

# World Journal of *Gastrointestinal Surgery*

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The primary aim of *World Journal of Gastrointestinal Surgery* (WJGS, *World J Gastrointest Surg*) is to provide scholars and readers from various fields of gastrointestinal surgery with a platform to publish high-quality basic and clinical research articles and communicate their research findings online.

WJGS mainly publishes articles reporting research results and findings obtained in the field of gastrointestinal surgery and covering a wide range of topics including biliary tract surgical procedures, biliopancreatic diversion, colectomy, esophagectomy, esophagostomy, pancreas transplantation, and pancreatectomy, *etc.*

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Retrospective Cohort Study

# Survival prognostic analysis of laparoscopic D2 radical resection for locally advanced gastric cancer: A multicenter cohort study

Xiu-Ming Sun, Kui Liu, Wen Wu, Chao Meng

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## Abstract

### BACKGROUND

With the development of minimally invasive surgical techniques, the use of laparoscopic D2 radical surgery for the treatment of locally advanced gastric cancer (GC) has gradually increased. However, the effect of this procedure on survival and prognosis remains controversial. This study evaluated the survival and prognosis of patients receiving laparoscopic D2 radical resection for the treatment of locally advanced GC to provide more reliable clinical evidence, guide clinical decision-making, optimize treatment strategies, and improve the survival rate and quality of life of patients.

### AIM

To investigate the survival prognosis and influencing factors of laparoscopic D2 radical resection for locally advanced GC patients.

### METHODS

A retrospective cohort study was performed. Clinicopathological data from 652 patients with locally advanced GC in our hospitals from December 2013 to December 2023 were collected. There were 442 males and 210 females. The mean age was  $57 \pm 12$  years. All patients underwent a laparoscopic D2 radical operation for distal GC. The patients were followed up in the outpatient department and by telephone to determine their tumor recurrence, metastasis, and survival. The follow-up period ended in December 2023. Normally distributed data are expressed as the mean  $\pm$  SD, and normally distributed data are expressed as M (Q1, Q3) or M (range). Statistical data are expressed as absolute numbers or

percentages; the  $\chi^2$  test was used for comparisons between groups, and the Mann-Whitney *U* nonparametric test was used for comparisons of rank data. The life table method was used to calculate the survival rate, the Kaplan-Meier method was used to construct survival curves, the log rank test was used for survival analysis, and the Cox risk regression model was used for univariate and multifactor analysis.

## RESULTS

The median overall survival (OS) time for the 652 patients was 81 months, with a 10-year OS rate of 46.1%. Patients with TNM stages II and III had 10-year OS rates of 59.6% and 37.5%, respectively, which were significantly different ( $P < 0.05$ ). Univariate analysis indicated that factors such as age, maximum tumor diameter, tumor differentiation grade (low to undifferentiated), pathological TNM stage, pathological T stage, pathological N stage (N2, N3), and postoperative chemotherapy significantly influenced the 10-year OS rate for patients with locally advanced GC following laparoscopic D2 radical resection for distal stomach cancer [hazard ratio (HR): 1.45, 1.64, 1.45, 1.64, 1.37, 2.05, 1.30, 1.68, 3.08, and 0.56 with confidence intervals (CIs) of 1.15-1.84, 1.32-2.03, 1.05-1.77, 1.62-2.59, 1.05-1.61, 1.17-2.42, 2.15-4.41, and 0.44-0.70, respectively;  $P < 0.05$ ]. Multifactor analysis revealed that a tumor diameter greater than 4 cm, low tumor differentiation, and pathological TNM stage III were independent risk factors for the 10-year OS rate in these patients (HR: 1.48, 1.44, 1.81 with a 95% CI: 1.19-1.84). Additionally, postoperative chemotherapy emerged as an independent protective factor for the 10-year OS rate (HR: 0.57, 95% CI: 0.45-0.73;  $P < 0.05$ ).

## CONCLUSION

A maximum tumor diameter exceeding 4 cm, low tumor differentiation, and pathological TNM stage III were identified as independent risk factors for the 10-year OS rate in patients with locally advanced GC following laparoscopic D2 radical resection for distal GC. Conversely, postoperative chemotherapy was found to be an independent protective factor for the 10-year OS rate in these patients.

**Key Words:** Gastric neoplasms; Chinese Laparoscopic Gastrointestinal Surgery Study Group; Laparoscopic surgery; Locally advanced gastric cancer; D2 lymph node dissection

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**Core Tip:** Data from multicenter patients with locally advanced gastric cancer (GC) were collected to compare the differences in survival and prognosis between laparoscopic D2 radical surgery and traditional open surgery. The contents of the study included postoperative survival rate, postoperative complication rate, postoperative recovery and quality of life. By comparing and analyzing the efficacy and safety of the two surgical methods, this study aimed to evaluate the actual effect of laparoscopic D2 radical surgery in the treatment of locally advanced GC, provide evidence for the selection of clinical surgical methods, and promote the application of minimally invasive surgical techniques in the treatment of GC.

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## INTRODUCTION

Gastric cancer (GC) is a malignant tumor with the fifth highest incidence and the fourth highest fatality rate in the world. In 2020, the number of GC deaths worldwide exceeded 760000[1-3]. Surgery is an important means of comprehensive treatment for GC[4]. The safety and long-term oncological efficacy of laparoscopy in the treatment of early (stage I) GC have been confirmed by high-level, evidence-based medical evidence[5]. Up to 80% of GC patients in China are locally advanced at first diagnosis and require more difficult D2 radical surgery. In 2009, the Chinese Laparoscopic Gastrointestinal Surgery Study Group was established in China, and in 2010, the first multicenter clinical database of laparoscopic GC surgery with the largest sample size was established in China. The CLASS-01 study began in 2012 and revealed that laparoscopic D2 radical gastrectomy had the same long-term survival benefit as open surgery for locally advanced GC[6-8]. In fact, it was better than open surgery in many ways. Laparoscopic minimally invasive surgery was recommended for the first time in the National Comprehensive Cancer Network Clinical Practice Guidelines for GC (2<sup>nd</sup> Edition, 2021) as an option for the treatment of locally advanced GC[9].

At 11 years of follow-up, a Dutch study revealed that D2 lymph node dissection did not provide any significant benefits. However, at 15 years of follow-up, D2 lymph node dissection significantly decreased the rate of local recurrence and death from GC, and the overall survival (OS) rate tended to increase.

## MATERIALS AND METHODS

### General information

A retrospective cohort study was used. The clinicopathological data of 652 patients with locally advanced GC in our hospitals in the laparoscopic GC surgery multicenter database of the CLASS research group were collected. There were 442 males and 210 females. The mean age was  $57 \pm 12$  years. The body mass index (BMI) of the 652 patients was  $21 \pm 3$  kg/m<sup>2</sup>. There were 396, 232, and 24 patients with Eastern Cooperative Oncology Group (ECOG) scores of 0, 1, and  $\geq 2$ , respectively. Of the 652 patients, 130 had preoperative comorbidities. Tumors were located in the lower part of the stomach in 517 patients and in the middle part of the stomach in 135 patients, and the patients and their families signed informed consent forms.

### Inclusion criteria

(1) Preoperative gastroscopy and postoperative histopathological examination both confirmed primary gastric adenocarcinoma; (2) Patients who had not previously undergone preoperative chemoradiotherapy or other antitumor therapies; (3) Laparoscopic-assisted radical resection of distal GC D2 or D2+ was performed; and (4) Preoperative gastroscopy and whole-abdominal enhanced computed tomography (CT) or whole-body positron emission tomography/CT were performed, and postoperative histopathological examination confirmed the diagnosis of stage II or III (stage T2N1-3M0, stage T3-4N0-3M0) GC.

### Exclusion criteria

The exclusion criteria for patients were as follows: (1) Underwent laparotomy or laparoscopic conversion to laparotomy; (2) Had a history of gastrectomy; (3) Had a history of other malignant tumors or concurrent malignant tumors; (4) Had distant metastasis before and during the operation; (5) Had a postoperative histopathological examination confirming stage T4b disease; (6) Had no R0 excision; (7) Had a postoperative survival time less than 1 month; and (8) Were lost to follow-up at the first postoperative visit.

### Treatment method

All patients underwent a laparoscopic D2 radical operation for distal GC. The surgical procedures and methods used are described in the references. For basic principles, refer to the relevant guidelines. The overall surgical principles, lymph node dissection standards, and surgical resection scope were in accordance with relevant GC guidelines and operating norms of the period, including the 2<sup>nd</sup> and 3<sup>rd</sup> editions of the GC Treatment Guidelines of the Japan GC Society and the 2007 edition of the Laparoscopic and Endoscopic Surgery Group of the Chinese Medical Association Surgery Society. The specific reconstruction method depends on the operative experience and personal preference of the surgeon. Adjuvant chemotherapy is recommended after surgery.

### Observation indices

(1) Surgical information included the following parameters: maximum tumor diameter, number of lymph node dissections, number of lymph node metastases, tumor proximal incisional margin, tumor distal incisional margin, tumor Borrmann classification, tumor pathological T stage, pathological N stage, and pathological TNM stage; (2) Follow-up information: The number of patients followed up, follow-up time, postoperative recurrence and metastasis, and overall postoperative survival were obtained; and (3) Analysis of prognostic factors included sex, age, BMI, ECOG score, intraoperative blood transfusion, complications, maximum tumor diameter, tumor location, Borrmann classification, tumor differentiation degree, pathological TNM stage, pathological T stage, pathological N stage, method of digestive tract reconstruction, lymph node dissection, proximal resection margin of tumor, distal resection margin of tumor, combined organ resection, postoperative chemotherapy, number of lymph node dissections, complications, and Clavien-Dindo grade  $\geq$  III complications.

### Evaluation criteria

Postoperative complications were assessed according to the Clavien-Dindo surgical complication grading system. The pathological TNM staging criteria refer to the 7<sup>th</sup> edition of the American Cancer Society Tumor Staging.

### Follow-up visit

The patients were followed up in the outpatient department and by telephone to determine their tumor recurrence, metastasis, and survival. The follow-up period ends in December 2023.

### Statistical analysis

SPSS 26.0 statistical software and R language software (ver. 3.4.3) were used for analysis. Normally distributed data are expressed as the mean  $\pm$  SD, and normally distributed data are expressed as M (Q1, Q3) or M. Statistical data are expressed as absolute numbers or percentages; the  $\chi^2$  test was used for comparisons between groups, and the Mann-Whitney *U* nonparametric test was used for comparisons of rank data. The Cox risk regression model was used for univariate and multivariate analyses, and  $P < 0.05$  was considered to indicate statistical significance.



## RESULTS

### Operation situation

Of the 652 patients, 617 underwent D2 lymph node dissection, and 35 underwent D2 + lymph node dissection. Billroth II anastomosis was used in 348 patients, Billroth I anastomosis in 218 patients, Roux-en-Y anastomosis in 25 patients, and other anastomoses in 61 patients. Twelve patients underwent combined organ resection (1 patient who underwent combined partial transverse colon resection, 1 patient who underwent combined partial small intestine resection, 3 patients who underwent combined gallbladder resection, and 7 patients who underwent combined gallbladder resection). There were 569 patients who received intraoperative transfusions and 83 patients who did not receive intraoperative transfusions.

### Pathological examination after the operation

The maximum tumor diameter of the 652 patients was  $4.5 \pm 2.0$  cm. There were 26 (19, 35) lymph node dissections, of which 570 were  $> 15$  and 82 were  $\leq 15$ . The number of lymph node metastases was 4 (1, 9). The proximal incisional margin of the tumor was  $4.8 \pm 1.6$  cm, and the distal incisional margin of the tumor was  $4.5 \pm 1.5$  cm. Among the 652 patients, 255 had Borrmann type I to II, 334 had Borrmann type III to IV, and 63 lacked Borrmann type data. The degree of tumor differentiation was high (medium-differentiated) in 171 patients, low (undifferentiated) in 430 patients, and absent in 51 patients. There were 123, 253, and 276 patients with T2, T3, and T4a disease in the T stage of tumor pathology; 116, 131, 214, and 191 patients with N0, N1, N2, and N3 disease in the N stage of pathology; and 260 and 392 patients with II and III diseases in the TNM stage, respectively.

### Postoperative recovery and complications

For 652 patients, the first time of getting out of bed was 3 (2, 4) days, the first time of anal exhaust was 4 (3, 5) days, the first time of eating liquid food was 5 (4, 6) days, and the postoperative hospital stay was 10 (9, 13) days. Among the 652 patients, 69 had complications after surgery. Of these, 54 had complications related to the operation, 20 had complications related to the body as a whole, and 5 had both operation-related and systemic complications.

Additionally, 60 patients had Clavien-Dindo grade I to II complications, and 3, 5, and 1 patients had Clavien-Dindo grade I to II complications. Among the patients with grade I to II complications, there were 19 cases of duodenal residual fistula, 18 cases of respiratory complications, 11 cases of gastroparesis, 6 cases of poor wound healing and bleeding, 5 cases of abdominal infection, 4 cases of chylorrhea, 3 cases of digestive tract bleeding, and 1 case each of anastomotic fistula, intestinal obstruction, and urinary system complications III.

Among the patients with Grade A complications, there were 2 cases of abdominal infection and 1 case of duodenal residual fistula, chylorrhea, or intestinal obstruction. There were 2 cases of grade IIIb complications, 2 of intestinal obstruction, 1 of anastomotic fistula, one of anastomotic stenosis, one of abdominal hemorrhage, and one of digestive tract hemorrhage; one patient with a grade A complication had a respiratory system complication. Multiple complications may be associated with the same patient. Among surgical complications and systemic complications, the most common were duodenal residual fistulas (3.07%, 20/652) and respiratory complications (2.91%, 19/652), respectively. All 69 patients were successfully cured and discharged from the hospital after treatment.

### Follow-up situation

All 652 patients were followed up for 110-193 months, and the median follow-up time was 124 months. Among the 298 patients with postoperative recurrence and metastasis, 255 patients had recurrence and metastasis  $\leq 5$  years after surgery, and 43 patients had recurrence and metastasis  $> 5$  years after surgery. There was no significant difference in the recurrence or metastasis type between the two patients ( $P > 0.05$ ). There was no significant difference between patients with distant metastasis  $\leq 5$  years and those with distant metastasis  $> 5$  years after surgery, peritoneal metastasis, local recurrence, multiple recurrence and metastasis, or recurrence and metastasis at other sites ( $P > 0.05$ ). There was a significant difference in TNM stage between patients with recurrence and metastasis  $\leq 5$  years and those with recurrence and metastasis  $> 5$  years after surgery ( $P < 0.05$ ).

There was no statistically significant difference in the pathological T stage ( $P > 0.05$ ). Further analysis revealed no statistically significant difference in the T2 stage or T3 stage of pathology between the two groups ( $P > 0.05$ ), and there was a statistically significant difference in the T4a stage between the two groups ( $P < 0.05$ ). The comparison of pathological N stages revealed statistically significant differences ( $P < 0.05$ ), as shown in Table 1.

The median OS time for the 652 patients was 81 months, with a 10-year OS rate of 46.1%. The 10-year OS rates for patients with TNM stages II and III were 59.6% and 37.5%, respectively, showing a statistically significant difference ( $\chi^2 = 35.29$ ,  $P < 0.001$ ) (Figure 1A). Further analysis revealed that the 10-year OS rates for patients with TNM stages IIA, IIB, IIIA, IIIB, and IIIC were 65.6%, 55.8%, 46.9%, 37.1%, and 24.0%, respectively ( $\chi^2 = 55.06$ ,  $P < 0.001$ ) (Figure 1B). For patients with stage T2, T3, or T4a disease, the 10-year OS rates were 55.2%, 46.5%, and 41.5%, respectively, which were significantly different ( $\chi^2 = 8.39$ ,  $P = 0.014$ ) (Figure 1C). Additionally, the 10-year OS rates for patients with stages N0, N1, N2, and N3 disease were 63.7%, 56.2%, 48.5%, and 26.4%, respectively, which were statistically significant ( $\chi^2 = 54.89$ ,  $P < 0.001$ ) (Figure 1D).

### Analysis of prognostic factors

Sex, BMI, ECOG score, intraoperative blood transfusion, comorbidities, tumor location, Borrmann classification, digestive tract reconstruction mode, lymph node dissection, proximal resection margin of the tumor, distal resection margin of the tumor, combined organ resection, number of lymph nodes dissected, complications, and Clavien-Dindo grade  $\geq$  III

**Table 1 Comparison between 298 locally advanced gastric cancer patients with the time to postoperative recurrence and metastasis  $\leq 5$  years and  $> 5$  years after laparoscopic assisted D2 radical distal gastrectomy**

Clinical pathological factors	Recurrence and metastasis within $\leq 5$ years after surgery, $n = 255$	Recurrence and metastasis after surgery $> 5$ years, $n = 43$	Statistical value	<i>P</i> value
Types of recurrence and metastasis	-	-	$\chi^2 = 5.52$	0.238
Distant metastasis	21	5	$\chi^2 = 0.53$	0.466
Peritoneal metastasis	69	9	$\chi^2 = 0.72$	0.398
Local recurrence	37	10	$\chi^2 = 2.12$	0.146
Multiple relapses and metastases	52	4	$\chi^2 = 2.9$	0.085
Recurrence and metastasis in other parts	76	15	$\chi^2 = 0.45$	0.503
Pathological TNM staging	-	-	-	-
Stage II	62	23	$\chi^2 = 15.36$	$< 0.001$
Stage III	193	20		
Pathological T-staging	-	-	$Z = -1.80$	0.07
T2	42	9	$\chi^2 = 0.52$	47
T3	95	21	$\chi^2 = 2.08$	0.150
T4a	118	13	$\chi^2 = 3.84$	0.049
Pathological N-staging	-	-	$Z = -3.34$	0.001
N0	19	12	$\chi^2 = 16.52$	$< 0.001$
N1	44	5	$\chi^2 = 0.85$	0.357
N2	85	18	$\chi^2 = 1.18$	0.277
N3	107	8	$\chi^2 = 8.47$	0.004

complications did not affect the D2 root diameter of laparoscopic distal GC patients. Factors related to the 10-year OS rate of patients with locally advanced GC after treatment were identified ( $P > 0.05$ ) (Table 2).

The results of the multifactor analysis showed that the maximum diameter of the tumor was  $> 4$  cm, and the degree of tumor differentiation was low ( $P < 0.05$ ). After laparoscopic D2 radical resection for distal GC, chemotherapy after surgery was a protective factor for an OS rate greater than 10 years for people with locally advanced GC ( $P < 0.05$ ) (Table 3).

## DISCUSSION

The findings of the GASTRIC study group show that disease-free survival can be used as a substitute for total survival in GC clinical studies, but total survival is always the gold standard for evaluating long-term oncological efficacy. The latest follow-up results from the CLASS-01 study evaluated long-term oncological outcomes using 5-year OS. Based on the above evaluation methods of domestic and foreign research groups, our team used the 10-year OS rate to evaluate the long-term oncological efficacy of this study[10-14].

The 10-year survival rates of 652 patients at corresponding stages collected in this study from December 2013 to December 2023 were 46.1%, 65.6%, 55.8%, 46.9%, 37.1%, and 24.0%, respectively, which were slightly greater than those in the above study on open GC[15]. The reason may be that this study included patients with stage T4b disease (611 patients), stage M1 disease (427 patients), and nonradical resection (631 patients), which affected the long-term survival outcome of the whole group and of patients in each stage[16]. The results of a study that included the United States SEER database and a large sample of GC patients in China showed that the 10-year OS rate of patients with GC in these two countries was 32.2%[17-20]. The above indicators were all lower than the 10-year survival rates of patients at each corresponding stage in this study. The author believes that the most likely reason is that the SEER database lacks detailed records of patients' adjuvant chemotherapy and D2 lymph node dissection, the incidence of GC is low in the United States, neoadjuvant chemotherapy is more common, and more GC patients undergo surgery with a low degree of radical treatment[21]. Therefore, some patients who did not receive adjuvant chemotherapy or standard D2 lymph node dissection were included in the study, resulting in poor long-term survival outcomes. Another Brazilian study showed that the 10-year OS rate was 30.6% in 526 patients who underwent laparotomy with D2 radical resection for GC; however, the study included 62 stage IV patients[22]. This study concluded that the inclusion of stage IV patients was the main

**Table 2 Univariate analysis of overall survival rate of locally advanced gastric cancer patients undergoing laparoscopic D2 radical distal gastrectomy**

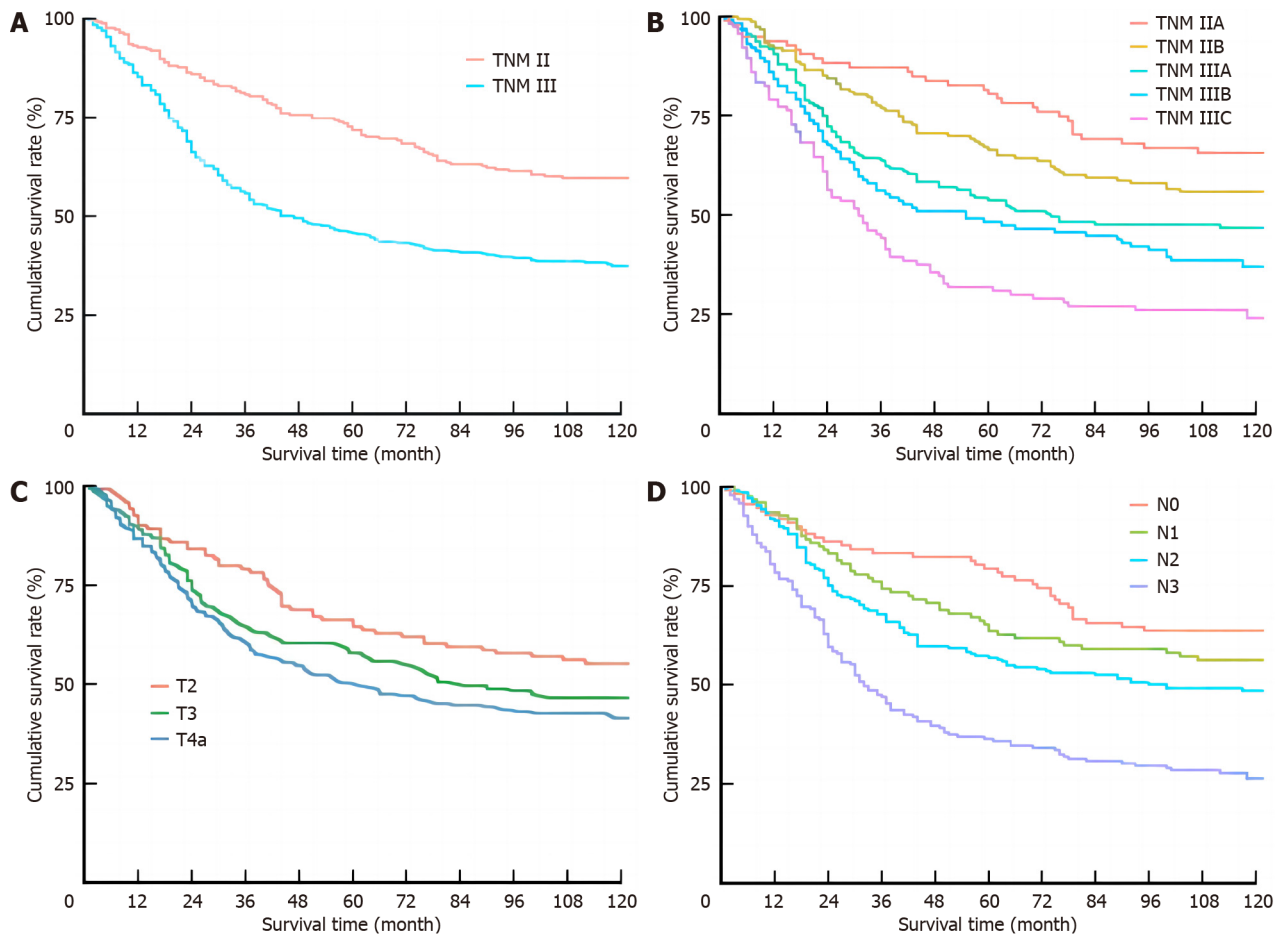
Clinical pathological factors	$\beta$ value	SE	Wald value	Hazard ratio	95%CI	P value
Sex as female/male	0.03	0.11	0.07	1.03	0.82-1.30	0.788
Age	0.37	0.12	9.58	1.45	1.15-1.84	0.002
Body mass index	-0.25	0.19	1.76	0.78	0.54-1.13	0.19
Scoring for EUSSCG	-	-	1.97	-	-	0.37
1-0	-0.04	0.12	0.09	0.97	0.77-1.21	0.77
$\geq 2$	0.36	0.28	1.71	1.44	0.84-2.47	0.19
Intraoperative blood transfusion	0.14	0.16	0.82	1.15	0.85-1.56	0.37
Hejing syndrome	0.10	0.13	0.59	1.11	0.85-1.44	0.44
Maximum diameter of the tumor in $> 4$ cm to $\leq 4$ cm	0.49	0.11	20.35	1.64	1.32-2.03	$< 0.001$
Tumor location	0.00	0.14	0.06	0.97	0.74-1.27	0.81
Remmunm typing	-	-	2.16	-	-	0.34
Type III-IV is more common than Type I-II	0.07	0.12	0.32	1.07	0.85-1.34	0.57
Unknown ratio of type I to type II	-0.23	0.21	1.22	0.80	0.53-1.19	0.27
degree of tumor differentiation	-	-	5.99	-	-	0.05
Low undifferentiated to high medium differentiated	0.31	0.13	5.57	1.37	1.05-1.77	0.02
Unknown high to medium differentiation	0.10	0.23	0.20	0.11	0.71-0.73	0.65
Pathological TNM staging	0.72	0.12	35.29	2.05	1.62-2.59	$< 0.001$
Pathological T-staging	0.26	0.11	5.69	1.30	1.05-1.61	0.02
Pathological N-staging	-	-	55.20	-	-	$< 0.001$
N1	0.26	0.21	0.48	1.30	0.85-1.97	0.22
N2	0.52	0.19	7.88	1.68	.17-2.42	0.01
N3	1.13	0.18	37.78	3.08	2.15-4.41	$< 0.001$
Gastrointestinal reconstruction methods	-	-	4.49	-	-	0.21
Billroth II matches better than Billroth I matches	0.08	0.12	0.41	1.08	0.85-1.37	0.52
Roux-en-Y matches better than Billroth I matches	0.02	0.29	0.00	1.02	0.58-1.82	0.94
Other matches better than Billroth I	0.40	0.19	4.40	1.50	1.03-2.18	0.13
Lymph node dissection	-0.17	0.24	0.46	0.85	0.53-1.36	0.94
Tumor proximal margin	0.00	0.01	0.02	1.00	0.99-1.0	0.88
Distal margin of tumor resection	0.00	0.00	0.02	1.00	0.99-1.0	0.90
Combined organ resection	0.77	0.58	1.78	2.17	0.70-6.75	0.18
Postoperative chemotherapy	-0.59	0.12	24.40	0.56	0.44-0.70	$< 0.001$
Number of lymph node dissection	0.11	0.17	0.44	1.12	0.80-1.57	0.51
Complications	0.09	0.17	0.26	0.10	0.78-1.52	0.61
Clavien-Dindo $\geq$ Grade III complications	-0.18	0.50	0.13	0.84	0.31-2.24	0.72

reason for the lower 10-year OS rate of patients who underwent laparoscopic D2 radical gastrectomy for GC.

If laparoscopic surgery is used to treat locally advanced GC, especially for pathological T4a tumors with serous membrane involvement, there is a chance that the tumor cells will spread, and the peritoneum will become implanted under the pneumoperitoneum[23]. Therefore, long-term observation of the survival, recurrence, and metastasis characteristics of patients with this type of GC after laparoscopic surgery has important clinical significance and is also the main reason why this study focused on the 10-year survival of patients with locally advanced GC in pathological TNM stages II and III. Among the 652 patients in this study, 298 had postoperative recurrence and metastasis, among which peritoneal metastasis accounted for the greatest proportion (26.17%, 78/298). Peritoneal metastasis is the most common type of postoperative recurrence of GC, which is consistent with the recurrence and metastasis reported in many traditional open

**Table 3 Multivariate analysis of overall survival rate of locally advanced gastric cancer patients undergoing laparoscopic D2 radical distal gastrectomy**

Clinical pathological factors	$\beta$ value	SE	Wald value	Hazard ratio	95%CI	P value
Ages of > 65 years to $\leq$ 65 years	0.24	0.12	3.73	1.27	0.99-1.61	0.053
Maximum diameter of the tumor of > 4 cm to $\leq$ 4 cm	0.39	0.11	12.19	1.48	1.19-1.84	< 0.001
Degree of tumor differentiation			10.08			0.006
Low undifferentiated to high medium differentiated	0.37	0.14	7.36	1.44	1.11-1.88	0.007
Unknown high to medium differentiation	-0.07	0.23	0.10	0.93	0.60-1.46	0.753
Pathological TNM staging of stage III compared to stage II	0.59	0.12	23.41	1.81	1.42-2.30	< 0.001
Postoperative chemotherapy	-0.56	0.12	20.81	0.57	0.45-0.73	< 0.001



**Figure 1 Survival outcome of laparoscopic D2 radical surgery for locally advanced gastric cancer.** A: Overall survival curve of 652 patients with locally advanced gastric cancer in pathological TNM stages II and III after laparoscopic D2 radical treatment for distal gastric cancer; B: Overall survival curve of patients with locally advanced gastric cancer at pathological TNM stage IA, IIB, IIIA, IIIB, IIIC after laparoscopic D2 radical treatment for distal gastric cancer; C: Overall survival curve of patients with T2, T3 and T4a locally advanced gastric cancer after laparoscopic D2 radical resection for distal gastric cancer; D: Overall survival curve of patients with stage N0, stage N1, stage N2 and stage N3 locally advanced gastric cancer after laparoscopic D2 radical resection for distal gastric cancer.

GC studies. In this study, 43.96% (131/298) of patients with postoperative recurrence and metastasis had stage T4a disease according to pathology[24-26]. The high incidence of recurrence and metastasis in patients with late pathological T stage disease may be the main reason for the large proportion of peritoneal metastasis cases[26-28].

No recurrence or metastasis at 5 years after radical surgery is generally considered "clinically cured." However, due to the lack of > 5 years of survival data, few studies have reported the risk and characteristics of recurrence and metastasis > 5 years after laparoscopic surgery for advanced GC[29]. In this study, 43 patients experienced recurrence or metastasis > 5 years after surgery. This suggests that even if there is no tumor survival for 5 years, regular follow-up is still necessary to

guard against tumor recurrence and metastasis. Further analysis revealed no significant difference in the incidence of GC recurrence or metastasis between the two groups[30]. However, it is worth noting that the patients who experienced recurrence and metastasis  $\leq 5$  years after surgery were mainly in pathological TNM stage III, T4a, and N3. The patients with recurrence and metastasis  $> 5$  years after surgery were mainly in TNM stages II and N0. The above results showed that patients with locally advanced GC with serous membrane involvement, more lymph node metastasis, and a later TNM stage were more likely to experience recurrence and metastasis in the early postoperative period[31]. However, patients with locally advanced GC without lymph node metastasis and an early pathological TNM stage have a greater risk of recurrence and metastasis after 5 years of survival without a tumor[32-34].

The results of the CLASS-01 study showed that the 5-year OS rates of GC patients with different pathological TNM stages in the laparoscopic group were 91% in stage A, 81% in stage B, 73% in stage A, 47% in stage B, and 28% in stage C [35]. This study investigated how long people with different pathological TNM stages had lived for 10 years. The OS rate was 65.6% for stage A, 55.8% for stage B, 46.9% for stage A, 37.1% for stage B, and 24.0% for stage C. The later the stage of the tumor was, the smaller the difference between the 5-year OS rate and the 10-year OS rate, and the more gradual the decline in the 5- to 10-year postoperative OS rate. In other words, for patients who have successfully survived for 5 years, the later the tumor stage, the greater the probability of continuing to survive for 5 years, and the less obvious the decline in survival rate after 5 to 10 years. Conditional survival can explain this phenomenon[36]. The traditional survival assessment is based on clinicopathological indicators determined at the time of diagnosis and operation and does not consider the influence of the existing survival time on the subsequent survival time[37]. Conditional survival refers to the possibility of surviving for additional years and/or months on the basis of having survived for a certain period of time, which fully considers the dynamic change in survival time and changes in survival time[38].

## CONCLUSION

Laparoscope-assisted D2 radical resection for locally advanced GC has a satisfactory 10-year oncologic effect. Patients with TNM stage III, T4a, and N3 disease had a high recurrence and metastasis ratio  $\leq 5$  years after surgery, while those with TNM stage II and N0 disease had a high recurrence and metastasis ratio  $> 5$  years after surgery. The largest tumor was more than 4 cm in size, and it was not very differentiated. The long-term oncological efficacy of laparoscopic treatment for locally advanced GC needs to be further verified by prospective randomized controlled studies with large sample sizes.

## FOOTNOTES

**Author contributions:** Sun XM wrote the manuscript; Liu K and Wu W collected the data; and Meng C guided the study. All authors reviewed, edited, and approved the final manuscript and revised it critically for important intellectual content, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work.

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## REFERENCES

- 1 **Xu Y**, Zhang R, Li C, Sun Z, Deng J, Wang X, Ding X, Wang B, Xue Q, Ke B, Zhan H, Liu N, Liu Y, Wang X, Liang H, Xue Y, Xu H. Intraperitoneal Chemotherapy Using Fluorouracil Implants Combined With Radical Resection and Postoperative Adjuvant Chemotherapy for Stage III Gastric Cancer: A Multi-Center, Randomized, Open-Label, Controlled Clinical Study. *Front Oncol* 2021; **11**: 670651 [PMID: 34307140 DOI: 10.3389/fonc.2021.670651]
- 2 **Yao Z**, Yang H, Cui M, Xing J, Zhang C, Zhang N, Chen L, Tan F, Xu K, Liu M, Su X. Clinicopathological characteristics and treatment outcome of resectable gastric cancer patients with small para-aortic lymph node. *Front Oncol* 2023; **13**: 1131725 [PMID: 36923426 DOI: 10.3389/fonc.2023.1131725]
- 3 **Yu P**, Huang X, Huang L, Dai G, Xu Q, Fang J, Ye Z, Chai T, Du Y. Hyperthermic intraperitoneal chemotherapy (HIPEC) plus systemic chemotherapy versus systemic chemotherapy alone in locally advanced gastric cancer after D2 radical resection: a randomized-controlled study. *J Cancer Res Clin Oncol* 2023; **149**: 11491-11498 [PMID: 37392201 DOI: 10.1007/s00432-023-05019-z]
- 4 **Shi JW**, Zhou Y, Wu S. Clinical efficacy and safety of adjuvant immunotherapy (Tislelizumab) plus chemotherapy vs. adjuvant chemotherapy alone in lymph node-positive patients with gastric cancer after D2 radical resection: a prospective, 2-arm, phase II study. *Eur Rev Med Pharmacol Sci* 2023; **27**: 10472-10480 [PMID: 37975371 DOI: 10.26355/eurrev\_202311\_34324]
- 5 **Wu L**, Zheng Y, Liu J, Luo R, Wu D, Xu P, Wu D, Li X. Comprehensive evaluation of the efficacy and safety of LPV/r drugs in the treatment of SARS and MERS to provide potential treatment options for COVID-19. *Aging (Albany NY)* 2021; **13**: 10833-10852 [PMID: 33879634 DOI: 10.18632/aging.202860]
- 6 **Romero-Peña M**, Suarez L, Valbuena DE, Rey Chaves CE, Conde Monroy D, Guevara R. Laparoscopic and open gastrectomy for locally advanced gastric cancer: a retrospective analysis in Colombia. *BMC Surg* 2023; **23**: 19 [PMID: 36703124 DOI: 10.1186/s12893-023-01901-2]
- 7 **Li T**, Liu G, Li J, Cui J, Wang X, Li W, Zhao Z, Zhang K, Liu T. Gastric tumorigenesis after radical resection combined with adjuvant chemotherapy for colorectal cancer: two case reports and a literature review. *J Int Med Res* 2021; **49**: 3000605211007050 [PMID: 33858250 DOI: 10.1177/03000605211007050]
- 8 **Wu L**, Liu Q, Ruan X, Luan X, Zhong Y, Liu J, Yan J, Li X. Multiple Omics Analysis of the Role of RBM10 Gene Instability in Immune Regulation and Drug Sensitivity in Patients with Lung Adenocarcinoma (LUAD). *Biomedicines* 2023; **11** [PMID: 37509501 DOI: 10.3390/biomedicines11071861]
- 9 **Ma L**, Chen G, Wang D, Zhang K, Zhao F, Tang J, Zhao J, Roe OD, He S, Liao D, Gu Y, Tao M, Shu Y, Li W, Chen X. A nomogram to predict survival probability of gastric cancer patients undergoing radical surgery and adjuvant chemotherapy. *Front Oncol* 2022; **12**: 893998 [PMID: 35992865 DOI: 10.3389/fonc.2022.893998]
- 10 **Wu L**, Li X, Qian X, Wang S, Liu J, Yan J. Lipid Nanoparticle (LNP) Delivery Carrier-Assisted Targeted Controlled Release mRNA Vaccines in Tumor Immunity. *Vaccines (Basel)* 2024; **12** [PMID: 38400169 DOI: 10.3390/vaccines12020186]
- 11 **Graversen M**, Rouvelas I, Ainsworth AP, Bjarnesen AP, Detlefsen S, Ellebaek SB, Fristrup CW, Liljefors MG, Lundell L, Nilsson M, Pfeiffer P, Tarpgaard LS, Tsekrekos A, Mortensen MB. Feasibility and Safety of Laparoscopic D2 Gastrectomy in Combination with Pressurized Intraperitoneal Aerosol Chemotherapy (PIPAC) in Patients with Gastric Cancer at High Risk of Recurrence-The PIPAC-OPC4 Study. *Ann Surg Oncol* 2023; **30**: 4433-4441 [PMID: 36867174 DOI: 10.1245/s10434-023-13278-w]
- 12 **Pachauri A**, Chaudhari V, Batra S, Ramaswamy A, Ostwal V, Engineer R, Bal M, Shrikhande SV, Bhandare MS. Pathological N3 Stage (pN3/ypN3) Gastric Cancer: Outcomes, Prognostic Factors and Pattern of Recurrences After Curative Treatment. *Ann Surg Oncol* 2022; **29**: 229-239 [PMID: 34283313 DOI: 10.1245/s10434-021-10405-3]
- 13 **Zhaoran S**, Min K, Kuanshan S, Kunfeng L, Guihe W. S-1 Combined With Apatinib and Trans-arterial Chemotherapy and Embolization for Conversion Therapy of Unresectable Locally Advanced Gastric Cancer. *J Surg Res* 2022; **270**: 162-168 [PMID: 34673305 DOI: 10.1016/j.jss.2021.09.012]
- 14 **Chen QY**, Zhong Q, Li P, Xie JW, Liu ZY, Huang XB, Lin GT, Wang JB, Lin JX, Lu J, Cao LL, Lin M, Zheng QL, Tu RH, Huang ZN, Zheng CH, Huang CM. Comparison of submucosal and subserosal approaches toward optimized indocyanine green tracer-guided laparoscopic lymphadenectomy for patients with gastric cancer (FUGES-019): a randomized controlled trial. *BMC Med* 2021; **19**: 276 [PMID: 34702260 DOI: 10.1186/s12916-021-02125-y]
- 15 **Wu L**, Li H, Liu Y, Fan Z, Xu J, Li N, Qian X, Lin Z, Li X, Yan J. Research progress of 3D-bioprinted functional pancreas and *in vitro* tumor models. *Int J Bioprinting* 2024; **10**: 1256 [DOI: 10.36922/ijb.1256]
- 16 **Wu L**, Zhong Y, Wu D, Xu P, Ruan X, Yan J, Liu J, Li X. Immunomodulatory Factor TIM3 of Cytolytic Active Genes Affected the Survival and Prognosis of Lung Adenocarcinoma Patients by Multi-Omics Analysis. *Biomedicines* 2022; **10** [PMID: 36140350 DOI: 10.3390/biomedicines10092248]
- 17 **Dai W**, Zhai ET, Chen J, Chen Z, Zhao R, Chen C, Yuan Y, Wu H, Cai S, He Y. Extensive Dissection at No. 12 Station During D2 Lymphadenectomy Improves Survival for Advanced Lower-Third Gastric Cancer: A Retrospective Study From a Single Center in Southern China. *Front Oncol* 2021; **11**: 760963 [PMID: 35087750 DOI: 10.3389/fonc.2021.760963]
- 18 **Shen J**, Zhu X, Du Y, Zhu Y, Yu P, Yang L, Xu Z, Huang L, Zhang Y, Zhang Y, Liu L, Cheng X. Adjuvant SOX chemotherapy versus concurrent chemoradiotherapy after D2 radical resection of locally advanced esophagogastric junction (EGJ) adenocarcinoma: study protocol for a randomized phase III trial (ARTEG). *Trials* 2021; **22**: 753 [PMID: 34717717 DOI: 10.1186/s13063-021-05617-7]
- 19 **Wang H**, Zhang CC, Ou YJ, Zhang LD. Ex vivo liver resection followed by autotransplantation in radical resection of gastric cancer liver metastases: A case report. *World J Clin Cases* 2021; **9**: 4221-4229 [PMID: 34141784 DOI: 10.12998/wjcc.v9.i17.4221]
- 20 **Mei Y**, Feng X, Feng T, Yan M, Zhu Z, Li T, Zhu Z. Adjuvant Chemotherapy in pT2N0M0 Gastric Cancer: Findings From a Retrospective Study. *Front Pharmacol* 2022; **13**: 845261 [PMID: 35250596 DOI: 10.3389/fphar.2022.845261]
- 21 **Tong Y**, Zhao Y, Shan Z, Zhang J. CA724 predicts overall survival in locally advanced gastric cancer patients with neoadjuvant chemotherapy. *BMC Cancer* 2021; **21**: 4 [PMID: 33402124 DOI: 10.1186/s12885-020-07666-8]
- 22 **Wu L**, Zhong Y, Yu X, Wu D, Xu P, Lv L, Ruan X, Liu Q, Feng Y, Liu J, Li X. Selective poly adenylation predicts the efficacy of immunotherapy in patients with lung adenocarcinoma by multiple omics research. *Anticancer Drugs* 2022; **33**: 943-959 [PMID: 35946526 DOI: 10.1097/CAD.0000000000001319]
- 23 **Wakahara T**, Miura S, Yasuhara Y, Mukubo H, Kanemitsu K, Iwasaki T, Sasako M. Is the ISGPS definition of pancreatic fistula applicable after gastrectomy? *Int J Clin Oncol* 2022; **27**: 1273-1278 [PMID: 35570258 DOI: 10.1007/s10147-022-02177-x]
- 24 **Wu L**, Chen X, Zeng Q, Lai Z, Fan Z, Ruan X, Li X, Yan J. NR5A2 gene affects the overall survival of LUAD patients by regulating the activity of CSCs through SNP pathway by OCLR algorithm and immune score. *Heliyon* 2024; **10**: e28282 [PMID: 38601554 DOI: 10.1016/j.heliyon.2024.100000]

- 10.1016/j.heliyon.2024.e28282]
- 25 **Zhang N**, Deng J, Sun Y, Xiao J, Li H, Liang H. An unresectable gastric cancer with bulky lymph node metastases treated with SOX chemotherapy plus apatinib followed by D3 radical gastrectomy: a case report. *Transl Cancer Res* 2021; **10**: 537-545 [PMID: 35116283 DOI: 10.21037/tcr-20-1400]
  - 26 **Wu L**, Zheng Y, Ruan X, Wu D, Xu P, Liu J, Wu D, Li X. Long-chain noncoding ribonucleic acids affect the survival and prognosis of patients with esophageal adenocarcinoma through the autophagy pathway: construction of a prognostic model. *Anticancer Drugs* 2022; **33**: e590-e603 [PMID: 34338240 DOI: 10.1097/CAD.0000000000001189]
  - 27 **Zhang X**, Zhang C, Hou H, Zhang Y, Jiang P, Zhou H, Wang L, Zhou N, Zhang X. Neoadjuvant PD-1 blockade plus chemotherapy versus chemotherapy alone in locally advanced stage II-III gastric cancer: A single-centre retrospective study. *Transl Oncol* 2023; **31**: 101657 [PMID: 36934638 DOI: 10.1016/j.tranon.2023.101657]
  - 28 **Paredes Torres O**, Prado Cucho S, Taxa Rojas L, Luque-Vasquez C, Chavez I, Payet Meza E, Ruiz Figueroa E, Berrospi Espinoza F. Clinicopathological factors associated with the presence of tumor deposits in resected gastric cancer patients. *Heliyon* 2021; **7**: e07185 [PMID: 34141939 DOI: 10.1016/j.heliyon.2021.e07185]
  - 29 **Wang K**, Yu Y, Zhao J, Meng Q, Xu C, Ren J, Zhang Y, Wang Y, Wang G. A Retrospective Analysis of the Lauren Classification in the Choice of XELOX or SOX as an Adjuvant Chemotherapy for Gastric Cancer. *Curr Gene Ther* 2024; **24**: 147-158 [PMID: 37767800 DOI: 10.2174/0115665232247694230921060213]
  - 30 **Fujimoto D**, Taniguchi K, Takashima J, Kobayashi H. Postoperative Early Body Weight Loss Is a Risk Factor for Recurrence in Patients with pStage III Gastric Cancer. *Oncology* 2023; **101**: 705-713 [PMID: 37494910 DOI: 10.1159/000532089]
  - 31 **Caruso S**, Giudicissi R, Mariatti M, Cantafio S, Paroli GM, Scatizzi M. Laparoscopic vs. Open Gastrectomy for Locally Advanced Gastric Cancer: A Propensity Score-Matched Retrospective Case-Control Study. *Curr Oncol* 2022; **29**: 1840-1865 [PMID: 35323351 DOI: 10.3390/curroncol29030151]
  - 32 **Hu CG**, Hu BE, Zhu JF, Zhu ZM, Huang C. Prognostic significance of the preoperative hemoglobin to albumin ratio for the short-term survival of gastric cancer patients. *World J Gastrointest Surg* 2022; **14**: 580-593 [PMID: 35979426 DOI: 10.4240/wjgs.v14.i6.580]
  - 33 **Cheng X**, Wu D, Xu N, Chen L, Yan Z, Chen P, Zhou L, Yu J, Cui J, Li W, Wang C, Feng W, Wei Y, Yu P, Du Y, Ying J, Xu Z, Yang L, Zhang Y. Adjuvant albumin-bound paclitaxel combined with S-1 vs. oxaliplatin combined with capecitabine after D2 gastrectomy in patients with stage III gastric adenocarcinoma: a phase III multicenter, open-label, randomized controlled clinical trial protocol. *BMC Cancer* 2021; **21**: 56 [PMID: 33435909 DOI: 10.1186/s12885-020-07772-7]
  - 34 **Wang P**, Zhou H, Han G, Ni Q, Dai S, Huang J, Dai C, Yu L. Assessment of the value of adjuvant radiotherapy for treatment of gastric adenocarcinoma based on pattern of post-surgical progression. *World J Surg Oncol* 2021; **19**: 205 [PMID: 34238296 DOI: 10.1186/s12957-021-02304-4]
  - 35 **Wu L**, Li X, Yan J. Commentary: Machine learning developed an intratumor heterogeneity signature for predicting prognosis and immunotherapy benefits in cholangiocarcinoma. *Transl Oncol* 2024; **45**: 101995 [PMID: 38789241 DOI: 10.1016/j.tranon.2024.101995]
  - 36 **Biondi A**, Agnes A, Laurino A, Moretta P, Lorenzon L, D'Ugo D, Persiani R. The definition of "R1" lymph node dissection status in patients undergoing curative-aim gastrectomy for gastric carcinoma: A proof of concept study. *Surg Oncol* 2023; **48**: 101908 [PMID: 36906935 DOI: 10.1016/j.suronc.2023.101908]
  - 37 **Yang P**, Tian Y, Tan B, Ding P, Guo H, Liu Y, Zhang Z, Li Y, Zhao Q. Clinical application of nano-carbon to improve the accuracy of lymph node staging in patients with advanced gastric cancer receiving neoadjuvant chemotherapy: a prospective randomized controlled trial. *J Gastrointest Oncol* 2021; **12**: 2052-2060 [PMID: 34790373 DOI: 10.21037/jgo-21-457]
  - 38 **Chen QY**, Xie JW, Zhong Q, Wang JB, Lin JX, Lu J, Cao LL, Lin M, Tu RH, Huang ZN, Lin JL, Zheng HL, Li P, Zheng CH, Huang CM. Safety and Efficacy of Indocyanine Green Tracer-Guided Lymph Node Dissection During Laparoscopic Radical Gastrectomy in Patients With Gastric Cancer: A Randomized Clinical Trial. *JAMA Surg* 2020; **155**: 300-311 [PMID: 32101269 DOI: 10.1001/jamasurg.2019.6033]



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