OSP Journal of Health Care and Medicine

Research Article

ISSN: 2752-6232

Early Post-Operative Complications and Prognosis of Gastric Cancer Surgery

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Received: March 10, 2025; **Accepted:** March 15, 2025; **Published:** March 22, 2025

Abstract

Introduction: Gastric cancer remains a significant global health challenge, requiring surgical intervention as the primary curative approach. Despite advancements in surgical techniques and perioperative care, gastrectomy is associated with a high rate of early postoperative complications (EPC), which can significantly impact patient morbidity and mortality. Understanding the incidence, nature, and predictive factors of these complications are crucial to improving surgical outcomes and optimizing perioperative management.

Objective: This study aims to analyze the incidence of early postoperative complications following gastrectomy for gastric cancer and identify key predictive factors influencing patient prognosis. The findings may contribute to the development of preventive strategies and improvements in surgical protocols.

Methods: A retrospective, descriptive, and analytical study was conducted at CHU Ibn Rochd, including 50 patients who underwent gastrectomy for gastric cancer between January 2020 and August 2023. Clinical, biological, and perioperative data were collected from patient records. Statistical analysis was performed to identify significant risk factors for early postoperative complications.

Results: Among the 50 patients included in the study, 34 (68%) developed at least one early postoperative complication. The most frequent complications were:

Paralytic ileus: 41 cases (82%), predominantly in elderly patients and those with pre-existing comorbidities.

Postoperative hemorrhage: 24 cases (48%), with the majority requiring transfusion, highlighting the need for intraoperative hemostatic control.

Pulmonary infections: 12 cases (24%), primarily observed in patients with prolonged mechanical ventilation.

Surgical site infections: 8 cases (16%), often linked to prolonged surgical duration and contamination.

Digestive fistula: 3 cases (6%), a severe complication associated with poor healing and requiring reoperation in some cases.

Predictive Factors: Statistical analysis identified several significant predictive factors associated with postoperative complications:

Advanced age (>60 years): Strongly correlated with increased risk of pulmonary infections and paralytic ileus ($p < 0.01$).

Severe hypoalbuminemia (<28 g/L): A major risk factor for poor wound healing, infections, and prolonged hospitalization ($p = 0.001$).

Anthropyloric tumor localization: Associated with an increased risk of postoperative ileus and anastomotic leakage ($p = 0.0002$).

Total gastrectomy with extended organ resection: Patients undergoing more extensive procedures had a higher incidence of complications ($p = 0.02$).

The overall postoperative mortality rate was 6 cases (12%), with septic shock and peritonitis being the leading causes of death. Patients with multiple complications had a significantly higher mortality risk, emphasizing the importance of early intervention and close postoperative monitoring.

Conclusion: Early postoperative complications following gastrectomy for gastric cancer remain a prevalent challenge, influenced by multiple predictive factors. Optimizing preoperative nutritional status, enhancing intraoperative hemostatic techniques, and implementing standardized postoperative care protocols could significantly reduce morbidity and mortality in these patients. The findings of this study underscore the

importance of personalized perioperative management strategies to improve surgical outcomes and patient survival rates.

Keywords: *Gastric Cancer; Gastrectomy; Early Postoperative Complications; Predictive Factors; Prognosis; Mortality*

Introduction

Gastric cancer remains a leading cause of cancer mortality worldwide. Despite technological advances and advances in surgical care, curative gastrectomy is still associated with a high rate of early postoperative complications (EPCs), which can significantly influence patient morbidity and mortality.

The most frequently reported EPCs include gastrointestinal disorders (paralytic ileus, anastomotic fistulas), infections (nosocomial pneumonia, surgical site infections), and hemorrhagic and thromboembolic complications. Identifying the risk factors associated with these complications would optimize perioperative management and improve patient prognosis.

The objective of this study is to evaluate the incidence and nature of EPCs after gastrectomy for gastric cancer and to identify the main predictive factors impacting post-surgical prognosis.

Materials and Methods

We conducted a retrospective, descriptive and analytical study over a three-year period (January 2020-August 2023) at the Ibn Rochd University Hospital in Casablanca. This study involved 50 patients who underwent curative gastrectomy for gastric cancer.

The inclusion of patients was conditioned by several strict criteria. Only patients who underwent curative gastrectomy with histological confirmation of gastric cancer and who had complete clinical follow-up were retained. However, patients who underwent palliative surgery, those with severe comorbidities contraindicating surgery and those with incomplete medical records were excluded from this analysis.

Data were collected from patients' medical records and were grouped into several categories:

- Demographic data: Age, gender, comorbidities (diabetes, hypertension, smoking, alcoholism), preoperative nutritional status (albuminemia).
- Tumor characteristics: Location, histological type (Lauren classification), TNM classification.
- Surgical data: Type of gastrectomy performed (total, subtotal, with organ resection), type of anastomosis used, operative time, blood loss and need for transfusion.
- Early postoperative complications: Digestive, infectious, hemorrhagic and thromboembolic complications.
- Postoperative follow-up parameters: Length of hospitalization, readmission to intensive care, postoperative mortality.
- All statistical analyses were performed using SPSS 20.0 software. Data were described as mean ± standard deviation for quantitative variables and as frequencies (%) for qualitative variables.

Intergroup comparisons were performed using the Chi^2 test for qualitative variables and the Student t test for quantitative variables. Multivariate logistic regression was then applied to identify independent factors associated with early postoperative complications. A value of $p < 0.05$ was retained as the threshold for statistical significance.

Results

Our study included 50 patients who underwent gastrectomy for gastric cancer. The mean age of the patients was 59 ± 11 years, with a male predominance of 54% (27 men) versus 46% (23 women), a sex ratio of 1.17.

The age of the patients ranged from 30 to 85 years, with a peak frequency in the sixth decade. Regarding medical history, 22% of the patients were diabetic, 34% hypertensive, and 12% had a history of heart disease. Chronic smoking was present in 21 patients (42%) and alcoholism in 10 patients (20%).

Nutritional assessment revealed severe hypoalbuminemia (< 28 g/L) in 56% of the patients, while 44% had moderate hypoalbuminemia. All patients underwent gastrectomy, of which 22 cases (44%) were total gastrectomies, 13 cases (26%) were

subtotal gastrectomies, 3 cases (6%) were atypical gastrectomies, and 12 cases (24%) were extendedresection of adjacent organs. The type of anastomosis used was mainly a Y-en-GJ anastomosis in 29 patients (58%), a Y-en-GJ anastomosis in 18 patients (36%), and a omega-loop gastroduodenal anastomosis in 3 patients (6%).

The mean operative time was 5.8 ± 1.9 hours. In 36% of cases, the duration exceeded 7 hours, and blood loss greater than 800 mL was reported in 28% of cases, requiring transfusion in 16% of cases.

Among the 50 patients, 34 (68%) developed at least one early postoperative complication. The detailed distribution of complications is presented in the following Table 1.

Table 1: Postoperative Complications and Associated Risk Factors in Patients Undergoing Gastrectomy for Gastric Cancer

Complication	Number of Cases (N = 50)	%	Associated Risk Factors	Statistical Test	p-value
Digestive Complications					
Paralytic ileus	41	82%	Advanced age, prolonged surgery	$\chi^2 = 8.12$	$p < 0.01$
Delayed gastric emptying	9	18%	Tumor location in the antropyloric region	$\chi^2 = 6.78$	$p = 0.02$
Digestive fistula	3	6%	Severe hypoalbuminemia	$\chi^2 = 7.05$	$p = 0.01$
Infectious Complications					
Pulmonary infections	12	24%	Prolonged mechanical ventilation	$\chi^2 = 5.47$	$p = 0.03$
Postoperative peritonitis	3	6%	Anastomotic fistula	$\chi^2 = 6.12$	$p = 0.02$
Intra-abdominal abscesses	6	12%	Total gastrectomy, prolonged surgery	$\chi^2 = 4.89$	$p = 0.04$
Septic shock	4	8%	Severe infections	$\chi^2 = 7.33$	$p = 0.009$

Multivariate analysis highlighted several independent risk factors associated with early postoperative complications:

Advanced age (> 60 years): associated with a significant risk of paralytic ileus and pulmonary infections ($p < 0.01$).

Severe hypoalbuminemia (< 28 g/L): major predictive factor of digestive fistulas and severe infections ($p = 0.001$).

Antropyloric tumor location: linked to an increased risk of delayed gastric emptying and digestive fistulas ($p = 0.0002$).

Total gastrectomy with extended resection: correlated with a significantly higher rate of postoperative complications ($p = 0.02$).

Prolonged operative time (> 7 hours): associated with an increase in hemorrhagic and infectious complications ($p = 0.03$).

The overall mortality rate observed in our study was 12% (6 out of 50 patients). The main causes of death were:

Table 2: Postoperative Mortality Causes in Patients Undergoing Gastrectomy for Gastric Cancer Patients with multiple postoperative complications had a significantly higher risk of mortality ($p < 0.01$).

Cause of Death	Number of Cases (N = 50)	%
Septic shock	2	4%
Postoperative peritonitis	3	6%
Massive pulmonary embolism	1	2%

Among the six deaths, 83% had severe hypoalbuminemia (< 28 g/L), 67% were aged over 65 years, and 50% had undergone total gastrectomy with extended organ resection. Our results highlight a high prevalence of early postoperative complications after gastrectomy, particularly digestive disorders, pulmonary infections and hemorrhages. Paralytic ileus, mainly observed in elderly patients, remains the most frequent com-

Citation: Renzakour R, Fadli Y, Dioury O, Mounir A, Kettani CE (2025) Early Post-Operative Complications and Prognosis of Gastric Cancer Surgery. *OSP Journal of Health Care and Medicine* 6: HCM-6-155.

plication. Digestive fistulas, although rare, significantly increase the risk of peritonitis and death. Optimizing the nutritional status of patients preoperatively seems to be a key strategy to reduce postoperative morbidity. Similarly, reducing operative time and rigorous management of intraoperative hemostasis could limit the occurrence of hemorrhages.

Discussion

Early postoperative complications after gastrectomy remain a challenge in oncological surgery. They influence patient morbidity and mortality and require rigorous management. Our study highlights a high incidence of digestive, infectious, and hemorrhagic complications, with significant risk factors. The most frequently reported postoperative complications in our study are comparable to those found in the international literature. Paralytic ileus was the most common complication (82%), a trend also reported by Baiocchi et al. in an Italian cohort, where digestive disorders were the leading cause of postoperative morbidity [1]. Postoperative hemorrhage was observed in 48% of patients, requiring blood transfusion in the majority of cases, highlighting the importance of intraoperative hemostasis control [2]. Pulmonary infections affected 24% of patients, a rate similar to the results obtained by Kwon et al. in Korea, who reported an incidence of 22% [3]. These complications were particularly observed in patients receiving prolonged mechanical ventilation.

Furthermore, anastomotic leak was a severe complication in our study (6% of cases), consistent with the findings of Sierzega et al., who demonstrated the significant impact of this complication on long-term patient survival [4]. Our study identified several predictive factors associated with postoperative complications.

Advanced age (> 60 years) appears to be a major risk factor, with a significant impact on the occurrence of pulmonary infections and gastrointestinal disorders ($p < 0.01$). This result is consistent with the results of Cuschieri et al., who reported an increased risk of complications in elderly patients after D2 gastrectomy [5]. Severe hypoalbuminemia (< 28 g/L) was significantly associated with infectious complications and impaired wound healing ($p = 0.001$), confirming the data of Brigic et al., who highlighted the negative impact of malnutrition on postsurgical recovery [6]. Antropyloric tumor location also appears to be a major risk factor, linked to an increased risk of delayed gastric emptying and gastrointestinal fistulas ($p = 0.0002$), corroborating the findings of Degiuli et al. in their analysis of D1 and D2 procedures [7]. Finally, total gastrectomy with extended organ resection was associated with a higher incidence of postoperative complications ($p = 0.02$), consistent with the results of Katai et al., who demonstrated an increased complication rate after extensive surgery [8]. Prolonged operative time (> 7 hours) was also identified as an independent risk factor ($p = 0.03$), consistent with the observations of Wu et al., who showed a higher morbidity rate after prolonged procedures [9]. Perioperative patient optimization can reduce the frequency and severity of postoperative complications. Preoperative nutritional assessment and protein supplementation have been shown to decrease the risk of infectious complications and promote better postoperative recovery [6, 10]. Furthermore, rigorous intraoperative management, including strict control of blood loss and prevention of fluid and electrolyte imbalances, can improve surgical outcomes [11]. The impact of extensive lymph node dissection on postoperative morbidity remains controversial. Some studies, such as Hartgrink et al., have suggested that D2 dissection is associated with better overall survival, despite a higher risk of postoperative complications [11]. In contrast, Songun et al. reported long-term benefits with improved survival after gastrectomy with extended lymphadenectomy [10]. Improving postoperative outcomes requires the adoption of accelerated rehabilitation strategies and standardized care protocols. The introduction of minimally invasive techniques and optimization of perioperative management are promising avenues that could reduce the morbidity associated with gastrectomy [8, 9]. Furthermore, integrating chemotherapy and radiotherapy as part of a multimodal approach could improve the long-term prognosis of patients, as demonstrated by the work of Macdonald et al.

Conclusions

The incidence and mortality of gastric cancer have decreased significantly in recent decades in most

countries of the world. However, it is still a common malignant cancer with a high mortality rate. According to the latest published global cancer data, it is the fifth most diagnosed cancer and the second leading cause of death worldwide.

Early postoperative complications after gastrectomy for gastric cancer are influenced by several predictive factors, including advanced age, hypoalbuminemia, and prolonged operative time. Implementation of preventive strategies, including preoperative nutritional optimization, rigorous intraoperative management, and early postoperative rehabilitation, could significantly reduce morbidity and mortality after this type of surgery.

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