



Original Research

Comparative study of laparoscopy-assisted and open radical gastrectomy for stage T4a gastric cancer



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HIGHLIGHTS

- Long-term clinical outcomes were comparable between ORG and LARG.
- LARG for stage T4a gastric cancer has a low postoperative complication rate.
- LARG for stage T4a gastric cancer has satisfactory clinical effects.

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ABSTRACT

Background: The feasibility and safety of laparoscopic-assisted gastrectomy as a first-line treatment for advanced gastric cancer is controversial, especially for patients with serous membrane invasion. This study was designed to evaluate and compare the clinical effect of laparoscopy-assisted and open radical gastrectomy for stage T4a gastric cancer.

Materials and methods: We performed a retrospective analysis of the clinical data of 230 patients with stage T4a gastric cancer in our hospital from October 2006 to October 2008. A total of 111 patients with stage T4a gastric cancer underwent laparoscopic radical gastrectomy (LARG group), and 119 patients with stage T4a gastric cancer underwent open radical gastrectomy (ORG group). Clinical parameters, including incision length, operation time, blood loss, time to first flatus, time to first defecation, length of hospital stay, postoperative complications, one-year, three-year, and five-year disease-free survival rates, and the overall survival rate were analyzed via t-tests and chi-squared tests.

Results: The incision length, blood loss, time to first flatus, time to first defecation, and length of hospital stay in the LARG group were significantly less than in the ORG group ($P < 0.05$). The mean operation time in the LARG group was similar to that in the ORG group ($P > 0.05$). Postoperative complications were significantly less in the LARG group than in the ORG group ($P < 0.05$). The one-year, three-year, and five-year disease-free survival rates were 83.8%, 67.6%, and 37.8% in the LARG group, respectively, and 81.5%, 65.5%, and 35.3% in the ORG group, respectively ($P > 0.05$). The one-year, three-year, and five-year survival rates were 89.2%, 72.1%, and 47.7% in the LARG group, respectively, and 87.4%, 68.1%, and 40.3% in the ORG group, respectively ($P > 0.05$).

Conclusion: LARG for stage T4a gastric cancer not only has the advantage of being minimally invasive, but the postoperative complication rate is low and the clinical effects are satisfactory.

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1. Introduction

Since first reported by Kitano et al. [1] in 1994, laparoscopy-

assisted gastrectomy and lymph node dissection have been used as a therapeutic approach for gastric cancer. Laparoscopic surgery for early gastric cancer has been performed worldwide. Various studies have highlighted its short- and long-term benefits for early gastric cancer, with the recorded 5-year survival rate exceeding 95%. Early gastric cancer has therefore become an indication for laparoscopic surgery [2,3]. However, because of limited long-term research and disputes surrounding the technique, its feasibility

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and safety as a first-line treatment for advanced gastric cancer has remained controversial, especially for patients with serous membrane invasion. There have been few reports on whether laparoscopic surgery can be performed for advanced gastric cancer with serous membrane invasion. This study was designed to evaluate and compare the clinical effect of laparoscopic and open radical gastrectomy for stage T4a gastric cancer.

2. Methods

2.1. Patients

This retrospective study focused on patients who underwent LARG or ORG for stage T4a gastric cancer at the Department of General Surgery, Southwest Hospital of the Third Military Medical University, from October 2006 to October 2008. The surgical options were chosen by patients based on a full explanation of the advantages and risks of LARG or ORG.

The inclusion criteria were as follows: (1) confirmed histology of stage T4a gastric cancer (tumor invading the serosa or visceral peritoneum); (2) no positive margins on any specimens after surgery; and (3) ability and willingness to participate in the study and to sign and give informed consent. The exclusion criteria were as follows: (1) presence of serious heart, liver, lung, or kidney complications; (2) history of abdominal surgery; (3) an American Society of Anesthesiology score of 4 or higher; and (4) surgical contraindications regarding the abdominal cavity.

2.2. Surgery

In all procedures, a selection criterion for participating surgeons was established. Three expert surgeons participated and eligibility was defined by at least 50 cases of LADG and ORG each. Each surgeon regularly observed operations conducted by the other two surgeons and attended weekly conferences to review high-definition video recordings of the week's operations.

All patients were placed in a supine position under intratracheal intubation anesthesia with their legs apart. Five trocars were inserted into the abdominal cavity, and a transumbilical laparoscope was used for abdominal exploration. A 12-mm incision is generated and a cannula inserted at the umbilicus to establish a carbon dioxide pneumoperitoneum. Then a camera passed through the umbilical port, primarily to inspect the peritoneum for any evidence of disseminated disease. The remaining ports are set up, involving two 5-mm incisions in the right and left upper quadrants and two 12-mm incisions in the right and left lower quadrants. Tumor location, distant metastasis, or obvious serosal cancer involvement were detected routinely after entrance to the abdominal cavity. The surgical method was chosen based on tumor location. The extent of the suprapancreatic node dissection was decided according to the surgical T and N stages of the tumor, based on the 13th version of the gastric cancer treatment guidelines in Japan [4].

2.3. Observation indices

First, the short-term effects, including length of incision, operation time, blood loss, time to first flatus, time to first defecation, and length of hospital stay were observed and compared between the two groups. Then, the postoperative complications were observed, and all complication rates were compared between the two groups. Finally, all patients were followed up for further examination and evaluation by means of telephone calls, letters, outpatient service, and clinical database at least every 3 months for the first two years after the operation and then every six months for

another three years until five years had passed. The one-year, three-year, and five-year disease-free survival rates, the overall survival rate, and the long-term effects were analyzed.

2.4. Statistical analysis

Statistical analyses were performed with SPSS software V.21.0 (IBM SPSS Inc., Chicago IL, USA) for Windows. The results were expressed as mean \pm SD. Categorical variables were analyzed using χ^2 tests or Fisher's exact test, as appropriate. Continuous variables were expressed as mean \pm SD and analyzed using a Student's t-test. Long-term variables, including disease-free survival and overall survival rates, were assessed by Kaplan-Meier analysis and verified by log-rank testing. A P value less than 0.05 was considered statistically significant.

3. Results

3.1. The general clinical characteristics

230 patients were included in the analysis. A total of 111 patients with stage T4a gastric cancer underwent laparoscopic radical gastrectomy (LARG group), and 119 patients with stage T4a gastric cancer underwent open radical gastrectomy (ORG group). The LARG group was comprised of 63 men (56.8%) and 48 women (43.2%). The median age was 57.2 years (range, 17–81 years). The ORG group was comprised of 69 men (58.0%) and 50 women (42.0%). The median age was 58.7 years (range, 16–83 years). There were no differences between the two groups in terms of sex, age, surgical method, tumor location, TNM stage, histology differentiated degree, the number of lymph nodes dissected, or metastatic lymph nodes. The general clinical characteristics of the 230 people included in the study are summarized in [Table 1](#).

3.2. Short-term clinical outcomes

The mean operation time in the LARG group (189 ± 57.5 min) was similar to the ORG group (201 ± 68.2 min; $P > 0.05$). However, the length of the incision in the LARG group was significantly shorter than in the ORG group (4.8 ± 1.2 cm vs. 17.2 ± 3.4 cm, $P < 0.05$), the estimated blood loss in the LARG group (143 ± 87.3 ml) was significantly less than in the ORG group (201 ± 68.2 ml; $P < 0.05$), the time to first flatus and time to first defecation for the LARG group were significantly shorter than for the ORG group, and the mean hospital stay in the LARG group was 8.6 ± 2.1 d compared to 13.2 ± 3.8 d in the ORG group ($P < 0.05$). These results are shown in [Table 2](#).

3.3. Postoperative complications

The postoperative complication rate was significantly lower in the LARG group than in the ORG group (7.2% vs. 15.1%; $P < 0.05$). Two patients in the LARG group underwent a second operation, and one patient in the ORG group underwent a second operation. No patient died within the first 60 days after the operation in either group. Other postoperative complications were treated conservatively. All patients between two groups used analgesics on two consecutive days after surgery and the postoperative pain have been relieved. These results are shown in [Table 3](#).

3.4. Long-term clinical outcomes

All patients were followed up for 3–60 months (average, 37 months). Three patients from the LARG group were lost to follow-up evaluation, and five patients from the ORG group were lost to

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