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Original Article

Relevance of Totally Laparoscopic Gastrectomy for Patients with Advanced Gastric Cancer

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Abstract

Purpose : Although the use of laparoscopic gastrectomy for gastric cancer has been widespread, it has remained controversial whether it can be applied for the patients with advanced gastric cancer. The aim of this study was to clarify the safety and usefulness of totally laparoscopic gastrectomy for patients with advanced gastric cancer.

Patients and Methods : Totally laparoscopic gastrectomy was applied for a total of 38 patients with pStage IB–III advanced gastric cancer at our institute. The surgical and long-term results were analyzed in those patients.

Results : Twenty-seven patients underwent distal gastrectomy and 11 patients underwent total gastrectomy. The mean number of dissected lymph nodes was 41 (range, 16–87). The mean length of the operation and amount of blood loss was 324 min and 123 ml, respectively. Two cases of postoperative bleeding were noted, while neither anastomosis-related complications nor in-hospital death was observed. The follow-up period after surgery was 8–72 months. Postoperative recurrence was observed in 6 patients (peritoneal dissemination : 3 patients, pleural dissemination : 1 patient, liver metastasis : 1 patient, ovarian metastasis : 1 patient). The overall survival rates at 1, 3 and 5 years were 94.7%, 76.3% and 76.3%, respectively.

Conclusion : Totally laparoscopic gastrectomy is safe and can lead to satisfactory long-term outcomes in cases of advanced gastric cancer. Prospective controlled studies are warranted to confirm our findings.

Key words : Laparoscopic gastrectomy · Advanced gastric cancer · Less invasive surgery · Complication · Prognosis

Introduction

Although the annual incidence of mortality from gastric cancer has been decreasing yearly worldwide, gastric cancer is still the second

leading cause of cancer-related death¹⁾²⁾. Chemotherapy and molecular targeting therapy for gastric cancer have recently made progress, however radical gastrectomy with regional lymph node dissection remains the only potentially

curative treatment available for advanced gastric cancer.

Laparoscopic gastrectomy has undergone rapid development and gained popularity in the past 20 years since the first reported case³. The surgical techniques and technologies associated with laparoscopic surgeries have markedly advanced⁴⁻⁷. Compared to traditional open gastrectomy, previous studies have reported that laparoscopic gastrectomy contributes to a faster recovery, better cosmetic outcomes and a better postoperative quality of life⁸⁻¹⁰.

Laparoscopic surgery is currently being regarded as a treatment of choice for early gastric cancer, while its application for advanced gastric cancer has not achieved universal acceptance because of its uncertain oncological safety, particularly from the standpoint of sufficient lymphadenectomy^{11,12}. Until now, there have been insufficient long-term follow-up results regarding the oncological adequacy of laparoscopic surgery for advanced gastric cancer.

We herein report the surgical and long-term clinical results of laparoscopic gastrectomy for patients with advanced gastric cancer. The aim of this study was to clarify the safety and usefulness of this operation for the patients with advanced gastric cancer.

Patients and Methods

Patients

Three hundred and twenty-eight patients with gastric cancer were surgically treated in the Department of Surgery and Science, Graduate School of Medical Sciences, Kyushu University, from 2007 to 2012. One hundred and seventy-one of these patients (52%) underwent totally laparoscopic gastrectomy, defined as both the resection and anastomosis being performed intracorporeally with a laparoscopic technique^{5,7,13,14}. The subjects included in this study were 38 patients who underwent totally laparoscopic gastrectomy with pathological Stage IB-IIIc (potentially resectable) advanced gastric cancer, after excluding 125

Stage IA and 8 Stage IV patients. We investigated the background clinical data, surgical results, postoperative course and long-term prognosis of these 38 patients.

Surgical procedures

The distal or total gastrectomy and lymphadenectomy were performed according to the guidelines of the Japanese Gastric Cancer Association¹⁵. The patient was placed under general anesthesia in the lithotomy position. A balloon blunt tip trocar was inserted in the umbilical region using a cut-down method and a laparoscope was inserted through the trocar. The liver was pulled up using a silicone disc by a phi-shaped technique as previously reported⁶. All procedures were performed using two trocars for the operator and two trocars for the assistant. For distal gastrectomy, reconstruction was performed by the Billroth I method as the first choice, or by the Roux-en Y method. Billroth I reconstruction was performed with a delta anastomosis¹⁶ or a book binding technique⁴ and Roux-en Y reconstruction was also performed using a linear stapler¹⁷. The resected specimen was pulled through the extended wound at the umbilicus. For total gastrectomy, Roux-en Y reconstruction with a functional end-to-end anastomosis using a linear stapler was performed as the first choice or otherwise was performed with a transorally inserted anvil delivery system¹⁸. The resected specimen was pulled through the extended wound at the umbilicus for a functional end-to-end anastomosis, while it was pulled through the left upper abdomen when using a transorally inserted anvil delivery system. All anastomoses were completed intracorporeally without extending the wound for the anastomotic procedure.

Staging of the tumor and statistical analysis

The staging of the tumor was based on the Japanese Classification of Gastric Carcinoma¹⁵ and the depth of invasion and lymph node metastasis were defined by the pathological

findings. The survival curve was plotted according to the Kaplan–Meier method. The data were analyzed using the StatView software package (Abacus Concepts, Inc., Berkeley, California).

Results

The background data and surgical results of 38 patients who underwent totally laparoscopic gastrectomy for advanced gastric cancer are shown in Table 1. Among the 38 patients, 18 patients (47%) had pStage III disease. D2 or D1 + lymph node dissection was applied for all patients except for 1 patient who underwent D1 lymph node dissection because he had simultaneous

far-advanced lung cancer. Twenty-seven patients underwent distal gastrectomy and 11 patients received total gastrectomy. The mean number of dissected lymph nodes was 41 (range, 16–87). The mean length of the operation and amount of blood loss was 324 min (range, 200–760 min) and 123 ml (range, 4–400 ml), respectively.

The postoperative clinical course, morbidity and mortality after totally laparoscopic gastrectomy for advanced gastric cancer are shown in Table 2. The mean day of resuming oral intake was postoperative day 5 (POD5) (range, POD2–16). The mean hospital stay after the operation was 13 days (range, 8–28 days). Two

Table 1 The background data and surgical results

Factor	Cases (n=38)
Male/Female	26/12
Mean age (range)	66 (35–95)
Pathological Stage	
IB	6 (16)
IIA	9 (24)
IIB	5 (13)
IIIA	8 (21)
IIIB	5 (13)
IIIC	5 (13)
Operation	
Distal gastrectomy	27 (71)
Total gastrectomy	11 (29)
Lymph node dissection	
D1	1 (3)
D1 +	10 (26)
D2	27 (71)
Mean number of dissected lymph nodes (range)	41 (16–87)
Mean length of operation, min (range)	324 (200–760)
Mean amount of blood loss, ml (range)	123 (4–400)

The data in parentheses are percentages unless stated otherwise.

Table 2 The postoperative clinical course, morbidity and mortality

Factor	Cases (n=38)
Mean day of resuming oral intake, postoperative day (range)	5 (2–16)
Mean hospital stay after operation, days (range)	13 (8–28)
Overall morbidity	3 (8)
Anastomotic leakage	0 (0)
Anastomotic stenosis	0 (0)
Pulmonary complication	0 (0)
Cardiac complication	0 (0)
Bleeding	2 (5)
Pancreatic fistula	1 (3)
Mortality	0 (0)

The values in parentheses are percentages unless stated otherwise.

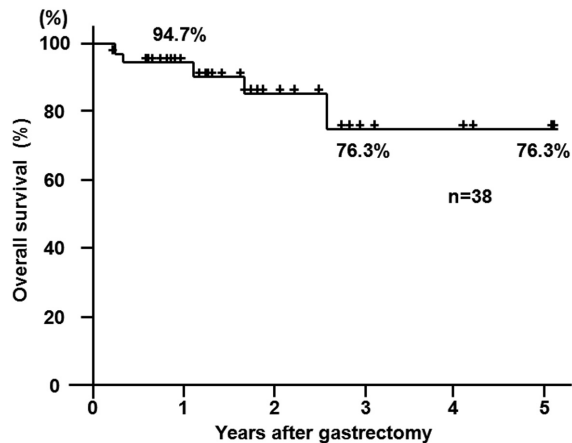


Fig. 1 The survival curve of the 38 patients with advanced gastric cancer who underwent totally laparoscopic gastrectomy. The 1, 3 and 5-year overall survival rates were 94.7%, 76.3% and 76.3%, respectively.

cases of postoperative bleeding were noted, however, no anastomosis-related complications, other severe complications or in-hospital death was observed.

The follow-up period after surgery was 8–72 months. Postoperative recurrence was observed in 6 patients (pStage IIA : peritoneal dissemination in 1 patient, pleural dissemination in 1 patient, pStage IIIA : peritoneal dissemination in 1 patient, pStage IIIB : liver metastasis in 1 patient, ovarian metastasis in 1 patient, pStage IIIC : peritoneal dissemination in 1 patient). As shown in Figure 1, the overall survival rates at 1, 3 and 5 years were 94.7%, 76.3% and 76.3%, respectively.

Discussion

Laparoscopic gastrectomy for early gastric cancer has still been recognized as an investigational treatment in daily practice, not as a standard operation, since the benefits of the procedure have been evaluated only by limited comparative studies, and randomized control trials to assess its usefulness in early gastric cancer are still ongoing^{19)–21)}. Needless to say, the indications for its application, particularly for advanced gastric cancer, have not yet been determined. However, some clinical studies, including the current study, have emphasized that

laparoscopic gastrectomy is technically feasible for advanced gastric cancer and can yield sufficient short and long-term oncological outcomes compared with conventional open gastrectomy¹²⁾²²⁾.

Although this was a retrospective study performed at a single center, the amount of blood loss seemed to be advantageous, while the operation tended to be longer compared with the conventional operation. A reduction of the blood loss is a consistent finding in previous studies comparing laparoscopic and open operations for advanced gastric cancer²³⁾. Regarding the length of the operation, laparoscopic gastrectomy is generally more time-consuming than open gastrectomy²³⁾. However, various modified laparoscopic techniques could help to simplify the procedure and shorten the operation⁶⁾¹⁸⁾²⁴⁾. We expect that with the increased proficiency in the laparoscopic technique and continuous improvements of the equipment, the time required for laparoscopic gastrectomy will become shorter.

The laparoscopic approach for gastric surgery is expected to improve the postoperative recovery, morbidity and mortality for patients in comparison to open surgery. Totally laparoscopic gastrectomies are associated with less surgical trauma, less pain, a more rapid return to gastrointestinal function, a shorter hospital stay and a decreased risk of impaired respiratory function²⁵⁾²⁶⁾. In the current study, the results concerning the day of resuming oral intake and the hospital stay after the operation were considered to be moderate compared with other studies²³⁾. However, the results for these factors largely depend on institutional principles, as well as the patient's postoperative clinical course. It is suggested that these factors can be further improved by the application of a critical pathway for laparoscopic gastrectomy, which may help to reduce the postoperative hospital stay and hospitalization cost²⁷⁾. Based on a systematic review including the randomized and observational trials limited solely to advanced gastric

cancer²⁸), the overall postoperative morbidity associated with laparoscopy-assisted gastrectomy was similar to that associated with open gastrectomy. With regard to the postoperative complications in the current study, no anastomosis-related complications, other severe complications or in-hospital death, was observed. The surgical safety of totally laparoscopic gastrectomy for advanced gastric cancer should be investigated in larger scale studies.

Cancer recurrence and the long-term prognosis are critical outcomes for evaluating surgical interventions in oncological therapy. The postoperative cancer recurrence and the long-term survival rate in laparoscopic gastrectomy for advanced gastric cancer were previously reported to be similar to those in open gastrectomy by a meta-analysis²³. Regarding the recurrence pattern, the concerns about the dissemination of gastric cancer due to insufflated gas from the pneumoperitoneum and port site or wound metastasis has been emphasized. Although port-site recurrence was reported in some studies²⁹⁾³⁰, there have also been reports of wound metastasis in open gastrectomy, thus suggesting that such metastasis was not a peculiar event to laparoscopic gastrectomy³⁰. Laparoscopic gastrectomy has been reported to not increase the risk of perigastric lymph node recurrence compared to open gastrectomy³¹. The results of this study did not demonstrate any peculiar recurrence pattern related to the laparoscopic gastrectomy. With regard to the long-term prognosis, the results of laparoscopic gastrectomy were also reported to be comparable to those of open gastrectomy³¹⁾⁻³³. In this study, the number of dissected lymph nodes was not inferior to that of open gastrectomy reported in previous study³⁴. This might have positively contributed to the satisfactory long-term survival results in this study.

In conclusion, totally laparoscopic gastrectomy is safe and can contribute to satisfactory long-term outcomes in cases of advanced gastric

cancer. Well-designed prospective and controlled studies are thus warranted to validate our findings.

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(和文抄録)

進行胃癌に対する完全鏡視下胃切除術の妥当性

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【目的】 胃癌に対する腹腔鏡下手術は広く普及したが, 進行胃癌に対する適応の是非に関しては議論の余地がある. 本研究の目的は, 進行胃癌に対する完全腹腔鏡下胃切除術の有用性を明らかにすることである.

【対象・方法】 当科において完全腹腔鏡下胃切除術が施行された IB 期-III 期進行胃癌症例 38 例の手術成績と予後を検討した.

【結果】 幽門側胃切除 27 例, 胃全摘 11 例が施行された. 郭清リンパ節個数は平均 41 個 (16-87 個) であった. 平均出血量 123ml, 平均手術時間 324 分, 術後合併症として出血を 2 例に認めたが, 吻合部関連合併症および在院死は認めなかった. 観察期間は 8-72 ヶ月で, 再発は 6 例に認めた (腹膜播種 3 例, 胸膜播種 1 例, 卵巣転移 1 例, 肝転移 1 例). 全生存率は 1 年 94.7%, 3 年・5 年 76.3% であった.

【結語】 進行胃癌に対する腹腔鏡下胃切除術は安全に施行可能であり, 予後も良好である. これらの結果を検証するための, 前向き比較試験が必要である.