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ORIGINAL ARTICLE

Prealbumin Levels as a Useful Marker for Predicting Infectious Complications After Gastric Surgery

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Abstract

Background/Objectives Preoperative nutritional status is associated with postoperative complications. Prealbumin, a visceral protein, is sensitive to protein malnutrition. The objective of this study is to evaluate the role of preoperative prealbumin levels as a marker for predicting complications after gastric surgery.

Methods An observational study was performed on 183 patients who underwent gastric surgery due to benign or malignant gastric disease at Seoul National University Hospital (SNUH) between August 2009 and October 2010. Preoperative prealbumin levels were also measured. Nutritional variables such as prealbumin (cutoff value, 18 mg/dL), albumin, body mass index (BMI), and clinicopathologic data were collected. Postoperative hospital stay, 30-day complications and mortality rate were obtained to investigate outcomes.

Results The complication rate was 52% in the abnormal prealbumin group (n=23) and 24% in the normal prealbumin group (n=160; p=0.005). The complication rate was higher in patients with low preoperative albumin levels (<3.5 g/dL) and abnormal BMI (<18.5 kg/m^2), but the differences were not statistically significant. Comorbidity of diabetes mellitus (DM), resection extent, combined resection, TNM stage and prealbumin levels were associated with complications. In multivariate analysis, DM and combined resection were significantly correlated with complications (p=0.001 for each). In subgroup analysis, resection extent, approach, combined resection, TNM stage, and prealbumin levels were significantly associated with infectious complications. Multivariate analysis identified combined resection (p=0.001) and prealbumin levels (p=0.032) as independent variables.

Conclusions Preoperative prealbumin levels could be a useful marker for predicting complications, especially infectious complications, after gastric surgery.

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Keywords Prealbumin · Gastrectomy · Postoperative complications

Abbreviations

SNUH	Seoul National University Hospital
BMI	Body mass index
DM	Diabetes mellitus
VA	Veterans Affairs
SGA	Subjective global assessment
DNA	Detailed nutrition assessment
NRS	Nutrition risk screening
UICC/AJCC	Union for International Cancer Control/ American Joint Cancer Committee
STG	Subtotal gastrectomy
TG	Total gastrectomy

LADG	Laparoscopy-assisted distal gastrectomy
CT	Computed tomography
PCD	Percutaneous drainage
UGIS	Upper gastrointestinal series

Introduction

The effects of preoperative nutritional status on clinical outcomes have been well described. In the USA, 44 Veterans Affairs (VA) medical centers performed the National VA Surgical Risk Study in order to develop a risk-adjusted model to predict postoperative outcomes in major non-cardiac operations between October 1991 and December 1993.[1,2] In this study, the effects of various preoperative, operative, and postoperative parameters on postoperative outcomes were analyzed, and preoperative albumin levels were identified to be the best predictor of postoperative morbidity and mortality. The Centers for Disease Control and Prevention guidelines suggest that malnutrition and obesity (weight≥20% of ideal body weight) could be risk factors for surgical site infection, a major postoperative complication.[3]

Various nutritional parameters, including visceral proteins, as well as anthropometric parameters and immunocompetence have been clinically used to evaluate the degree of risk of malnutrition.[4] In addition, various nutritional assessment and screening tools, such as subjective global assessment (SGA), detailed nutrition assessment (DNA), and nutrition risk screening (NRS) 2002, have been introduced.[5,6] Many studies have been performed to determine nutritional parameters that highly correlate with clinical outcomes. Nutritional assessment parameters—such as albumin[7,8] and weight loss[9]—and tools, such as NRS 2002[10] and Seoul National University Hospital-Nutrition Screening Index,[11] have been identified to significantly correlate with clinical outcomes.

Visceral proteins frequently used in clinical practice include albumin, prealbumin, and transferrin. Unlike subjective nutritional assessment performed by nutrition experts, visceral protein test results can be quickly and easily evaluated. According to the criteria of the American Dietetic Association for establishing a diagnosis of malnutrition, body weight is associated with energy malnutrition, whereas serum albumin levels are associated with protein malnutrition.[12] It has been reported that serum albumin correlates with clinical outcomes in medical and surgical patients.[7,8,13] However, the sensitivity of albumin can be reduced in acute protein malnutrition because of a large body pool and a long half-life (20 days).[14]

Prealbumin is a rapid-turnover protein, and has a much shorter half-life (2 days) than albumin. Prealbumin is assumed to be a better indicator of protein nutrition than albumin because it contains a high percentage of essential amino acids such as tryptophan. In addition, prealbumin levels rapidly decrease in patients with pre-kwashiorkor or early marasmus.[14] Devoto et al.[15] have demonstrated that prealbumin has a high sensitivity and specificity compared to nutritional assessment tools such as DNA, SGA and Prognostic Inflammatory and Nutritional Index score. It has been suggested that prealbumin, as a single parameter, is useful for evaluating protein energy malnutrition.

Preoperative nutritional support is known to be effective for moderate-to-severe malnutrition.[16,17] Postoperative complications are significantly decreased by nutritional support after gastrointestinal surgery.[18] Discovering nutritional markers associated with postoperative complications would allow us to improve clinical outcomes by nutritional support of selected patients with nutritional risk.[16]

The objectives of this study are to investigate the usefulness of prealbumin levels as a predictor of postoperative complications and to compare it with other nutritional parameters such as serum albumin and body mass index (BMI) frequently used in clinical practice and to assess clinicopathologic factors that can affect postoperative complications.

Material and Methods

The study subjects were patients who underwent gastric surgery due to benign or malignant gastric disease at Seoul National University Hospital (SNUH) between August 2009 and October 2010 and whose preoperative prealbumin levels were measured. We prospectively collected the clinical data of 183 such patients. The following patients having factors that could be affected preoperative prealbumin levels were excluded from the study: (1) those with acute or chronic inflammation; laboratory abnormalities (C-reactive protein elevation, abnormal numbers of leukocyte) and/or clinical symptoms or signs suggestive of inflammation; (2) those with severe liver disease, Child-Pugh class B or C, and (3) those who received corticosteroid therapy.

Baseline characteristics, operation, and disease-related factors were collected. Gastric cancer patients were classified based on the seventh edition of the Union for International Cancer Control/American Joint Cancer Committee (UICC/AJCC) TNM staging system.[19] We investigated comorbidities, such as hypertension, heart disease, pulmonary disease, renal disease, liver disease, diabetes mellitus (DM), cerebrovascular disease, and other cancers. DM is reported to correlate well with surgical site infec-

Table 1 Definitions of postoperative complications

	Complications	Definitions
Infectious complications	Wound complications	Seroma, hematoma, dehiscence, evisceration of surgical wound, wound infection requiring wound repair
	Intra-abdominal fluid collection/abscess	Confirmed by abdominal ultrasonography or computed tomography (CT)
		Requiring percutaneous drainage (PCD) or antibiotic therapy
	Anastomosis leakage, fistula	Drainage of intestinal content or leakage in upper gastrointestinal series (UGIS)
		Fistula confirmed by fistulogram
	Pancreatitis	Confirmed by serum amylase and CT
	Cholangitis	Confirmed by liver function test and CT
	Pulmonary infection	Pneumonia, bronchiolitis, etc.
	Urinary tract infection	Confirmed by urine culture
	Bacteremia, sepsis	Confirmed by blood culture
Non-infectious complications	Bleeding	Requiring transfusion or intervention (angiography, reoperation)
	Intestinal obstruction	No gas passage or other symptoms suspected intestinal obstruction, the findings of suspected mechanical obstruction on abdominal radiograph
	Ileus	Vomiting during meals after surgery or difficulty with diet progression, the findings of suspected paralytic obstruction on abdominal radiograph
	Anastomosis stenosis	Anastomotic stenosis confirmed by gastrofibroscopy or UGIS, requiring intervention
	Pulmonary complications	Atelectasis, pneumothorax, pleural effusion, respiratory failure requiring PCD or mechanical ventilator support
	Renal complications	Acute renal failure
	Hepatic complications	Hepatic dysfunction
	Cardiac complications	Myocardial infarction, heart failure, arrhythmia, cardiac arrest
	Endocrine complications	Diabetes inspidus, diabetic ketoacidosis, syndrome of inappropriate secretion of anti-diuretic hormone
	Neurovascular disorders	Cerebrovascular accident, deep vein thrombosis, pulmonary embolism

tion,[20] and thus DM patients were classified into subgroups. DM was defined according to the 2011 standards of medical care in diabetes recommended by the American Diabetes Association.[21]

We collected information on weight changes before surgery, and nutritional parameters including BMI at admission, the most recent albumin level before surgery (up to 30 days), the most recent prealbumin level before surgery (from 2 days before surgery to the day of surgery) and prealbumin levels within 7 days of surgery (early [2–4 days after surgery] and late [5–7 days after surgery]).

The 30-day mortality rate, 30-day postoperative complications, and postoperative hospitalization duration were included as outcome variables. The definitions of postoperative complications are shown in Table 1. Overall complications were analyzed, and subgroup analysis was also performed on infectious complications.

The chi-square test and Fisher's exact test were used to determine the correlation between postoperative complications and variables. In multivariate analysis, a logistic regression model (stepwise) was used. A p value of <0.05 was considered to be statistically significant. Variables with a p value of <0.05 in the univariate analyses were assigned in the multivariate analysis. The ROC curve was used to obtain the cutoff value of prealbumin levels with a high sensitivity and specificity capable of predicting overall complications. The t test was used to compare the mean of prealbumin levels. Statistical analyses were performed using SPSS version 17.0.

This study was passed through the deliberations of the SNUH Institutional Review Board (IRB no. H-1007-027-322). All of authors have no actual or potential conflict of interest.

Results

Baseline Characteristics

This study included 1,029 patients who underwent gastric surgery due to benign or malignant gastric disease at SNUH between August 2009 and October 2010. Of these patients, 183 underwent measurement of preoperative prealbumin levels. The mean age of the patients was 59.3±12.3 years, and the number of patients was greater in males. The

Table 2 Baseline characteristics (n=183)

Variables		Number (%)
Age (mean±S.D.)	59.3±12.3 years (range 25–85 years)	
Gender (male/female)	131:52	
Diagnosis	Gastric cancer	168 (91.8%)
	Gastrointestinal stromal tumor	13 (7.1%)
	Others[a]	2 (1.1%)
Comorbidity	≥1[b]	81 (44.3%)
	DM	20 (10.9%)
BMI	≥18.5 kg/m^2	171 (93.4%)
	<18.5 kg/m^2	12 (6.6%)
Operation name	STG	151 (82.5%)
	TG	18 (9.8%)
	Wedge resection	12 (6.6%)
	Gastrojejunostomy	2 (1.1%)
Approach	Open surgery	103 (56.3%)
	Laparoscopic surgery	80 (43.7%)
Combined resection	No	162 (88.5%)
	Yes[c]	21 (11.5%)
Radicality (n=182)	R0	173 (95.1%)
	R1 and R2	9 (4.9%)
Gastric cancer TNM stage[d] (n=168)	I	110 (65.5%)
	II	19 (11.3%)
	III	33 (19.6%)
	IV	6 (3.6%)

[a] One carcinoid tumor and one duodenal ulcer

[b] Hypertension, heart disease, pulmonary disease, renal disease, liver disease, DM, cerebrovascular disease, and other cancers

[c] Eight gallbladder, four spleen, four spleen and pancreas, and five others

[d] Seventh UICC/AJCC TNM staging system

number of patients with gastric cancer was 168 (91.8%). Patients who had at least one underlying disease accounted for 44.3% of all patients. Of these patients, 10.9% had DM. The majority (82.5%) of patients underwent subtotal gastrectomy (STG), whereas 9.8% underwent total gastrectomy (TG), and the remaining patients underwent wedge resection or gastrojejunostomy. Patients with gastric cancer underwent D1+β or D2 lymph node dissection, and those with other diseases underwent limited lymph node dissection. Of the patients with gastric cancer, 76.8% had TNM stage I–II tumors, and 23.2% had stage III–IV tumors. Other information about the baseline characteristics of subjects is shown in Table 2.

Distribution of Nutritional Markers

We investigated BMI as an anthropometric parameter as well as visceral proteins, including albumin and prealbumin, as a nutritional marker. The distribution of each nutritional marker is shown in Fig. 1. BMI less than 18.5 kg/m^2 was found in 6.6% (12/183) of patients, and BMI 30 kg/m^2 or more (obesity) was found in 5.5% (10/183). The number of patients with albumin test results within 30 days before surgery was 145, and hypoalbuminemia (less than 3.5 g/dL) was found in 7.6% (11/145) of patients. Prealbumin levels less than 18 mg/dL were observed in 12.6% (23/183) of patients.

The mean±S.D. of BMI was 23.56±3.551 kg/m^2. The mean±S.D. of prealbumin level was 26.97±8.330 mg/dL and the mean±S.D. of albumin level was 4.09±0.446 g/dL (median, 4.2 g/dL).

Surgical Outcomes

The 30-day postoperative mortality rate was 0% (0/183). The postoperative complications during the last 30 days are shown in Table 3. The overall complication rate was 27.9% (51/183). Among postoperative complications, wound complications were most common, followed by intra-abdominal fluid collection/abscess, anastomosis stenosis, and pulmonary complications. Infectious complications, which occurred, included intra-abdominal infection, pneumonia, bronchiolitis, pancreatitis, and cholangitis, in addition to two cases before sepsis.

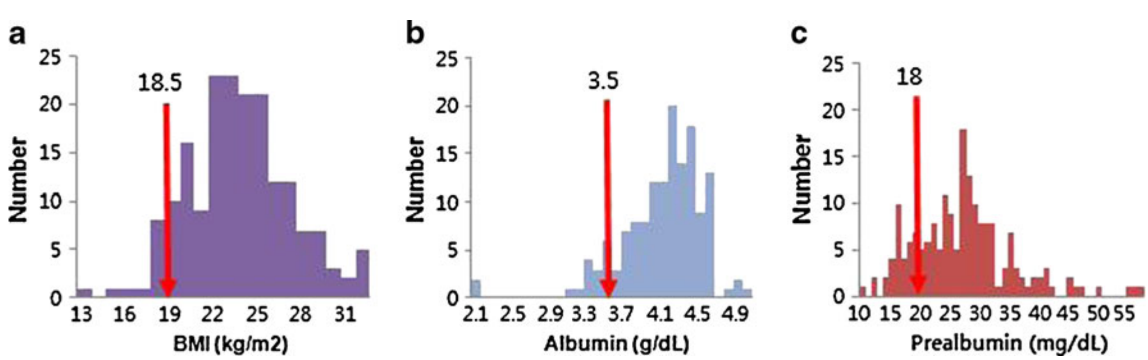

Fig. 1 Distribution of nutritional markers. **a** BMI, **b** albumin, **c** prealbumin

Table 3 Surgical outcomes: 30-day postoperative complications

	Complications	Number	Percent, %
Infectious complications	Wound complications	18	9.8
	Intra-abdominal fluid collection/abscess	11	6.0
	Pulmonary infection	6	3.3
	Sepsis	2	1.1
	Pancreatitis	1	0.5
	Cholangitis	1	0.5
	Other infection (thrombophlebitis)	1	0.5
Non-infectious complications	Anastomosis stenosis	9	4.9
	Bleeding (intra-abdominal, intraluminal)	5	2.7
	Ileus	4	2.2
	Anastomosis leakage	4	2.2
	Pulmonary complications (atelectasis, pleural effusion)	3	1.6
	Obstruction	2	1.1
	Hepatic complication (hepatic artery thromboembolism and liver enzymes elevation)	1	0.5
	Cardiac complications (ST segment elevation myocardial infarction)	1	0.5
Total		69	
Overall complication rate		51/183	27.9
Infectious complication rate		36/183	19.7

Postoperative hospital stays ranged from 5 to 44 days (median, 7 days). The median of postoperative hospital stay was 7 days in patients without complications and 12 days in those with.

Factors Affecting Postoperative Complications

Cross-analyses were performed to determine the factors affecting postoperative complications, and the results are

Table 4 Factors affecting postoperative complications: overall and infectious complications (univariate)

Variables		Overall complications		Infectious complications	
		Percent, % (no./total no.)	*P* value	Percent, % (no./total no.)	*P* value
Age (years)	<65	23.5 (27/115)	0.085	17.4 (20/115)	0.313
	≥65	35.3 (24/68)		23.5 (16/68)	
Gender	Male	26.7 (35/131)	0.581	18.3 (24/131)	0.465
	Female	30.8 (16/52)		23.1 (12/52)	
Comorbidity of DM	No	23.3 (38/163)	<0.001*	17.8 (29/163)	0.078
	Yes	65.0 (13/20)		35.0 (7/20)	
Operation name (resection extent)	STG	26.5 (40/151)	0.038*	18.5 (28/151)	0.028*
	TG	50.0 (9/18)		44.4 (8/18)	
Approach	Open surgery	33.0 (34/103)	0.078	25.2 (26/103)	0.031*
	Laparoscopic surgery	21.3 (17/80)		12.5 (10/80)	
Combined resection	No	23.5 (38/162)	<0.001*	15.4 (25/162)	<0.001*
	Yes	61.9 (13/21)		52.4 (11/21)	
TNM stage	I–II	25.6 (33/129)	0.031*	17.8 (23/129)	0.039*
	III–IV	43.6 (17/39)		33.3 (13/39)	
BMI (kg/m^2)	≥18.5	26.9 (46/171)	0.320	19.9 (34/171)	1.000
	<18.5	41.7 (5/12)		16.7 (2/12)	
Preoperative albumin (g/dL)	≥3.5	23.1 (31/134)	0.141	14.9 (20/134)	0.085
	<3.5	45.5 (5/11)		36.4 (4/11)	
Preoperative prealbumin (mg/dL)	≥18	24.4 (39/160)	0.005*	16.3 (26/160)	0.005*
	<18	52.2 (12/23)		43.5 (10/23)	

*$p<0.05$

Table 5 Factors affecting postoperative complications: overall and infectious complications (multivariate)

Variables	Overall complications			Variables	Infectious complications		
	P value	OR	95% CI		*P* value	OR	95% CI
Combined resection Yes	0.001*	6.521	2.220–19.151	Combined resection Yes	0.001*	5.720	2.029–16.127
Comorbidity DM	0.001*	6.521	2.220–19.151	Preoperative prealbumin <18 mg/dL	0.032*	2.996	1.096–8.188
Preoperative prealbumin <18 mg/dL	0.192	2.007	0.705–5.715	TNM stage III–IV	0.508	1.377	0.533–3.559
TNM stage III–IV	0.412	1.460	0.591–3.609	Operation name TG	0.642	1.367	0.366–5.102
Operation name TG	0.869	0.892	0.229–3.475	Approach Open surgery	0.837	1.102	0.438–2.773

*$p<0.05$

shown in Table 4. The complication rate was 52% in the abnormal prealbumin group (n=23) and 24% in the normal prealbumin group (n=160) (p=0.005). The complication rate was higher in patients with low preoperative albumin levels (<3.5 g/dL) and abnormal BMI (<18.5 kg/m^2), but the differences were not statistically significant. As for complications, DM, resection extent, combined resection, TNM stage, and preoperative prealbumin level had statistically significant correlation with postoperative complications in univariate analysis. The complication rate was higher in elderly patients (≥65 years) or in patients who underwent open surgery, but the differences were not statistically significant.

Five variables significant in the univariate analysis with complications were assigned in the multivariate analysis. In logistic regression analysis, comorbidity of DM (p=0.001; OR, 6.521) and combined resection (p=0.001; OR, 6.521) were significantly correlated with complications (Table 5).

Subgroup analysis of infectious complications was performed in the same way. As for infectious complications, resection extent, approach, combined resection, TNM stage, and preoperative prealbumin levels were associated with infectious complications in univariate analysis (p<0.05; Table 4). The complication rate was higher in DM patients and patients with low preoperative albumin levels (<3.5 g/dL), but the differences were not statistically significant.

Five variables significant in the univariate analysis with infectious complications were assigned in the multivariate analysis. Multivariate logistic regression analysis identified combined resection (p=0.001; OR, 5.720) and low preoperative prealbumin level (p=0.032; OR, 2.996) as independent variables for the development of postoperative infectious complications (Table 5).

Prealbumin showed a higher sensitivity than albumin for predicting overall complications (0.235 vs. 0.139) and infectious complications (0.278 vs. 0.167) (Table 6). Both visceral proteins showed good specificities.

Change of Prealbumin Levels

Prealbumin levels were gradually reduced from preoperative levels to early postoperative (2–4 days after surgery) and late postoperative (5–7 days after surgery) levels. In patients with complications, the mean of preoperative prealbumin levels were lower, and the postoperative reduction rates were higher (Fig. 2).

Discussion

In the USA, the National VA Surgical Risk Study was performed to develop a risk-adjusted model for predicting postoperative outcomes, and preoperative albumin levels were the best predictor of postoperative morbidity and mortality.[1,2] Additional analysis was performed by Gibbs et al.[7] using the albumin database. Preoperative albumin levels most significantly correlate with 30-day postoperative mortality and morbidity rates. Subgroup analysis performed in terms of general surgery, thoracic surgery, and orthopedic surgery

Table 6 Comparison of prealbumin and albumin

	Overall complications		Infectious complications	
	Sensitivity	Specificity	Sensitivity	Specificity
Prealbumin	0.235 (12/51)	0.917 (121/132)	0.278 (10/36)	0.912 (134/147)
Albumin	0.139 (5/36)	0.945 (103/109)	0.167 (4/24)	0.942 (114/121)

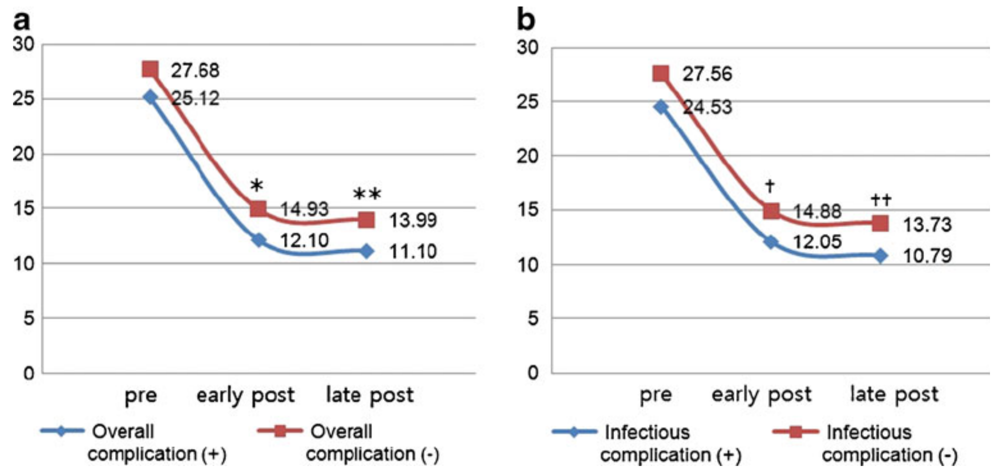

Fig. 2 Changes in prealbumin levels (mean, milligrams per deciliter). **a** overall complications, **b** infectious complications. $p^*=0.010$, $p^{**}<0.001$, $p^{\dagger}=0.011$, $p^{\dagger\dagger}=0.001$

showed that albumin-based prediction was most accurate in general surgery. Kudsk et al.[8] reported that preoperative albumin levels have inverse relationships with clinical outcomes such as postoperative complications, hospital stay, and mortality in gastrointestinal surgery patients.

In our study, among nutritional parameters, prealbumin levels were the only significant variable that correlated significantly with postoperative complications, but albumin levels had no significant correlation. These results are different from those of previous studies.[7,8] The results could be influenced by the different classifications of clinically meaningful malnutrition. Although lower cutoff values (less than 3.0 g/dL) have been used in previous studies,[22] albumin cutoff values for predicting surgical outcomes have not yet been established. In previous investigators,[4,12,14] serum albumin levels of >3.5 g/dL have been regarded as well nourished. Therefore, our study used an albumin cutoff value of 3.5 g/dL. In our study, the number of patients whose preoperative albumin levels were less than 3.0 g/dL was only 2 (1.4%) and thus it is difficult to identify significant correlations with albumin levels and postoperative complications.

The reason for the low frequency of hypoalbuminemia may be that serum albumin levels remained relatively constant because the degeneration rate is proportional to the size of the extravascular pool and that albumin levels do not fully reflect short-term malnutrition.[23] Prealbumin may be used as a marker with a higher sensitivity for screening patients at high risk of malnutrition. In our study, prealbumin showed a higher sensitivity than albumin for predicting surgical complications. Abnormal preoperative prealbumin levels (<18 mg/dL) could be regarded as a risk factor of surgical complications.

The synthesis of prealbumin is decreased in severe liver disease. Prealbumin can be decreased in patients with inflammation but increased in those with corticosteroid therapy.[14] In our study, exclusion criteria were established in order to rule out these effects and to improve the reliability of the results.

Previous studies of prealbumin were conducted mainly in patients with renal diseases or critically ill patients. These studies commonly reported mortality correlated with prealbumin.[24,25] However, studies in surgical patients have been rare. One study with Brazilian elderly patients, who underwent a major elective surgery, reported that prealbumin levels had the most significant correlation with postoperative mortality and complications in multivariate analysis which included visceral proteins, anthropometric parameters, and immunocompetence.[26] Also, it has been reported that postoperative complication rates are significantly higher in ovarian cancer patients with prealbumin levels of <18 mg/dL who underwent cytoreductive surgery.[27] However, these two studies did not eliminate the effects of surgery itself or clinicopathologic factors such as comorbidity and severity of disease.

Ryan et al.[9] have proposed that a weight loss of ≥10% before surgery is the only independent predictor of postoperative complications on multivariate analysis, considering the impact of tumor site, morphology, operation type, and comorbidity with many nutritional parameters, such as BMI, SGA, and albumin. Since most subjects in our study were asymptomatic at diagnosis, the frequency of significant weight loss before surgery was relatively low. In addition, most subjects were within normal limits of BMI and the number of patients with an abnormal BMI did not seem to be enough to identify the effect of BMI on postoperative complications.

Gibbs et al.[7] investigated 21 complications. They found that major infectious complications, such as deep wound infection, pneumonia, and systemic sepsis, significantly correlate with albumin levels. In our study, the incidence of infectious complications, such as wound infection, intra-abdominal abscess, and pneumonia, was relatively high, and there were two cases of sepsis. Our high incidence of infectious complications was similar to the results of previous studies.[7]

Besides nutritional markers, many clinicopathologic and operation-related variables could also affect postoperative outcomes. In a study by Park et al.[28], age (>50 years), combined resection, and Billroth II reconstruction are identified as independent prognostic factors of postoperative complications in gastric cancer patients. In cases of Billroth II reconstruction, surgical complications, such as ileus and obstruction, occurred frequently. A previous multicenter study identified comorbidity as the most important risk factor of postoperative complications in patients who underwent laparoscopy-assisted distal gastrectomy (LADG).[29] Kim et al.[30] investigated underlying diseases in patients who underwent LADG. They found that the patients with combined pulmonary comorbidity had significantly higher postoperative complications, especially pulmonary complications. DM is correlated with surgical site infection.[20] In our study, combined resection and comorbidity of DM were significantly correlated with overall complications. The complication rate was higher in elderly patients, without any statistical significance. In analysis of infectious complications, combined resection and low preoperative prealbumin levels were identified as independent factors. As with previous studies, nutritional status was found to be related to infectious complications, and prealbumin could be used as a predictor based on our results.

In a recent study of postoperative changes in rapid-turnover proteins (prealbumin, transferrin, and retinol-binding protein) in elective gastrointestinal surgery, the serum prealbumin levels decreased 3 days after surgery, gradually increased and returned to approximately 80% of preoperative values on the 14th postoperative day.[31] In our study, early postoperative prealbumin levels decreased approximately 50% of preoperative values, and early and late postoperative prealbumin levels were significantly lower in patients with complications. Postoperative changes in prealbumin levels may be affected by preoperative nutritional status, as well as the surgical procedure, clinical course, and postoperative nutrition support.[31,32]

In our study, the total number of study patients was 183, and there were much fewer patients with abnormal prealbumin levels (n=23) than normal subjects (n=160). This may be a limitation of our study. However, the proportion of abnormal prealbumin was higher than that of albumin. When only gastric surgery patients are analyzed, the homogeneity of the sample patients could be obtained as compared to previous studies in gastrointestinal surgery patients.

Taken together, preoperative prealbumin levels showed a higher sensitivity for screening patients at risk of malnutrition than albumin and BMI. Unlike albumin and BMI, prealbumin was significantly correlated with postoperative complications. The results of this study suggest that preoperative prealbumin levels may be a useful marker for predicting surgical complications, especially infectious complications in patients undergoing gastric surgery.

Disclosure All authors have no conflict of interest.

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