

Long-term Outcomes of Laparoscopic Distal Gastrectomy for Advanced Gastric Carcinoma: A Multicenter Retrospective Study in Vietnam

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ABSTRACT

Objective: to evaluate the outcomes of laparoscopic distal gastrectomy with D2 lymph node dissection as a treatment for advanced gastric cancer in three major hospitals in Hanoi, Vietnam.

Material and Methods: a retrospective study was conducted on patients with advanced gastric cancer who underwent laparoscopic distal gastrectomy with D2 lymph node dissection between January 2017 and December 2021.

Results: a total of 119 patients were included in the study, consisting of 85 males and 34 females. All patients had cancer located in the lower third of the stomach. The majority of patients were staged T3 (67.23%) and N1 (56.30%) before surgery. The surgical success rate was 97.48%, with four patients experiencing complications during the operation and three requiring conversion to open surgery. The average operation time was 221.58 minutes. The average number of dissected lymph nodes was 21.54, and the rate of patients with lymph node metastasis was 60.36%. Nine patients (7.76%) experienced postoperative complications, with four patients (4.45%) suffering from serious complications. The average postoperative hospital stay was 11.66 days. The average disease-free survival time was 53.26 months, with a disease-free survival rate of 77.7% at three years and 62.0% at five years. The overall survival time was 58.33 months, with an overall survival rate of 83.9% at three years and 69.9% at five years.

Conclusion: laparoscopic distal gastrectomy with D2 lymph node dissection can be performed safely with favorable outcomes at three major hospitals in Hanoi, Vietnam. This procedure contributes to improving the quality of cancer care for gastric cancer patients in Hanoi.

Key words: gastric cancer, laparoscopic gastrectomy, gastric cancer treatment, advanced gastric cancer

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INTRODUCTION

According to GLOBOCAN 2020 statistics, stomach cancer ranks 6th among common cancers worldwide, with over one million new cases and an incidence

rate of 11.1 per 100,000 people. The mortality rate from stomach cancer ranks 3rd, accounting for 768,793 deaths annually (1). In Vietnam, stomach cancer is quite common, ranking 4th in incidence and 3rd in mortality, following liver cancer and lung cancer. Surgery remains the most important treatment method for stomach cancer, especially at stages where tumors are resectable. Other treatment modalities, such as chemotherapy, radiation therapy, and targeted therapy, play significant roles at specific stages. These methods can help improve surgical outcomes, increase the complete resection rates - such as with adjuvant chemotherapy - or prolong survival after surgery, as seen with radiation therapy and targeted therapy (2).

Since 1994, Japanese surgeons have been performing laparoscopic gastrectomy, and the use of laparoscopic surgery in the treatment of gastric cancer has significantly progressed. Studies have demonstrated that laparoscopic gastrectomy presents more advantages over traditional open surgery, providing a safe approach with fewer complications while adhering to the principles of cancer treatment and achieving similar oncological outcomes (3-5).

However, the complexity of laparoscopic gastrectomy for treating stomach cancer necessitates skilled surgeons with extensive experience in gastric cancer surgery and proficient laparoscopic techniques. Additionally, many modern medical devices required for this procedure can be expensive and may exceed the financial capabilities of patients. Unfortunately, many health insurance policies do not cover these devices in hospitals. Consequently, laparoscopic gastrectomy is not widely promoted across the country but is implemented primarily in a few esteemed medical facilities.

Thanh Nhan Hospital, E Central Hospital, and Hanoi Medical University Hospital are the three major hospitals in Hanoi, Vietnam, where hundreds of patients with stomach cancer receive treatment annually. All three hospitals have been utilizing this technology since 2014; however, it was not until 2017 that laparoscopic gastrectomy, along with D2 lymph node dissection for advanced gastric cancer, was standardized in accordance with the Japanese Gastric Cancer Association's guidelines (6,7). Therefore, this study aims to evaluate a cohort of patients with advanced gastric cancer who underwent laparoscopic distal gastrectomy with D2 lymph node dissection in accordance with the Japanese Gastric Cancer Association's guidelines at the three aforementioned hospitals from January 2017 to December 2021.

MATERIAL AND METHODS

This is a retrospective study conducted on a group of patients with non-metastatic gastric epithelial cancer. The inclusion criteria required histologically confirmed gastric epithelial cancer patients who underwent laparoscopic distal gastrectomy and D2 lymphadenectomy at Hanoi Medical University Hospital, E Central Hospital, and Thanh Nhan Hospital from January 2017 to December 2021. The exclusion criteria consisted of patients with recurrent gastric cancer, non-epithelial cancers, and metastatic cancers from other sites.

The study parameters encompassed general characteristics, including patient numbers, age, gender, BMI, ASA score, TNM staging before surgery, tumor location, anemia status, and CEA levels. Surgical results included surgical technique, anastomotic technique, blood loss during surgery, operation time, intra-operative complications, cases of conversion to open surgery, postoperative recovery time, postoperative complications, and any chemotherapeutic treatment following surgery. Pathological results consisted of the number of lymph nodes examined, the number of metastatic lymph nodes, postoperative TNM classification, post-operative cancer stage, histological differentiation, and the width of resected margins. Follow-up results included the number of remaining patients, the length of the disease-free period, and survival rates. All patients in our study provided written informed consent, and the study was approved by the Ethics Committee of Hanoi Medical University, Vietnam (Decision No. 4889/QD-DHYHN, dated October 21, 2022).

Statistical Analysis

Data were analyzed using SPSS version 26.0 (IBM, New York, USA). Mean values are presented as mean \pm standard deviation, and proportions are expressed as percentages. Time and survival rates after surgery were calculated using the Kaplan-Meier curve. Appropriate statistical tests were employed for each type of variable to examine relationships between research variables.

RESULTS

A total of 119 stomach cancer patients met the selection criteria for the study and were selected from three medical centers. The characteristics of the patients before surgery are detailed in *table 1*.

Table 1 - Clinicopathological characteristics

Characteristics	Result	
	n	%
Age, years, mean (range)	59.77 ± 10.46 (31 - 88)	
Gender		
Male	85	71.4
Female	34	28.6
BMI (kg/m ²), mean (range)	20.52 ± 2.53 (13.6 - 28.4)	
ASA score		
I	92	77.31
II	27	22.69
Clinical T stage		
T1	6	5.04
T2	33	27.73
T3	80	67.23
Clinical N stage		
N0	52	43.70
N1	67	56.30
Tumor location		
Lower third	119	100
Anemia before surgery		
Yes	26	21.85
No	93	78.15
CEA		
Normal	83	69.75
Increase	36	30.25

All 119 patients were scheduled to undergo laparoscopic distal gastrectomy and D2 lymph node dissection. Among them, 116 patients (97.48%) successfully underwent the procedure. However, 4 patients (3.36%) experienced complications during surgery. Specifically, one patient had a minor complication involving damage to the large bowel muscle, which was sutured laparoscopically. Three patients faced serious complications that necessitated conversion to open surgery for further treatment. One patient required open colectomy due to an injury to the middle colonic artery, another underwent open splenectomy following a splenic injury, and the third patient experienced bleeding from the left gastric artery during lymphadenectomy, requiring open surgery to control the hemorrhage. The surgical outcomes for the 116 patients who successfully underwent laparoscopic distal gastrectomy are described in detail in *table 2*.

All cases successfully re-established gastrointestinal flow via a Billroth II anastomosis, with immediate biopsies performed on the specimens prior to the anastomosis. The results revealed no malignant cells in either the upper or lower sections of the gastric specimens. Subsequently, all specimens were sent to the pathology department for examination by pathology technicians. The pathological results for the 116 patients who successfully underwent laparoscopic distal gastrectomy with D2 lymphadenectomy are detailed in *table 3*.

Table 2- Surgical outcomes

Characteristics	Result	
	n	%
Type of surgery		
Distal gastrectomy	116	100
Type of reconstruction		
Billroth-II reconstruction	116	100
Operative time (minute), mean (range)	221.85 ± 55.46 (120-360)	
Estimated blood loss (ml), mean (range)	98.81 ± 25.32 (20 – 150)	
Time to first flatus (d), mean (range)	3.30 ± 1.11 (1-5)	
Number of patients with complications	9	7.76
Patients with minor complications	5	4.31
Pneumonia	2	1.72
Wound infection	1	0.86
Early intestinal obstruction	2	1.72
Patients with major complications	4	4.45
Heart failure	1	0.86
Intra-abdominal bleeding	1	0.86
Anastomotic stenosis	1	0.86
Anastomosis bleeding	1	0.86
Mortality within 30 postoperative days or hospital stay	0	0.0
Hospital stay after surgery (d), mean (range)	11.66± 4.25 (6-38)	
Adjuvant chemotherapy		
Yes	106	91.38
No	10	8.62

Table 3 - Histopathological outcomes

Characteristics	Result	
	n	%
Retrieved lymph nodes	21.54 ± 5.01 (15 - 48)	
Number of patient lymph nodes metastatic	70 (1 – 41)	60.34
Pathological T stage		
T1	4	3.45
T2	17	14.66
T3	93	80.17
T4a	2	1.72
Pathological N stage		
N0	37	30.90
N1	36	31.03
N2	27	23.28
N3a	11	9.48
N3b	5	4.31
Histological differentiation		
Poorly differentiated	48	41.38
Moderately differentiated	53	45.69
Highly differentiated	1	0.86
Undifferentiated	14	12.07
Classification of disease stage after surgery		
Stage Ib	13	11.21
Stage IIa	32	27.59
Stage IIb	29	25.00
Stage IIIa	27	23.27
Stage IIIb	10	8.62
Stage IIIc	5	4.31
Residual tumor		
R0	116	100
R1	0	0

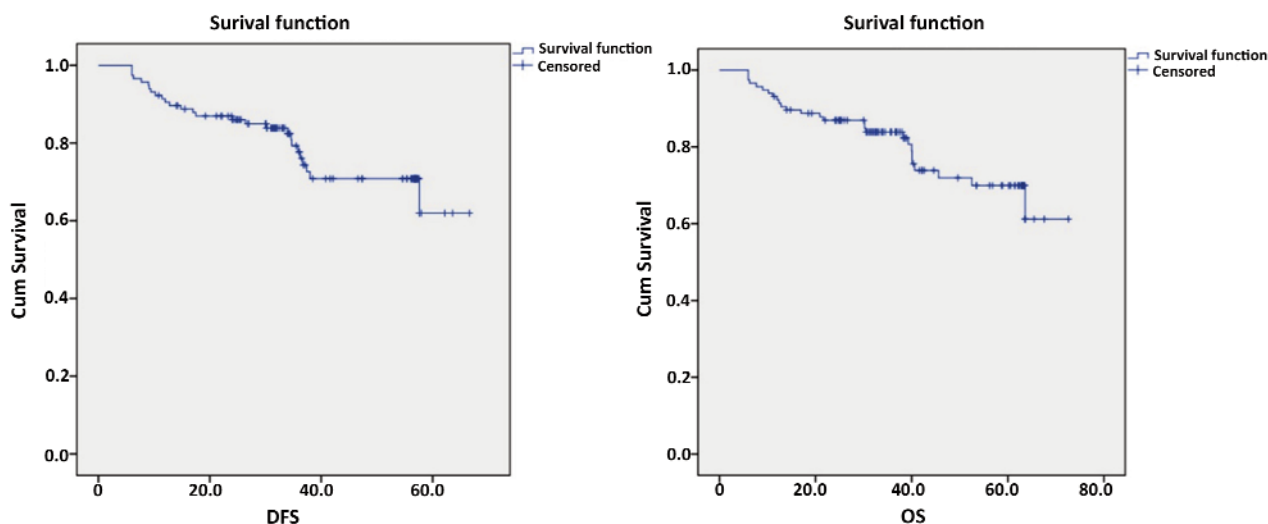


Figure 1 - Disease-free survival and overall survival

Among the 116 patients who underwent successful laparoscopic surgery, 89 were still alive at the end of the study, while 27 had died. Utilizing methods to calculate survival rates at different time points and establishing the Kaplan-Meier survival curve, we determined that the average disease-free survival time was 53.26 ± 2.21 months. The cumulative disease-free survival rates were 90.5% at 1 year, 87.0% at 2 years, 77.7% at 3 years, 70.7% at 4 years, and 62.0% at 5 years.

The average overall survival time was 58.33 ± 2.36 months, with overall survival rates of 92.2% at 1 year, 86.9% at 2 years, 83.9% at 3 years, 71.9% at 4 years, and 69.9% at 5 years. Through statistical hypothesis testing, we found that the rates of recurrence and mortality during the follow-up period after surgery were closely related to lymph node metastasis and the post-operative disease stage ($p < 0.0001$).

DISCUSSION

In recent years, scientists have established that stomach cancer is a pathological condition primarily linked to infection, with *H. pylori* being identified as a significant causative agent. However, this hypothesis is not yet universally accepted. Additional factors that may contribute to the promotion of stomach cancer include smoking, alcohol consumption, and the intake of salt-preserved foods. Diets low in fresh fruits and vegetables and high in smoked fish, salted meats, and pickled vegetables are believed to elevate the risk of stomach cancer (2,8,9).

Vietnam ranks as one of the countries with a high incidence of stomach cancer within the Asian region. According to statistics from the World Health Organization, stomach cancer in Vietnam is the fourth most common cancer in terms of incidence and the third leading cause of cancer-related deaths for both genders (1,10). Recent reports indicate that the prevalence of *H. pylori* infection among the Vietnamese population is alarmingly high, especially within school environments, ranging from 65.6% to 87.7% (11-13). This, combined with smoking habits, alcohol consumption, and a diet rich in salt and fermented foods, has contributed to the elevated incidence of stomach cancer in Vietnam. In 2020, the World Health Organization reported 17,906 new cases of stomach cancer and 14,615 deaths out of a total population of 97.58 million (1,10,14).

As a developing country in Southeast Asia, Vietnam has seen significant improvements in social life, resulting in a notable enhancement in community health awareness. Scientific and technological advancements from developed countries, including breakthroughs in medicine, have been rapidly integrated. Recent years have witnessed extensive studies on gastric cancer, focusing on microbiological characteristics, causative factors, histopathology, and genetic aspects conducted by major research centers (11,13-16). These studies indicate that gastric cancer patients in Vietnam tend to be over 50 years old, with male patients exhibiting twice the incidence rate compared to female patients. In our study, conducted on 119 patients, the average age was 59.77 years, with male

patients outnumbering female patients by more than twofold (85/34), reflecting similar trends seen in other studies within Vietnam and the region (17-19).

Noteworthy advancements in gastric cancer treatment in Vietnam include a shift from solely relying on surgical removal of the stomach to incorporating improved radiation therapy and targeted therapies. There is a strong emphasis on achieving complete resection during surgery. The use of laparoscopic surgery for gastric cancer treatment has rapidly advanced, with several studies published in international journals highlighting its efficacy (20).

In our study, the success rate of laparoscopic distal gastrectomy and D2 lymph node dissection was 97.48% (116/119 cases), with an average surgical time of 221.85 minutes, average blood loss of 98.81 ml, and an average of 21.54 lymph nodes removed. Among the 119 study participants, one case (0.92%) involved a minor complication treated laparoscopically, while three cases (2.75%) were serious complications that necessitated conversion to open surgery. Nine patients (7.76%) experienced postoperative complications, including four (3.45%) with serious complications requiring prolonged hospitalization through conversion to open surgery. Nevertheless, the surgeries were performed safely, with no postoperative deaths reported. These results align with recent reports on laparoscopic distal gastrectomy for gastric cancer (21,22). Although laparoscopic distal gastrectomy is a common surgical procedure in many countries, it remains complex and carries inherent risks of complications. With advancements in surgeons' technical skills and continuous modernization of laparoscopic surgical instruments, the efficacy and safety of laparoscopic distal gastrectomy continue to improve.

Our study stands out as one of the few in Vietnam evaluating laparoscopic gastric resection for stomach cancer with a long enough follow-up period to provide insight into survival outcomes. A study assessing survival rates for 18 common cancers across 71 countries, encompassing 37,513,025 patients, revealed that the number of gastric cancer patients included in the report was 2,019,382 adults from 294 health facilities in 62 countries. The findings indicated considerable variation in 5-year survival rates for gastric cancer patients between countries and regions. Between 2010 and 2014, the 5-year survival rate was notably high in South Korea (69%) and Japan (60%), followed by Jordan (56%) and Costa Rica. In contrast, the 5-year survival rates ranged from 30-40% in 16 countries, including Canada, the USA, and several Asian

and European nations, while survival rates below 20% were noted in countries like Chile, Ecuador, Thailand, and Bulgaria (23).

In our study, the disease-free survival rate was 77.7% after 3 years and 62.0% after 5 years. The overall survival rates were 83.9% and 69.9% after 3 and 5 years, respectively. When compared to survival rates from higher-performing countries, our findings appear comparable. However, given that our study was conducted after 2014, these conclusions should be interpreted with caution.

CONCLUSION

This multicenter study was conducted at three major hospitals in Hanoi, Vietnam. Our findings indicate that the long-term outcomes for patients with advanced stomach cancer who underwent laparoscopic distal gastrectomy are favorable. The results demonstrate that laparoscopic gastrectomy for advanced stomach cancer is effective regarding both surgical and oncological outcomes. This study provides valuable insights for readers and researchers regarding the outcomes of laparoscopic distal gastrectomy for advanced gastric cancer in a major city in Vietnam.

Conflict of interest: none.

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