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ORIGINAL ARTICLE

Palliative Gastroenterostomy in Malignant Gastric Outlet Obstruction: A Single-Center, Single Surgical Team Experience

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Abstract

Background: Malignant gastric outlet obstruction (GOO) is a common complication of stomach, pancreas, and periampullary region tumors, causing serious nutritional disorders and loss of quality of life. This study evaluated the clinical data and factors affecting the survival of patients who underwent palliative gastroenterostomy.

Methods: Data from 23 patients who underwent palliative gastroenterostomy due to malignant gastric outlet obstruction in our center between June 2020 and January 2025 were analyzed retrospectively. Demographic characteristics, preoperative clinical data, intraoperative findings, and postoperative outcomes of the patients were evaluated. Patients were divided into two groups according to their survival times as below and above 90 days; factors affecting survival were analyzed by Kaplan-Meier curves and Cox regression analyses.

Results: Patients who lived longer than 90 days had higher Karnofsky Performance Score, lower Charlson Comorbidity Index, higher albumin level, and preserved electrolyte balance ($p<0.05$). In multivariate analysis, only Clavien-Dindo Classification ≥3a level complications (HR: 60.77; $p=0.002$) and high Gastric Outlet Obstruction Scoring System (GOOSS) score (HR: 0.01; $p=0.008$) were identified as factors independently affecting survival.

Conclusions: Preoperative oral intake capacity and postoperative major complications are the main determinants that directly affect survival. Parameters such as functional status, comorbidity burden, and metabolic balance should also be taken into account in terms of prognosis. Detection of malignancies before GOO occurs and effective management of complications with a multidisciplinary approach may improve patient outcomes.

Keywords: Malignant gastric outlet obstruction, palliative gastroenterostomy, survival, nutrition, complications.

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INTRODUCTION

Gastric outlet obstruction (GOO) is a common complication of benign and malignant stomach, pancreas, and duodenum pathologies. Both intrinsic and extrinsic growth can cause luminal obstruction. Approximately 55% of gastric cancers and 75% of pancreatic cancers are unresectable at the time of diagnosis (1,2). Additionally, it is reported that 15% to 20% of patients with duodenal and periampullary cancer develop gastric outlet syndrome during the disease (2,3). Therefore, they constitute the most common causes of malignant GOO. GOO may also occur due to lymphoma, gallbladder and biliary tract pathologies, metastasis from other organs to the duodenum and jejunum, or external compression (1). Patients with malignant GOO have a short and limited survival time of approximately 3-6 months (1,4,5).

Malignant GOO is a significant treatment problem for surgeons, as it leads to serious quality of life loss in an already high-risk patient group (4). Palliative interventions are often necessary to relieve symptoms and improve quality of life in patients suffering from GOO (6). In this study, we aimed to evaluate patients who underwent surgical gastroenterostomy due to malignant GOO in the light of current literature data.

MATERIALS AND METHODS

The data of patients who underwent palliative gastroenterostomy due to malignant GOO at Istanbul Çam and Sakura City Hospital between June 2020 and January 2025 were evaluated retrospectively. Inclusion criteria for the study included having an endoscopic or radiological diagnosis of malignant GOO, being 18 years or older, and having complete clinical data in the hospital database. On the other hand, the study did not include patients who underwent endoscopic procedures due to GOO and were followed up and treated by another general surgery service.

The patient's age, sex, Karnofsky Performance Scale (KPS), Eastern Cooperative Oncology Group (ECOG) score, Charlson Comorbidity Index (CCI), American Society of Anesthesiology (ASA) score, body mass index (BMI), preoperative albumin level, electrolyte imbalance, presence and type of nutritional support, type of malignancy, whether additional procedures were performed, and Clavien-Dindo Classification (CDC) parameters were evaluated. In addition, the degree of obstruction in the preoperative period was assessed using an adapted version of the gastric outlet obstruction scoring system (GOOSS) described by Adler and Baron (7), and the degree of obstruction was divided into four categories: 0: no oral intake; 1: liquid intake only; 2: soft solid food intake; 3: low-residue or full diet. Factors affecting survival were analyzed by comparing patients with survival shorter than and longer than 90 days. The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethics approval was obtained from the Başakşehir Çam and Sakura City Hospital Scientific Research Ethics Committee (Approval Date: 30.01.2025, Approval No: 2025-17)

Oral feeding was not administered to patients with advanced GOO and complaints of nausea/vomiting. A nasogastric tube was placed to provide gastric decompression in patients with moderate to severe and persistent vomiting or significant abdominal distension. Intravenous fluid therapy was administered to maintain normovolemia and electrolyte balance. High-dose proton pump inhibitors have been used to reduce the volume of gastric secretions and control associated inflammation.

It was aimed to improve the nutritional status of the patients before surgery and oral or parenteral nutritional support was provided according to their tolerance. All patients were evaluated by a radiology-surgery council within the framework of a multidisciplinary approach and underwent surgical intervention after optimal nutrition and fluid-electrolyte balance were achieved.

The surgical procedure was individualized on a patient-by-patient basis, preferably aiming for ante-colic isoperistaltic single-loop gastroenterostomy. In the postoperative period, the aim is for patients to start oral feeding as early as possible. After discharge, patients were followed up with regular outpatient clinic check-ups.

Statistical Analysis

Statistical analysis of the data was performed using IBM SPSS Statistics for Windows 25.0 (IBM Corp., Armonk, New York, USA). The normality distributions of the groups were evaluated with the Kolmogorov-Smirnov Test. Since the variables between the groups did not show normal distribution, the non-parametric Mann-Whitney U test was applied. Categorical meas-

urements were given as number (n) and percentage (%), and continuous measurements were given as median (M), 25th percentile (Q1), and 75th percentile (Q3) values. Pearson chi-square test was used to compare proportions. Overall survival time was analyzed using the Kaplan-Meier method and displayed graphically. Univariate and multivariate Cox regression analyses were used to evaluate the factors affecting survival. Cox regression results were reported as hazard ratio (HR) with a 95% confidence interval (CI). For statistical significance, p values <0.05 will be considered significant.

RESULTS

Of the patients included in the study, 60.9% (n=14) were male, and the median age was 62 years (57-73). When the KPS was evaluated, 52.2% of the patients had a KPS score of 60%. According to the ECOG performance scale, 60.9% of the patients were found to be at ECOG level 2.The median score of the patients in terms of CCI was calculated as 12 (10-13). When the ASA score was examined, 34.8% of the patients were classified as ASA 2 and 65.2% as ASA 3.

The median BMI value of the patients was calculated as 22 (20-27). The median value for preoperative albumin level was 29 g/dL (26-32), and electrolyte imbalance was detected at 39.1%. In terms of nutritional support, 52.2% of the patients received total parenteral nutrition (TPN), while 47.8% received oral nutritional support. When the patients were evaluated according to the type of malignancy, the tumor types were gastric (47.8%), periampullary (47.8%), and colon (4.4%) malignancies.

According to the GOOSS, 56.5% of patients had a score of 0, and 43.5% had a score of 1. The rate of patients who underwent additional surgical procedures was determined to be 34.8%. According to the CDC, the complication rate of grade 3a and above is 26.1%.

Patients were divided into two groups according to their survival time: less than 90 days (n=12) and more than 90 days (n=11). No significant difference was found between the two groups in terms of age, sex, ASA score, BMI, type of nutritional support, type of malignancy, GOOSS score, and additional surgical procedure (p>0.05).

While 36.4% of patients who lived longer than 90 days had a KPS of 70%, this rate was found to be 8.3% in patients who lived shorter than 90 days (p=0.04). Higher KPS score was associated with longer survival. In terms of CCI, the median score of patients who survived longer than 90 days was 10 (9-12), while this value was calculated as 12 (12-13) in those who survived shorter than 90 days (p=0.011). A lower CCI score was associated with longer survival.

In terms of preoperative albumin level, the median albumin level of patients who survived longer than 90 days was 31 g/dL (28-34), while this value was 26 g/dL (24.25-30.75) in those who survived shorter than 90 days (p=0.026). Higher preoperative albumin levels have been shown to be associated with longer survival. When evaluated in terms of electrolyte imbalance, electrolyte imbalance was detected in 66.7% of the patients who lived less than 90 days, while this rate was determined as 9.1% in those who lived longer than 90 days (p=0.005). Electrolyte imbalance was found to be significantly associated with shorter survival.

When postoperative complications were evaluated, according to the CDC, the complication rate of 3a and above was 50% in patients who survived less than 90 days. In contrast, no complications were observed in patients who survived longer than 90 days (p=0.006). A higher complication rate was found to be significantly associated with shorter survival. Table 1 presents a comparison of patient groups surviving less than and more than 90 days (Table 1).

Overall survival time was analyzed using the Kaplan-Meier method and shown graphically in Figure 1 (Figure 1). In the univariate Cox regression analysis performed to determine the factors affecting survival, electrolyte imbalance (HR: 4.83; 95% CI: 1.72–13.57; p=0.003), CDC grade (HR: 40.04; 95% CI: 4.61–347.78; p=0.001), GOOSS (HR: 0.22; 95% CI: 0.07–0.66; p=0.007), nutritional support (HR: 0.29; 95% CI: 0.10–0.82; p=0.020) and CCI (HR: 1.46; 95% CI: 1.06–2.01; p=0.019) were found to be significant. In multivariate analysis, only CDC grade (HR: 60.77; 95% CI: 4.39–841.32; p=0.002) and GOOSS (HR: 0.01; 95% CI: 0.00–0.3; p=0.008) were found to be independent predictors of survival time (Table 2).

Patients with CDC grade ≥3a had an approximately 60.77-fold increased risk of death compared to patients without such complications. This finding suggests that severe postoperative complications have a statistically significant negative impact on survival. On the other

Table 1. Comparison of patient groups with survival less than and more than 90 days

	Less than 90 days (n=12)	More than 90 days (n=11)	p value
Age#	60 (57-75.5)	64 (60-73)	0.497
Sex* (Male)	9 (75)	5 (45.4)	0.147
KPS*			*0.04*
50%	*5 (41.7)*	*1 (9.1)*	
60%	*6 (50)*	*6 (54.5)*	
70%	*1 (8.3)*	*4 (36.4)*	
ECOG*			0.218
1	1 (8.3)	4 (36.4)	
2	8 (66.7)	6 (54.5)	
3	3 (25)	1 (9.1)	
CCI#	*12 (12-13)*	*10 (9-12)*	*0.011*
ASA*			0.879
2	4 (33.3)	4 (36.4)	
3	8 (66.7)	7 (63.6)	
BMİ#	22 (20-23)	25 (21-27)	0.204
Biliary Drainage* (Yes)	4 (33.3)	4 (36.4)	0.879
Preop Alb.#	*26 (24.25-30.75)*	*31 (28-34)*	*0.026*
Electrolyte imbalance (Yes)*	*8 (66.7)*	*1 (9.1)*	*0.005*
Nutritional Support*			0.146
Oral	4 (33.3)	7 (63.6)	
TPN	8 (66.7)	4 (36.4)	
Type of malignancy* (Periampullary)	7 (58.3)	4 (36.4)	0.292
GOOSS*			0.062
0	9 (75)	4 (36.4)	
1	3 (25)	7 (63.6)	
Additional procedure* (Yes)	4 (33.3)	4 (36.4)	0.879
CDC (3a and above)*	*6 (50)*	*0 (0)*	*0.006*

: median (Q1-Q3), *: n(%), KPS; Karnofsky Performance Score, ECOG; Eastern Cooperative Oncology Group, CCI; Charlson Comorbidity Index, ASA; American Society of Anesthesiologists, BMI; Body mass index, Preop Alb.; Preoperative Albumin (g/dL), GOOSS; Gastric outlet obstruction scoring system, CDC; Clavien-Dindo Classification.

Table 2. Results of Univariate and Multivariate Cox Regression Analyses

	HR (95% CI) - Univariate	p value Univariate	HR (95% CI) - Multivariate	p value Multivariate
GOOSS	0.22 (0.07–0.66)	0.007	0.01 (0.00–0.3)	0.008
CDC	40.04 (4.61–347.78)	0.001	60.77 (4.39–841.32)	0.002
Electrolyte imbalance	4.83 (1.72–13.57)	0.003	3.24 (0.67–15.63)	0.143
Nutritional Support	0.29 (0.10–0.82)	0.020	10.14 (0.42–243.75)	0.153
CCI	1.46 (1.06–2.01)	0.019	1.35 (0.90–2.02)	0.142
KPS	0.94 (0.89–1.01)	0.074	–	–
Preop Alb.	0.94 (0.84–1.06)	0.317	–	–
ECOG	1.62 (0.85–3.09)	0.143	–	–
BMI	0.91 (0.79–1.04)	0.164	–	–
Age	1.00 (0.97–1.04)	0.863	–	–
Sex	1.70 (0.71–4.07)	0.237	–	–
ASA	0.72 (0.30–1.74)	0.463	–	–
Biliary Drainage	0.65 (0.26–1.62)	0.352	–	–
Additional procedure	0.68 (0.27–1.71)	0.415	–	–
Type of malignancy	1.01 (0.43–2.37)	0.975	–	–

GOOSS; Gastric outlet obstruction scoring system, CDC; Clavien-Dindo Classification, CCI; Charlson Comorbidity Index, KPS; Karnofsky Performance Score, Preop Alb.; Preoperative Albumin (g/dL), ECOG; Eastern Cooperative Oncology Group, BMI; Body mass index, ASA; American Society of Anesthesiologists.

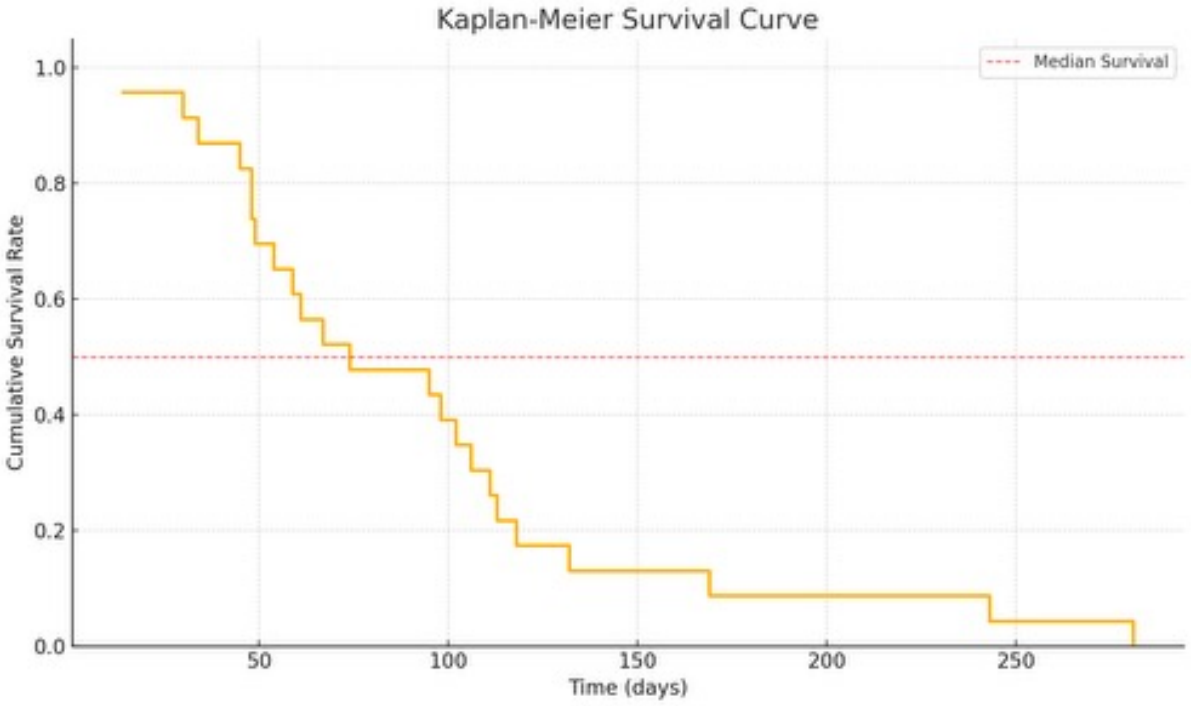

Figure 1: Kaplan-Meier Overall Survival Curve

hand, it has been determined that each unit increase in GOOSS score reduces the risk of death by approximately 99%. Higher GOOSS scores—better oral intake status—show a significant protective effect on survival. The fact that the hazard ratios (HR) of both variables are significantly far from 1 and the confidence intervals are statistically significant reveals the strong effects of these variables on prognosis.

DISCUSSION

Malignant GOO is a common condition in advanced-stage stomach, pancreas, and periampullary tumors and negatively affects patients' nutritional and general health status. In our study, we evaluated the clinical and prognostic data of patients who underwent palliative surgical gastroenterostomy due to malignant GOO. Our findings revealed some important factors affecting survival in this patient group.

Although the number of endoscopic interventions has increased in recent years, conventional surgery is always considered the best option in cases where endoscopic intervention is not possible (8). It is reported that obstructive symptoms are better relieved in the long term, and the rates of recurrent obstruction and reintervention are lower after conventional surgery (9-11). However, approximately 30% of patients experience delayed gastric emptying after conventional surgery, which can result in prolonged hospital stays and delays in cancer treatment (12,13). In our study, only patients who underwent conventional gastroenterostomy were evaluated, thus creating an isolated patient group and examining the results in a homogeneous population. In addition, having all surgical procedures performed by a single team is a significant advantage in terms of providing a standard surgical approach and patient management.

When patients were divided into two groups according to their survival time, patients who survived longer than 90 days were found to have significantly higher KPS values (p=0.04). Similarly, a borderline significant association was found between KPS score and survival in univariate analysis (HR: 0.94; 95% CI: 0.89–1.01; p=0.074). This finding suggests that KPS may be a po-

tential prognostic marker. As a matter of fact, it is reported in the literature that KPS is one of the important prognostic factors predicting survival time in cancer patients (14).

In terms of CCI, statistically significant results were obtained in both group comparisons (p=0.011) and univariate Cox regression analysis (HR: 1.46; 95% CI: 1.06–2.01; p=0.019). However, CCI did not reach significance level in multivariate analysis. This suggests, in line with the literature, that CCI may be one of the important factors affecting survival; however, this effect may be relatively reduced when other variables are controlled (15).

Preoperative albumin levels showed a significant difference between the groups (p=0.026); it is known that postoperative recovery takes longer, and the risk of developing complications is higher in patients with low albumin levels (16–18). However, in Cox regression analyses, albumin level was not found to be a factor independently affecting survival (HR: 0.94; p=0.317). This finding suggests that the effect of albumin on survival occurs indirectly through the healing process and development of complications rather than directly through mortality.

Electrolyte imbalance significantly affected survival in both group comparisons (p=0.005) and univariate analysis (HR: 4.83; 95% CI: 1.72–13.57; p=0.003) but lost significance in multivariate analysis (p=0.143). This suggests that the effect of electrolyte imbalance interacts with other clinical parameters.

One of the most striking findings in our study is the strong association between CDC grade ≥3a complications and survival. These complications were identified as an independent risk factor for death in both group analysis (p=0.006) and Cox regression analyses (HR: 60.77; 95% CI: 4.39-841.32; p=0.002). This extremely high risk ratio clearly demonstrates the decisive effect of serious complications developing after surgery on patient prognosis, in line with the literature (16).

Another important finding is the effect of the GOOSS score on survival. While a trend close to significance (p=0.062) was detected in group comparisons, it stood out as an independent protective factor in both univariate (HR: 0.22; p=0.007) and multivariate analysis (HR: 0.01; p=0.008). Each unit increase is associated with an approximate 99% reduction in the risk of death. This finding suggests that functional oral intake capacity has a direct impact not only on symptom control but also on survival. In addition, the decrease in functional uptake capacity as the tumor stage progresses makes this parameter important as an indirect prognostic marker. Although there is no clear study in the literature evaluating the direct relationship between preoperative GOOSS score and mortality, there are studies examining preoperative and postoperative GOOSS changes. In this context, a prospective multicenter study conducted by Terashima et al. showed that an increase in oral intake after surgery had a significantly positive effect on survival (19).

Our study has some limitations. First of all, having a single-center and retrospective design may limit the generalizability of the results. In addition, our patient number is relatively low, and stronger statistical results can be obtained with larger-scale and multicenter studies. In addition, only patients who underwent surgical palliative gastroenterostomy were evaluated in our study, and no comparison was made with alternative treatment methods such as endoscopic stenting. This situation can be considered deficient in determining the most appropriate palliative approach. Patients' postoperative quality of life and symptom control have not been studied prospectively. In future studies, it is important to evaluate the effects of different palliative approaches on survival and their contribution to quality of life.

In conclusion, the preoperative oral intake level and the major complications that developed in the postoperative period had decisive effects on survival in patients undergoing palliative gastroenterostomy. Additionally, statistically significant differences were detected between the groups in various clinical parameters such as functional status, comorbidity burden, and metabolic balance. These findings suggest that recognition of malignancies before gastric outlet obstruction occurs and effective management of postoperative complications with a multidisciplinary approach may play a critical role in improving patient prognosis.

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Abbreviations list

ASA: American Society of Anesthesiology
BMI: Body Mass Index
CCI: Charlson Comorbidity Index
CDC: Clavien-Dindo Classification
ECOG: Eastern Cooperative Oncology Group
GOO: Gastric Outlet Obstruction
GOOSS: Gastric Outlet Obstruction Scoring System
KPS: Karnofsky Performance Scale
TPN: Total Parenteral Nutrition

Ethics approval and consent to participate

The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethics approval was obtained from the Başakşehir Çam and Sakura City Hospital Scientific Research Ethics Committee (Approval Date: 30.01.2025, Approval No: 2025-17).

Consent for publication

It does not contain any personal data.

Availability of data and materials

Not available.

Competing interests

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Authors' contributions

Conception: FG, MFA, Design: FG, MD, Supervision: İK, BB, Fundings: None, Materials: HK, MFA, İK Data Collection and/or Processing: FG, HK, BB, MD, Analysis and/or Interpretation: FG, MFA, Literature Review: FG, MD, Writing: FG, HK, Critical Review: İK, BB

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