Laparoscopic gastrectomy with D2 lymphadenectomy for gastric cancer: Short-term results from a tertiary hospital in Vietnam

Ngoc Cuong Luong¹,², Anh Tuan Nguyen², Hong Anh Vu Thi³, Quynh Nhung Bui Thi⁴, Van Du Nguyen²

¹ Gastrointestinal Surgery - Hepatobiliary Department, Thai Nguyen National Hospital, Vietnam
² Gastrointestinal Tract Surgery Department, 108 Military Central Hospital, Vietnam
³ Surgery Department, Thai Nguyen University of Medicine and Pharmacy, Vietnam
⁴ Clinical pharmacology Department, Thai Nguyen University of Medicine and Pharmacy, Vietnam

Abstract

Objectives: We performed this study to determine the early success and outcomes of totally laparoscopic gastrectomy (TLG), dissecting the lower part of the stomach to treat gastric cancer.

Materials and Methods: Clinical data, preoperative diagnosis, evaluation of intraoperative lesions, surgical techniques, postoperative pathology, and surgical results of 106 gastric cancer patients who underwent TLG and Billroth II gastrojejunal-anastomosis with a Hofmeister-Finsterer reconstruction and D2 lymphadenectomy from January 2019 to August 2020 were recorded and analyzed using SPSS 17.0. We used the Japanese Gastric Cancer Association standards for the clinical and pathological definitions.

Results: Of the 106 cases, 76 were males and 30 were females. The average age was 59.33 ± 12.20 years, and the average duration of surgery was 136.37 ± 26.08 minutes. The estimated blood loss was 18.08 ± 10.95 mL. The average length of hospital stay was 8.63 ± 3.89 days. The average post-surgical time to pass flatus was 4.18 ± 1.4 days and that of restarting diet was 3.27 ± 1.08 days. There were no intraoperative complications, and no laparotomy was required. Gastrointestinal anastomosis was performed with Hofmeister-Finsterer reconstruction. General postoperative complications consisted of seven (6.58%) cases: one (0.94%) anastomotic leakage, one (0.94%) gastrojejuno-colic fistula, three (2.82%) early small bowel obstructions, and two (1.89%) late small bowel obstructions. No intra-abdominal bleeding, duodenal stump leakage, pancreatitis, surgical site infections, intra-abdominal abscesses, or fatal cases were recorded.

Conclusions: Totally laparoscopic gastrectomy (TLG) treating stomach cancer and D2 lymphadenectomy has shown positive results, with a low postoperative complication rate and safe implementation process to help patients achieve faster recovery and a shorter hospital stay.

Keywords: Gastric cancer, Laparoscopy, Intracorporeal anastomosis.

(Received December 4, 2020; Accepted December 17, 2020)

Background

Laparoscopy-assisted gastrectomy (LAG) for treating stomach cancer was first published in 1994 and has experienced rapid development, becoming a common method in recent decades². LAG has more benefits than gastrectomy, including minimal incisions, the usefulness of intraoperative navigation, reduced blood loss, less pain, and faster recovery²,³. However, LAG treating stomach cancer requires surgeons to make a small incision (about 5 cm) at the midline that leads to difficulties in obese patients who have a thick abdominal wall, creating anastomosis at risk for stretching. In addition, the longer the time of exposure between the digestive tract and the surgical incision, the greater the risk of surgical site infection. Furthermore, the pulling into the abdominal wall during surgery also causes pain after surgery for the patients. Recently, totally laparoscopic gastrectomy (TLG) has been performed by many surgeons around the world to preserve the integrity of the abdominal wall. The abdominal wall receives no incision, except for trocar incisions, using laparoscopic linear staplers to perform anastomosis without creating a small incision in the epigastric region. This has been shown to be superior to other methods⁴. In Vietnam, TLG for stomach cancer with performance of anastomosis in the abdomen has not been chosen by many surgeons due to technical and economic considerations. Although there have been some initial positive results, there are few reports related to this method. We performed this study to determine the early success and outcome of TLG dissecting the lower part of.
stomach as a treatment for stomach cancer.

Materials and Methods

Patient Selection

From January 2019 to August 2020, 106 gastric cancer patients underwent TLG and Billroth II gastrojejunostomy with a Hofmeister-Finsterer reconstruction and D2 lymphadenectomy, following the standards of the Japanese Gastric Cancer Association. All cases received the same procedure performed by the Department of Gastrointestinal Surgery at 108 Military Central Hospital.

We only selected gastric cancer patients with a tumor located in the central and distal stomach that did not exceed the T4a stage or show distant metastases on abdominal computed tomography (CT) scan.

Progressive research and clinical descriptions were chosen using the Japanese Gastric Cancer Association standards for the clinical and pathological definitions. Clinical data, preoperative diagnosis, evaluation of intraoperative lesions, surgical techniques, postoperative pathology, and surgical results were recorded and analyzed using SPSS 17.0.

Surgical Techniques

We had patients lie supine with straddled legs after being endotracheally anesthetized. The surgical display was located on the upper right side of the patient. The surgeon sat between the patient’s legs and the first assistant was located on the right side of the patient, while the second assistant remained on the other side taking turns holding the camera depending on stage of the operation.

We inserted 5 surgical ports: a 10-mm port was inserted into the umbilicus for the endoscope, a 12-mm port was inserted at the right mid-clavicular line for the operator’s right hand, a 5-mm port was inserted at the right mid-axillary line below the costal margin for the operator’s left hand, and two 5-mm ports were inserted at the left side of the abdomen in the same manner. We maintained abdominal pressure of approximately 10–12 mm H₂O and performed liver retraction. After assessing the tumor status and abdominal condition, we then dissected the greater omentum followed by D2 lymphadenectomy. Finally, we used laparoscopic linear staplers and performed anastomosis with a Hofmeister-Finsterer reconstruction.

Data collection and analysis

We collected data on age, sex, body mass index (BMI), clinical signs, endoscopic results, abdominal CT scanner, preoperative diagnosis, evaluation of intraoperative lesions, surgical techniques, postoperative pathology, surgical results, early complications, and re-hospitalization within 30 days after surgery. We used SPSS 17.0 to record and analyze the data.

Results

A total of 106 patients with stomach cancer were assigned for TLG and D2 lymphadenectomy, including 76 males (71.70%) and 30 females (28.30%) with a sex ratio of 2.5 males per 1 female. The average patient age is 59.33 ± 12.20 with the largest infected age group being 40–70 years old, accounting for 74.53% of the total patients. All of the patients underwent medical examinations due to epigastric pain. We performed the Hofmeister-Finsterer reconstruction in all patients. We did not record any intraoperative complications, and the estimated blood loss was 18.08 ± 10.95 mL. The mean duration of the operation was 136.37 ± 26.08 min. The number of dissected lymph nodes was 28.30 ± 10.40. Regarding postoperative characteristics, the average length of hospital stay was 8.63 ± 3.89 days. In our study, the shortest hospital-stay case was a patient discharged after 5 days. The average time of pass flatus was 4.18 ± 1.4 days, and the average time until resuming a diet was 3.27 ± 1.08 days (Table 1). General postoperative complications consisted of seven (6.58%) cases, in which one (0.94%) was an anastomotic leakage, one (0.94%) was a gastrojejuno-colic fistula, three (2.82%) were early small bowel obstructions, and two (1.89%) had late small bowel obstructions. No internal bleeding, duodenal stump leakage, pancreatitis, surgical site infections, intra-abdominal abscesses, or fatal cases were recorded (Table 2).

Table 1 Postoperative outcomes

| Variable                        | Mean  | SD   |
|---------------------------------|-------|------|
| Average age                     | 59.33 | 12.20|
| Estimated blood loss (mL)       | 18.08 | 10.95|
| Duration of operation (minutes) | 136.37| 26.08|
| Duration of hospitalization (days)| 8.63 | 3.89 |
| Number of lymph nodes dissected | 28.30 | 10.40|
| Average time to pass flatus (days)| 3.97 | 1.30 |
| Average time until resuming diet (days)| 4.98 | 2.75 |

Table 2 Postoperative complications

| Complication                        | No. of cases | Percent of cases |
|-------------------------------------|--------------|-----------------|
| Intra-abdominal bleeding             | 0            | 0.00%           |
| Anastomotic leakage                  | 1            | 0.94%           |
| Small bowel obstruction              | 4            | 3.77%           |
| Surgical site infection              | 0            | 0.00%           |
| Intra-abdominal fluid collection     | 0            | 0.00%           |
| Intra-abdominal abscess              | 0            | 0.00%           |
| Pancreatitis                         | 0            | 0.00%           |
| Dumping syndrome                     | 0            | 0.00%           |
| Afferent loop syndrome               | 1            | 0.94%           |
| Gastrojejuno-colic fistula           | 1            | 0.94%           |
| Nonsurgical complication            | 99           | 93.40%          |
A patient had symptoms appearing 10 days after surgery, including abdominal pain, fever, and a CT scan showing images of anastomotic leakage. We drained the fistula site and treated the internal infection. The patient was stable and discharged after 32-day hospitalization.

A patient presented with belching and diarrhea 1.5 months after discharge with esophagogastroduodenoscopy results showing a gastrojejuno-colic fistula. We had to operate to close the fistula using a linear stapler. The patient was discharged after a 7-day hospitalization.

There were two cases of small bowel obstruction; the first case was hospitalized with obvious obstruction syndrome 2.5 months after the operation and underwent emergency surgery. After surgery, the cause of the obstruction was due to small intestine herniation through the back of the gastrojejunostomy. We brought the small intestine back and sutured the hole in the mesenteric vein. On the 7th day after surgery, the patient was stable. In this case, 2.5 months after discharge, this patient was hospitalized with bowel obstruction syndrome, diagnosed with adhesive small bowel obstruction, received medical treatment, and was discharged after 9 days.

There were three cases (2.82%) of early bowel obstruction, in which the first case was still in the hospital with intestinal obstruction syndrome on the 11th day after surgery. Abdominal CT scan indicated thick inflammation throughout the colon. We diagnosed intestinal obstruction due to pseudomembranous colitis. After an anti-inflammatory medical treatment, the patient was discharged after 4-day hospitalization.

On the 5th day after discharge, the second case of small bowel obstruction experienced abdominal pain, bloating, constipation, and the inability to pass gas. That patient was admitted to the hospital and underwent abdominal CT scan. The patient was diagnosed with afferent loop syndrome (ALS). After 10 days of medical treatment, the patient was discharged from the hospital. Appearing with abdominal pain 1.5 months after discharge, the third patient was diagnosed with an adhesive small bowel obstruction, received medical treatment, and was discharged after 8 days.

There were no cases of duodenal stump leakage. This demonstrated it was safe to secure closure of the duodenal stump with a laparoscopic stapler.

Discussion

LAG for treating stomach cancer has been widely accepted; however, TLG for treating stomach cancer with performance of anastomosis in the abdomen has not been performed in the major hospitals of Vietnam. Several studies by authors around the world, such as Chen K et al., Du J, and Shuang J et al., have shown that this method can be applied to all stages of stomach cancer.6 Laparoscopic surgery has advantages over laparotomy that have been proven by many studies, but the performance of the anastomosis in the abdomen requires skilled and trained surgeons to avoid complications.

The average age in our study was 59.33 ± 12.20. The estimated blood loss during surgery in our study was about 18.08 ± 10.95 mL, which was very minimal, and no patients needed blood transfusion, and few had adverse effects during the recovery period. According to the studies of many authors, the amounts of blood loss during the operation also were different. According to Cianchi et al., among 41 patients, the average amount of blood loss was 118.7 mL, and other authors showed an average blood loss in surgery of over 100 mL.4,7. In our research, among 106 assigned cases, we saw no cases needing to transfer to laparotomy or receive a small incision to assist in the procedure. Nguyen Minh Hai noted that out of 44 cases of LAG, 1 patient had to be transferred to laparotomy. However, according to the study of Le Manh Ha, 14/68 cases had to be transferred to laparotomies, accounting for 21% of the patients.8 Today, LAG is assigned much more frequently than TLG because TLG requires more difficult techniques.9, 10 However, for those patients with a thick abdominal wall or obesity, making a small incision in the LAG or transferring to laparotomy could create many difficulties, while TLG leads to a clearly observed and easily performed anastomosis. For TLG, those of Kim and Shinohara were only 144.0 ± 45.5 minutes in 139 cases and 369.7 ± 109.5 minutes in 186 cases of patients under 75 years of age. In our study, the average duration of surgery was 136.37 ± 26.08 minutes, the same as other authors’ results.9 Because of the distal gastrectomy, the Hofmeister-Finsterer reconstruction was easy to perform with a laparoscopic linear stapler. A study by Jin-Jo Kim reviewed 45 cases assigned TLG using various methods of reconstruction; the average duration of surgery was 314 ± 79 minutes; however, there was no difference in complications or mortality from other authors’ results.10

According to a study by major authors, there were no significant differences in postoperative complications between the laparoscopic and laparotomy surgeries.6 According to Goto et al., general postoperative complications were about 15.3%.9 Our TLG patients had a 6.58% rate of postoperative complications.

Conclusion

TLG treating stomach cancer and D2 lymphadenectomy has shown positive results, with a low postoperative complication rate and safe implementation, which will help patients achieve faster recoveries and shorter hospital stays.
Conflict of interest:
The authors declare no conflict of interest.

References
1) Kitano S, Shiraishi N, Kakisako K, Yasuda K, Inomata M, Adachi Y. Laparoscopy-assisted Billroth-I gastrectomy (LADG) for cancer: our 10 years’ experience. Surg Laparosc Endosc Percutan Tech. 2002;12:204–7.
2) Adachi Y, Suematsu T, Shiraishi N, Katsuta T, Morimoto A, Kitano S, Akazawa K. Quality of life after laparoscopy-assisted Billroth I gastrectomy. Ann Surg. 1999;229:49–54.
3) Huscher CG, Mingoli A, Sgarzini G, Sansonetti A, Di Paola M, Recher A, Ponzano C. Laparoscopic versus open subtotal gastrectomy for distal gastric cancer: five-year results of a randomized prospective trial. Ann Surg. 2005;241:232–7.
4) Chen K, Mou YP, Xu XW, Pan Y, Zhou YC, Cai JQ, Huang CJ. Comparison of short-term surgical outcomes between totally laparoscopic and laparoscopic-assisted distal gastrectomy for gastric cancer: a 10-y single-center experience with meta-analysis. J Surg Res. 2015;194:367–374.
5) Japanese Gastric Cancer A. Japanese gastric cancer treatment guidelines 2014 (ver. 4). Gastric Cancer. 2017;20:1–19.
6) Du J, Shuang J, Li J, Zhao Q, Hong L, Du X, Wen J, Hua J. Totally laparoscopic Billroth II gastrectomy with a novel, safe, simple, and time-saving anastomosis by only stapling devices. J Gastrointest Surg. 2012;16:738–43.
7) Cianchi F, Grici E, Trallori G, Macri G, Indenmitate G, Ortolani M, Paoli B, Biagini MR, Galli A, Messerini L, Mallardi B, Badii B, Staderini F, Perigli G. Totally laparoscopic versus open gastrectomy for gastric cancer: a matched cohort study. J Laparoendosc Adv Surg Tech A. 2013;23:117–22.
8) Le Manh Ha. Laparoscopic-assisted gastrectomy with lymph nodes dissection for gastric cancer. Journal of Practical Medicine. 2013;869:37–37.
9) Goto M, Okitsu H, Yuasa Y, Kuramoto S, Tomibayashi A, Matsumoto D, Masuda Y, Edagawa H, Tani R, Mori O, Matsuo Y. Short-term Outcomes of Laparoscopic Distal Gastrectomy for Advanced Gastric Cancer. J Med Invest. 2016;63:68–73.
10) So KO, Park JM. Totally laparoscopic total gastrectomy using intracorporeally hand-sewn esophagojejunostomy. J Gastric Cancer. 2011;11:206–11.
11) Kim JJ, Song KY, Chin HM, Kim W, Jeon HM, Park CH, Park SM. Totally laparoscopic gastrectomy with various types of intracorporeal anastomosis using laparoscopic linear staplers: preliminary experience. Surg Endosc. 2008;22:436–42.