

# World Journal of *Clinical Cases*

*World J Clin Cases* 2019 November 6; 7(21): 3384-3682



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**RESPONSIBLE EDITORS FOR THIS ISSUE**

Responsible Electronic Editor: *Yan-Xia Xing*  
 Proofing Production Department Director: *Xiang Li*

**NAME OF JOURNAL**

*World Journal of Clinical Cases*

**ISSN**

ISSN 2307-8960 (online)

**LAUNCH DATE**

April 16, 2013

**FREQUENCY**

Semimonthly

**EDITORS-IN-CHIEF**

Dennis A Bloomfield, Bao-Gan Peng, Sandro Vento

**EDITORIAL BOARD MEMBERS**

<https://www.wjnet.com/2307-8960/editorialboard.htm>

**EDITORIAL OFFICE**

Jin-Lei Wang, Director

**PUBLICATION DATE**

November 6, 2019

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<https://www.wjnet.com/bpg/gerinfo/208>

**ARTICLE PROCESSING CHARGE**

<https://www.wjnet.com/bpg/gerinfo/242>

**STEPS FOR SUBMITTING MANUSCRIPTS**

<https://www.wjnet.com/bpg/GerInfo/239>

**ONLINE SUBMISSION**

<https://www.f6publishing.com>

## Current controversies in treating remnant gastric cancer: Are minimally invasive approaches feasible?

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**Author contributions:** Ma FH wrote the manuscript; Tian YT conceived the study and revised the manuscript; Liu H, Ma S, and Li Y collected the references and analyzed data; all authors approved the final version of the article.

**Supported by** National Natural Science Foundation of China, No. 81772642.

**Conflict-of-interest statement:** There are no potential conflicts of interest to report.

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**Manuscript source:** Invited manuscript

**Received:** June 26, 2019

**Peer-review started:** June 26, 2019

**First decision:** August 2, 2019

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### Abstract

The incidence of remnant gastric cancer (RGC) is still increasing. Minimally invasive approaches including endoscopic resection, laparoscopic and robotic approaches, and function-preserving gastrectomy have been utilized as curative treatment methods for primary gastric cancer. However, adhesions and anatomical alterations due to previous gastrectomy make the use of minimally invasive approaches complicated and difficult for RGC. Application of these approaches for the treatment of RGC is still controversial. Endoscopic submucosal dissection is a favorable alternative therapy for the resection of early gastric cancer that occurs in the remnant stomach and can prevent unnecessary complications. The majority of retrospective studies have shown that endoscopic submucosal dissection is an effective and oncologically safe treatment modality for RGC. Subtotal gastrectomy could serve as a function-preserving gastrectomy for patients with early RGC and improve postoperative late-phase function. However, there are only two studies that demonstrate the feasibility and oncological efficacy of subtotal gastrectomy for RGC. The non-randomized controlled trials showed that compared to open gastrectomy, laparoscopic gastrectomy for RGC led to better short-term outcomes and similar oncologic results. Because of the rarity of RGC, future multicenter studies are required to determine the indications of minimally invasive treatment for RGC.

**Key words:** Remnant gastric cancer; Minimally invasive approaches; Endoscopic submucosal dissection; Subtotal gastrectomy; Laparoscopic gastrectomy

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**Core tip:** The incidence of remnant gastric cancer (RGC) is increasing. Minimally

**Revised:** September 30, 2019**Accepted:** October 15, 2019**Article in press:** October 15, 2019**Published online:** November 6, 2019**P-Reviewer:** Kosugi S, Nishida T**S-Editor:** Zhang L**L-Editor:** Ma JY**E-Editor:** Wu YXJ

invasive approaches including endoscopic resection, laparoscopic and robotic approaches, and function-preserving gastrectomy have been utilized as curative treatment methods for RGC. The majority of recent studies have shown that endoscopic submucosal dissection is an effective and oncologically safe treatment modality for RGC. Subtotal gastrectomy could serve as a function-preserving gastrectomy for patients with early RGC and improve postoperative late-phase function. The non-randomized controlled trials demonstrated that compared to open gastrectomy, laparoscopic gastrectomy for RGC led to better short-term outcomes and similar oncologic results.

**Citation:** Ma FH, Liu H, Ma S, Li Y, Tian YT. Current controversies in treating remnant gastric cancer: Are minimally invasive approaches feasible? *World J Clin Cases* 2019; 7(21): 3384-3393

**URL:** <https://www.wjgnet.com/2307-8960/full/v7/i21/3384.htm>

**DOI:** <https://dx.doi.org/10.12998/wjcc.v7.i21.3384>

## INTRODUCTION

Gastric cancer is the fourth most common cancer worldwide and the second leading cause of cancer-related death<sup>[1,2]</sup>. Remnant gastric cancer (RGC) comprises nearly 1%–8% of all gastric neoplasms<sup>[3–5]</sup>. The incidence of RGC, however, is increasing due to advances in surgical techniques and treatment options, which have prolonged survival of patients with GC following gastrectomy<sup>[6,7]</sup>. In the past, RGC was commonly detected at an advanced stage, which resulted in low rates of curative resection and consequently poor prognoses<sup>[8,9]</sup>. Recently, an increasing number of cases have been diagnosed at an early stage after gastrectomy due to the advances in diagnostic techniques and routine periodic endoscopic surveillance<sup>[10–12]</sup>.

Minimally invasive approaches including endoscopic mucosal resection or endoscopic submucosal dissection (ESD), laparoscopic and robotic approaches, sentinel lymph node biopsy, and function-preserving gastrectomy have been utilized as curative treatment methods for primary early GC with benefits such as improved pain, reduced blood loss, and reduced length of hospital stay<sup>[13–15]</sup>. However, adhesions and anatomical alterations due to previous gastrectomy make the use of minimally invasive approaches complicated and difficult. In addition, the literature in this area is sparse, and only a few small case series have described ESD or laparoscopic gastrectomy (LG) for RGC. The aim of this review is to provide an overview, based on the recent literature, of the current knowledge related to minimally invasive treatment for RGC.

## DIVERSITY OF INITIAL DISEASE AND PREVIOUS RECONSTRUCTION METHODS

The use of gastrectomy for peptic ulcer disease has drastically declined in recent decades<sup>[16]</sup>. Although Balfour's definition of RGC was the carcinoma arising in the remnant stomach after surgery for benign disease<sup>[17]</sup>, later studies included carcinoma which was detected more than 5 years after the initial gastrectomy for GC<sup>[18]</sup>. Since the number of patients with long-term survival after gastrectomy has increased as a result of early detection and early treatment of GC, the number of patients who develop RGC following GC resection may increase<sup>[16,19]</sup>. Recently, RGC was defined by the Japanese Classifications and Treatment Guideline for Gastric Cancer (14<sup>th</sup> edition) as all carcinomas arising in the remnant stomach following gastrectomy, irrespective of the primary disease, risk of recurrence, extent of resection or reconstruction type<sup>[20]</sup>. Based on the Japanese classification definition of gastric carcinoma, the initial disease and surgery type are expanded.

Although the prevalence of GC is decreasing, the incidence of adenocarcinoma of esophagogastric junction is increasing<sup>[21]</sup>. The choice of surgical technique for treating adenocarcinoma of esophagogastric junction is controversial, but proximal gastrectomy remains an important surgical option. Proximal gastrectomy is also widely used as a function-preserving approach for early-stage proximal stomach cancer<sup>[22]</sup>. The incidence of RGC after proximal gastrectomy (PG) is increasing and thus, RGC following proximal gastrectomy may be increasingly encountered by

surgeons in the coming years<sup>[23]</sup>.

Morbid obesity has become a worldwide health problem, probably due to the changes in dietary habits and sedentary lifestyles<sup>[24]</sup>. Bariatric surgery has been growing in popularity because of its long-term effectiveness in weight loss and comorbid resolution<sup>[25]</sup>. Over the last 10 years, the number of reported RGC cases in the literature has significantly increased, probably because of the concomitant increase in Roux-en-Y gastric bypass procedures or because of previous underreporting<sup>[26]</sup>. Tornese *et al*<sup>[26]</sup> evaluated the reported incidence of RGC after Roux-en-Y gastric bypass; the real-world incidence is unknown. The incidence of RGC following Roux-en-Y gastric bypass may increase in the coming years.

## ENDOSCOPIC SUBMUCOSAL DISSECTION FOR GASTRIC STUMP CANCER

ESD is widely accepted as a treatment for early GC with a low risk of lymph node metastasis<sup>[27,28]</sup>. Traditionally, resection of the gastric stump is the standard treatment for RGC, but this method is associated with high morbidity and mortality<sup>[29]</sup>. ESD is a favorable alternative therapy for the resection of EGC that occurs in the remnant stomach and can prevent unnecessary complications. Moreover, Fukui *et al*<sup>[30]</sup> have found that complete gastrectomy does not improve survival outcomes compared with ESD, and complete gastrectomy may even adversely affect the long-term outcomes of patients with early RGC. However, performing ESD in the remnant stomach is challenging due to the narrow workspace and the presence of severe fibrosis, adhesions and staples under the suture lines<sup>[31,32]</sup>. We reviewed all published English language literature to assess the efficacy and feasibility of ESD in treating early RGC.

The incidence of lymph node metastasis in early RGC is similar to that of lymph node metastasis in primary early GC<sup>[33,34]</sup>. Lymph node metastasis of RGC is affected by the current disease stage, not by the initial disease stage. Therefore, it would be possible to apply the indications of ESD for primary GC to RGC. However, the lymphatic drainage system in the remnant stomach might be different from primary GC, and the regional lymph nodes may have already been dissected. Therefore, the indications of ESD for RGC may be different. However, only one study determined the indication of ESD for RGC. The study found that 17 patients who met the indications of ESD for primary GC had no lymph node metastases after radical gastrectomy of remnant stomach<sup>[34]</sup>.

Several retrospective studies<sup>[30,35-48]</sup> have reported that *en bloc* resection and curative resection could be achieved (Table 1). According to these studies, the *en bloc* resection rate, complete resection and curative resection rate for RGC were 88.9%-100%, 77-95% and 74.2%-93.9%, respectively. Chung *et al*<sup>[49]</sup> reported rates of *en bloc* resection, complete resection, and curative resection of 88.9%, 90% and 88%, respectively, and Suzuki *et al*<sup>[50]</sup> reported rates of *en bloc* resection and curative resection of 99.2%, and 91.6%, respectively, in the normal stomach. Perforation and delayed bleeding are the major complications of ESD. Previous studies have reported that the bleeding and perforation rates are 0-17.6% and 0-18% in ESD for RGC, respectively. Chung *et al*<sup>[49]</sup> reported bleeding and perforation rates of 8.9% and 8%, respectively, and Suzuki *et al*<sup>[50]</sup> also reported rates of 4.4% and 2.3%, respectively, in the normal stomach.

Only four studies have considered the long-term outcomes after ESD for RGC. The Nonaka *et al*<sup>[40]</sup> reported that the 5-year overall survival rate was 87.3% and the 5-year cause-specific survival rate of 100% during a median follow-up period of 4.5 years for 128 patients who underwent ESD for early RGC. Yabuuchi *et al*<sup>[47]</sup> reported that the 5-year overall and cause-specific survival rates were 88.4% and 97.6%, respectively, during a median follow-up period of 50.7 mo. Ojima *et al*<sup>[44]</sup> compared the oncologic results of ESD for early RGC with the results of ESD for early GC in normal stomachs and found that the 5-year disease-specific survival rates were 99.5% for patients with normal stomachs and 96.2% for patients with RGC. According to the pathologic results, all patients who died after receiving ESD treatments had contraindications for submucosal invasive EGC. Takeshi Yamashina *et al*<sup>[43]</sup> reported that the 3- and 5-year overall survival rates in the ESD group were 85.7% and 81.8% and were 87.5% and 75% in the gastrectomy group, respectively ( $P = 0.602$ ). The 3-year and 5-year cause-specific survival rates in the ESD group were 94.1% and 89.8%, whereas those in the gastrectomy group were 100% and 100%, respectively ( $P = 0.334$ ).

Lesions that occur on the suture line or anastomosis site are also difficult to resect *en bloc* due to fibrosis, adhesions, and staples. There have been a few reports about ESD for RGC at the staple site. Yabuuchi *et al*<sup>[47]</sup> found that the *en bloc* resection rate and intraoperative perforation rate were almost equal between the non-anastomosis or suture line group and the suture line group, whereas the *en bloc* resection rate was

Table 1 Clinical outcomes of endoscopic submucosal dissection for remnant gastric cancer

Ref.	Initial surgery	No. of ESD lesions	Suture line/anastomosis	<i>En bloc</i> resection	Complete resection	Curative resection	Complications		5-yr OS
							Bleeding	Perforation	
Takenaka <i>et al</i> <sup>[35]</sup> , 2008	DG	31	12	96.8%	NA	74.2%	0	13%	NA
Hirasaki <i>et al</i> <sup>[36]</sup> , 2008	DG	17	NA	100%	82.4%	82.4%	17.6%	0	NA
Lee <i>et al</i> <sup>[37]</sup> , 2010	DG	13	6	100%	92%	85%	0	0	NA
Hoteya <i>et al</i> <sup>[38]</sup> , 2010	Gastrectomy or EG	40	NA	NA	95.0%	80%	5.0%	2.5%	NA
Nishide <i>et al</i> <sup>[39]</sup> , 2012	Gastrectomy or EG	62	29	95%	85%	85%	8%	18%	NA
Nonaka <i>et al</i> <sup>[40]</sup> , 2013	PG/DG/PPG	139	47	94%	85%	78%	1.4%	1.4%	87.3%
Tanaka <i>et al</i> <sup>[41]</sup> , 2014	DG	33	11	100%	93.9%	93.9%	3.0%	9.1%	NA
Ojima <i>et al</i> <sup>[42]</sup> , 2014	DG/PG/Gastric conduit/Partial gastrectomy	49	8	100%	85.7%	81.6%	2%	12.2%	NA
Yamashina <i>et al</i> <sup>[43]</sup> , 2015	DG/PG	42	NA	NA	NA	NA	0	4.8%	81.8%
Ojima <i>et al</i> <sup>[44]</sup> , 2016	PG/DG/PD/EG	34	NA	100	85.3	NA	NA	NA	99.5%
Lee <i>et al</i> <sup>[45]</sup> , 2016	DG	18	9	88.9%	91.7%	91.7%	0	5.6%	NA
Song <i>et al</i> <sup>[46]</sup> , 2017	PD/DG	31	4	90%	77%	71%	6%	3%	NA
Fukui <i>et al</i> <sup>[30]</sup> , 2018	DG	80	NA	NA	NA	68%	NA	NA	NA
Yabuuchi <i>et al</i> <sup>[47]</sup> , 2019	PG/DG/PPG	157	73	95.5%	84.7%	70.9%	9.6%	11.5%	88.4%
Nomura <i>et al</i> <sup>[48]</sup> , 2018	PG/DG/PPG	138	64	NA	89.1%	77.5%	4.3%	2.2%	NA

PG: Proximal Gastrectomy; DG: Distal Gastrectomy; PPG: Pylorus Preserving Gastrectomy; EG: Esophagectomy; PD: Pancreaticoduodenectomy; NA: Not applicable; OS: Overall survival; ESD: endoscopic submucosal dissection.

lower and the intraoperative perforation rate was significantly higher in the anastomosis group than in the other two groups. Song *et al*<sup>[46]</sup> reported that the *en bloc* and complete resection rates were significantly lower for the tumor located at the suture lines comparing to the tumor not (50% vs 96%,  $P = 0.037$  and 25% vs 89%,  $P = 0.028$ ).

The majority of recent studies have shown that ESD is an effective and safe treatment modality for RGC after distal gastrectomy. However, few studies have reported the outcomes of ESD for RGC after other types of partial gastrectomy were performed. Nomura *et al*<sup>[48]</sup> investigated the clinical outcomes of ESD in the remnant stomach reconstructed after distal gastrectomy; the authors found that the incidence of lesions at the anastomosis site was significantly higher and the mean procedure duration was significantly longer after Billroth II reconstruction than after other procedures. Additionally, the curative resection rate was significantly lower after Billroth II reconstruction (50.0%) than after Billroth I reconstruction. Ojima *et al*<sup>[42]</sup> found that there were no differences in the rates of complications between patients with a normal stomach and patients with a remnant stomach after distal gastrectomy or PG. Barakat *et al*<sup>[12]</sup> compared the safety and efficacy of ESD for lesions occurring in the remnant stomach and tubular stomach and did not find a significant difference in the *en bloc*, complete, and curative resection rates. No difference in bleeding rates existed; however, there was a statistically significant difference in perforation rates between the two groups.

ESD is a feasible and oncologically safe treatment for early RGC based on the present studies. However, evidence is limited. Further multicenter studies are

required to precisely evaluate clinical outcomes of ESD in the remnant stomach.

## SUBTOTAL GASTRECTOMY FOR PATIENTS WITH REMNANT GASTRIC CANCER

Total gastrectomy (TG) combined with radical lymph node dissection has been accepted as a standard treatment for RGC. A survey in Japan revealed that TG was performed in approximately 90% of patients with resectable RGC<sup>[51]</sup>. Instead of undergoing TG, some patients with early RGC underwent partial gastrectomy as a less invasive surgery, which is based solely on the assumption that early RGC might have a low incidence of lymph node involvement. Hosokawa *et al*<sup>[52]</sup> first investigated the surgical techniques, outcomes, and postoperative quality of life of patients who underwent subtotal gastrectomy (SG) ( $n = 13$ ) or TG ( $n = 22$ ) for early RGC. The authors found that the operating time, blood transfusion, and length of hospital stay were similar between the two groups. One year after surgery, the levels of hemoglobin and total protein in the SG group were higher than those in the TG group because of the preserved stomach. In terms of long-term outcomes, no recurrence was found in the SG group during a median follow-up period of 99.2 mo. Irino *et al*<sup>[53]</sup> also reported 24 patients treated with SG. There was no significant difference in the number of lymph nodes harvested between the two groups. The 5-year overall survival rate of the SG group (94.7%) was acceptable (Table 2).

For patients with RGC, SG could serve as a function-preserving gastrectomy which is known to improve postoperative late-phase function. Although there are only two studies that demonstrate the safety of SG for RGC, we believe that this procedure would benefit selected patients with early RGC. However, whether SG is feasible for RGC not limited to the early stage is unknown. Further studies with a larger number of patients are necessary to reach a more definitive conclusion.

## LAPAROSCOPIC GASTRECTOMY FOR REMNANT GASTRIC CANCER

Randomized controlled trials (RCTs) in Eastern countries have demonstrated the benefits of LG for patients with early-stage GC, including a fast recovery and improved quality of life<sup>[54,55]</sup>. The fourth edition of the Japanese Gastric Cancer Association guideline considers laparoscopy-assisted distal gastrectomy as a treatment option for clinical stage I cancer<sup>[56]</sup>. The RCTs have also demonstrated that laparoscopic distal gastrectomy with D2 lymph node dissection for locally advanced GC is safe and associated with a lower complication rate, faster recovery, and less pain than open surgery<sup>[57,58]</sup>. However, LG has not generally been indicated in patients with RGC in the early era of laparoscopic surgery because of the adhesions to the adjacent organs, alterations of the anatomical structures and changes in the lymphatic flow caused by previous gastrectomy which make the laparoscopic surgery complicated and difficult. Yamada *et al*<sup>[59]</sup> reported the use of LG for RGC in a patient who had undergone a previous Billroth II reconstruction first in 2005. Since then, several other similar reports of using LG for RGC have been published sporadically. However, the number of cases reported remains small because RGC is rare. The safety and feasibility of using laparoscopic approaches to treat RGC are still unclear. The evidence for the oncologic safety of LG is currently limited. Therefore, we reviewed all published English language literature on LG for RGC to better characterize the technical aspects of the currently used procedures (Table 3). Recently, ten non-RCT studies with a small series of patients compared the perioperative results of LG for RGC with those of open gastrectomy (OG)<sup>[60-69]</sup>.

All studies comparing the operating time between OG and LG reported that LG required more time than OG, even though the difference was not statistically significant in five out of the ten studies<sup>[64-66,68,69]</sup>. However, LG was associated with lower intraoperative blood loss than OG in six of the ten studies<sup>[60,61,65,66,68,69]</sup>. The number of resected lymph nodes was reported in all non-RCTs and case studies. There were also no significant differences in the number of lymph nodes harvested between LG and OG in 9 out of the ten studies. Only one study found that the number of retrieved lymph nodes was significantly larger in the LG group than in the OG group ( $22 \pm 13$  vs  $12 \pm 9$ , respectively;  $P = 0.03$ )<sup>[68]</sup>. The number of harvested lymph nodes is occasionally used as an indicator of the quality of oncological gastrectomy. Compared to the open approach, LG harvested a similar number of lymph nodes at least, if not more. A laparoscopic approach provides a magnified view of the anatomy

Table 2 Clinical outcomes of subtotal gastrectomy for remnant gastric cancer

Ref.	Type of procedure	No. of patients	Operating time (min)	Blood loss (mL)	Retrieved lymph node	Hospital stay	Complications	Follow-up (mo)	Recurrence/5-yr OS
Hosokawa <i>et al</i> <sup>[52]</sup> , 2014	SG	13	174 ± 53.0	381 ± 372	NA	17.8 ± 8.7	23.10%	99.2	0
	TG	22	200 ± 59.8	597 ± 489	NA	18.6 ± 7.1	27.30%	57.2	1
Irinio <i>et al</i> <sup>[53]</sup> , 2014	SG	24	NA	NA	18.5 (0–46)	NA	29%	36	94.10%
	TG	42	NA	NA	16.5 (3–86)	NA	14%	32	67.30%

NA: Not applicable; OS: Overall survival.

of the abdominal cavity, could illuminate landmarks for surgeons for optimal lymphadenectomy and potentially help reveal more lymph nodes and reduce intraoperative blood loss<sup>[70]</sup>.

In terms of the postoperative complication rate, five of the ten studies reported a 6.5%–23.3% risk reduction with LG compared to that of OG<sup>[60,62,64,65,68]</sup>. The remaining five studies showed unfavorable results from the laparoscopic approach in terms of the postoperative mortality rate, although the result was not statistically significant<sup>[61,63,66,67,69]</sup>. LG was also associated with a significantly shorter postoperative hospital stay than OG, as shown in one of the non-RCTs.

In terms of oncological outcomes, long-term clinical outcomes were reported by five studies. All studies indicated comparable 5-year survival rates between the LG and OG groups. Son *et al*<sup>[61]</sup> reported that the 5-year survival rate of the LG group was 66.6%, which was similar to the rate of 66.7% in the OG group. Nagai *et al*<sup>[60]</sup> found that the overall 5-year survival rate was 77.8% in the LG group and 72.9% in the OG group. Kwon *et al*<sup>[62]</sup> found that the 5-year survival rates of the LG group and OG group were also similar (94.9% *vs* 100%, respectively). Nakaji *et al*<sup>[62]</sup> found that the 5-year overall survival (OS) of LG and OG were 81% and 60.6%, respectively. The 5-year OS of RGC was different among the studies, which may result from the different stages of disease in each study. However, these results remain inconclusive due to the short follow-up time (21 to 39.1 mo). Therefore, further studies with longer follow-up periods are required to confirm the long-term oncologic outcomes of LG and to establish LG as a standard treatment option for RGC.

Some cases required an open conversion because of severe adhesions or bleeding. However, few reports have investigated the open conversion rate of LG for RGC. Three studies reported a 5.6%–47.1% conversion rate to OG. Liao *et al*<sup>[71]</sup> found that Billroth I reconstruction, previous open surgery and surgeon experience were the factors significantly associated with conversion to open surgery. Booka *et al*<sup>[66]</sup> reported that 2 out of the 8 patients who required an open conversion had previously undergone OG and Billroth I reconstruction, and the authors found that neither patient experienced any postoperative complications; the open conversion was safely performed in the presence of severe adhesions. The conversion to OG during LG is an unavoidable phenomenon in a number of patients. More data about the effects of conversion in comparison to those of open surgery are needed.

The evidence concerning locally advanced RGC is scarce. Luo *et al*<sup>[65]</sup> reported 18 patients with locally advanced (T2–4N0–3M0, stage II–III) RGC who underwent hand-assisted laparoscopic ( $n = 9$ ) or open surgery ( $n = 9$ ) and found that hand-assisted LC had several advantages, including small incisions, mild intraoperative hemorrhage, fast postoperative recovery, and few postoperative complications. However, Sasako showed their results at 13<sup>th</sup> International Gastric Cancer Congress and believed that LG did not benefit locally advanced RGC because of the lack of tactile sensation with LG, making it difficult to discriminate severe adhesions and to judge the depth of tumor invasion. The author believed that the left kidney needs to be mobilized from the retroperitoneum to obtain a good view.

The present non-RCTs demonstrated that compared to OG, LG for RGC led to better short-term outcomes and similar oncologic results. Although LG for RGC is technically complex, this method is technically feasible, can be performed safely, and has the advantages of a minimally invasive technique. However, further studies are required to draw any conclusions about the significance of LG for RGC because the number of cases was too small.

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Table 3 Clinical outcomes of laparoscopic surgery for remnant gastric cancer

Ref.	Type of procedure	No. of patients	Conversion to open surgery	Operative time (min)	Blood loss	Retrieved lymph-node	Postoperative hospital stay	Complications	Follow-up (mo)	5-yr OS
Nagai et al <sup>[61]</sup> , 2014	LG	12	0	362.3 ± 68.4	68.5 ± 62 g	23.7 ± 10.7	11.3 ± 2.8	0	39.1 ± 20.5	77.80%
	OG	10	NA	270.5 ± 94.9	746.3 ± 577.1 g	15.7 ± 7.6	24.9 ± 10	20%	62.7 ± 39.8	72.90%
Son et al <sup>[61]</sup> , 2015	LG	17	47.10%	234.4 ± 65.2	227.6 ± 245.0 mL	18.8 ± 12.3	9.3 ± 3.2	35.20%	23.6	66.70%
	OG	17	NA	170.0 ± 39.5	184.1 ± 123.1 mL	22.3 ± 14.4	9.3 ± 3.1	29.40%	37.3	60.30%
Kwon et al <sup>[62]</sup> , 2014	LG	18 <sup>a</sup>	5.60%	266.2 ± 77.2	182.2 ± 188.7 mL	8	6	33.30%	25.2	94.90%
	OG	58	NA	203.3 ± 52.2	193.1 ± 227.6 mL	7	9	44.80%		100%
Kim et al <sup>[63]</sup> , 2014	LG	17	0	197.2 ± 60.6	NA	NA	11.1 ± 8.7	30%	NA	NA
	OG	50	NA	149.3 ± 46.9	NA	NA	13.8 ± 9.4	23.50%	NA	NA
Tsunoda et al <sup>[64]</sup> , 2016	LG	10	0	324.5 ± 42.8	55 g	22.4 ± 15.8	12.5 ± 2.9	10	NA	NA
	OG	6	NA	289	893 g	7	24	33.30%	NA	NA
Luo et al <sup>[65]</sup> , 2015	LG	9	0	221.1 ± 19.5	105.5 ± 35.04 mL	16.2 ± 3	NA	11.10%	NA	NA
	OG	9	NA	212.9 ± 14.3	147.7 ± 41.92 mL	16.7 ± 3.3	NA	22.20%	NA	NA
Booka et al <sup>[66]</sup> , 2019	LG	8	25%	307.5 ± 56.0	135.5 ± 181.2 mL	8.8 ± 4.6	10.6 ± 3.7	37.50%	NA	NA
	OG	23	NA	295.8 ± 81.7	568.3 ± 446.4 mL	6.0 ± 6.9	21.3 ± 37.3	26.10%	NA	NA
Nakaji et al <sup>[67]</sup> , 2019	LG	4	0	455	158 mL	15	15	50%	NA	94%
	OG	18	NA	293	625 mL	11	16	27.80%	NA	NA
Otsuka et al <sup>[68]</sup> , 2019	LG	7	0	364 ± 95	70 ± 71 g	22 ± 13	13 ± 5	28.60%	NA	NA
	OG	20	NA	309 ± 104	1066 ± 1428 g	12 ± 9	27 ± 21	50%	NA	NA
Kaihara et al <sup>[69]</sup> , 2019	LG	6	17%	310.5	50 mL	7	9	50%	21	88%
	OG	15	NA	263	465 mL	3	9	33%		60.60%

<sup>a</sup>Ten laparoscopic gastrectomy, eight robotic gastrectomy. LG: Laparoscopic Gastrectomy; OG: Open Gastrectomy; NA: Not applicable; OS: Overall survival.

## CONCLUSION

Because of the rarity of RGC, reports about minimally invasive approaches for RGC are sporadic. Based on those limited evidence, we could conclude ESD, SG and LG are feasible to treat early RGC. As for LG for locally advanced RGC, the evidence is scarce. Therefore, it is of most importance that the surveillance system to detect early diseases should be established. Future multicenter studies are required to determine the indications of minimally invasive treatment for RGC and provide concrete evidence.

## REFERENCES

- 1 Jemal A, Bray F, Center MM, Ferlay J, Ward E, Forman D. Global cancer statistics. *CA Cancer J Clin* 2011; **61**: 69-90 [PMID: 21296855 DOI: 10.3322/caac.20107]
- 2 Van Cutsem E, Sagaert X, Topal B, Haustermans K, Prenen H. Gastric cancer. *Lancet* 2016; **388**: 2654-2664 [PMID: 27156933 DOI: 10.1016/S0140-6736(16)30354-3]
- 3 Irino T, Hiki N, Ohashi M, Nunobe S, Tokunaga M, Sano T, Yamaguchi T. Characteristics of gastric stump cancer: A single hospital retrospective analysis of 262 patients. *Surgery* 2016; **159**: 1539-1547 [PMID: 26879072 DOI: 10.1016/j.surg.2016.01.003]
- 4 Sinning C, Schaefer N, Standop J, Hirner A, Wolff M. Gastric stump carcinoma - epidemiology and current concepts in pathogenesis and treatment. *Eur J Surg Oncol* 2007; **33**: 133-139 [PMID: 17071041 DOI: 10.1016/j.ejso.2006.09.006]
- 5 Mezhir JJ, Gonen M, Ammori JB, Strong VE, Brennan MF, Coit DG. Treatment and outcome of patients

- with gastric remnant cancer after resection for peptic ulcer disease. *Ann Surg Oncol* 2011; **18**: 670-676 [PMID: 21063791 DOI: 10.1245/s10434-010-1425-1]
- 6 **Fujita T**, Gotohda N, Takahashi S, Nakagohri T, Konishi M, Kinoshita T. Relationship between the histological type of initial lesions and the risk for the development of remnant gastric cancers after gastrectomy for synchronous multiple gastric cancers. *World J Surg* 2010; **34**: 296-302 [PMID: 20012285 DOI: 10.1007/s00268-009-0325-7]
  - 7 **Chen QY**, Zhong Q, Zhou JF, Qiu XT, Dang XY, Cai LS, Su GQ, Xu DB, Liu ZY, Li P, Guo KQ, Xie JW, Chen QX, Wang JB, Li TW, Lin JX, Lin SM, Lu J, Cao LL, Lin M, Tu RH, Huang ZN, Lin JL, Lin W, He QL, Zheng CH, Huang CM. Development and External Validation of Web-Based Models to Predict the Prognosis of Remnant Gastric Cancer after Surgery: A Multicenter Study. *J Oncol* 2019; **2019**: 6012826 [PMID: 31093283 DOI: 10.1155/2019/6012826]
  - 8 **Di Leo A**, Pedrazzani C, Bencivenga M, Coniglio A, Rosa F, Morgani P, Marrelli D, Marchet A, Cozzaglio L, Giacomuzzi S, Tiberio GA, Doglietto GB, Vittimberga G, Roviello F, Ricci F. Gastric stump cancer after distal gastrectomy for benign disease: clinicopathological features and surgical outcomes. *Ann Surg Oncol* 2014; **21**: 2594-2600 [PMID: 24639193 DOI: 10.1245/s10434-014-3633-6]
  - 9 **Komatsu S**, Ichikawa D, Okamoto K, Ikoma D, Tsujiura M, Nishimura Y, Murayama Y, Shiozaki A, Ikoma H, Kuriu Y, Nakanishi M, Fujiwara H, Ochiai T, Kokuba Y, Otsuji E. Progression of remnant gastric cancer is associated with duration of follow-up following distal gastrectomy. *World J Gastroenterol* 2012; **18**: 2832-2836 [PMID: 22719193 DOI: 10.3748/wjg.v18.i22.2832]
  - 10 **Fukui Y**, Shinohara H. ASO Author Reflections: Endoscopic Management Will Be an Effective Treatment Option for Early Remnant Gastric Cancer, Similar to Primary Gastric Cancer. *Ann Surg Oncol* 2018; **25**: 743-744 [PMID: 30324484 DOI: 10.1245/s10434-018-6907-6]
  - 11 **Nozaki I**, Kurita A, Nasu J, Kubo Y, Aogi K, Tanada M, Takashima S. Higher incidence of gastric remnant cancer after proximal than distal gastrectomy. *Hepatogastroenterology* 2007; **54**: 1604-1608 [PMID: 17708311]
  - 12 **Barakat M**, Seif M, Abdelfatah MM, Ofosu A, Carr-Locke DL, Othman MO. Endoscopic submucosal dissection for early neoplastic lesions in the surgically altered stomach: a systematic review and meta-analysis. *Surg Endosc* 2019; **33**: 2381-2395 [PMID: 30963259 DOI: 10.1007/s00464-019-06778-y]
  - 13 **Koeda K**, Nishizuka S, Wakabayashi G. Minimally invasive surgery for gastric cancer: the future standard of care. *World J Surg* 2011; **35**: 1469-1477 [PMID: 21476116 DOI: 10.1007/s00268-011-1051-5]
  - 14 **Caruso S**, Patrìti A, Roviello F, De Franco L, Franceschini F, Coratti A, Ceccarelli G. Laparoscopic and robot-assisted gastrectomy for gastric cancer: Current considerations. *World J Gastroenterol* 2016; **22**: 5694-5717 [PMID: 27433084 DOI: 10.3748/wjg.v22.i25.5694]
  - 15 **Hu J**, Zhao Y, Ren M, Li Y, Lu X, Lu G, Zhang D, Chu D, He S. The Comparison between Endoscopic Submucosal Dissection and Surgery in Gastric Cancer: A Systematic Review and Meta-Analysis. *Gastroenterol Res Pract* 2018; **2018**: 4378945 [PMID: 29670651 DOI: 10.1155/2018/4378945]
  - 16 **Hanyu T**, Wakai A, Ishikawa T, Ichikawa H, Kameyama H, Wakai T. Carcinoma in the Remnant Stomach During Long-Term Follow-up After Distal Gastrectomy for Gastric Cancer: Analysis of Cumulative Incidence and Associated Risk Factors. *World J Surg* 2018; **42**: 782-787 [PMID: 28924721 DOI: 10.1007/s00268-017-4227-9]
  - 17 **Balfour DC**. FACTORS INFLUENCING THE LIFE EXPECTANCY OF PATIENTS OPERATED ON FOR GASTRIC ULCER. *Ann Surg* 1922; **76**: 405-408 [PMID: 17864703 DOI: 10.1097/00000658-192209000-00014]
  - 18 **Takeno S**, Hashimoto T, Maki K, Shibata R, Shiwaku H, Yamana I, Yamashita R, Yamashita Y. Gastric cancer arising from the remnant stomach after distal gastrectomy: a review. *World J Gastroenterol* 2014; **20**: 13734-13740 [PMID: 25320511 DOI: 10.3748/wjg.v20.i38.13734]
  - 19 **Ohashi M**, Morita S, Fukagawa T, Kushima R, Katai H. Surgical treatment of non-early gastric remnant carcinoma developing after distal gastrectomy for gastric cancer. *J Surg Oncol* 2015; **111**: 208-212 [PMID: 25175816 DOI: 10.1002/jso.23774]
  - 20 **Sano T**, Aiko T. New Japanese classifications and treatment guidelines for gastric cancer: revision concepts and major revised points. *Gastric Cancer* 2011; **14**: 97-100 [PMID: 21573921 DOI: 10.1007/s10120-011-0040-6]
  - 21 **Masuzawa T**, Takiguchi S, Hirao M, Imamura H, Kimura Y, Fujita J, Miyashiro I, Tamura S, Hiratsuka M, Kobayashi K, Fujiwara Y, Mori M, Doki Y. Comparison of perioperative and long-term outcomes of total and proximal gastrectomy for early gastric cancer: a multi-institutional retrospective study. *World J Surg* 2014; **38**: 1100-1106 [PMID: 24310733 DOI: 10.1007/s00268-013-2370-5]
  - 22 **Ma FH**, Xue LY, Chen YT, Li WK, Li Y, Kang WZ, Xie YB, Zhong YX, Xu Q, Tian YT. Surgical resection of gastric stump cancer following proximal gastrectomy for adenocarcinoma of the esophagogastric junction. *World J Gastrointest Oncol* 2019; **11**: 416-423 [PMID: 31139311 DOI: 10.4251/wjgo.v11.i5.416]
  - 23 **Iwata Y**, Ito S, Misawa K, Ito Y, Komori K, Abe T, Shimizu Y, Tajika M, Niwa Y, Yoshida K, Kinoshita T. Incidence and treatment of metachronous gastric cancer after proximal gastrectomy. *Surg Today* 2018; **48**: 552-557 [PMID: 29460126 DOI: 10.1007/s00595-018-1632-0]
  - 24 **Hurt RT**, Kulisek C, Buchanan LA, McClave SA. The obesity epidemic: challenges, health initiatives, and implications for gastroenterologists. *Gastroenterol Hepatol (N Y)* 2010; **6**: 780-792 [PMID: 21301632]
  - 25 **Torres-Landa S**, Kannan U, Guajardo I, Pickett-Blakely OE, Dempsey DT, Williams NN, Dumon KR. Surgical management of obesity. *Minerva Chir* 2018; **73**: 41-54 [PMID: 29243457 DOI: 10.23736/S0026-4733.17.07588-5]
  - 26 **Tornese S**, Aiolfi A, Bonitta G, Rausa E, Guerrazzi G, Bruni PG, Micheletto G, Bona D. Remnant Gastric Cancer After Roux-en-Y Gastric Bypass: Narrative Review of the Literature. *Obes Surg* 2019; **29**: 2609-2613 [PMID: 31001760 DOI: 10.1007/s11695-019-03892-7]
  - 27 **Tanabe S**, Ishido K, Matsumoto T, Kosaka T, Oda I, Suzuki H, Fujisaki J, Ono H, Kawata N, Oyama T, Takahashi A, Doyama H, Kobayashi M, Uedo N, Hamada K, Toyonaga T, Kawara F, Tanaka S, Yoshifuku Y. Long-term outcomes of endoscopic submucosal dissection for early gastric cancer: a multicenter collaborative study. *Gastric Cancer* 2017; **20**: 45-52 [PMID: 27807641 DOI: 10.1007/s10120-016-0664-7]
  - 28 **Fujishiro M**, Yoshida S, Matsuda R, Narita A, Yamashita H, Seto Y. Updated evidence on endoscopic resection of early gastric cancer from Japan. *Gastric Cancer* 2017; **20**: 39-44 [PMID: 27704225 DOI: 10.1007/s10120-016-0647-8]
  - 29 **Kwon IG**, Cho I, Choi YY, Hyung WJ, Kim CB, Noh SH. Risk factors for complications during surgical treatment of remnant gastric cancer. *Gastric Cancer* 2015; **18**: 390-396 [PMID: 24705942 DOI: 10.1007/s10120-015-0389-2]

- 10.1007/s10120-014-0369-8]
- 30 **Fukui Y**, Shindoh J, Inoshita N, Mizuno A, Haruta S, Udagawa H, Hoteya S, Tsunoda S, Miyamoto S, Ozawa R, Niwa H, Sakai Y, Shinohara H. Efficacy of Endoscopic Management for Early Remnant Gastric Cancer: Is Completion Gastrectomy Truly Necessary in Cases with Marginally Noncurative Histopathologic Features? *Ann Surg Oncol* 2018; **25**: 1608-1615 [PMID: 29633096 DOI: 10.1245/s10434-018-6407-8]
- 31 **Kim SM**. Clinical outcomes of endoscopic submucosal dissection for early gastric cancer in the remnant stomach after gastrectomy. *Ann Gastroenterol* 2014; **27**: 85-86 [PMID: 24714593]
- 32 **Pham DV**, Shah A, Borao FJ, Gorcey S. Endoscopic submucosal dissection training with ex vivo human gastric remnants. *Surg Endosc* 2014; **28**: 222-226 [PMID: 23996336 DOI: 10.1007/s00464-013-3164-4]
- 33 **Gotoda T**, Yanagisawa A, Sasako M, Ono H, Nakanishi Y, Shimoda T, Kato Y. Incidence of lymph node metastasis from early gastric cancer: estimation with a large number of cases at two large centers. *Gastric Cancer* 2000; **3**: 219-225 [PMID: 11984739]
- 34 **Choi YY**, Kwon IG, Lee SK, Kim HK, An JY, Kim HI, Cheong JH, Mliwa RT, Shin SK, Lee YC, Hyung WJ, Noh SH. Can we apply the same indication of endoscopic submucosal dissection for primary gastric cancer to remnant gastric cancer? *Gastric Cancer* 2014; **17**: 310-315 [PMID: 23695167 DOI: 10.1007/s10120-013-0265-7]
- 35 **Takenaka R**, Kawahara Y, Okada H, Tsuzuki T, Yagi S, Kato J, Ohara N, Yoshino T, Imagawa A, Fujiki S, Takata R, Nakagawa M, Mizuno M, Inaba T, Toyokawa T, Sakaguchi K. Endoscopic submucosal dissection for cancers of the remnant stomach after distal gastrectomy. *Gastrointest Endosc* 2008; **67**: 359-363 [PMID: 18226704 DOI: 10.1016/j.gie.2007.10.021]
- 36 **Hirasaki S**, Kanzaki H, Matsubara M, Fujita K, Matsumura S, Suzuki S. Treatment of gastric remnant cancer post distal gastrectomy by endoscopic submucosal dissection using an insulation-tipped diathermic knife. *World J Gastroenterol* 2008; **14**: 2550-2555 [PMID: 18442204 DOI: 10.3748/wjg.14.2550]
- 37 **Lee JY**, Choi JJ, Cho SJ, Kim CG, Kook MC, Lee JH, Ryu KW, Kim YW. Endoscopic submucosal dissection for metachronous tumor in the remnant stomach after distal gastrectomy. *Surg Endosc* 2010; **24**: 1360-1366 [PMID: 19997930 DOI: 10.1007/s00464-009-0779-6]
- 38 **Hoteya S**, Iizuka T, Kikuchi D, Yahagi N. Clinical advantages of endoscopic submucosal dissection for gastric cancers in remnant stomach surpass conventional endoscopic mucosal resection. *Dig Endosc* 2010; **22**: 17-20 [PMID: 20078659 DOI: 10.1111/j.1443-1661.2009.00912.x]
- 39 **Nishide N**, Ono H, Kakushima N, Takizawa K, Tanaka M, Matsubayashi H, Yamaguchi Y. Clinical outcomes of endoscopic submucosal dissection for early gastric cancer in remnant stomach or gastric tube. *Endoscopy* 2012; **44**: 577-583 [PMID: 22402983 DOI: 10.1055/s-0031-1291712]
- 40 **Nonaka S**, Oda I, Makazu M, Haruyama S, Abe S, Suzuki H, Yoshinaga S, Nakajima T, Kushima R, Saito Y. Endoscopic submucosal dissection for early gastric cancer in the remnant stomach after gastrectomy. *Gastrointest Endosc* 2013; **78**: 63-72 [PMID: 23566640 DOI: 10.1016/j.gie.2013.02.006]
- 41 **Tanaka S**, Toyonaga T, Morita Y, Fujita T, Yoshizaki T, Kawara F, Wakahara C, Obata D, Sakai A, Ishida T, Ikehara N, Azuma T. Endoscopic submucosal dissection for early gastric cancer in anastomosis site after distal gastrectomy. *Gastric Cancer* 2014; **17**: 371-376 [PMID: 23868403 DOI: 10.1007/s10120-013-0283-5]
- 42 **Ojima T**, Takifuji K, Nakamura M, Nakamori M, Katsuda M, Iida T, Hayata K, Iwahashi M, Yamaue H. Endoscopic submucosal dissection for gastric tumors in various types of remnant stomach. *Endoscopy* 2014; **46**: 645-649 [PMID: 24777426 DOI: 10.1055/s-0034-1365454]
- 43 **Yamashina T**, Uedo N, Dainaka K, Aoi K, Matsuura N, Ito T, Fujii M, Kanesaka T, Yamamoto S, Akasaka T, Hanaoka N, Takeuchi Y, Higashino K, Ishihara R, Kishi K, Fujiwara Y, Iishi H. Long-term survival after endoscopic resection for early gastric cancer in the remnant stomach: comparison with radical surgery. *Ann Gastroenterol* 2015; **28**: 66-71 [PMID: 25608929]
- 44 **Ojima T**, Takifuji K, Nakamura M, Nakamori M, Yamaue H. Long-term Survival of Patients With Endoscopic Submucosal Dissection for Remnant Gastric Cancers. *Surg Laparosc Endosc Percutan Tech* 2016; **26**: 78-81 [PMID: 26679685 DOI: 10.1097/SLE.0000000000000233]
- 45 **Lee JY**, Min BH, Lee JG, Noh D, Lee JH, Rhee PL, Kim JJ. Endoscopic Submucosal Dissection for Early Gastric Neoplasia Occurring in the Remnant Stomach after Distal Gastrectomy. *Clin Endosc* 2016; **49**: 182-186 [PMID: 26879552 DOI: 10.5946/ce.2015.049]
- 46 **Song BG**, Kim GH, Lee BE, Jeon HK, Baek DH, Song GA. Endoscopic Submucosal Dissection of Gastric Epithelial Neoplasms after Partial Gastrectomy: A Single-Center Experience. *Gastroenterol Res Pract* 2017; **2017**: 6395283 [PMID: 28592968 DOI: 10.1155/2017/6395283]
- 47 **Yabuuchi Y**, Kakushima N, Takizawa K, Tanaka M, Kawata N, Yoshida M, Kishida Y, Ito S, Imai K, Ishiwatari H, Hotta K, Matsubayashi H, Ono H. Short- and long-term outcomes of endoscopic submucosal dissection for early gastric cancer in the remnant stomach after gastrectomy. *J Gastroenterol* 2019; **54**: 511-520 [PMID: 30413872 DOI: 10.1007/s00535-018-1528-1]
- 48 **Nomura K**, Hoteya S, Kikuchi D, Inoshita N, Iizuka T. Utility of Endoscopic Submucosal Dissection in the Remnant Stomach and Clinical Outcomes for Different Reconstruction Methods. *Digestion* 2018; **1-8** [PMID: 30485848 DOI: 10.1159/000495346]
- 49 **Chung IK**, Lee JH, Lee SH, Kim SJ, Cho JY, Cho WY, Hwangbo Y, Keum BR, Park JJ, Chun HJ, Kim HJ, Kim JJ, Ji SR, Seol SY. Therapeutic outcomes in 1000 cases of endoscopic submucosal dissection for early gastric neoplasms: Korean ESD Study Group multicenter study. *Gastrointest Endosc* 2009; **69**: 1228-1235 [PMID: 19249769 DOI: 10.1016/j.gie.2008.09.027]
- 50 **Suzuki H**, Takizawa K, Hirasawa T, Takeuchi Y, Ishido K, Hoteya S, Yano T, Tanaka S, Endo M, Nakagawa M, Toyonaga T, Doyama H, Hirasawa K, Matsuda M, Yamamoto H, Fujishiro M, Hashimoto S, Maeda Y, Oyama T, Takenaka R, Yamamoto Y, Naito Y, Michida T, Kobayashi N, Kawahara Y, Hirano M, Jin M, Hori S, Niwa Y, Hikichi T, Shimazu T, Ono H, Tanabe S, Kondo H, Iishi H, Ninomiya M; Ichiro Oda for J-WEB/EGC group. Short-term outcomes of multicenter prospective cohort study of gastric endoscopic resection: 'Real-world evidence' in Japan. *Dig Endosc* 2019; **31**: 30-39 [PMID: 30058258 DOI: 10.1111/den.13246]
- 51 **Tanigawa N**, Nomura E, Lee SW, Kaminishi M, Sugiyama M, Aikou T, Kitajima M; Society for the Study of Postoperative Morbidity after Gastrectomy. Current state of gastric stump carcinoma in Japan: based on the results of a nationwide survey. *World J Surg* 2010; **34**: 1540-1547 [PMID: 20182716 DOI: 10.1007/s00268-010-0505-5]
- 52 **Hosokawa Y**, Konishi M, Sahara Y, Kinoshita T, Takahashi S, Gotohda N, Kato Y, Kinoshita T. Limited subtotal gastrectomy for early remnant gastric cancer. *Gastric Cancer* 2014; **17**: 332-336 [PMID: 23832238 DOI: 10.1007/s10120-013-0280-8]

- 53 **Irino T**, Hiki N, Nunobe S, Ohashi M, Tanimura S, Sano T, Yamaguchi T. Subtotal gastrectomy with limited lymph node dissection is a feasible treatment option for patients with early gastric stump cancer. *J Gastrointest Surg* 2014; **18**: 1429-1433 [PMID: 24944156 DOI: 10.1007/s11605-014-2576-3]
- 54 **Katai H**, Mizusawa J, Katayama H, Takagi M, Yoshikawa T, Fukagawa T, Terashima M, Misawa K, Teshima S, Koeda K, Nunobe S, Fukushima N, Yasuda T, Asao Y, Fujiwara Y, Sasako M. Short-term surgical outcomes from a phase III study of laparoscopy-assisted versus open distal gastrectomy with nodal dissection for clinical stage IA/IB gastric cancer: Japan Clinical Oncology Group Study JCOG0912. *Gastric Cancer* 2017; **20**: 699-708 [PMID: 27718137 DOI: 10.1007/s10120-016-0646-9]
- 55 **Kim W**, Kim HH, Han SU, Kim MC, Hyung WJ, Ryu SW, Cho GS, Kim CY, Yang HK, Park DJ, Song KY, Lee SI, Ryu SY, Lee JH, Lee HJ; Korean Laparo-endoscopic Gastrointestinal Surgery Study (KLASS) Group. Decreased Morbidity of Laparoscopic Distal Gastrectomy Compared With Open Distal Gastrectomy for Stage I Gastric Cancer: Short-term Outcomes From a Multicenter Randomized Controlled Trial (KLASS-01). *Ann Surg* 2016; **263**: 28-35 [PMID: 26352529 DOI: 10.1097/SLA.0000000000001346]
- 56 **Japanese Gastric Cancer Association**. Japanese gastric cancer treatment guidelines 2014 (ver. 4). *Gastric Cancer* 2017; **20**: 1-19 [PMID: 27342689 DOI: 10.1007/s10120-016-0622-4]
- 57 **Hu Y**, Huang C, Sun Y, Su X, Cao H, Hu J, Xue Y, Suo J, Tao K, He X, Wei H, Ying M, Hu W, Du X, Chen P, Liu H, Zheng C, Liu F, Yu J, Li Z, Zhao G, Chen X, Wang K, Li P, Xing J, Li G. Morbidity and Mortality of Laparoscopic Versus Open D2 Distal Gastrectomy for Advanced Gastric Cancer: A Randomized Controlled Trial. *J Clin Oncol* 2016; **34**: 1350-1357 [PMID: 26903580 DOI: 10.1200/JCO.2015.63.7215]
- 58 **Lee HJ**, Hyung WJ, Yang HK, Han SU, Park YK, An JY, Kim W, Kim HI, Kim HH, Ryu SW, Hur H, Kong SH, Cho GS, Kim JJ, Park DJ, Ryu KW, Kim YW, Kim JW, Lee JH, Kim MC; Korean Laparo-endoscopic Gastrointestinal Surgery Study (KLASS) Group. Short-term Outcomes of a Multicenter Randomized Controlled Trial Comparing Laparoscopic Distal Gastrectomy With D2 Lymphadenectomy to Open Distal Gastrectomy for Locally Advanced Gastric Cancer (KLASS-02-RCT). *Ann Surg* 2019 [PMID: 30829698 DOI: 10.1097/SLA.0000000000003217]
- 59 **Yamada H**, Kojima K, Yamashita T, Kawano T, Sugihara K, Nihei Z. Laparoscopy-assisted resection of gastric remnant cancer. *Surg Laparosc Endosc Percutan Tech* 2005; **15**: 226-229 [PMID: 16082311]
- 60 **Nagai E**, Nakata K, Ohuchida K, Miyasaka Y, Shimizu S, Tanaka M. Laparoscopic total gastrectomy for remnant gastric cancer: feasibility study. *Surg Endosc* 2014; **28**: 289-296 [PMID: 24013469 DOI: 10.1007/s00464-013-3186-y]
- 61 **Son SY**, Lee CM, Jung DH, Lee JH, Ahn SH, Park DJ, Kim HH. Laparoscopic completion total gastrectomy for remnant gastric cancer: a single-institution experience. *Gastric Cancer* 2015; **18**: 177-182 [PMID: 24477417 DOI: 10.1007/s10120-014-0339-1]
- 62 **Kwon IG**, Cho I, Guner A, Choi YY, Shin HB, Kim HI, An JY, Cheong JH, Noh SH, Hyung WJ. Minimally invasive surgery for remnant gastric cancer: a comparison with open surgery. *Surg Endosc* 2014; **28**: 2452-2458 [PMID: 24622766 DOI: 10.1007/s00464-014-3496-8]
- 63 **Kim HS**, Kim BS, Lee IS, Lee S, Yook JH, Kim BS. Laparoscopic gastrectomy in patients with previous gastrectomy for gastric cancer: a report of 17 cases. *Surg Laparosc Endosc Percutan Tech* 2014; **24**: 177-182 [PMID: 24686356 DOI: 10.1097/SLE.0b013e31828f6bfb]
- 64 **Tsunoda S**, Okabe H, Tanaka E, Hisamori S, Harigai M, Murakami K, Sakai Y. Laparoscopic gastrectomy for remnant gastric cancer: a comprehensive review and case series. *Gastric Cancer* 2016; **19**: 287-292 [PMID: 25503677 DOI: 10.1007/s10120-014-0451-2]
- 65 **Luo GD**, Chen BH, Cao YK, Gong JQ, Tang SH, Li YM. Hand-assisted laparoscopic versus open radical resection of gastric remnant cancer: a clinical comparison. *Int J Clin Exp Med* 2015; **8**: 21152-21158 [PMID: 26885048]
- 66 **Booka E**, Kaihara M, Mihara K, Nishiya S, Handa K, Ito Y, Shibutani S, Egawa T, Nagashima A. Laparoscopic total gastrectomy for remnant gastric cancer: A single-institution experience. *Asian J Endosc Surg* 2019; **12**: 58-63 [PMID: 29745474 DOI: 10.1111/ases.12495]
- 67 **Nakaji YU**, Saeki H, Kudou K, Nakanishi R, Sugiyama M, Nakashima Y, Ando K, Oda Y, Oki E, Maehara Y. Short- and Long-term Outcomes of Surgical Treatment for Remnant Gastric Cancer After Distal Gastrectomy. *Anticancer Res* 2019; **39**: 1411-1415 [PMID: 30842176 DOI: 10.21873/anticancer.13256]
- 68 **Otsuka R**, Hayashi H, Sakata H, Uesato M, Hayano K, Murakami K, Kano M, Fujishiro T, Toyozumi T, Semba Y, Matsubara H. Short-term clinical outcomes of laparoscopic gastrectomy for remnant gastric cancer: A single-institution experience and systematic review of the literature. *Ann Gastroenterol Surg* 2018; **3**: 181-186 [PMID: 30923787 DOI: 10.1002/ags3.12221]
- 69 **Kaihara M**, Matsuda S, Booka E, Saida F, Takashima J, Kasai H, Mihara K, Nagashima A, Egawa T. Laparoscopic completion gastrectomy in elderly patients with remnant gastric cancer: a case series. *Surg Case Rep* 2019; **5**: 63 [PMID: 31001749 DOI: 10.1186/s40792-019-0610-0]
- 70 **Kanaya S**, Haruta S, Kawamura Y, Yoshimura F, Inaba K, Hiramatsu Y, Ishida Y, Taniguchi K, Isogaki J, Uyama I. Video: laparoscopy distinctive technique for suprapancreatic lymph node dissection: medial approach for laparoscopic gastric cancer surgery. *Surg Endosc* 2011; **25**: 3928-3929 [PMID: 21660629 DOI: 10.1007/s00464-011-1792-0]
- 71 **Liao G**, Wen S, Xie X, Wu Q. Laparoscopic gastrectomy for remnant gastric cancer: Risk factors associated with conversion and a systematic analysis of literature. *Int J Surg* 2016; **34**: 17-22 [PMID: 27543820 DOI: 10.1016/j.ijssu.2016.08.013]



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