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# Association of inflammatory markers (Inflammatory Burden Index, Systemic Inflammation Response Index, Systemic Immune-Inflammation Index) and modified Glasgow Prognostic Score with 30- and 90-day mortality in a level 3 surgical intensive care unit[a]

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## ABSTRACT

**Aims**: We aimed to examine the relationship between systemic inflammatory markers and modified Glasgow Prognostic Score with 30- and 90-day mortality in critically ill patients who underwent various types of surgery (abdominal, neurosurgical, orthopedic, and urogynecological surgeries) and were followed up in a tertiary surgical intensive care unit.

**Methods**: This retrospective study included patients who were postoperatively followed in the tertiary surgical intensive care unit between January 2021-2025. A total of 455 patients were included in the study. Data regarding patients' age, gender, and preoperative 24-hour inflammatory parameters (leukocyte, neutrophil, platelet, lymphocyte, monocyte, CRP, albumin, procalcitonin), at intensive care unit admission were collected. Composite inflammatory biomarkers (Inflammatory Burden Index, Systemic Inflammation Response Index, Systemic Immune-Inflammation Index, mGPS) were calculated using formulas.

**Results**: A total of 455 postoperative patients were included in the study. Among them, 270 (59.3%) were male, and the mean age was 69.69±17.18 years. Of all patients, 193 (42.2%) underwent abdominal surgery, 74 (16.3%) underwent neurosurgery, 140(30.8%) underwent orthopedic surgery, and 48 (10.5%) underwent urogynecological surgery. Among the inflammatory indices, the IBI (p=0.001 for 30-day, p<0.001 for 90-day), and mGPS (p=0.005 for 30-day, p<0.001 for 90-day) were significant predictors of both short- and mid-term mortality.

**Conclusion**: Among postoperative surgical patients, IBI and mGPS are significant predictors of 30 days and 90 days mortality.

**Keywords**: Inflammatory Burden Index, Systemic Inflammatory Response Index, Systemic Immune-Inflammation Index, modified Glasgow Prognostic Score, mortality, post-surgical patients

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## INTRODUCTION

Intensive care units (ICU) are hospital departments where critically ill patients are monitored and treated. Surgical ICU are specialized critical care areas where critically ill patients undergoing emergency or elective surgery are monitored and treated postoperatively. Parameters that can predict mortality and morbidity in postoperative critically ill surgical patients remain a subject of ongoing research and debate. The Inflammatory Burden Index (IBI) is an inflammatory marker calculated from C-reactive protein (CRP), neutrophil, and lymphocyte levels, and has been associated with the prognosis of various tumors.[1] In particular, IBI has been reported to be the most accurate index for predicting the prognosis of patients with colorectal cancer.[2] The Systemic Inflammation Response Index (SIRI) is an inflammatory index calculated

from neutrophil, monocyte, and lymphocyte levels.[3] SIRI has been reported to predict the development and severity of acute pancreatitis and may serve as an independent prognostic factor in patients with hepatocellular carcinoma. A positive correlation has also been reported between SIRI and cardiovascular as well as all-cause mortality in the American population.[4-6] The Systemic Immune-Inflammation Index (SII) is an inflammatory marker calculated from neutrophil, platelet, and lymphocyte values.[7] SII is a biomarker used in malignancies and inflammatory diseases and has been reported as a valuable prognostic factor in conditions such as hepatocellular carcinoma, cervical cancer, and small cell carcinoma.[8] The modified Glasgow Prognostic Score (mGPS) is a parameter calculated from CRP and serum albumin levels, serving as an independent prognostic factor based on the CRP/albumin ratio.[9,10] The mGPS has been reported as a cost-effective and accessible tool for determining prognosis in patients with advanced esophageal squamous cell carcinoma.[11]

In our literature review, we found that subgroup analyses of the IBI , SIRI ,SII , and mGPS in postoperative critically ill patients monitored in surgical ICU have not yet been investigated. Therefore, in this study, we aimed to examine the relationship between systemic inflammatory markers and mGPS with 30- and 90-day mortality in critically ill patients who underwent various types of surgery (abdominal, neurosurgical, orthopedic, and urogynecological surgeries) and were followed up in a tertiary surgical intensive care unit.

## METHODS

### Ethics

The study was approved by the the Clinical Researches Ethics Committee of Kastamonu University Faculty of Medicine (Date: 18.09.2025, Decision No: 2025/43). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki.

### Study Design and Patients Selection

This retrospective study included patients who were postoperatively followed in the tertiary surgical intensive care unit of Kastamonu University Faculty of Medicine Hospital between January 2021 and January 2025. Inclusion criteria for the study: Being 18 years of age or older, undergoing abdominal surgery due to gastrointestinal cancer, undergoing neurosurgical surgery due to intracranial hemorrhage, undergoing orthopedic surgery due to femur and pelvis fracture, undergoing urogynological surgery due to urogynological cancer (ovarian tumor, kidney tumor, prostate tumor). Exclusion criteria were as follows: continuous use of anti-inflammatory medications within the last six months, incomplete clinical or laboratory data, presence of active preoperative infection, ongoing chemotherapy or radiotherapy, known hematological or systemic immunological diseases, and death within 24 hours after surgery.

According to these criteria, a total of 455 patients were included in the study based on a retrospective search of the hospital information management system. Of these, 193 patients underwent abdominal surgery, 74 underwent neurosurgery, 140 underwent orthopedic surgery, and 48 underwent urogynecological surgery (Table 1).

**Table 1.** Inclusion and exclusion criteria for the study and flow chart

| Inclusion criteria | Exclusion criteria |
|---|---|
| - Being 18 years of age or older<br>- Undergoing abdominal surgery due to gastrointestinal cancer<br>- Undergoing neurosurgical surgery due to intracranial hemorrhage<br>- Undergoing orthopedic surgery due to femur and pelvis fracture<br>- Undergoing urogynological surgery due to urogynological cancer. | - Continuous use of anti-inflammatory medications within the last six months<br>- Incomplete clinical or laboratory data<br>- Presence of active preoperative infection<br>- Ongoing chemotherapy or radiotherapy<br>- Known hematological or systemic immunological diseases<br>- Death within 24 hours after surgery |
| **Total patients (n): 455** | |
| - 193 patients; abdominal surgery (gastrointestinal cancer operations) | |
| - 74 patients; neurosurgery surgery (for intracranial hemorrhage) | |
| - 140 patients; orthopedic surgery (femur and pelvic fracture operations) | |
| - 48 patients; urogynecological surgery (urogynecological malignancies). | |

### Data Collection

The patients' age and 24-hour preoperative inflammation parameters were recorded. If there was only one blood parameter within the last 24 hours before surgery, that parameter was recorded; if there were two or more blood parameters, the highest values were recorded.

The composite inflammatory biomarkers were calculated using the following formulas:

- IBI=CRP×neutrophils/lymphocytes
- SIRI=neutrophils×monocytes/lymphocytes
- SII=neutrophils×platelets/lymphocytes.[12-14]
- The mGPS was defined as follows.[9]
- mGPS 0=CRP≤10 mg/L and albumin ≥3.5 g/dl
- mGPS 1=CRP>10 mg/L and albumin ≥3.5 g/dl
- mGPS 2=CRP>10 mg/L and albumin <3.5 g/dl

Postoperative 30-day and 90-day mortality data were obtained from patient medical records or follow-up via telephone.

### Statistical Analysis

The data analyses were performed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics for continuous variables were presented as mean±standard deviation (SD) or median with interquartile range (IQR), depending on the distribution. Categorical variables were expressed as frequencies and percentages. The Mann–Whitney U test was used to compare continuous variables with non-normal distribution. Categorical variables were analyzed using Pearson's Chi-squared test or Fisher's exact test, as appropriate. Multivariate logistic regression analysis was performed to evaluate the association between systemic inflammatory indices (SIRI,

SII, IBI, and mGPS) and 30-day and 90-day mortality among patients undergoing different types of surgery. All statistical tests were two-tailed, and a p-value of <0.05 was considered statistically significant.

## RESULTS

A total of 455 postoperative patients were included in the study. Among them, 270 (59.3%) were male, and the mean age was 69.69±17.18 years. Of all patients, 193 (42.2%) underwent abdominal surgery, 74 (16.3%) underwent neurosurgery, 140 (30.8%) underwent orthopedic surgery, and 48 (10.5%) underwent urogynecological surgery. Table 2 shows the statistical comparison of systemic inflammation parameters, independent of surgery, for 30 and 90-day mortality in surviving and non-surviving patients. Age was significantly associated with mortality, with deceased patients being older both at 30-day (p=0.005) and 90-day (p<0.001) follow-ups. Among the inflammatory indices, the IBI (p=0.001 for 30-day, p<0.001 for 90-day) and mGPS (p=0.005 for 30-day, p<0.001 for 90-day) were significant predictors of both short- and mid-term mortality. In contrast, the SIRI and the SII did not show a statistically significant association with mortality. Regarding the type of surgery, abdominal surgery was the most frequent among patients who died within 30 days postoperatively, and this was statistically significant (p=0.006).

Among patients who underwent abdominal surgery, age was identified as a significant risk factor for both 30-day (p=0.002) and 90-day mortality (p<0.001), as shown in Table 3. Female patients exhibited a significantly higher 30-day mortality rate compared to males (p=0.013), whereas male patients had a higher 90-day mortality rate (p=0.028). The IBI was significantly higher in both 30-day (p=0.030) and 90-day (p=0.001) mortality groups.

In Table 4, age was identified as a significant risk factor for both 30-day (p=0.009) and 90-day mortality (p<0.001) among patients undergoing neurosurgery. Significant differences were observed in the mGPS with respect to both 30-day (p=0.023) and 90-day mortality (p=0.001). furthermore, the IBI was significantly elevated in the 30-day (p=0.014) and 90-day (p=0.001) mortality groups.

Table 5 reveals a significant difference between age and 90-day mortality (p=0.006) in orthopedic surgery patients. There was a statistically significant differences between mGPS level, and 90-day (p=0.007) mortality.

In patients undergoing urogynaecological surgery, there was no significant difference in inflammatory indices; 30-day and 90-day mortality rates (Table 6).

Multivariate logistic regression analysis was performed for parameters that were clinically statistically significant in 30 days and 90 days mortality. As shown in Figure 1, Patients with an mGPS score of 1 demonstrated significantly lower 30-day mortality compared to those with mGPS 2, a finding consistent in the total surgery cohort (OR: 0.369; p = 0.003), abdominal surgery subgroup (OR: 0.255; p=0.002), and neurosurgery subgroup (OR: 0.167; p=0.010). No significant differences were observed for mGPS 2 in other cohorts. In Figure 2, the IBI showed a borderline significant association with 90-day mortality in the neurosurgery group (p=0.058; OR: 1.002), suggesting a potential link between higher IBI values and increased mortality risk. Furthermore, in the patient group with mGPS 1, 90-day mortality rates were a significant parameter in the total surgical cohort (OR: 0.292; p<0.001), in the abdominal surgery subgroup (OR: 0.345; p=0.026), and in the neurosurgery subgroup (OR: 0.239; p=0.034).

**Table 2.** Comparison of all postoperative patients based on 30-day and 90-day mortality

| | Alive at 30 days median (IQR) n=378 | 30-day mortality median (IQR) n=77 | p | Alive at 90 days median (IQR) n=334 | 90-day mortality median (IQR) n=121 | p |
|---|---|---|---|---|---|---|
| Age | 71.0 (62.0-81.0) | 79.0 (69.0-84.5) | 0.005 | 70.0 (60.0-80.0) | 79.0 (69.0-85.0) | <0.001 |
| **Gender, n (%)** | | | | | | |
| Female | 148 (39.2%) | 37 (48.1%) | 0.147 | 126 (37.7%) | 59 (48.8%) | 0.034 |
| Male | 230 (60.8%) | 40 (51.9%) | | 208 (62.3%) | 62 (51.2%) | |
| **Modified Glasgow Prognostic Score, n (%)** | | | | | | |
| 0 | 126 (33.3%) | 13 (16.9%) | 0.005 | 120 (35.9%) | 19 (15.7%) | <0.001 |
| 1 | 52 (13.8%) | 8 (10.4%) | | 48 (14.4%) | 12 (9.9%) | |
| 2 | 200 (52.9%) | 56 (72.7%) | | 166 (49.7%) | 90 (74.4%) | |
| Inflammatory Burden Index | 243.9 (40.2-1025.9) | 651.2 (133.1-1860.9) | 0.001 | 191.8 (36.3-981.6) | 651.3 (169.1-2021.2) | <0.001 |
| Systemic Inflammation Response Index | 4.5 (2.2-9.4) | 5.9 (1.5-13.1) | 0.266 | 4.5 (2.1-9.5) | 5.8 (1.9-11.4) | 0.352 |
| Systemic Immune-Inflammation Index | 1670.5 (887.1-3016) | 1657.5 (832.2-3487.7) | 0.620 | 1655.3 (848.4-3053.9) | 1693.6 (874.7-3339.3) | 0.459 |
| **Surgery type** | | | | | | |
| Abdominal | 150 (39.7) | 43 (55.8) | 0.006 | 136 (40.7) | 57 (41.1) | 0.084 |
| Neurosurgery | 58 (15.3) | 16 (20.8) | | 49 (14.7) | 25 (20.7) | |
| Orthopedic | 126 (33.3) | 14 (18.2) | | 109 (32.6) | 31 (25.6) | |
| Other | 44 (11.6) | 4 (5.2) | | 40 (12.0) | 8 (6.6) | |

IQR: Interquartile range

**Table 3.** Comparison of postoperative abdominal surgery patients based on 30-day and 90-day mortality

| | Alive at 30 days median (IQR) n=150 | 30-day mortality median (IQR) n=43 | p | Alive at 90 days median (IQR) n=136 | 90-day mortality median (IQR) n=57 | p |
|---|---|---|---|---|---|---|
| Age | 70.0 (61.7-78.2) | 80 (69.0-84.0) | 0.002 | 69.0 (60.2-77.7) | 79.0 (69.0-84.0) | <0.001 |
| **Gender, n (%)** | | | | | | |
| Female | 49 (32.7%) | 23 (53.5%) | 0.013 | 44 (32.4%) | 28 (49.1%) | 0.028 |
| Male | 101 (67.3%) | 20 (46.5%) | | 92 (67.6%) | 29 (50.9%) | |
| **Modified Glasgow Prognostic Score (mGPS), n (%)** | | | | | | |
| 0 | 46 (30.7%) | 6 (14%) | | 45 (33.1%) | 7 (12.3%) | |
| 1 | 14 (9.3%) | 3 (7%) | 0.062 | 14 (10.3%) | 3 (5.3%) | 0.003 |
| 2 | 90 (60%) | 34 (79.1%) | | 77 (56.6%) | 47 (82.5%) | |
| Inflammatory Burden Index | 243.7 (40.04-1345.3) | 570.4 (134-2650.8) | 0.03 | 174.3 (29.1-1106.5) | 651.3 (223.5-2885) | 0.001 |
| Systemic Inflammation Response Index | 4.1 (1.6-8.7) | 5.2 (1.1-7.7) | 0.933 | 4.1 (1.6-8.9) | 5.2 (1.4-7.7) | 0.832 |
| Systemic Immune-Inflammation Index | 1585.8 (744.5-2924.9) | 1220.2 (809.2-3266.1) | 0.596 | 1511.5 (729.6-2981.6) | 1463.0 (857.9-3181.1) | 0.810 |

IQR: Interquartile range

**Table 4.** Comparison of postoperative neurosurgery patients based on 30-day and 90-day mortality

| | Alive at 30 days median (IQR) n=58 | 30-day mortality median (IQR) n=16 | p | Alive at 90 days median (IQR) n=49 | 90-day mortality median (IQR) n=25 | p |
|---|---|---|---|---|---|---|
| Age | 62.5 (42.2-76.2) | 72.00 (63.75-83.75) | 0.009 | 57.0 (39.0-68.0) | 74.0 (64.5-83.0) | <0.001 |
| **Gender, n (%)** | | | | | | |
| Female | 20 (34.5%) | 6 (37.5%) | 0.823 | 17 (34.7%) | 9 (36%) | 0.911 |
| Male | 38 (65.5%) | 10 (62.5%) | | 32 (65.3%) | 16 (64%) | |
| **Modified Glasgow Prognostic Score (mGPS), n (%)** | | | | | | |
| 0 | 36 (62.1%) | 4 (25%) | | 34 (69.4%) | 6 (24%) | |
| 1 | 10 (17.2%) | 4 (25%) | 0.023 | 6 (12.2%) | 8 (32%) | 0.001 |
| 2 | 12 (20.7%) | 8 (50%) | | 9 (18.4%) | 11 (44%) | |
| Inflammatory Burden Index | 63.9 (21.7-244.8) | 216.1 (66.0-965.3) | 0.014 | 53.5 (18.1-170.2) | 245.6 (56.1-1074.4) | 0.001 |
| Systemic Inflammation Response Index | 4.1 (1.9-8.4) | 12.2 (2.8-18.4) | 0.097 | 4.1 (1.9-9.1) | 6.6 (1.9-15.7) | 0.417 |
| Systemic Immune-Inflammation Index | 1884.1 (984.3-2812.5) | 2278.3 (1024.1-5591.9) | 0.390 | 1880.1 (1009.8-2771.4) | 2236.1 (786.8-3339.3) | 0.493 |

IQR: Interquartile range

**Table 5.** Comparison of postoperative orthopedic surgery patients based on 30-day and 90-day mortality

| | Alive at 30 days median (IQR) n=126 | 30-day mortality median (IQR) n=14 | p | Alive at 90 days median (IQR) n=109 | 90-day mortality median (IQR) n=31 | p |
|---|---|---|---|---|---|---|
| Age | 78.0 (69.0-86.0) | 82.5 (72.75-91.0) | 0.224 | 77.0 (68.0-85.0) | 84.0 (74.0-91.0) | 0.006 |
| **Gender, n (%)** | | | | | | |
| Female | 68 (54%) | 6 (42.9%) | 0.429 | 55 (50.5%) | 19 (61.3%) | 0.286 |
| Male | 58 (46%) | 8 (57.1%) | | 54 (49.5%) | 12 (38.7%) | |
| **Modified Glasgow Prognostic Score, n (%)** | | | | | | |
| 0 | 21 (16.7%) | 2 (14.3%) | | 21 (19.3%) | 2 (6.5) | |
| 1 | 22 (17.5%) | 1 (7.1%) | 0.559 | 22 (20.2%) | 1 (3.2) | 0.007 |
| 2 | 83 (65.9%) | 11 (78.6%) | | 66 (60.6%) | 28 (90.3) | |
| Inflammatory Burden Index | 633.01 (132.02-1174.4) | 991.3 (378-4660.8) | 0.111 | 532.6 (104.9-1162.5) | 762.1 (430.2-1594.0) | 0.052 |
| Systemic Inflammation Response Index | 6.16 (3.3-10.14) | 6.4 (3.3-20.4) | 0.530 | 6.0 (3.2-10.2) | 6.3 (4.0-10.7) | 0.567 |
| Systemic Immune-Inflammation Index | 1788.6 (1137.9-3206.4) | 1901.1 (976.8-9223.3) | 0.498 | 1796.0 (1087.2-3266.2) | 1659.2 (1159.3-3672.3) | 0.857 |

IQR: Interquartile range

## DISCUSSION

This study investigated detailed inflammatory parameters in critically ill postoperative patients, including subgroup analyses. The IBI emerged as a significant predictor of 30-day mortality in the total surgical cohort, as well as in patients undergoing abdominal surgery and neurosurgery. Moreover, IBI was significantly associated with 90-day mortality in the total

**Table 6.** Comparison of postoperative urogynecological surgery patients based on 30-day and 90-day mortality

| | Alive at 30 days median (IQR) n=44 | 30-day mortal median (IQR) n=4 | p | Alive at 0 days median (IQR) n=40 | 90-day mortal median (IQR) n=8 | p |
|---|---|---|---|---|---|---|
| Age | 70.5 (63.0-76.0) | 56.0 (37.7-72.7) | 0.204 | 69.5 (62.25-75.75) | 71.5 (49.0-80.5) | 0.698 |
| **Gender, n(%)** | | | | | | |
| Female | 11 (25%) | 2 (50%) | 0.281 | 10 (25%) | 5 (62.5%) | 0.468 |
| Male | 33 (75%) | 2 (50%) | | 30 (75%) | 3 (37.5%) | |
| **Modified Glasgow Prognostic Score, n(%)** | | | | | | |
| 0 | 23 (52.3%) | 1 (25%) | | 20 (50%) | 4 (50%) | |
| 1 | 6 (13.6%) | 0 | 0.256 | 6 (15%) | 0 | 0.449 |
| 2 | 15 (34.1%) | 3 (75%) | | 14 (35%) | 4 (50%) | |
| Inflammatory Burden Index | 68.3 (14.5-305.9) | 1109.6 (280.4-2316.2) | 0.263 | 76.8 (16.8-315.1) | 580.1 (9.07-1985.3) | 0.782 |
| Systemic Inflammation Response Index | 4.3 (2.2-10.8) | 9.2 (4.9-17.2) | 0.156 | 4.2 (2.2-10.8) | 8.45 (2.3-16.6) | 0.407 |
| Systemic Immune-Inflammation Index | 69.6 (15.6-315.1) | 2742.8 (1225.4- 4586.9) | 0.168 | 1151.3 (741.5-2432.3) | 1762.3 (567.1-4586.8) | 0.543 |

IQR: Interquartile range

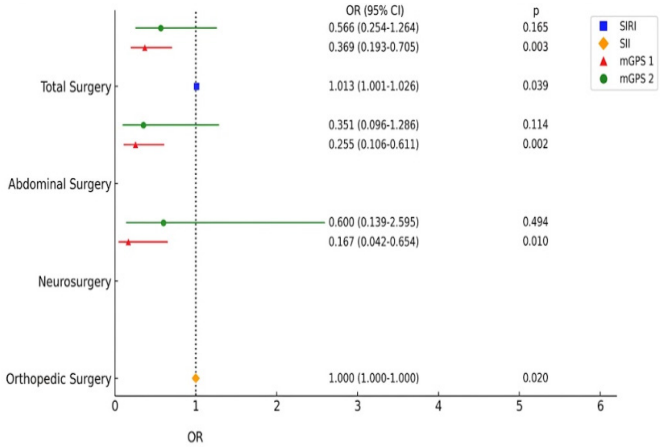


**Figure 1.** The multivariate regression analysis of the association between in SIRI, SII and mGPS for 30 day-mortality

SIRI: Systemic Inflammatory Response Index, SII: Systemic Immune-Inflammation Index, mGPS: Modified Glasgow Prognostic Score, OR: Odds ration, CI: Confidence interval

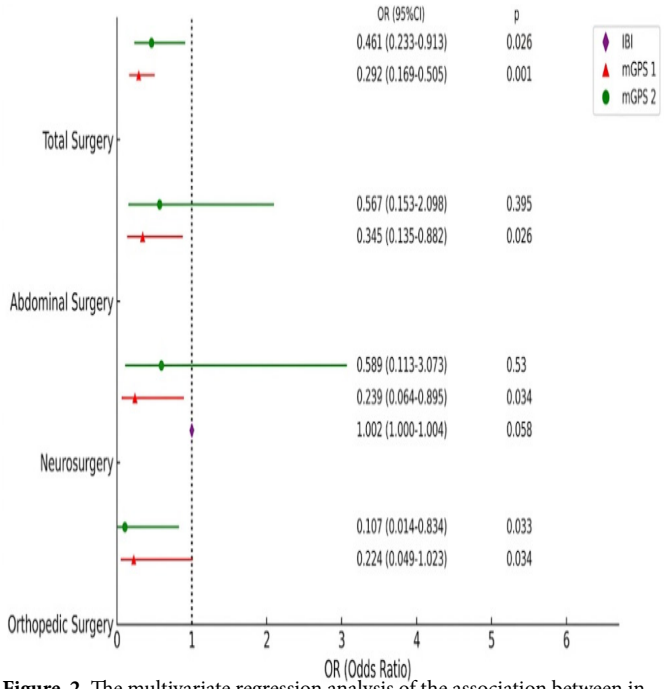


**Figure 2.** The multivariate regression analysis of the association between in IBI and mGPS for 90 day-mortality

IBI: Inflammatory Burden Index, mGPS : Modified Glasgow Prognostic Score, OR: Odds ration, CI: Confidence interval

surgical cohort, and specifically in the abdominal surgery, neurosurgery, and orthopedic surgery subgroups.

The mGPS was identified as a significant predictor of 30-day mortality in the total surgical cohort, for 90-day mortality, mGPS showed significant associations across the total surgical cohort, and in the abdominal surgery, neurosurgery, and orthopedic surgery subgroups. According to multivariate logistic regression analysis, IBI was associated with 90-day mortality in the neurosurgery. Inflammation is a fundamental characteristic of critically ill patients, and its extent can be assessed using various biomarkers in clinical practice.[15] Composite inflammatory indices, which combine these biomarkers, have proven valuable in guiding clinicians regarding patient prognosis.

The IBI , one such index, was originally studied as a prognostic and inflammatory burden marker in various cancers.[2] Interest in IBI grew due to the established link between its components CRP ,neutrophils, and lymphocytes and inflammation, which plays a pivotal role in cancer pathogenesis.[16,17] In 2024, He et al.[18] evaluated the association between IBI and all-cause mortality in a general population aged 45 and older, including 8827 participants. They identified a nonlinear relationship between IBI and all-cause mortality, noting that increasing IBI values corresponded with higher mortality risk. Our study population comprised critically ill patients requiring intensive care monitoring, a group inherently characterized by heightened inflammation. Unlike previous studies, our research focused specifically on critically ill postoperative patients. We found that IBI was a significant predictor of both 30-day and 90-day mortality in the overall cohort and in the subgroups undergoing abdominal surgery and neurosurgery. Additionally, IBI was significantly associated with 90-day mortality in patients who underwent orthopedic surgery.

In our study, the IBI was a significant predictor of both 30- and 90-day mortality. Since CRP is used in calculating IBI, and CRP is widely recognized in the literature as the most representative clinical marker of acute systemic inflammation.[19,20] We think that the significance of IBI in predicting mortality is primarily driven by the critical role of CRP in inflammation.

The mGPS , calculated using CRP and albumin levels, integrates CRP as a key inflammation marker and albumin as a parameter reflecting both disease severity and nutritional status.[21-23] Wu et al.[24] demonstrated in a large cohort of 4629 pancreatic cancer patients that a high pre-treatment mGPS was associated with poor prognosis. Similarly, Saal et al.[25] reported that mGPS could be used to monitor treatment response in patients with metastatic renal cell carcinoma. However, not all studies have confirmed the prognostic value of mGPS. For instance, Son et al.[26] found that mGPS did not predict overall survival in non-metastatic colon cancer patients, and Chan et al.[27] reported that mGPS was not a prognostic factor in colorectal cancer based on multivariate analysis. In our study, mGPS was significantly associated with 30-day mortality in the total surgical cohort and in patients undergoing abdominal surgery and neurosurgery in subgroup analyses. Additionally, mGPS was significant for 90-day mortality in the total cohort and in patients undergoing abdominal surgery, neurosurgery, and orthopedic surgery. One notable finding of our study was that no systemic inflammation index was significantly associated with mortality in patients undergoing urogynecological surgery. We attribute this result to the relatively small sample size within this subgroup, which may have limited the statistical power to detect significant associations.

### Limitations

Our study has some restrictions. These limitations include its retrospective design, single-center structure, small sample size within the urogynecological subgroup, and the inclusion of a heterogeneous patient group.

## CONCLUSION

Among postoperative surgical patients, IBI and mGPS are significant predictors of 30- and 90-day mortality. In subgroup analyses, IBI was significantly associated with both 30- and 90-day mortality in patients undergoing abdominal surgery (due to gastrointestinal cancer) and neurosurgery surgery (due to intracranial hemorrhage). Although some parameters were significant for mortality in our study, the results of our study are not suitable for generalization due to the heterogeneity of the patient groups. More comprehensive results can be obtained from studies with homogeneous groups.

## ETHICAL DECLARATIONS

### Ethics Committee Approval

The study was approved by the the Clinical Researches Ethics Committee of Kastamonu University Faculty of Medicine (Date: 18.09.2025, Decision No: 2025/43)

### Informed Consent

This retrospective study used pre-existing anonymized patient data. No additional intervention was performed, and there was no direct patient contact. The study was approved by the Ethics Committee, and the requirement for written informed consent was waived by the ethics committee.

### Peer Review Process

This manuscript was subject to external peer review.

### Conflict of Interest

The authors declare no conflicts of interest related to this study.

### Financial Disclosure

The authors received no financial support for the conduct or publication of this research.

### Author Contributions

Concept: VGS, AY; Methodology: VGS, AY, ÖT, UD; Data Collection and Investigation: VGS, AY, ÖT, UD, BTK, AD, HE, ZD; Formal Analysis: FÇİ; Writing–Original Draft: VGS, AY; Writing–Review and Editing: VGS,AY, ÖT, UD; Supervision: ZD; Critical Review: All authors.

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