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Preoperative CONUT score predicts postoperative complications in stage I-III gastric cancer patients undergoing curative gastric resections

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ABSTRACT

Objective: The controlling nutritional status (CONUT) score, calculated using serum albumin, total cholesterol, and lymphocyte count, is an effective predictor of post-operative complications (PC) following oncologic resections in gastrointestinal system cancers. This retrospective study aimed to investigate the impact of pre-operative CONUT scores on overall post-operative complications (OPC) in patients with stage I-III gastric cancer (GC) who underwent gastrectomy.

Material and Methods: Patients who underwent curative gastric resection for GC between January 2013 and December 2024 were retrospectively analyzed. Patients with a preoperative CONUT score of 0-1 were classified as the normal CONUT group. In contrast, those with a score of 2 or higher were classified as the high CONUT group. Preoperative, intraoperative, and postoperative data were reviewed. Risk factors for the development of OPC were evaluated using univariate and multivariate analyses.

Results: In the high CONUT group, American Society of Anesthesiologists scores, neutrophil/lymphocyte ratio, lymphatic invasion rates, TNM stages, duration of intensive care unit stay, OPC rates, and comprehensive complication index values were significantly higher ($p<0.05$). Multivariate analysis revealed that advanced TNM stage [odds ratio (OR): 5.8, 95% confidence interval (CI): 1.4-24.6, $p=0.016$] and a high CONUT score (OR: 4.1, 95% CI: 1.3-13.0, $p=0.014$) were independent risk factors for the development of PC.

Conclusion: Pre-operative CONUT score may serve as a predictor of OPC following curative GC resections.

Keywords: Gastric cancer, gastrectomy, gastrointestinal surgery

INTRODUCTION

Malnutrition has gained increasing global recognition over the years. According to the United Nations' 2030 Agenda for Sustainable Development, malnutrition is one of the main topics (1). In parallel, the volume and frequency of scientific research on malnutrition in the medical literature have also grown, enabling the generation of more reliable data. Although the specific prevalence of malnutrition may vary by country, its significance as a public health issue remains consistent across different settings. In high-income countries, the prevalence of malnutrition among hospitalized patients has been reported to be as high as 30% (2), whereas in low- and middle-income countries, this rate may reach up to 80% (3,4).

Malnutrition negatively affects both clinical outcomes and healthcare economics. Medically, it is associated with lower quality of life, increased morbidity, lower immune function, delayed wound healing, decreased muscle strength, and ultimately, increased mortality. From an economic standpoint, these complications often result in prolonged hospital stays, increased intensive care unit (ICU) admissions and duration, and higher overall healthcare costs (5,6). Given these consequences, it is evident that malnutrition, a preventable condition, may lead to substantial clinical and financial burdens if left unrecognized and adequately unmanaged. Therefore, raising awareness, improving knowledge, and clinical experience, and integrating standardized protocols for the identification and management of malnutrition into daily clinical practice are essential steps. In this regard, a multicenter survey involving 25 European countries revealed that only 52% of participating hospitals had routine

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protocols for malnutrition screening, underscoring the need for further improvements (7).

The prevalence of malnutrition in surgical patients can reach up to 20% (8). Among those undergoing surgery for gastrointestinal (GI) malignancies, malnutrition is particularly prevalent. Cancer cachexia and disease-related restrictions in oral intake often lead to malnutrition even at the time of diagnosis. Furthermore, in the post-operative period, malnutrition may adversely affect wound healing and increase both morbidity and mortality (9).

Various functional, biochemical, and radiological methods are currently used to identify and assess malnutrition. However, no universally accepted "gold standard" method has yet been established, due to limitations such as high cost, complexity, time requirements, or lack of validation of these tools. As a result, different centers continue to employ a range of screening and assessment methods (10). Practical tools that are cost-effective and easy to use are understandably preferred. One such tool is the controlling nutritional status (CONUT) score, which is derived from routinely available laboratory parameters (11). The impact of the pre-operative CONUT score on both short- and long-term outcomes following surgical resection of upper GI and colorectal cancers has been reported in various studies (12-15).

This single-center retrospective study aimed to investigate the impact of pre-operative CONUT scores on early post-operative outcomes in patients who underwent curative gastric resections for stage I-III adenocarcinoma of the stomach.

MATERIAL and METHODS

All patients who underwent gastric resections in Başkent University İstanbul Hospital between January 2013 and December 2024 were retrospectively analyzed. Only patients who underwent gastrectomy for histologically confirmed gastric adenocarcinoma (stage I-III) were included in the study. Patients who underwent gastric resections for benign conditions such as bleeding, perforation, or trauma; patients with tumors other than adenocarcinoma (e.g., neuroendocrine tumors, GI stromal tumors); patients who received neoadjuvant chemotherapy; and patients who underwent palliative resections for stage IV disease were excluded.

In addition to age, sex, and body mass index (BMI), American Society of Anesthesiologists (ASA) scores and the presence of cardiovascular disease, hyperlipidemia, and diabetes mellitus data were retrospectively recorded. Pre-operative hemoglobin, serum albumin, total protein, creatinine, and total cholesterol levels, white blood cell counts, neutrophil counts, platelet counts, lymphocyte counts, neutrophil to lymphocyte ratios, and CONUT scores were also recorded (Table 1) (11).

Histopathological findings, including T stage and N stage, pathological TNM stages, differentiation grade of tumors, presence of signet-ring cells, presence of lymphatic, perineural, and vascular invasions, the largest diameter of tumors, and total harvested lymph node counts were also evaluated. Malignant lymph node ratios were calculated as a percentage by dividing the number of malignant lymph node counts by the number of total harvested lymph node counts.

Duration of operation and post-operative outcomes: Requirements for ICU care, duration of ICU stay, length of hospital stay, and post-operative complications were recorded. Reoperation rates were noted. Post-operative complications were classified according to the well-known Clavien-Dindo scoring system (16). Comprehensive complication index (CCI) scores: (17) were used to evaluate the severity of the complications. The adjuvant chemotherapy administrations were evaluated in terms of post-operative outcomes.

The patients were classified according to their CONUT scores. The patients with a 0-1 CONUT score were evaluated in the normal CONUT group, and patients with a CONUT score ≥2 were evaluated in the High CONUT group. Pre-operative variables and 30-day early post-operative outcomes were compared.

This study was approved by the Başkent University Institutional Review Board (date: 24.07.2025, decision no: KA25/283).

Prior to inclusion in this retrospective study, informed consent was obtained either from the patients themselves or their first-degree relatives. All participants received comprehensive explanations about the surgical procedure, including potential risks, possible complications, anticipated outcomes, and estimated mortality rates. Additionally, they were informed that their anonymized clinical data might be used for scientific purposes. Written consent confirming their understanding and approval was collected before the operations took place.

Statistical Analysis

Statistical analyses were conducted using SPSS software (version 25.0; SPSS Inc., Chicago, IL, USA). Continuous variables were presented as mean ± standard deviation when they followed a normal distribution, based on Kolmogorov-Smirnov or Shapiro-Wilk tests (with Shapiro-Wilk applied for $n<30$). In cases where normality was not observed, data were expressed as medians. Group comparisons for continuous variables were performed using either the Student's t-test or the Mann-Whitney U test, depending on whether parametric or non-parametric criteria were met. Categorical data were compared using the chi-square test or Fisher's exact test, as appropriate. To adjust for possible confounding variables and to identify factors independently associated with postoperative complications, multivariate logistic regression analysis was employed. Variables with a p-value less than 0.10 in the univariate analysis were entered into the multivariate model. Statistical significance was defined as a p-value below 0.05.

RESULTS

General Outcomes

During the study period, a total of 167 consecutive gastric resections were performed at our surgical clinic (Figure 1). A total of 27 patients were excluded because they underwent benign procedures. Twenty-one patients with non-adenocarcinoma tumors were excluded. Nineteen patients who underwent palliative procedures, seventeen patients who underwent neoadjuvant chemotherapy, and fifteen patients with missing data were also excluded. Finally, 68 patients who underwent gastrectomy for stage I-III gastric adenocarcinoma were analyzed (Figure 2). All operations were carried out via an open surgical approach by an experienced surgical team with more than a decade of academic and clinical expertise.

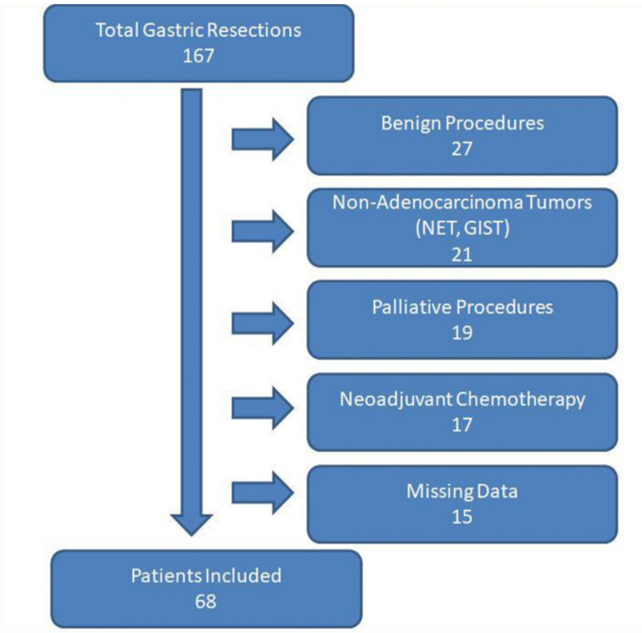

Figure 1. Flowchart diagram depicting the selection of the participants.

NET: Neuroendocrine tumors, GIST: Gastrointestinal stromal tumors

The mean age of the study population was 66.1 (±13.3). Forty patients (58.8%) were male, and the mean BMI was 24.9 (±4.9). The number of patients in both groups was the same. The pre-operative variables and distribution of the patients are shown in Table 2. A statistically significant difference was observed in ASA score distribution, as the high CONUT group included a greater number of ASA III patients (p=0.022). Lymphocyte count, serum albumin, and total cholesterol levels —the three components of the CONUT score— were significantly lower in the high CONUT group. In addition, the neutrophil-to-lymphocyte ratio also differed significantly between the groups (Table 2).

Histopathological investigations revealed that the high CONUT group had more advanced TNM-staged patients (p=0.044), and the presence of the lymphatic invasion was significantly higher in the high CONUT group (p=0.009) (Table 3).

The early post-operative outcomes are shown in Table 4. Duration of ICU stay, the presence of overall post-operative

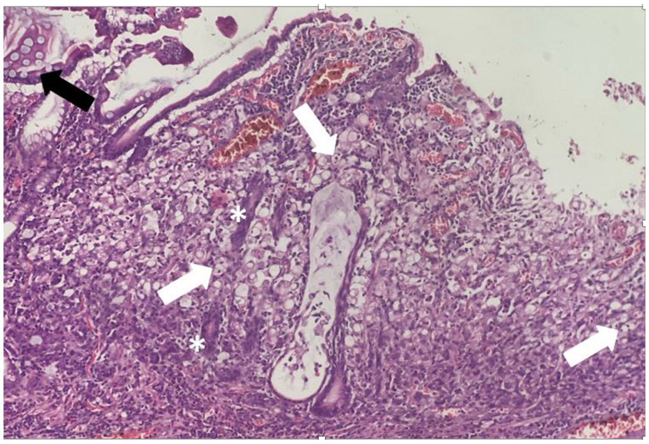

Figure 2. Histopathological examination of a 77-year-old female patient. Signet-ring cells with peripherally located hyperchromatic nuclei and intracellular mucin (white arrows). Adjacent intestinal metaplasia (black arrow) and rare normal gastric tubular structures (asterisk). H&E stain, ×100.

H&E: Hematoxylin & eosin

Table 1. CONUT scoring system

Variables	Undernutrition status			
	Normal	Light	Moderate	Severe
Albumin (g/dL)	≥3.5	3.0-3.49	2.5-2.9	<2.5
Points	0	2	4	6
Total lymphocyte count (cell/mm³)	>1600	1200-1599	800-1199	<800
Points	0	1	2	3
Total cholesterol (mg/dL)	>180	140-180	100-139	<100
Points	0	1	2	3
Total CONUT score	0-1	2-4	5-8	9-12

CONUT: Controlling nutritional status.

Table 2. Preoperative data of the patients

Parameter	Total (n=68)	Normal CONUT (0-1, n=34)	High CONUT (≥2, n=34)	p-value
Age (years, mean, SD)	66.1 (±13.3)	65.3 (±12.9)	66.8 (±13.9)	0.666
Sex (n, %)				
Male	40 (58.8%)	18 (52.9%)	22 (64.7%)	0.460
Female	28 (41.2%)	16 (47.1%)	12 (35.3%)	
Body mass index (kg/m^2)	24.9 (±4.9)	24.8 (±4.5)	25.2 (±5.5)	0.911
ASA score (n, %)				
I	6 (9%)	4 (12.1%)	2 (5.9%)	
II	24 (35.8%)	17 (51.8%)	7 (20.6%)	0.022
III	35 (52.2%)	11 (33.3%)	24 (70.6%)	
IV	2 (3%)	1 (3%)	1 (3%)	
Diabetes mellitus (n, %)	28 (41.2%)	12 (35.3%)	16 (47.1%)	0.460
Hyperlipidemia (n, %)	22 (32.4%)	14 (41.2%)	8 (23.5%)	0.194
Cardiovascular disease (n, %)	34 (50%)	15 (44.1%)	19 (55.9%)	0.467
Hemoglobin (g/dL)	11.7 (±2.3)	12.2 (±2.4)	11.1 (±2.2)	0.052
Platelet (cell/mm^3)	264 (71.6-573)	273 (71.6-573)	238 (77-573)	0.844
White blood cell count (cell/mm^3)	7065 (2560-14100)	7545 (2560-12000)	6775 (3100-14100)	0.462
Neutrophil count (cell/mm^3)	4300 (1700-9800)	4115 (200-8080)	4405 (1700-9800)	0.243
Lymphocyte count (cell/mm^3)	1770 (338-4000)	2005 (1246-4000)	1470 (338-400)	0.008
Neutrophil/lymphocyte ratio	2.31 (0.87-2307)	1.96 (1-2307)	3.21 (0.87-1603)	0.004
Creatinine (mg/dL)	0.83 (0.6-3)	0.8 (0.6-3)	0.9 (0.6-1.7)	0.584
Total protein (g/dL)	6.7 (±0.7)	6.9 (±0.6)	6.6 (±0.7)	0.055
Albumin (g/dL)	3.8 (±0.6)	4.1 (±0.4)	3.4 (±0.6)	0.001
Total cholesterol (mg/dL)	177.9 (±31.7)	189.9 (±27.3)	165.9 (±31.7)	0.001

SD: Standard deviation, CONUT: Controlling nutritional status, ASA: American Society of Anesthesiologists.

complications, and the CCI scores were statistically higher in the High CONUT group (p<0.05).

Postoperative Complications

There were 29 patients (42.7%) who developed post-operative overall complications. Nine of these patients were in the normal CONUT group and 20 were in the high CONUT group; all were classified as Clavien-Dindo grade I-V complications.

The univariate analysis revealed that the ASA score, TNM stage, presence of perineural invasion, the CONUT score, and malignant lymph node ratio were statistically higher in the patients who developed overall post-operative complications (Table 5). The multivariate logistic regression analysis revealed that higher TNM stage and High CONUT score were independent risk factors for developing overall post-operative complications (Figure 3, Table 5).

Normal CONUT Group

Post-operative complications occurred in 9 of the 34 patients in the normal CONUT group. In a 72-year-old male patient, evisceration developed on post-operative day (POD) 7, necessitating relaparotomy. The second surgery was uneventful, and the patient was discharged without complications on POD 9. An 81-year-old female patient was discharged on POD 8 but presented to the emergency department on POD 17 with symptoms of upper GI bleeding. Following medical stabilization, upper GI endoscopy revealed bleeding from the gastrojejunostomy anastomosis. Endoscopic clip placement was performed, and the patient was discharged in stable condition three days later. During this second hospitalization, two packages of red blood cells (RBC) and two packages of fresh frozen plasma were transfused.

Two female patients aged 42 and 77 developed respiratory distress, and pleural effusion was detected on POD 5. Both patients underwent percutaneous pleural catheter insertion, which led to clinical improvement. The catheters were removed after 48 hours, and both patients were discharged, without complications, 72 hours later. A 37-year-old male patient developed a superficial surgical site infection requiring wound care and antibiotic therapy. He also received one unit of RBCs and was discharged uneventfully on POD 11. A 52-year-old female patient developed urinary retention; requiring urinary re-catheterization, she also required one unit of RBC transfusion. A 76-year-old female patient experienced delayed gastric emptying, necessitating parenteral nutritional support and prolonged hospitalization. The patient was discharged on POD 15 in stable condition. A 51-year-old male patient required only two units of RBC transfusion, without any additional complications.

Finally, a 74-year-old male patient developed atrial fibrillation followed by cardiopulmonary failure and subsequent multiorgan failure. Despite 15 days of intensive care support, the patient did not survive.

High CONUT Group

Post-operative complications occurred in 20 patients. A 67-year-old female patient developed respiratory distress and oxygen desaturation, requiring re-intubation. Following ICU support

Table 3. Histopathological evaluations of the patients

Parameter	Total (n=68)	Normal CONUT (0-1, n=34)	High CONUT (≥2, n=34)	p-value
pT stage (n, %)				
I	12 (17.6%)	7 (20.6%)	5 (14.7%)	0.085
II	9 (13.2%)	5 (14.7%)	4 (11.8%)	
III	12 (30.9%)	14 (41.2%)	7 (20.6%)	
IV	26 (38.2%)	28 (23.5%)	18 (52.9%)	
pN stage (n, %)				
0	26 (38.2%)	15 (44.1%)	11 (32.4%)	0.254
I	14 (20.6%)	9 (26.5%)	5 (14.7%)	
II	9 (13.2%)	3 (8.7%)	6 (17.6%)	
III	19 (27.9%)	7 (20.6%)	12 (35.3%)	
TNM stage (n, %)				
I	18 (26.5%)	10 (29.4%)	8 (23.5%)	0.044
II	8 (11.8%)	7 (20.6%)	1 (2.9%)	
III	42 (61.8%)	17 (50%)	25 (73.5%)	
Differentiation grade (n, %)				
Well	10 (14.7%)	8 (23.5%)	2 (5.9%)	0.114
Mild	10 (14.7%)	5 (14.7%)	5 (14.7%)	
Poor	48 (70.6%)	21 (61.8%)	27 (79.4%)	
Signet cell (n, %)	26 (38.2%)	12 (35.3%)	14 (41.2%)	0.803
Lymphatic invasion (n, %)	52 (76.5%)	21 (61.8%)	31 (91.2%)	0.009
Perineural invasion (n, %)	39 (57.4%)	17 (50%)	22 (64.7%)	0.327
Vascular invasion (n, %)	13 (19.1%)	5 (14.7%)	8 (23.5%)	0.539
Tumor diameter (mm)	47 (15-120)	45 (15-120)	50 (15-100)	0.853
Total harvested lymph node	23 (8-56)	22 (8-47)	24 (8-56)	0.602
Malignant lymph node	2 (0-46)	1 (0-30)	6 (0-46)	0.066
MLNR	11 (0-100)	5 (0-91)	24 (0-100)	0.084

MLNR: Malignant lymph node ratio, CONUT: Controlling nutritional status.

Table 4. Postoperative outcomes

Parameter	Total (n=68)	Normal CONUT (0-1, n=34)	High CONUT (≥2, n=34)	p-value
Operation time (min)	197 (50-600)	195 (50-360)	202 (75-600)	0.348
Length of hospital stay (days)	8 (4-24)	7 (4-23)	8 (5-24)	0.078
Intensive care unit requirement (n, %)	38 (55.9%)	15 (44.1%)	23 (67.6%)	0.087
Intensive care duration (days)	1 (0-28)	0 (0-28)	1 (1-7)	0.026
Postoperative complication (n, %)	29 (42.6%)	9 (26.5%)	20 (58.8%)	0.014
Comprehensive complication index (%)	0 (0-100)	0 (0-100)	20.9 (0-100)	0.008
Reoperation (n, %)	3 (4.4%)	1 (2.9%)	2 (5.9%)	0.746
Mortality (n, %)	5 (7.4%)	1 (2.9%)	4 (11.8%)	0.356
Adjuvant chemotherapy (n, %)	42 (61.8%)	20 (58.8%)	22 (64.7%)	0.803

Min: Minutes, CONUT: Controlling nutritional status.

Table 5. Factors related to overall complications

Variable	Univariate analysis			Multivariate analysis		
	Overall complication		p-value	Odds ratio	(95% CI)	p-value
	Yes (n=29, 42.7%)	No (n=39, 57.3%)				
Age (years, mean, SD)	67.4 (±13.7)	65.1 (±13.1)	0.486			
Sex, male (n, %)	19 (65.5%)	21 (53.8%)	0.455			
ASA score (n, %)			0.036			
I	2 (6.9%)	4 (10.3%)				
II	5 (17.2%)	19 (48.7%)				
III	21 (72.4%)	15 (38.5%)				
IV	1 (3.4%)	1 (2.6%)				
TNM stage (n, %)			0.023			
I	3 (10.3%)	15 (38.5%)		Ref.		
II	3 (10.3%)	5 (12.8%)		5.5	(0.7-43.1)	0.102
III	23 (79.3%)	19 (48.7%)		5.8	(1.4-24.6)	0.016
Perineural invasion (n, %)	22 (75.9%)	17 (43.6%)	0.013			
CONUT score (n, %)			0.002			
Normal	9 (31%)	25 (64.1%)		Ref.		
High	20 (69%)	14 (35.9%)		4.2	(1.3-130)	0.014
MLNR	30 (0-100)	5 (0-9)	0.030			

CI: Confidence interval, ASA: American Society of Anesthesiologists, CONUT: Controlling nutritional status, MLNR: Malignant lymph node ratio, SD: Standard deviation.

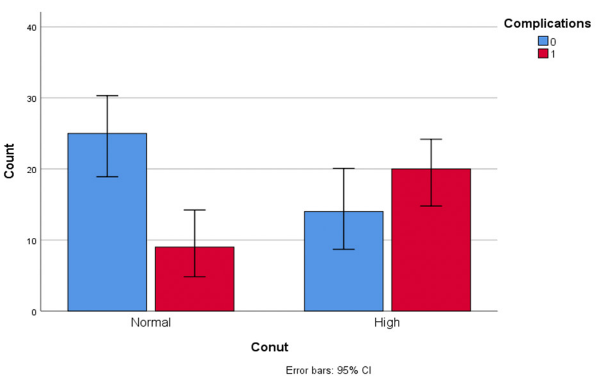

Figure 3. Multivariate logistic regression analysis revealing the relationship between the CONUT score and overall complications.

0: Cases without complications, 1: Cases with complications, CI: Confidence interval, CONUT: Controlling nutritional status

between POD 1 and POD 6, she was discharged without complications on POD 11. An 83-year-old male patient developed fever on POD 4. Imaging revealed an intra-abdominal abscess. As percutaneous drainage was unsuccessful, relaparotomy was performed. The patient was discharged in stable condition on POD 18. A 60-year-old male patient developed acute kidney injury followed by multiorgan failure. After re-intubation and initiation of hemodialysis, on POD 4, he was discharged uneventfully on POD 13.

Four male patients, aged 61, 66, 75, and 77, experienced post-operative respiratory distress due to pleural effusion and required percutaneous drainage. They were discharged uneventfully on POD 11, 15, 11, and 17, respectively. The 77-year-old patient also underwent relaparotomy on POD 6 due to evisceration.

Five patients required RBC transfusions only. Specifically, one unit was administered to a 52-year-old female and a 45-year-old male, two units to a 77-year-old female and an 85-year-old male, and three units to a 79-year-old male.

A 79-year-old male patient required percutaneous cystostomy on POD 5 due to severe urinary retention and was discharged on POD 12. A 75-year-old male patient with no prior history of epilepsy experienced a seizure. Radiological and neurological evaluations revealed no evidence of metastasis, bleeding, or ischemia. The seizure was medically managed, and the patient was discharged uneventfully following adjustment of antiepileptic treatment. A 73-year-old female patient developed a superficial surgical site infection, which was managed successfully with bedside drainage and antibiotic therapy. The patient was discharged on POD 12. A 47-year-old female patient developed an esophagojejunostomy leak requiring endoscopic covered stent placement. Additionally, bilateral pleural effusions necessitated percutaneous catheter insertion. The patient was discharged on POD 24.

In the high CONUT group, four patients died due to post-operative complications. A 55-year-old male patient developed an esophagojejunostomy anastomotic leak, which required endoscopic covered stent placement and bilateral pleural drainage catheter insertion. The patient had underlying interstitial lung disease and developed severe pneumosepsis. Following re-intubation on POD 11, he eventually died on POD 29 despite intensive supportive care. A 79-year-old male patient died on POD 21 due to septic shock secondary to a retroperitoneal abscess that developed as a result of a duodenal stump leak. A 76-year-old female patient developed an esophagojejunostomy anastomotic leak and underwent endoscopic stent placement. However, she succumbed to septic shock on POD 8. Lastly, a 77-year-old male patient developed severe pneumosepsis, which progressed to multi-organ failure. Despite aggressive management, the patient died on POD 21.

Statistical analysis demonstrated that the mortality rates were statistically similar in the two groups (p>0.05).

DISCUSSION

Multivariate analysis in this single-center retrospective study demonstrated that a pre-operative CONUT score of ≥2 was an independent risk factor for the development of post-operative overall complications in patients undergoing curative gastrectomy for stage I-III gastric adenocarcinoma [odds ratio (OR): 4.2] (Table 5). Another independent risk factor identified was advanced TNM stage (OR: 5.8) (Table 5).

Several recent studies have reported that a high pre-operative CONUT score is a significant risk factor for post-operative complications in patients undergoing gastric resection for gastric cancer (18-21). In a 2021 study by Sun et al. (18) involving 1,479 patients, the overall post-operative complication rate was 29.3%. Multivariate analysis demonstrated that a CONUT score ≥2 was an independent risk factor for post-operative complications (OR: 1.15, 95% CI 1.07-1.24, p<0.001) (18). In subgroup analysis, Sun et al. (18) also showed that a high CONUT score conferred a similar risk in both early and advanced-stage gastric cancer patients. In a 2021 study by Qian et al. (19), which evaluated 309 patients with gastric cancer, the post-operative complication rate was 29.4%. Multivariate analysis identified a CONUT score ≥2.5 as an independent predictor of post-operative complications (OR: 2.43, 95% CI 1.21-4.86, p=0.012). In a large-scale database analysis by Ryo et al. (20), including 3.484 patients, a CONUT score ≥2 was significantly associated with an increased risk of post-operative pulmonary complications. Similarly, in a 2022 study by Xiao et al. (21), which evaluated 106 patients with gastric cancer, a high CONUT score was shown to be an independent risk factor for the development of overall post-operative complications.

Some studies in the literature have focused exclusively on geriatric populations. In a study conducted by Suzuki et al. (22), from Kobe in 2018, which included 211 patients over the age of 75 who underwent gastrectomy for gastric cancer, a high pre-operative CONUT score was identified as an independent risk factor for post-operative infectious complications unrelated to surgery. Furthermore, when overall morbidity rates were analyzed, patients classified in the moderate-to-severe malnutrition group had higher rates of overall morbidity, although the difference approached but did not reach statistical significance (p=0.09). In 2019, a study by Huang et al. (23) from China investigated 357 patients over the age of 65 who underwent gastrectomy for gastric cancer. The authors found that a high CONUT score was an independent risk factor for the development of post-operative complications (OR: 2.69, 95% CI 1.63-4.45, p<0.0001). More recently, Lin et al. (24) published a study in 2023 focusing on patients over the age of 60 who underwent gastrectomy for gastric cancer. This study, which included 203 patients, similarly demonstrated that a high pre-operative CONUT score was an independent predictor of post-operative complications. In these three studies, the reported rates of overall post-operative complications ranged from 31.6% to 39%. Our overall complication rate was 42%.

In the literature, there are three meta-analyses that have investigated the association between pre-operative CONUT scores and postoperative complications following gastrectomy. In the meta-analysis published by Takagi et al. (25) in 2019, which included five studies and a total of 2.482 patients, a high pre-operative CONUT score was found to be significantly associated with an increased risk of overall post-operative complications (OR 1.39, 95% CI 1.12-1.72, p=0.003). Liu et al. (26) in their 2023 publication, presented a comprehensive analysis of 19 studies involving a total of 9,746 patients. A more recent meta-analysis, conducted by Yin et al. (27) in 2023, similarly demonstrated that a high CONUT score was associated with a higher incidence of post-operative complications (OR 1.64, 95% CI 1.31-2.06). Consistent with the previous two meta-analyses, their results showed that a high pre-operative CONUT score was significantly associated with increased post-operative morbidity (OR 1.96, 95% CI 1.5-2.57, p<0.0001). Another notable common finding across all three analyses was the association between higher CONUT scores and more advanced TNM stages. Despite the relatively small sample size in our study, our findings are in line with these recent meta-analyses in terms of both post-operative morbidity and the relationship with advanced disease stage.

Although numerous retrospective studies and meta-analyses have demonstrated an association between high CONUT scores and increased post-operative complications, some studies have reported no such relationship. In a study conducted by Liu et al. (28) in 2018, which included 697 consecutive patients who underwent gastrectomy for stage II and III gastric cancer, complication rates were similar between patients with low and high CONUT scores. Similarly, in a 2021 study by Jin et al. (29), which involved 272 patients who received neoadjuvant chemotherapy followed by gastrectomy, the preoperative CONUT score was not found to be a significant predictor of either overall or severe postoperative complications. These discrepancies may be attributed to differences in patient demographics, country-specific healthcare settings, institutional management protocols, or the threshold values used to define high CONUT scores across studies.

Study Limitations

The present study has several considerable limitations. The retrospective analysis and the single-center setting represent major constraints that may affect the generalizability of the outcomes. Additionally, the considerably small sample size may have limited the robustness of the statistical analysis. Nonetheless, evaluating long-term oncological outcomes in future studies may provide a more comprehensive understanding of the prognostic value of the CONUT score in patients with gastric adenocarcinoma, particularly when considered alongside short-term post-operative complications. We aim to address this aspect in future research. Furthermore, collecting detailed pre-operative data regarding weight loss and oral intake status could contribute to a more multidimensional assessment of nutritional status and potentially enhance the reliability of the findings.

CONCLUSION

This study provides valuable preliminary evidence supporting the potential role of the CONUT score as a practical tool for perioperative risk stratification in patients undergoing gastrectomy for gastric cancer. The identification of high CONUT scores and advanced TNM stage as independent risk factors for post-operative complications suggests that nutritional and tumor-related parameters both contribute significantly to short-term surgical outcomes. Although limited data exist in the literature, our findings are in line with recent studies that have also reported an association between higher CONUT scores and increased risk of post-operative morbidity. Further multicenter prospective studies with larger patient cohorts and long-term follow-up are needed to validate these results and to define the clinical utility of the CONUT score in the management of gastric cancer patients.

Ethics

Ethics Committee Approval: This study was approved by the Başkent University Institutional Review Board (date: 24.07.2025, decision no: KA25/283).

Informed Consent: Prior to inclusion in this retrospective study, informed consent was obtained either from the patients themselves or their first-degree relatives. All participants received comprehensive explanations about the surgical procedure, including potential risks, possible complications, anticipated outcomes, and estimated mortality rates. Additionally, they were informed that their anonymized clinical data might be used for scientific purposes. Written consent confirming their understanding and approval was collected before the operations took place.

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Footnotes

Author Contributions

Concept - İ.T., A.S.K.; Design - İ.T., A.S.K.; Data Collection or Processing - İ.T.; Analysis or Interpretation - İ.T., A.S.K.; Literature Search - İ.T.; Writing - İ.T., A.S.K.

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