Cerrahpaşa Med J 2025; 49: 1-4 ORIGINAL ARTICLE

Clinical Pathological Outcomes and Survival in Patients Undergoing Surgery for Early Stage Gastric Cancer

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Cite this article as: Torun M, Uzun O, Gülmez S, et al. Clinical pathological outcomes and survival in patients undergoing surgery for early stage gastric cancer. *Cerrahpaşa Med J* 2025; 49, 0052, doi: 10.5152/cjm.2025.24052

What is already known on this topic?

- Early-stage gastric cancer has a relatively favorable prognosis when diagnosed and treated appropriately.
- Lymphovascular invasion (LVI) and perineural invasion (PNI) are significant prognostic factors in solid organ tumors, including gastric cancer.
- Demographic factors such as age and sex, along with comorbid conditions, play a critical role in determining clinical outcomes in gastric cancer.

What this study adds on this topic?

- This study highlights the long-term survival outcomes of patients with early-stage gastric cancer, with an average survival time of 143.6±7.9 months.
- The absence of LVI and PNI in the majority of patients was associated with improved prognosis, emphasizing their prognostic value in early-stage gastric cancer.
- The study underscores the impact of advanced age and severe cardiovascular comorbidities on survival, emphasizing the need for personalized perioperative and postoperative care in high-risk patients.

Abstract

Objective: Gastric cancer is the fifth most common cancer worldwide and ranks fourth in cancer-related deaths. Early stage gastric cancer is usually treated with gastrectomy without requiring endoscopic methods or lymph node dissection. This study aims to evaluate the clinicopathological outcomes of early stage gastric cancer among patients undergoing surgery for gastric cancer.

Methods: A retrospective analysis was conducted on 340 patients who underwent total or subtotal gastrectomy for gastric cancer at our clinic between February 2007 and September 2019. The clinicopathological features of 32 patients diagnosed with early stage gastric cancer based on histopathological evaluation were analyzed. The final follow-up date was set as December 31, 2022.

Results: Early stage gastric cancer was found in 11.3% of all gastric cancer patients. Of these patients, 53.1% were male with a mean age of 61 ± 12 years. The mean tumor size was 2.5 ± 1.4 cm, with no lymph node involvement. Lymphovascular invasion (LVI) and perineural invasion (PNI) were negative in 90.6% of the patients. The mean survival time was 143.6 ± 7.9 months.

Conclusion: The clinicopathological outcomes of early stage gastric cancer patients provide promising prognostic insights. The absence of LVI and PNI positively affects the prognosis. The analysis of the 3 deceased patients highlights the impact of high-risk factors. Effective management of postoperative complications can increase morbidity without affecting mortality. Early diagnosis and appropriate surgical treatment in gastric cancer play a critical role in improving long-term survival. These findings emphasize the importance of multidisciplinary approaches and early interventions.

Keywords: Early stage, gastric cancer, radical surgery

Introduction

Gastric cancer ranks fifth in incidence among all cancers worldwide and fourth in cancer-related deaths.[1] In European and American countries, excluding Asian countries like Japan and South Korea, gastric cancer is usually diagnosed at an advanced stage.[1] While advanced-stage gastric cancer requires a multidisciplinary treatment approach, early stage gastric cancer is typically treated with gastrectomy without the need for endoscopic methods or lymph node dissection.[2] Developments in endoscopic methods and the establishment of national screening programs are significant factors in the diagnosis of early stage gastric cancer.[3] In Japan and South Korea, screening ages for asymptomatic patients begin at 50-75 and 40-75 years, respectively.[3] Regardless of lymph node metastasis, expected survival rates after endoscopic or surgical treatment of early stage gastric cancer, characterized by mucosal and submucosal involvement, are reported to be over 90%.[4-5]

In this study, we aim to retrospectively review gastric cancer patients who underwent surgery in our clinic and present the outcomes of our early-stage gastric cancer patients in comparison with the literature.

Received: September 20, 2024 **Revision Requested:** December 21, 2024 **Last Revision Received:** December 21, 2024
Accepted: December 30, 2024 **Publication Date:** January 31, 2025
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DOI: 10.5152/cjm.2025.24052

Methods

A retrospective analysis was conducted on 340 patients who underwent total or subtotal gastrectomy for gastric cancer at our clinic between February 2007 and September 2019. All patients aged over 18 and under 85 were included in the study. Patients diagnosed with distant organ metastasis at the time of surgery (8 patients had liver metastasis), those with positive peritoneal cytology (12 patients), those undergoing neoadjuvant chemoradiotherapy (34 patients), and those with positive surgical margins (4 patients) were excluded from the study, even if they had undergone a gastric resection. A histopathological evaluation of 282 patients was conducted, and the clinicopathological features of 32 patients diagnosed with early stage gastric cancer, according to the American Joint Committee on Cancer (AJCC) 8th Edition (2018) Tumor, Node, Metastasis (TNM) classification system, were retrospectively analyzed. The final follow-up date was set as December 31, 2022. The study was approved by the Giresun Teaching and Research Hospital Ethics Committee (Approval no: E-53593568-771-250095304, Date: August 2, 2024). Since the study is retrospective in nature, informed consent was not obtained from the patients.

Statistical Analysis

The normality of numerical data was assessed using the Kolmogorov–Smirnov test. For data with $P < .05$, indicating non-normal distribution, median (IQR) values were used, while for data with $P > .05$, indicating normal distribution, mean values were used. For categorical variables, counts and percentages were calculated. Survival analysis was performed and evaluated using the Kaplan–Meier test. SPSS version 22 software was used for this study, and a *P*-value of < .05 was considered statistically significant.

Results

Early stage gastric cancer was found in 11.3% of all gastric cancer patients. The median follow-up period was 55 (2-158) months. Of the patients, 53.1% were male, with a mean age of 61 ± 12 years. Additionally, 71.9% had tumors located in the antrum, and 53.1% had well-differentiated histological types. The mean tumor size was 2.5 ± 1.4 cm, with an average of 21 ± 10 lymph nodes removed, and no lymph node involvement was detected. Lymphovascular invasion (LVI) and perineural invasion (PNI) were negative in 90.6% of the patients. The average hospital stay was 11 ± 5 days. At the end of the follow-up period, 90.6% of the patients were still alive, with an average survival time of 143.6 ± 7.9 months (Table 1).

Table 1. Clinicopathological Characteristics of Patients Who Underwent Surgery for Early Stage Gastric Cancer

		Early Stage Gastric Cancer (32 Patients)			
		n	**%**	**Mean**	**±SD**
Sex	Male	17	53.1		
	Female	15	46.9		
Age				61	±12
T stage	T1a	16	50.0		
	T1b	16	50.0		
N stage	N0	32	100.0		
Tumor diameter (cm)				2,5	±1,4
Total number of lymph nodes removed				21	±10
Localization	Cardia	4	12.5		
	Corpus	5	15.6		
	Antrum	23	71.9		
Operation type	Subtotal	23	71.9		
	Total	9	28.1		
HİSTOLOJİK TİP	Differentiated type	17	53.1		
	Undifferentiated type	15	46.9		
Vasculer invasion	Negative	29	90.6		
	Positive	3	9.4		
Perinoral invasion	Negative	29	90.6		
	Positive	3	9.0		
Patient length of stay				11	±5
Average survival time				143.6	±7.9

The 3 patients who did not survive were all male and had undergone emergency surgery due to upper gastrointestinal bleeding and were transferred from the coronary intensive care unit. One patient had a history of operated mitral valve disease and arrhythmia requiring a cardiac pacemaker, while 2 patients had undergone triple-vessel coronary stenting due to anterior myocardial infarction. These patients had a mean age of 66 ± 3 years, an average of 10 ± 2 lymph nodes removed, and a hospital stay of 11 ± 2 days post-surgery without any complications. The average follow-up period for these patients was 3.2 months (Table 2).

Postoperatively, complications developed in 7 patients. These included bleeding in 2 patients, pneumonia in 2 patients, wound infection in 2 patients, and chylous ascites in 1 patient (Table 3). There were no deaths related to these complications.

Discussion

The clinicopathological outcomes of early stage gastric cancer patients provide promising prognostic insights.[6] In our study, 90.6% of patients were still alive, with an average survival time of 143.6 ± 7.9 months, reflecting successful treatment outcomes. The average tumor size of 2.5 ± 1.4 cm and the absence of lymph node involvement highlight the less invasive nature of early-stage cancer. Similar findings have been reported in recent studies, emphasizing the prognostic significance of LVI and PNI in solid organ tumors.[7-8] The absence of LVI and PNI in 90.6% of our patients was associated with improved prognosis, consistent with findings from Conti et al.[3]

The fact that 53.1% of the patients were male and the average age was 61 ± 12 underscores the importance of evaluating the impact of demographic factors on clinical outcomes. Most studies have shown a slight predominance of males.[9-10] The incidence rates of gastric cancer in the literature are generally reported as being above 55 years of age, which aligns with our study.[11] These results underline the importance of demographic variables in predicting outcomes.[12]

The analysis of 3 patients who did not survive sheds light on the impact of high-risk factors on prognosis. All 3 patients were male, underwent emergency surgery due to upper gastrointestinal bleeding, and had severe cardiac comorbidities, including operated mitral valve disease, arrhythmias requiring cardiac

Table 2. Clinicopathological Characteristics of Patients Who Underwent Surgery for Early Stage Gastric Cancer and Passed Away

		Early Stage Gastric Cancer Exitus (3 Patients)	
		n	**%**
Sex	Male	3	100
	Female	0	
T stage	T1a	1	33.3
	T1b	2	66.7
Localization	Cardia	0	
	Corpus	2	66.7
	Antrum	1	33.3
Gastrectomy type	Subtotal	1	33.3
	Total	2	66.7
Histological type	Differentiated type	3	100
	Undifferentiated type	0	
N stage	N0	3	100.0
	N1		
	N2		
	N3a		
	N3b		
Vascular invasion	Negative	3	100
	Positive		
Perineural invasion	Negative	3	100
	Positive		
		Mean	**±SD**
Age		66	±3
Tumor diameter (cm)		3.2	±2.5
Total number of lymph nodes removed		10	±2
Patient length of stay		11	±2
Acute anterior myocardial infarction and coronary artery stent			2
Operated mitral valve disease + cardiac pacemaker due to arrhythmia			1

pacemaker implantation, and triple-vessel coronary stenting following myocardial infarction.[13,14] Advanced age (average 66 ± 3 years) and cardiovascular diseases emerged as key risk factors affecting survival. Despite technically successful surgeries and an average hospital stay of 11 ± 2 days, these patients' overall health conditions significantly influenced their prognosis. Additionally, the short average follow-up period of 3.2 months indicates that these patients belonged to a high-risk group, posing challenges for long-term follow-up.

The analysis of the 7 patients who developed postoperative complications highlights the importance of managing complications in gastric cancer surgery. Bleeding, pneumonia, and wound infection were the most common complications, while chylous ascites was less common.[15-16] Although these complications increased morbidity, they did not affect mortality with appropriate management.[17] The presence of serious complications such as bleeding and pneumonia, despite the absence of patient deaths, demonstrates the effectiveness of postoperative care.[18] Multidisciplinary approaches and early interventions play a critical role in improving patient outcomes in the management of complications. These findings once again emphasize the importance of careful monitoring and prompt intervention in the management of complications that may arise after gastric cancer surgery.[19]

Table 3. Postoperative Complications

Complication Type	n (7)
Bleeding	2
Pneumonia	2
Wound infections	2
Chylous ascites	1

The clinicopathological outcomes obtained in patients with early stage gastric cancer highlight the importance of early diagnosis and treatment once again. In our study, the fact that 90.6% of the patients are still alive and the average survival time is determined to be 143.6 ± 7.9 months indicates that successful results can be achieved in the treatment of early stage gastric cancer. The negative status of LVI and PNI positively affects the prognosis of patients and is consistent with similar studies in the literature. The analysis of high-risk patients showed that severe cardiovascular diseases and acute complications can significantly impact the prognosis. Effective management of postoperative complications can increase morbidity but has not affected mortality with appropriate care. These findings underscore the importance of multidisciplinary approaches and early interventions in the treatment of gastric cancer. In conclusion, early diagnosis and appropriate surgical treatment play a critical role in improving long-term survival in gastric cancer patients.

Availability of Data and Materials: The data that support the findings of this study are available on request from the corresponding author.

Ethics Committee Approval: Ethics committee approval was received for this study from the Giresun Teaching and Research Hospital Ethics Committee (Approval no: E-53593568-771-250095304, Date: August 2, 2024).

Informed Consent: Informed consent was not obtained from the patients due to retrospective nature of the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – M.T., O.U.; Design – M.T., S.G., N.B.; Supervision – M.D., E.P.; Resources – A.S.S., M.Y.; Materials – M.T.; Data Collection and/or Processing – O.S.; Analysis and/or Interpretation – M.T., M.Y.; Literature Search – O.S.; Writing Manuscript – M.T., O.U.; Critical Review – S.G., A.S.S.

Declaration of Interests: The authors have no conflict of interest to declare.

Funding: The authors declared that this study has received no financial support.

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