Safety of Laparoscopy-assisted Distal Gastrectomy in Patients Aged 75 Years or More

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Abstract

Objective: To determine whether Laparoscopy-Assisted Distal Gastrectomy (LADG) is suitable for treatment of gastric cancer in elderly patients, we conducted a retrospective study to examine the safety and outcomes of LADG performed in elderly patients at our hospital.

Patients and Methods: Included in the study were 68 patients (15 aged ≥ 75 years and 53 aged < 75 years) who underwent LADG at our hospital. We compared patients' characteristics (age, sex, and body mass index [BMI]), physical status as defined by the American Society of Anesthesiologists (ASA-PS), medical history, whether endoscopic submucosal dissection (ESD) had been performed previously; surgical factors (operation time, blood loss volume, length of hospital stay, extent of dissection, number of lymph nodes dissected, anastomosis method, time to first flatus, time to first stool, complications); and pathologic factors (tumor location, tumor presence, invasion depth, lymph node metastasis).

Results: Mean age of the elderly patients was 79.8 years (75–86 years). Mean BMI was 18.4 (14.3–22.2) kg/m². Three elderly patients were classified into ASA-PS 3, and hypertension was common in the elderly group. The mean duration of surgery was 193.2 (125–290) minutes, and the mean blood loss volume was 52 (4–263) mL. Mean time to first flatus and first stool were 3.0 (2–5) days and 5.3 (4–8) days, respectively. The mean hospital stay was 18.4 (8–48) days. Complications included 1 pancreatic fistula and 1 stenosis associated with an anastomotic ulcer. The mean number of lymph nodes dissected was 33.1 (15–61), and there were 3 cases of lymph node metastasis. Only BMI and the incidence of previous ESD differed between the elderly patients and younger patients.

Conclusion: We conclude on the basis of our study findings that laparoscopy-assisted distal gastrectomy can be performed safely in patients aged 75 years and older (just as it is in patients under 75 years of age), as long as patient selection is properly carried out.

Key words

elderly, laparoscopy-assisted distal gastrectomy

Introduction

The number of elderly patients with gastric cancer has been increasing in recent years¹⁾. Preoperative comorbidities and postoperative complications are quite common in these patients²⁾, making minimally invasive and safe treatments desirable. Laparoscopy-

assisted distal gastrectomy (LADG) is now an established, minimally invasive treatment for early gastric cancer³⁾. In an effort to determine whether LADG is suitable for treatment of gastric cancer in elderly patients, we conducted a retrospective study to examine the safety and outcomes of LADG performed in elderly patients at our hospital. The study was approved

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by the St. Marianna University School of Medicine ethics committee (Approval No. 3260).

Patients and Methods

Included in our study were 68 patients who underwent LADG at our hospital and were identified through a search of hospital records spanning September 2008 through March 2016. To assess the safety of LADG in elderly patients, we first divided the 68 patients into 2 groups: those aged ≥ 75 years (Group A, $n=15$) and those aged <75 years (Group B, $n=53$).

To achieve our study goal, we accessed the clinical records of patients in both groups for the following information: their basic clinical characteristics, namely age, sex, body mass index (BMI), American Society of Anesthesiologists physical status (ASA-PS score), and medical history, including previous endoscopic submucosal dissection (ESD) in particular; surgical factors, namely, operation time, total blood loss volume, length of the hospital stay, extent of dissection, number of lymph nodes dissected, method of anastomosis, time to first flatus, time to first stool, and any complications; and pathologic factors, namely, tumor location, whether all surgical specimens contained tumor, invasion depth, and any lymph node metastasis. In addition, postoperative complications were evaluated on the basis of the Clavien-Dindo classification system. Complications included in the analysis were those of grade 2 or higher. All study variables were compared between the 2 groups of patients. Because all patients had been screened for any heart, lung, or kidney disorder that would have ruled out surgery, we assumed there were no between-group differences in indicators of heart, lung, or kidney function and thus did not include these variables in the analysis.

Indications for and performance of LADG

At our hospital, the indication for LADG is cT1cN0, cT1cN1, or cT2N0 disease in the middle or lower third of the stomach. We perform lymph node dissection in accordance with the Japanese Gastric Cancer Treatment Guidelines⁴⁾. The surgery is performed through 5 ports. The laparoscope is placed in an umbilical port, and dissection is performed within the peritoneal cavity. However, resection and anastomosis are performed through an incision approximately 4 cm in length (minilaparotomy) and placed in the epigastric region. Either a Billroth I (B-I) anastomosis is created by means of a hemi-double sta-

pling technique or a Roux-en-Y (R-Y) anastomosis is created. The surgeries performed for patients in both groups were done by surgeons who were certified by the Japan Society for Endoscopic Surgery.

Statistical analyses

Mean (and range) values or numbers of patients are shown. Between-group differences in continuous variables were analyzed by Student's *t*-test, and differences in categorical variables were analyzed by χ^2 test. $P < 0.05$ was considered significant.

Results

Patients' clinical characteristics (Table 1)

Age of patients was 79.8 (75–86) years in Group A and 59.8 (36–74) years in Group B. The male:female sex ratio was 8:7 in Group A and 26:27 in Group B and did not differ significantly between the 2 groups. BMI, at 18.4 kg/m² (18.4–22.2) in Group A and 20.8 kg/m² (14.7–27.8) in Group B, did differ significantly. ASA-PS scores did not differ significantly between the 2 groups, but we noted that 3 patients (20%) in Group A had an ASA-PS score of 3, including 1 patient who suffered a previous myocardial infarction and 2 patients who had undergone surgery for an abdominal aortic aneurysm, and 3 patients (5.6%) in Group B had an ASA-PS score of 3. Patients' medical histories, including the presence of diabetes mellitus, did not differ significantly between the 2 groups. Twelve patients (80%) in group A and 34 patients (64%) in group B had been treated previously for other clinical disorders, the most common being hypertension, with 6 patients (40%) in Group A and 10 patients (18%) in Group B being hypertensive. Five patients (33%) in Group A and 11 patients in Group B (20%) had undergone abdominal surgery. Neither these medical issues nor others that were noted differed significantly between the 2 groups. Five patients (33%) in Group A and 5 patients (9%) in Group B had previously undergone ESD, with a history of ESD being significantly more prevalent in Group A.

Surgical factors (Table 2)

Operation time was 193.2 (125–290) minutes in Group A and 215.1 (142–320) minutes in Group B and did not differ significantly. Blood loss volume was 52 (4–263) mL in Group A and 85.2 (8–450) mL in Group B, and the difference was not significant. The extent of dissection was D1 in 12 patients (80%) in Group A and 42 patients (79%) in group B. The

Table 1. Patient Characteristics Per Study Group

	Group A n=15	Group B n=53	P-value
Age (years)	79.8 (75–86)	59.8 (36–74)	<0.0001
Sex ratio (M:F)	8:7	26:27	0.77
BMI (kg/ m ²)	18.4 (14.3 - 22.2)	20.8 (14.7 - 27.8)	0.0007
ASA-PS (1/2/3)	8/4/3	39/11/3	0.20
	12	34	
Hypertension	6	10	0.16
Dyslipidemia	3	7	0.67
Cardiovascular disease	1	2	0.46
Abdominal surgery	5	11	0.31
Cerebrovascular disease	1	3	1.00
Diabetes mellitus	0	5	0.57
Gastric ulcer	0	7	0.33
Previous ESD	5	5	0.03

Group A=patients aged ≥ 75 years; Group B=patients aged > 75 years;
 BMI=body mass index; ASA-PS=American Society of Anesthesiologists physical status; ESD=endoscopic submucosal dissection.

Table 2. Surgical Factors Per Study Group

	Group A (n=15)	Group B (n= 53)	P-value
Operation time (minutes)	193.2 (125–290)	215.1 (142–320)	0.08
Blood loss volume (mL)	52 (4–263)	85.2 (8–450)	0.16
Hospital stay (days)	18.4 (8–48)	18.3 (7–110)	0.99
Extent of dissection (D1, D2)	12/3	42/11	1
No. of lymph nodes dissected	33.1 (15–61)	36.6 (7–67)	0.34
Anastomosis method (BI/RY)	14/1	50/3	1
Time to first flatus (days)	3 (2–5)	3.3 (1–7)	0.17
Time to stool (days)	5.3 (4–8)	5.2 (2–9)	0.9
Complications (yes/no)	2/13	9/44	1

Mean $\pm$ SD (and range) values or numbers of patients are shown.

Group A=patients aged ≥ 75 years; Group B=patients aged > 75 years; BI=Billroth I;
 RY=Roux-en-Y.

number of lymph nodes dissected was 33.1 (15–61) in Group A and 36.6 (7–67) in Group B. The anastomotic method was B-I in 14 (93%) Group A patients and 50 (94%) Group B patients and R-Y in 1 (6.6%) Group A patient and 3 (5.6%) Group B patients. None of these factors differed significantly between the 2 groups. Time to first flatus was 3.0 (2–5) days in Group A and 3.3 (1–7) days in Group B; time to first stool was 5.3 (4–8) days and 5.2 (2–9) days, respectively. Hospital stay was 18.4 (8–48) days in Group A and 18.3 (7–110) days in Group B. None of these factors differed significantly between the 2 groups. Complications occurred in 2 patients (13%) in Group A and 9 patients (16%) in Group B, without a significant difference between them.

Pathologic factors (Table 3)

The tumor was located in the middle third of the stomach in 8 (53%) patients in Group A and in the lower third in 7 (47%) patients. The tumor was located in the middle third in 30 (57%) patients in Group B and in the lower third in 23 (43%) patients. No invasion to the subserosa or serosa was observed in either group. There was no N2 or N3 metastasis in either group, and there was no significant between-group difference in the incidence of lymph node metastasis. No residual tumor was found in any patient in Group A or Group B who had previously undergone ESD.

Complications (Table 4)

Of the complications that occurred, none dif-

Table 3. Pathologic Factors Per Study Group

	Group A n=15	Group B n=53	P-value
Tumor location (M/L)	8:7	30/23	1
No tumor	5	5	0.03
Invasion depth (M/SM/MP/SS/SE)	7/1/2/0/0	19/19/10/0/0	0.55
Lymph node metastasis (N0/N1/N2/N3)	12/3/0/0	45/8/0/0	0.45

Numbers of patients are shown.

Group A=patients aged ≥ 75 years; Group B=patients aged > 75 years; M=middle third of the stomach; L=lower third of the stomach; M/SM/MP/SS/SE=mucosa/submucosa/muscularis propria/subserosa/serosa

Table 4. Complications Per Study Group

	Group A n=15	Group B n=53	P-value
Anastomotic leakage	0	4	0.93
Anastomotic stenosis	1	1	0.39
Pancreatic fistula	1	2	0.23
Intra-abdominal abscess	0	1	0.53
Intestinal obstruction	0	1	0.53
SSI	0	2	0.79

Numbers of patients are shown.

Group A=patients aged ≥ 75 years; Group B=patients aged > 75 years; SSI=surgical site infection.

ferred significantly between the 2 groups of patients. There was no anastomotic leakage in Group A, and there were only 4 (7.5%) cases of anastomotic leakage in Group B. Anastomotic stenosis occurred only in 1 (6.6%) Group A patient and 1 (1.8%) Group B patient. Pancreatic fistula occurred in 1 (6.6%) Group A patient and 2 (3.7%) Group B patients. Intra-abdominal abscess did not occur in Group A and was seen in only 1 (1.8%) Group B patient. Intestinal obstruction also did not occur in Group A and occurred only in 1 (1.8%) Group B patient. Surgical-site infection, which was noted in 2 (3.7%) Group B patients, did not occur in Group A. Thus, complications occurred primarily in Group B, none required repeat surgery, and all resolved with conservative treatment. There were no surgical deaths.

Discussion

According to the Practice Guidelines on Endoscopic Surgery, laparoscopic gastrectomy is currently indicated for gastric diseases, even in elderly patients, but the decision to perform laparoscopic gastrectomy should be based on the surgeon's skill level⁵. The safety and efficacy of laparoscopic gastrectomy for

elderly patients have not been fully established. LADG was first reported for treatment of early gastric cancer in 1991⁶, and subsequent studies have shown that, in comparison to open gastrectomy, laparoscopic gastrectomy reduces postoperative pain, shortens the postoperative hospital stay, and reduces respiratory dysfunction⁷. Thereafter, LADG came into widespread use throughout the country, and according to the 12th questionnaire-based survey of endoscopic surgeons conducted by the Japan Society for Endoscopic Surgery in 2014 conducted by the Japan Society for Endoscopic Surgery, 6744 LADGs were performed in 2013⁸. Japan is confronted with the challenges of an aging society, and we believe it will be impossible to avoid performing laparoscopic surgeries in elderly patients.

Elderly patients often have a history of health problems. In fact, according to data gathered by Lee et al.⁹, 60.3% of elderly patients have a significant medical history. We did not find a statistical difference in the medical histories of our elderly and younger patients. However, a large number of our Group A patients (n=12, 80%) did have previous or current medical problems that were clinically signifi-

cant. The most common involved the cardiovascular system, with such disorders as hypertension and dyslipidemia affecting 10 patients (66%). No respiratory diseases were noted. Lee et al.⁹⁾ also reported that cardiovascular and respiratory disorders were likely to have been screened for to same extent when patients were introduced to the Department of Surgery. Five (33%) patients in Group A and 11 (20%) patients in Group B had undergone previous abdominal surgery. However, many of the previous surgeries were appendectomies, and there were no conversions from laparoscopy to laparotomy. As noted above, previous ESD was significantly more prevalent in Group A than in Group B. The ESDs performed in our Group A patients would have been under extended indications, with the age of these patients first taken into consideration.

In terms of the surgical factors, Oki et al.¹⁰⁾ reported no significant difference in blood loss volume, operation time, or hospital stay. However, Lee et al.⁹⁾ reported a significant difference in the degree of lymph node dissection, which resulted in a significantly reduced operation time in elderly patients. We found no significant difference in the numbers of lymph nodes dissected, the extent of dissection, or the duration of surgery, although the surgery took longer in our Group B patients. We believe this was due to the fact that BMI was significantly higher in Group B than in Group A, and the blood loss volume was slightly, though not significantly, greater in Group B. The fact that there were no significant between-group differences in the time to first flatus, time to first stool, and hospital stay indicates to us that the quality of LADG is maintained when performed in patients aged 75 years or more.

When we looked at the safety of LADG in terms of complications, we found no anastomotic leakage in our elderly patients (Group A), whereas we found 4 cases in our younger patients (Group B), and we found only 1 case of anastomotic stenosis and associated ulcer and 1 case of pancreatic fistula among our elderly patients, but these issues were resolved with conservative treatment. The reported incidence of anastomotic leakage is 1.2⁷⁾. The incidence among our Group B patients was higher, but no repeat surgery was performed for any of the 4 patients; conservative treatment was all that was needed. B-I anastomosis (with hemi-double stapling) was performed in all 4 of these patients, and we believe that the anastomotic leaks occurred in areas where there were overlapping linear staples. All 4 patients had diabetes

mellitus, but preoperative and postoperative blood glucose control was good, so we cannot say that the diabetes mellitus contributed to the anastomotic leakage. There were also no complications affecting the cardiovascular or respiratory system. We believe that the elderly patients referred to us for LADG were very carefully selected, with their disease condition, medical status, and age all taken into consideration.

Yasuda et al.¹¹⁾, Mochiki et al.¹²⁾, Kunisaki et al.¹³⁾, and Cho et al.¹⁴⁾ also reported no significant differences in complication rates, reinforcing the notion that laparoscopic gastrectomy is safe for elderly patients.

In terms of pathologic factors, there was no invasion to the subserosa or serosa in either of our patient groups and there were no cases of N2 or N3 lymph node metastasis. Thus, we believe that the indications for LADG at our hospital are generally valid and suitable for patients of all ages.

Based on the 2014 Gastric Cancer Treatment Guidelines, LADG is indicated for early gastric cancer⁴⁾. Early detection is part of this picture, and for this reason, we believe screening examinations are important. Currently, there are demands for increasing the percentage of screening examinations performed in Japan, and over the past few years, screening examination have been on the rise. For gastric cancer alone, the mean national examination rate was 30.2% in 2007 32.3% in 2010, and 39.6% in 2013. However, the current target is 50%. By age group, the rates are highest at 40.1% for persons aged 50–54 and considerably lower at 28.8% for those aged 75–79 years¹⁵⁾. The screening examination rate is believed to be highest among individuals in their 50s because these individuals have a high level of health awareness. We presume that these patients will continue with screening as they continue to age. If the health check-up rate increases, the detection of early gastric cancer will also increase, and we predict that the number of patients eligible for ESD or LADG will increase accordingly. Thus, minimally invasive and safe surgery will continue to be important for elderly patients in Japan, a country with an aging society.

Conclusion

We conclude on the basis of our study findings that laparoscopy-assisted distal gastrectomy can be performed safely in patients aged 75 years and older (just as it is in patients under 75 years of age), as long as patient selection is properly carried out.

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