01 - 12294,75)	2358,81 ± 1610,45	1785,77 (398,74 - 7799,47)	U= 1734,0	**0.042**
NPR	4,12 ± 1,68	3,99 (1,34 - 10,04)	4,68 ± 1,68	4,58 (1,37 - 10,46)	t= -1,895	**0.048**

t: Independent Samples t Test; U: Mann Whitney U Test
HB: Haemoglobin, NEU: Neutrophil, LYM: Lymphocyte, MONO: monocyte, PLT: Platelet, SII: Systemic Inflammatory Index, NRP: Neutrophil Platelet Ratio

Exitus developed in 38 (28.6%) of the patients who underwent EVT. These values were higher in patients who developed exitus and in patients with exitus, in whom a statistically significant difference was observed in SII values (p=0.004). Moreover, a statistically significant difference was observed between the NPR median values according to mortality status, and NPR values were higher in patients who developed exitus (p=0.001) (Table 4).

Table 4. Comparison of quantitative parameters according to mortality

	Mortality				**Test Stat.**	**p**
	Exitus		**Alive**			
	Mean ± S.deviation	**Median (min-max)**	**Mean ± S.deviation**	**Median (min-max)**		
SII	2663,72 ± 1764,74	2022,01 (652,18 - 8157,03)	1958,42 ± 1742,38	1537,76 (169,01 - 12294,75)	U= 1220	**0.004**
NPR	5,08 ± 1,74	4,95 (1,37 - 10,46)	4,08 ± 1,61	3,93 (1,34 - 10,04)	U= 1120	**0.001**

U: Mann Whitney U Test
SII: Systemic Inflammatory Index, NRP: Neutrophil Platelet Ratio

In patients with poor clinical outcome according to mRS, a statistically significant increase was observed in SII values (p=<0.001), whereas no significant difference was observed with NPR (p=0.090) (Table 5).

Table 5. Comparison of quantitative parameters according to mRS results

	mRS result				Test Stat.	p
	Good		Poor			
	Mean ± S.deviation	Median (min-max)	Mean ± S.deviation	Median (min-max)		
SII	1387,08 ± 916,73	1021,28 (191,93 - 4303,41)	2492,35 ± 1942,54	1884,79 (169,01 - 12294,75)	U= 1034	**<0,001**
NPR	4,11 ± 1,91	3,81 (1,52 - 10,46)	4,48 ± 1,6	4,45 (1,34 - 8,93)	U= 1514	0.090
Age	63,1 ± 13,45	65 (30 - 90)	67,81 ± 12,95	68 (31 - 90)	t= -1,9	0.060
NIHSS	12,9 ± 5,13	13 (4 - 24)	14,53 ± 5,18	15 (4 - 24)	U= 1493	0.071

t: Independent Samples t Test; U: Mann Whitney U Test
SII: Systemic Inflammatory Index, NRP: Neutrophil Platelet Ratio, NIHSS: National Institutes of Health Stroke Scale, mRS: Modified Rankin Score

NPR and SII values did not indicate a statistically significant difference according to ASPECT categories (p>0.050). Risk factors affecting the development of intracranial haemorrhage were analysed by Binary Logistic Regression Analysis and Enter method was utilized to include independent variables in the model. No risk factor affecting haemorrhage was found (p>0.050). A statistically significant cut-off value was found for the SII value in determining the presence of haemorrhage (AUC=0.603; p=0.042). SII ≥ 990.5 indicates the presence of haemorrhage. A statistically significant cut-off value was found for the NPR value in determining the presence of haemorrhage (AUC=0.610; p=0.029). NPR ≥ 4.34 indicates the presence of haemorrhage (Table 6) (Figure 2,3).

Table 6. Cut-off values for parameters to determine the presence of haemorrhage

	Cut-off	AUC (%95 CI)/p	Sensitivity	Specificity	PPV	NPV
SII	≥ 990,5	0,603 (0,506 - 0,7)/**0,042**	86,44%	36,49%	52,04%	77,14%
NPR	≥ 4,34	0,61 (0,514 - 0,706)/**0,029**	62,71%	59,46%	55,22%	66,67%

SII: Systemic Inflammatory Index, NRP: Neutrophil Platelet Ratio

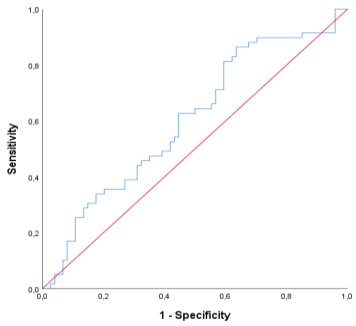

Figure 2. ROC Curve for SII-ICH

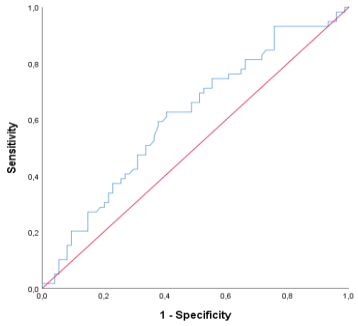

Figure 3. ROC Curve for NPR-ICH

A statistically significant cut-off value was found for the SII value in determining mortality (AUC=0.662; p=0.004). SII ≥ 1012.27 indicates mortality. A statistically significant cut-off value was found for the NPR value in determining mortality (AUC=0.690; p=0.001). NPR ≥ 4,59 indicates mortality (Figure 4,5)

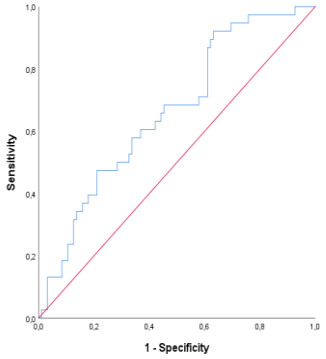

Figure 4. ROC Curve for SII- Mortality

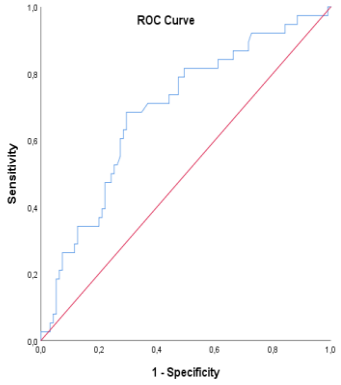

Figure 5. ROC Curve for NPR- Mortality

4. Discussion

In this study, we retrospectively evaluated our patients who were hospitalised in the neurology intensive care unit of our hospital, a tertiary stroke centre, and underwent EVT for acute ischaemic stroke. The significant data we obtained were as follows:

1. SII is an independent value that can predict the presence of ICH and mortality after EVT, and a SII ≥ 990.5 indicates the presence of haemorrhage and a SII ≥ 1012.27 indicates mortality, respectively (sensitivity 0.86; 0.92, specificity 0.36; 0.36, respectively).

2. NPR is an independent value that can predict the presence of ICH and mortality after EVT, and a NPR ≥ 4.34 indicates the presence of haemorrhage and a NPR ≥ 4.59 indicates mortality (sensitivity 0.62; specificity 0.59; 0.70, respectively).

In recent studies, there is evidence that NLO, PLO, NPR and SII calculated based on routine blood count can be utilized in prognosis after ischaemic stroke and ICH, haemarogical transformation after ischaemic stroke, or detection of malignant oedema after ischaemic stroke (11,16-18). Since the utilization of these values, which are easy to calculate and can be obtained from a routine whole blood measurement, as a predictor will be very encouraging, studies on this subject are of great importance.

In ischaemic stroke, neutrophil migration occurs in the parenchymal perivasculer area at the 6th–24th hours and reaches a maximum level on days 1st–3rd. Neutrophils are an important source of matrixmetalloproitenase-9, which releases reactive oxidant derivatives and proinflammatory cytokines. As a result, destruction of the blood-brain barrier begins to occur. Although platelets are associated with thrombosis in ischaemic vascular events, it is known that platelet activation may directly trigger local and systemic inflammatory responses. Platelets are the cells that play the most prominent role in reperfusion injury after ischaemia. Platelets lead to intracranial haemorrhage by various mechanisms as well as the formation of various free oxygen radicals after reperfusion, and this increases mortality significantly (19,20).

In our study, in support of this, NPR values were high in the ICH group, and NPR values were also higher in the mortality group. In a recent study by Cheng et al., a high NPR level was associated with haemorrhagic transformation after IV TPA (21). In another study by Li et al., high NPR levels were associated with futile revascularization (12). However, no study is available on NPR, HT, or mortality after EVT. Our study is valuable in this respect.

Similarly, in our study, the SII value was higher in the ICH and mortality groups.

In a study by Acar et al., SII was associated with failed cerebral perfusion and an unfavorable clinical outcome in stroke patients undergoing EVT (22). Yi et al. investigated the relationship between SII and prognosis in patients who underwent EVT and showed that a high SII value was associated with poor prognosis in accordance with our study (23). Yang et al. investigated the presence of symptomatic ICH in 379 patients who underwent EVT and found a positive correlation between SII and the presence of symptomatic intracranial haemorrhage in patients treated with EVT (24). Unlike these studies, our study included not only patients with symptomatic ICH but also patients with non-symptomatic haemorrhage and also analyzed them using NPR values, which is another indicator of inflammation.

In a meta-analysis published by Hao et al., it was argued that endovascular treatment in ischaemic stroke patients increased the risk of ICH compared to any medical treatment. In addition, in this study, it was reported that this increase in risk was mostly due to patients with asymptomatic ICH, and the rate of patients with symptomatic haemorrhage was similar to that of patients receiving medical treatment (25). Furthermore, it was claimed that minor or asymptomatic haemorrhages on BBT are proportional to successful reperfusion (26). In our study, symptomatic haemorrhage was observed in 8.2% of all

patients who developed ICH with a high rate of 44.4% and in 18.7% of those with haemorrhage. Although the incidence of haemorrhage was high compared to the literature, we think that there are several reasons for this: Firstly, our study was retrospective, and our study population consisted of patients with EVT hospitalized in the tertiary intensive care unit. In our centre, patients with low NIHHS and poor general conditions who undergo EVT can also be followed up in the 1st and 2nd cycle intensive care unit. Therefore, our study population consists mostly of patients with high NIHSS, advanced age, or a possibility of deterioration in general condition. Secondly, neuroimaging is frequently performed on patients hospitalised in our intensive care unit, and thus we think that we have detected asymptomatic ICHs at a higher rate compared to the literature.

Our study has several restrictions. Firstly, this is a single-centre retrospective observational study in which only patients hospitalized in the tertiary neurology intensive care unit were included. Therefore, limited sample size may lead to selection bias. Another bias is that only the laboratory values of the patients during hospitalization were considered. Monitoring with laboratory values at the time of haemorrhage detection would have strengthened the study.

In conclusion, our findings indicate the correlation of SII and NPR independently with ICH and mortality in patients with EVT. These noninvasive and cost-effective inflammatory markers may constitute a good biomarker for ICH and mortality after EVT. In order to confirm these findings, prospective studies with a larger population of patients are needed.

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Ethics

Ethics Committee Approval: The study was approved by Republic of Turkey Ministry Of Health Antalya Provincal Health Directorate University Of Health Sciences Antalya Training And Research Hospital interventional Clinical Research Ethical Committee (Decision no: 3/26, Date: 21.03.2024).
Informed Consent: The authors declared that it was not considered necessary to get consent from the patients because the study was a retrospective data analysis.
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