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Comparative Evaluation of Inflammatory, Nutritional and Composite Indices in Acute Pancreatitis

Selma Özlem Çelikdelen[1], Muhammet Cemal Kızılarslanoğlu[2]

[1]University of Health Sciences Türkiye, Konya City Hospital, Clinic of Internal Medicine, Konya, Türkiye
[2]University of Health Sciences Türkiye, Konya City Hospital, Clinic of Internal Medicine, Division of Geriatrics, Konya, Türkiye

Abstract

Aim: Early identification of patients with acute pancreatitis (AP) who are at risk of complicated disease and the need for intensive care unit (ICU) admission remains a major clinical challenge during emergency department evaluation and during inpatient follow-up. Easily accessible laboratory-based inflammatory and nutritional indices may provide practical tools for early risk stratification and clinical decision-making.

Materials and Methods: In this retrospective cohort study, 348 patients hospitalized with AP were evaluated. Inflammatory, nutritional, and composite indices derived from routine laboratory parameters obtained at hospital admission were calculated. Their associations with clinical outcomes were analyzed.

Results: Complicated pancreatitis occurred in 40.2% of patients and 10.3% of patients required ICU admission. Several inflammation-based indices, including the neutrophil-to-lymphocyte ratio, systemic immune-inflammation index, systemic inflammation response index and C-reactive protein-to-albumin ratio (CAR), were significantly associated with adverse outcomes. In multivariable analyses, CAR and the C-reactive protein-albumin-lymphocyte index (CALLY) remained independently associated with both complicated pancreatitis and the need for ICU admission. In ROC analysis, CALLY demonstrated the highest discriminative performance for predicting ICU requirement (area under the curve =0.808) with an optimal cut-off of≤0.05. Composite prognostic scores, including the Naples Prognostic score and Glasgow Prognostic score, were associated with outcomes in unadjusted analyses, but did not retain independent prognostic value.

Conclusion: Inflammation-based indices derived from routine laboratory tests particularly CAR and CALLY are associated with complicated pancreatitis and the need for ICU admission in patients with AP. Given their simplicity, low cost and availability at hospital admission, these indices may support early risk stratification and clinical management. Prospective multicenter studies are warranted to validate these findings.

Keywords: Acute pancreatitis, inflammatory indices, nutritional indices, C-reactive protein-to-albumin ratio

Introduction

Acute pancreatitis (AP) is a common gastrointestinal emergency with a highly variable clinical course, ranging from a mild, self-limiting disease to a severe condition associated with systemic inflammation, organ failure, and substantial morbidity (1). In the emergency department, AP represents a frequent cause of acute abdominal pain and often requires early decisions regarding hospitalization, the level of monitoring, and the need for intensive care. Despite advances in supportive care, early identification of patients at risk for a complicated disease course and for intensive care unit (ICU) admission remains a major clinical challenge. Timely risk stratification is crucial to optimize monitoring intensity and allocate critical care resources. It also plays a key role in guiding early therapeutic decisions, particularly during the initial assessment at hospital admission.

Several clinical scoring systems and imaging-based tools have been proposed to predict disease severity in AP; however, many are complex, time-consuming, or require repeated assessments, which may limit their practicality in time-sensitive emergency settings (2). In routine clinical practice, interest is growing in easily accessible laboratory-based biomarkers. These markers reflect the underlying inflammatory and nutritional status of the patient

Corresponding Author: Selma Özlem Çelikdelen MD, University of Health Sciences Türkiye, Konya City Hospital, Clinic of Internal Medicine, Konya, Türkiye
E-mail: drozlemkoc@hotmail.com **ORCID ID:** orcid.org/0009-0000-8546-0070

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and can be readily obtained at presentation. Inflammatory indices derived from complete blood count parameters, such as the neutrophil-to-lymphocyte ratio (NLR) and related composite markers, have emerged as practical indicators of systemic inflammatory burden in various acute and chronic conditions (3). Beyond isolated inflammatory markers, integrated indices combining inflammatory and nutritional components such as the systemic immune-inflammation index (SII), systemic inflammation response index (SIRI), prognostic nutritional index (PNI), C-reactive protein-based ratios, and composite prognostic scores including the Naples Prognostic score (NPS) and Glasgow Prognostic score (GPS) have gained increasing attention. By integrating immune activation with nutritional reserve, these indices may better reflect the host response to acute inflammatory stress. This response represents a key determinant of outcomes in critically ill patients (4-8).

Although previous studies have explored selected inflammatory or nutritional markers in AP, comparative data evaluating a broad panel of inflammatory, nutritional and composite indices within the same cohort remain limited (9-12). Moreover, the relative performance of these indices in predicting clinically relevant outcomes particularly complicated pancreatitis and the need for ICU admission has not been fully clarified. Notably, composite prognostic scores such as the GPS and the NPS have not been extensively evaluated in patients with AP clarifying the prognostic utility of these readily available indices may improve early risk stratification in patients with AP.

Therefore, this study aimed to comprehensively evaluate the clinical relevance of multiple inflammatory and nutritional indices in patients hospitalized with AP. Specifically, we examined the associations of these indices with the development of complicated pancreatitis and the requirement for ICU admission, focusing on laboratory parameters available at hospital admission to identify readily accessible markers for early risk stratification in routine clinical practice.

Materials and Methods

Study Design and Patient Selection

This retrospective cohort study included adult patients (≥18 years) who were hospitalized for AP and followed in the internal medicine ward between March 2023 and September 2025. During this period, 372 patients were screened. All consecutive eligible patients presenting during the study period were evaluated for inclusion.

Patients were excluded if they were receiving routine hemodialysis (n=5), did not meet the Revised Atlanta Classification diagnostic criteria for AP (n=15), or had a concomitant malignancy on admission (n=4). After applying these exclusion criteria, a total of 348 patients were included in the final analysis.

Diagnosis and Classification of Acute Pancreatitis

The diagnosis of AP was confirmed according to the Revised Atlanta Classification and required the presence of at least two of the following three criteria: (1) characteristic abdominal pain consistent with AP; (2) serum amylase and/or lipase levels at least three times the upper limit of normal; and (3) imaging findings compatible with AP (13).

Disease severity was classified as mild, moderately severe, or severe based on the Revised Atlanta Classification. The presence of complicated pancreatitis, including local and/or systemic complications, was also determined in accordance with the same classification system (13).

Data Collection

Demographic data (including age and sex), body mass index, etiology of pancreatitis, and comorbidity burden were obtained from electronic medical records. Comorbid conditions were quantified using the Charlson Comorbidity index (CCI), a validated scoring system that assigns weighted scores to predefined chronic diseases, as described by Quan et al. (14). Laboratory parameters were obtained from blood samples collected at hospital admission, prior to initiation of disease-specific treatment, and reflect routine laboratory evaluation performed during the initial presentation to the emergency department.

Inflammatory and Nutritional Indices

Inflammatory, nutritional, and composite indices were calculated using laboratory values obtained at admission. The evaluated indices included NLR, platelet-to-lymphocyte ratio (PLR), lymphocyte-to-monocyte ratio (LMR), SII, SIRI, PNI, C-reactive protein-to-albumin ratio (CAR), C-reactive protein-albumin-lymphocyte index (CALLY), NPS, and GPS. All indices were calculated according to previously published definitions (3-8).

The NPS was calculated based on serum albumin, total cholesterol, NLR, and LMR, with patients categorized according to established scoring criteria. The GPS was determined using C-reactive protein and serum albumin levels, as previously described.

Clinical Outcomes

The predefined clinical outcomes of interest were the development of complicated pancreatitis and the requirement for ICU admission during hospitalization. Both outcomes were recorded based on the clinical course during follow-up.

Ethical approval for this study was obtained from the Ethics Committee of Karatay University Faculty of Medicine with the

(approval number: 2025/043, date: 30.10.2025). The study was conducted in accordance with the principles of the World Medical Association Declaration of Helsinki (revised in 2013). Our study was conducted retrospectively through review of the electronic medical records, laboratory findings, and imaging reports of hospitalized patients. No direct contact with patients was made, and no interventions were performed. Therefore, individual informed consent was not required.

Statistical Analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) software, version 26.0 (IBM Corp., Armonk, NY, USA). Categorical variables were expressed as counts and percentages. Continuous variables were presented as mean ± standard deviation for normally distributed data and as median (minimum-maximum) for non-normally distributed data. Comparisons between groups were conducted using the chi-square test or Fisher's exact test for categorical variables, and the Student's t-test or Mann-Whitney U test for continuous variables, as appropriate.

The associations of inflammatory and nutritional indices with the development of complicated pancreatitis and with ICU requirement were evaluated using univariate and multivariable logistic regression analyses. Multivariable models were adjusted for clinically relevant covariates, including age, sex, etiology of pancreatitis, and selected biochemical parameters. Results were reported as odds ratios with 95% confidence intervals.

ROC analyses were performed to assess the discriminative performance of inflammatory and nutritional indices in predicting complicated pancreatitis and ICU requirement; AUCs were calculated. A p value <0.05 was considered statistically significant.

Results

Baseline Characteristics: A total of 348 patients with AP were included; 196 (56.3%) were female. The median age was 58 years (range 19-97). The median CCI score was 0 (0-4) and the median length of hospital stay was 6 days (3-40). Biliary etiology accounted for 181 cases (52.0%) while 167 cases (48.0%) were of non-biliary origin. Disease severity was classified as mild in 204 (58.6%) patients, moderate in 120 (34.5%) patients, and severe in 24 (6.9%) patients. ICU admission was required for 36 patients (10.3%). Complicated pancreatitis occurred in 140 patients (40.2%), and overall mortality was 0.9% (n=3). Baseline demographic, clinical, and laboratory characteristics, including inflammatory and nutritional indices, are summarized in Table 1.

Table 1. General characteristics of the patients

Parameters	n (%) or mean ± SD or median (minimum-maximum)
General features	
Total patient numbers	348 (100.0)
Gender, female	196 (56.3)
Age, years	58 (19-97)
BMI, kg/m^2	25.9 (17.5-44.6)
Older patients, age ≥65 years	133 (38.2)
CCI	0 (0-4)
Length of hospital stay, days	6 (3-40)
Characteristics of pancreatitis	
Etiology of pancreatitis	
Nonbiliary origin	167 (48.0)
Biliary origin	181 (52.0)
Severity of pancreatitis	
Mild	204 (58.6)
Moderate	120 (34.5)
Severe	24 (6.9)
ICU requirement	36 (10.3)
Complicated pancreatitis	140 (40.2)
Mortality	3 (0.9)
Indices	
NLR	5.66 (0.80-89.12)
SII	1448.9 (139.6-31636.0)
SIRI	3.92 (0.32-83.64)
PNI	47.89±7.71
PLR	166.5 (37.2-2100.0)
CAR	0.36 (0.01-9.74)
CALLY	0.38 (0.00-40.95)
LMR	2.19 (0.21-16.67)
NPS	3 (0-4)
GPS	1 (0-2)

Data are presented as n (%), mean ± standard deviation, or median (minimum-maximum), as appropriate
BMI: Body mass index, CCI: Charlson Comorbidity index, ICU: Intensive care unit, NLR: Neutrophil-to-lymphocyte ratio, SII: Systemic immune-inflammation index, SIRI: Systemic inflammation response index, PLR: Platelet-to-lymphocyte ratio, CAR: C-reactive protein-to-albumin ratio, CALLY: C-reactive protein-albumin-lymphocyte index, LMR: Lymphocyte-to-monocyte ratio, PNI: Prognostic nutritional index, NPS: Naples prognostic score, GPS: Glasgow Prognostic score, SD: Standard deviation

Comparison of Inflammatory and Nutritional Indices According to Clinical Outcomes: Patients with complicated pancreatitis exhibited a significantly higher inflammatory burden compared with those with uncomplicated pancreatitis. Median values of NLR, SII, SIRI, PLR, and CAR were markedly elevated, whereas nutritional indices, including PNI and CALLY, were significantly lower in the complicated pancreatitis group (all p<0.001). Similarly, NPS and GPS scores were modestly but significantly higher among patients with complications.

A consistent pattern was observed in analyses stratified by ICU requirement. Patients requiring ICU care had substantially higher levels of NLR, SII, SIRI, PLR, and CAR, and lower values of PNI, CALLY, and LMR compared with non-ICU patients (all p≤0.005). Additionally, both the NPS and GPS scores were significantly higher in patients admitted to the ICU. These findings are summarized in Table 2.

Multivariable Logistic Regression Analysis

In multivariable models adjusted for age, sex, etiology of pancreatitis, and relevant biochemical parameters, several inflammatory indices remained independently associated with adverse clinical outcomes. In complicated pancreatitis, higher NLR, SII, SIRI, and CAR levels were independently associated with an increased risk of complications, whereas higher CALLY values were inversely associated with the development of complications. Among these parameters, CAR demonstrated the strongest independent association with complicated pancreatitis.

Similarly, in analyses evaluating ICU requirement, elevated levels of NLR, SII, SIRI, PLR, and CAR remained independently associated with ICU requirement after adjustment. In contrast, PNI and LMR, as well as the composite scores NPS and GPS, did not retain independent significance in adjusted models. These findings are summarized in Table 3.

ROC Curve Analyses

ROC curve analyses were performed to evaluate the discriminatory performance of inflammatory and nutritional indices in predicting complicated pancreatitis and the need for ICU admission. In complicated pancreatitis, inflammatory indices showed modest discriminatory performance, with the highest AUC values observed for CALLY, NLR and SIRI, while composite prognostic scores demonstrated limited discrimination. Based on ROC-derived optimal cut-off values, CALLY ≤0.20 and CAR >0.60 were associated with an increased risk of complicated pancreatitis and showed moderate sensitivity and specificity (Table 4).

Table 2. Comparison of laboratory indices between groups based on pancreatitis complications and ICU requirements

Indices	**Uncomplicated pancreatitis**	**Complicated pancreatitis**	**p value**
NLR	4.29 (0.8-45.88)	8.66 (1.02-89.12)	<0.001
SII	1071.94 (139.57-11457.95)	2053.96 (156.63-31635.96)	<0.001
SIRI	2.96 (0.32-65.46)	5.31 (0.48-83.64)	<0.001
PNI	49.24±7.11	45.9±8.16	<0.001
PLR	148.65 (43.62-1015.38)	204.45 (37.21-2100)	<0.001
CAR	0.26 (0.01-5.06)	0.64 (0.01-9.74)	<0.001
CALLY	0.56 (0.01-40.95)	0.18 (0-10.32)	<0.001
LMR	2.43 (0.28-16.67)	1.9 (0.21-12.5)	<0.001
NPS*	3 (0-4)	3 (0-4)	0.012
GPS*	1 (0-2)	1 (0-2)	<0.001
Indices	**No ICU requirement**	**ICU requirement**	**p value**
NLR	5.05 (0.8-68.56)	13.79 (2.08-89.12)	<0.001
SII	1336.32 (139.57-14356.36)	3384.91 (592.7-31635.96)	<0.001
SIRI	3.67 (0.32-83.64)	9.56 (0.86-68)	<0.001
PNI	48.45±7.06	42.94±10.91	0.005
PLR	159.46 (40.37-1021.21)	235.81 (37.21-2100)	<0.001
CAR	0.31 (0.01-8.29)	1.88 (0.12-9.74)	<0.001
CALLY	0.47 (0.01-40.95)	0.04 (0-5.87)	<0.001
LMR	2.25 (0.22-16.67)	1.39 (0.21-12.5)	0.002
NPS	3 (0-4) and (2.69±0.99)	3 (2-4) and (3.22±0.75)	0.005
GPS	1 (0-2) and (0.67±0.61)	1 (0-2) and (1.11±0.71)	<0.001

Data are presented as median (minimum-maximum) or mean ± standard deviation, as appropriate.
*For additional information, mean ± standard deviation values were as follows:
NPS: 2.64±1.02 in uncomplicated pancreatitis and 2.92±0.91 in complicated pancreatitis;
GPS: 0.62±0.62 in uncomplicated pancreatitis and 0.86±0.62 in complicated pancreatitis
NLR: Neutrophil-to-lymphocyte ratio, SII: Systemic immune-inflammation index, SIRI: Systemic inflammation response index, PLR: Platelet-to-lymphocyte ratio, CAR: C-reactive protein-to-albumin ratio, CALLY: C-reactive protein-albumin-lymphocyte index, LMR: Lymphocyte-to-monocyte ratio, PNI: Prognostic nutritional index, NPS: Naples prognostic score, GPS: Glasgow prognostic score, ICU: Intensive care unit

Table 3. Multiple logistic regression models showing associations of the laboratory indices with complicated pancreatitis and ICU requirement

Parameters	Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI
Complicated pancreatitis				
NLR	1.065***	1.036-1.095	1.037*	1.005-1.069
SII	1.029***	1.017-1.041	1.021**	1.007-1.036
SIRI	1.072***	1.036-1.110	1.042*	1.002-1.084
PNI	0.942***	0.913-0.971	0.995	0.951-1.040
PLR	1.003***	1.001-1.004	1.001	1.000-1.003
CAR	1.764***	1.408-2.211	1.841***	1.393-2.443
CALLY	0.771**	0.658-0.904	0.845*	0.731-0.976
LMR	0.839*	0.730-0.964	0.900	0.777-1.041
NPS	1.364*	1.069-1.741	1.177	0.863-1.604
GPS	1.843**	1.295-2.624	1.287	0.839-1.975
ICU requirement				
NLR	1.075***	1.046-1.104	1.063**	1.026-1.101
SII	1.028***	1.017-1.039	1.027***	1.012-1.042
SIRI	1.069***	1.037-1.102	1.057**	1.014-1.101
PNI	0.907***	0.864-0.952	0.979	0.909-1.055
PLR	1.003***	1.002-1.005	1.003**	1.001-1.005
CAR	1.836***	1.496-2.253	1.961***	1.481-2.596
CALLY	0.387*	0.187-0.801	0.675	0.365-1.249
LMR	0.853	0.670-1.086	0.965	0.764-1.221
NPS	1.891**	1.204-2.968	1.308	0.730-2.342
GPS	3.047***	1.731-5.365	1.782	0.873-3.637

*Indicates p values <0.05, **indicates p value <0.01, and ***indicates p value <0.001
All indices were adjusted for age, gender, etiology of pancreatitis, and levels of triglycerides, calcium, bilirubin, lactate dehydrogenase, albumin, and creatinine, except for the CAR, PNI, CALLY, and GPS scores, which were adjusted using the same parameters except for albumin.
The SII levels were included in the regression models as SII/100
NLR: Neutrophil-to-lymphocyte ratio, SII: Systemic immune-inflammation index, SIRI: Systemic inflammation response index, PLR: Platelet-to-lymphocyte ratio, CAR: C-reactive protein-to-albumin ratio, CALLY: C-reactive protein-albumin-lymphocyte index, LMR: Lymphocyte-to-monocyte ratio, PNI: Prognostic nutritional index, NPS: Naples prognostic score, GPS: Glasgow Prognostic score, ICU: Intensive care unit, OR: Odds ratio, CI: Confidence interval

In analyses assessing the need for ICU care, several indices demonstrated greater discriminatory performance. CALLY demonstrated the highest accuracy (AUC =0.808), followed by SII (AUC =0.784), CAR (AUC =0.781), NLR (AUC =0.771), and SIRI (AUC =0.761). The optimal CALLY cut-off for ICU requirement was ≤0.05, with high specificity (94.8%) and negative predictive value (94.8%) (Table 4).

Overall, inflammatory indices showed moderate-to-good discrimination for ICU requirement, whereas composite scores (NPS and GPS) showed modest discrimination. The ROC analysis results are summarized in Table 4 and the corresponding ROC curves are shown in Figure 1.

Discussion

In this retrospective cohort study, we comprehensively evaluated a broad panel of inflammatory, nutritional, and composite indices obtained at hospital admission from patients with AP. Our findings indicate that several inflammation-based indices were associated with the development of complicated pancreatitis and the need for ICU admission; however, only a subset of these indices remained independently associated with clinical outcomes in multivariable analyses.

Consistent with previous literature, indices of systemic inflammatory burden, including NLR, SII, SIRI, and CAR, were elevated in patients who developed complicated pancreatitis or required ICU care. In multivariable analyses, several of these

Table 4. ROC curve analysis of laboratory indices for complicated pancreatitis and ICU requirement

Parameters	AUC	Cut-off	p value	Sensitivity %	Specificity %	PPV %	NPV %
For complicated pancreatitis							
NLR	0.686	>5.1	<0.001	72.9	58.9	54.5	76.2
SII	0.676	>16.8	<0.001	61.4	71.0	58.9	73.1
SIRI	0.681	>3.5	<0.001	72.1	57.9	53.7	75.5
PLR	0.615	>178.2	0.001	60.7	66.2	54.8	71.4
CAR	0.662	>0.6	<0.001	52.1	72.1	55.7	69.1
NPS	0.585	>2.0	0.013	73.2	42.3	46.2	70.0
GPS	0.583	>0.0	0.015	72.5	45.6	47.2	71.2
PNI	0.633	≤47.0	<0.001	58.6	65.2	53.2	69.9
CALLY	0.690	≤0.20	<0.001	54.3	76.8	61.3	71.3
LMR	0.617	≤1.7	<0.001	47.9	75.4	56.8	68.1
For ICU requirement							
NLR	0.771	>8.4	<0.001	77.8	69.7	23.0	96.4
SII	0.784	>15.8	<0.001	88.9	59.0	20.1	97.9
SIRI	0.761	>8.4	<0.001	58.3	82.3	27.6	94.4
PLR	0.682	>155.9	0.001	86.1	48.7	16.3	96.8
CAR	0.781	>1.0	<0.001	69.4	78.8	27.5	95.7
NPS	0.640	>2.0	0.010	81.3	38.2	13.4	94.5
GPS	0.647	>1.0	0.007	30.7	92.8	33.3	89.5
PNI	0.711	≤43.9	<0.001	58.3	75.8	21.1	93.6
CALLY	0.808	≤0.05	<0.001	55.6	94.8	55.6	94.8
LMR	0.656	≤1.6	0.002	61.1	72.3	20.4	94.1

Optimal cut-off values were determined using ROC curve analysis based on the Youden index. Sensitivity, specificity, PPV, and NPV were calculated accordingly
NLR: Neutrophil-to-lymphocyte ratio, SII: Systemic immune-inflammation index, SIRI: Systemic inflammation response index, PLR: Platelet-to-lymphocyte ratio, CAR: C-reactive protein-to-albumin ratio, CALLY: C-reactive protein-albumin-lymphocyte index, LMR: Lymphocyte-to-monocyte ratio, PNI: Prognostic nutritional index, NPS: Naples prognostic score, GPS: Glasgow Prognostic score, ICU: Intensive care unit, PPV: Positive predictive value, NPV: Negative predictive value, AUC: Area under the curve

indices remained independently associated with adverse clinical outcomes. Wu et al. (9) demonstrated a significant association between SIRI and disease severity in AP, underscoring the role of systemic inflammation in disease progression. Similarly, Khanal et al. (11) reported that the CAR is a useful predictor of disease severity in AP. In addition, inflammation-based models incorporating multiple inflammatory markers have been shown to aid in the identification of severe AP (15). Similarly, our study demonstrated that these inflammation-based indices were associated with clinically relevant indicators of disease severity in AP. These included the development of complicated pancreatitis and the need for ICU admission.

Among all evaluated parameters, the CALLY index emerged as a particularly informative marker. Higher CALLY values were inversely associated with the development of complicated pancreatitis and demonstrated the highest discriminative performance for predicting ICU requirement in our cohort. This finding is consistent with the study by Xu et al. (12), who identified CALLY as a strong predictor of severe AP in a large single-center retrospective cohort. By combining inflammatory and nutritional components, CALLY may provide a more comprehensive reflection of the host response to acute inflammatory stress.

The PNI and the LMR were significantly lower in patients with complicated disease and in those requiring ICU care; however, neither parameter retained independent significance in adjusted models. These findings are consistent with Genc et al. (10), who reported that PNI was not significantly associated with overall complication status, but was lower in patients who developed pancreatic necrosis. This suggests that while nutritional status may be related to specific disease manifestations, systemic inflammatory burden appears to play a more prominent role in determining early clinical outcomes in AP.

Composite prognostic scores, including the NPS and GPS, were modestly associated with adverse outcomes in unadjusted analyses, but did not demonstrate independent predictive value in multivariable models. Data regarding the prognostic role of these composite scores in AP remain limited. To our

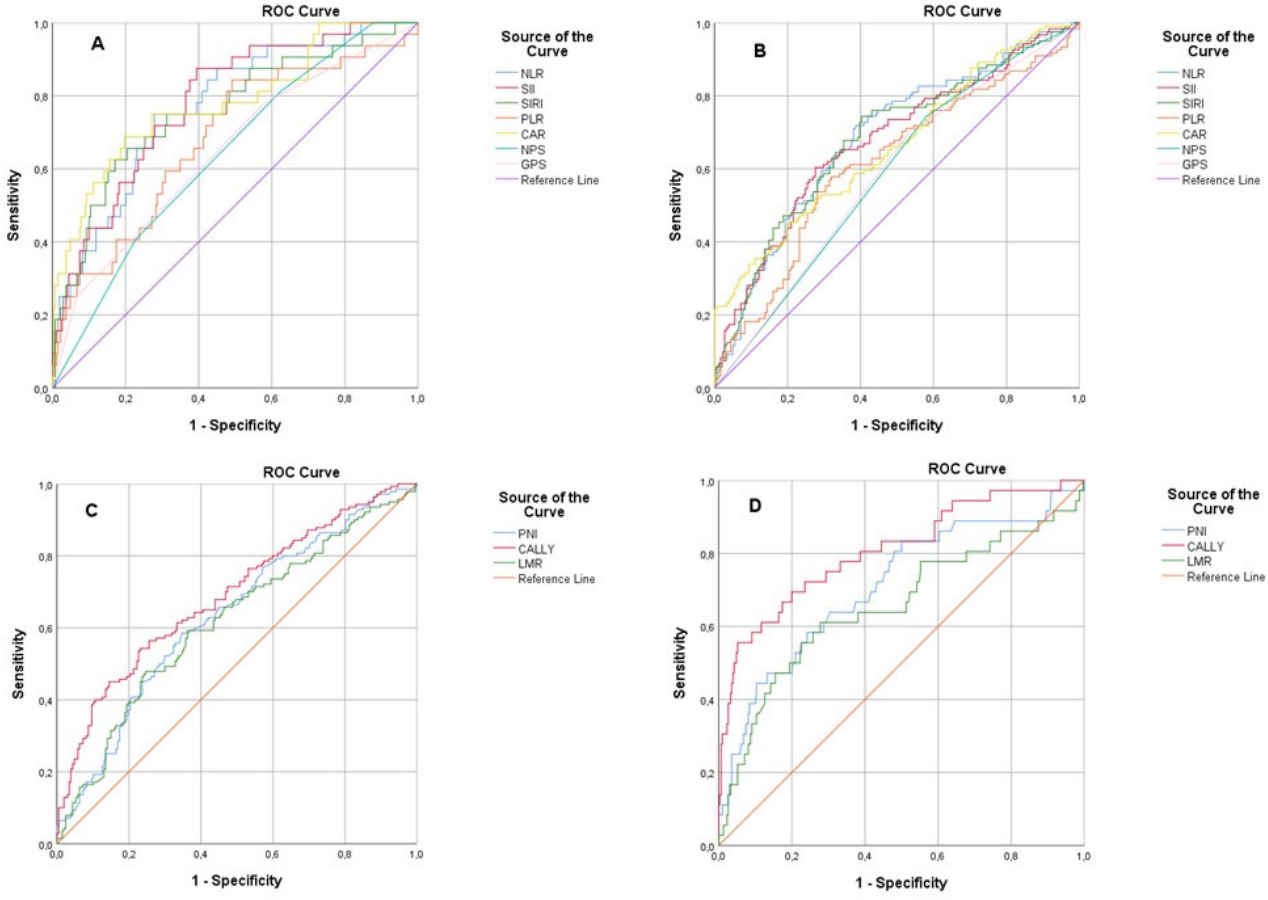

Figure 1. ROC curve analyses of inflammatory and nutritional indices for predicting complicated pancreatitis and intensive care unit (ICU) requirement. Panels A and D illustrate ROC curves for ICU requirement, while panels B and C illustrate ROC curves for complicated pancreatitis. AUC values are provided for each index

NLR: Neutrophil-to-lymphocyte ratio, SII: Systemic immune-inflammation index, SIRI: Systemic inflammation response index, PLR: Platelet-to-lymphocyte ratio, CAR: C-reactive protein-to-albumin ratio, CALLY: C-reactive protein-albumin-lymphocyte index, LMR: Lymphocyte-to-monocyte ratio, PNI: Prognostic nutritional index, NPS: Naples prognostic score, GPS: Glasgow Prognostic score, ICU: Intensive Care unit, PPV: Positive predictive value, NPV: Negative predictive value, AUC: Area under the curve

knowledge, this is one of the first studies to comprehensively evaluate NPS and GPS in this clinical setting. Our findings suggest that while these scores may reflect overall health status and inflammatory burden, their standalone prognostic utility for early risk stratification in AP appears limited when established clinical variables and systemic inflammatory markers are taken into account.

Study Limitations

Several limitations of this study should be acknowledged. First, the retrospective, and single-center design may limit the generalizability of the findings. Second, laboratory indices were assessed only at hospital admission; dynamic changes during hospitalization were not evaluated. Third, external validation in independent cohorts was not performed. Despite these limitations, the strengths of the study include a relatively large sample size and a comprehensive evaluation of multiple indices within the same cohort. In addition, the focus on clinically meaningful outcomes using laboratory parameters that are readily available at initial presentation enhances the relevance of our findings to routine emergency and acute-care practice.

From an emergency medicine perspective, the ability to identify high-risk patients using routinely available laboratory parameters at the time of hospital admission is of particular importance. Early risk stratification may inform triage decisions, guide monitoring intensity, and facilitate timely ICU referral. In this regard, indices such as CALLY, CAR and SIRI which demonstrated consistent associations with clinically relevant outcomes may serve as practical tools for emergency physicians during the initial assessment of patients AP.

Conclusion

In conclusion, this study demonstrates that inflammation-based indices derived from routine laboratory tests particularly the CAR and CALLY indices are associated with progression to complicated pancreatitis and with the need for intensive care among patients with AP. Owing to their simplicity, low cost, and availability at hospital admission, these indices may serve as practical tools for early risk stratification in the emergency setting, facilitating timely triage decisions between ward and ICU. Furthermore, by aiding the early identification of high-risk patients, these markers may support clinicians in optimizing monitoring strategies and guiding appropriate clinical management. Prospective, multicenter studies are warranted to validate these findings and further clarify their role in routine clinical practice.

Ethics

Ethics Committee Approval: Ethical approval for this study was obtained from the Ethics Committee of Karatay University Faculty of Medicine with the (approval number: 2025/043, date: 30.10.2025). The study was conducted in accordance with the principles of the World Medical Association Declaration of Helsinki (revised in 2013).

Informed Consent: Our study was a retrospective review of the electronic medical records, laboratory findings, and imaging reports of hospitalized patients. No direct contact with the patients was made, and no interventions were performed. Therefore, individual informed consent was not required.

Footnotes

Authorship Contributions

Concept: S.Ö.Ç., M.C.K., Design: S.Ö.Ç., M.C.K., Data Collection or Processing: S.Ö.Ç., Analysis or Interpretation: M.C.K., Literature Search: S.Ö.Ç., Writing: S.Ö.Ç.

Conflict of Interest: No conflict of interest was declared by the authors.

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