International Journal of Surgery 29 (2016) 118–122

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original research

Is the 5-ports approach necessary in laparoscopic gastrectomy? Feasibility of reduced-port totally laparoscopic gastrectomy for the treatment of gastric cancer: A Prospective Cohort Study

Ho Seok Seo, Han Hong Lee*

Division of Gastrointestinal Surgery, Department of Surgery, College of Medicine, The Catholic University of Korea, Seoul, South Korea

HIGHLIGHTS

- Reduced-port surgery can be applied to the treatment of gastric cancer.
- Reduced-port totally laparoscopic gastrectomy has good short-term outcomes.
- Skillful surgeons would conduct reduced-port surgery as reliable scar reducing method.

ARTICLE INFO

Article history:
Received 6 November 2015
Received in revised form
13 March 2016
Accepted 17 March 2016
Available online 28 March 2016

Keywords:
Gastrectomy
Laparoscopic surgery
Minimal invasive surgery
Surgical instruments
Stomach neoplasm

ABSTRACT

Background/Aim: Interest of gastric cancer patients in the quality of life postoperatively with respect to reduced scarring is increasing. This study aimed to evaluate the feasibility of reduced-port totally laparoscopic gastrectomy (RepTLG) for the treatment of gastric cancer.
Methods: In total, 170 patients who underwent RepTLG (n = 97) or conventional totally laparoscopic gastrectomy (cTLG) (n = 73) were enrolled. Clinicopathological features, operative details, and short-term postoperative outcomes were analyzed retrospectively and compared between groups.
Results: There were no significant differences for preoperative comorbidity between the RepTLG and c TLG groups, although patients in the RepTLG group were older than those in the cTLG group (63.5 ± 11.1 vs. 59.3 ± 10.6; $p = 0.014$). Operating time was shorter in the RepTLG group compared to the cTLG group (187.5 ± 67.7 min vs. 219.6 ± 43.3 min; $p < 0.001$) and duration of flatus of the RepTLG group was shorter than that of the cTLG group (2.7 ± 0.6 days vs. 2.9 ± 0.8 days; $p = 0.016$).
Conclusion: RepTLG is a reliable scar reducing method with good operative and short-term outcomes for the treatment of gastric cancer compared with cTLG.

1. Introduction

Because the survival rate of gastric cancer patients has increased due to early detection using improved diagnostic tools, interest in the quality of life postoperatively with regard to reduced scarring has increased [1]. Accordingly, minimal invasive surgery with a laparoscopic approach for patients with early gastric cancer (EGC) is widely used as a standard treatment [2,3]. Totally laparoscopic distal gastrectomy (TLDG) was first reported in 1992, where intracorporeal Billroth II anastomosis was performed using laparoscopic linear staplers to treat benign gastric ulcers [4]. Improvements in laparoscopic skills and instruments have led to many studies demonstrating that TLDG with intracorporeal anastomosis has technical feasibility in the field of gastric cancer [5–7].

In an effort to reduce scarring, reduced port surgery was recently developed. In addition, single incision laparoscopic surgery (SILS) was attempted to treat cholecystectomy, appendectomy, splenectomy, achalasia operation, and colorectal cancer [8–12]. Several studies have reported using reduced-port laparoscopic surgery, including SILS, in gastric cancer patients. However, these studies have several limitations, including long operation time and shallow learning curve. Additionally, particularly in SILS, usage of laparoscopic extra-instruments, such as a flexible camera and curved grasper, is essential because of the repeated clash between

* Corresponding author. Department of Surgery, Uijeongbu St. Mary's Hospital, College of Medicine, The Catholic University of Korea, 271, Cheonbo-ro, Uijeongbu-si, Gyenggi-do, 11765, South Korea.
E-mail address: painkiller9@catholic.ac.kr (H.H. Lee).

http://dx.doi.org/10.1016/j.ijsu.2016.03.035
1743-9191/

the instruments and camera [13–16]. Therefore, to prove feasibility of reduced-port laparoscopic surgery, which does not require the use of special instruments, comparable operative outcomes with the conventional laparoscopic approach need to be obtained.

Thus, the present study performed a comparative analysis between the reduced-port totally laparoscopic gastrectomy (RepTLG) using ordinary equipment and the conventional totally laparoscopic gastrectomy (cTLG) with five ports, which is widely used as a laparoscopic approach method for patients with gastric cancer.

2. Patients and methods

2.1. Patients and data collection

Considering all patients with gastric cancer, 97 who underwent RepTLG and 73 who underwent cTLG at Uijeongbu St. Mary's Hospital between 2010 and 2014 were enrolled in the present study. There were no ones who received neoadjuvant chemotherapy or were diagnosed as remnant gastric cancer. All operations were performed by a single gastric cancer specialist (L.H.H). Of the 97 patients in the RepTLG group, 87 underwent 4-port RepTLG and 10 underwent 3-port RepTLG.

Demographics, clinical and pathological characteristics, operative details, and short-term postoperative outcomes, which were collected retrospectively from the hospital's Gastric Cancer Patient Registry, were compared between groups.

Perioperative clinical characteristics were classified according to the Eastern Cooperative Oncology Group (ECOG) classification [17]. Pathological stage was classified according to the Seventh American Joint Cancer Committee (AJCC) TNM. Histological cancer type was categorized as differentiated or undifferentiated. Poorly differentiated tubular adenocarcinoma, signet ring cell adenocarcinoma, and mucinous adenocarcinoma were assigned to the undifferentiated group.

This study was conducted in accordance with the STROBE criteria [18] and approved by the Institutional Review Board of the Ethics Committee of the College of Medicine, The Catholic University of Korea (UC15RISI0106). Patient records were anonymized and de-identified prior to analysis.

2.2. Surgical procedures

The 3-port RepTLG was performed through a 12 mm port located in the umbilical area for camera work, a 12 mm port located in the right lower quadrant (RLQ) area, and a 5 mm port located in the right upper quadrant (RUQ) area. The 4-port RepTLG was performed using the same locations as the 3-port RepTLG with an additional 5 mm port in the left lower quadrant (LLQ) area. cTLG was performed with a total of five ports comprising all ports of the 4-port RepTLG and an additional 5 mm port in the left upper quadrant (LUQ) area (Fig. 1). The operator mainly used the ports in the RUQ and RLQ areas. During the 4-port RepTLG, the first assistant or scopist used the port of the LLQ area and, in the case of cTLG, the first assistant used the ports of the LLQ and LUQ areas. A 30° rigid laparoscope was used in each operation.

All reconstructions including gastro-duodenostomy, gastro-jejunostomy, jejuno-jejunostomy and esophago-jejunostomy were performed by intracorporeal anastomosis with a linear stapler. The linear stapler was used through the RLQ or the umbilical 12 mm port for anastomosis. Every entry holes of linear stapler for anastomotic site were closed by intracorporeal hand-sewn suture. The umbilical port site was extended vertically 2.5–3 cm, and a specimen enclosing in the bag was extracted via the extended umbilical site. Closed drain was routinely used via 5 mm port in the RUQ area.

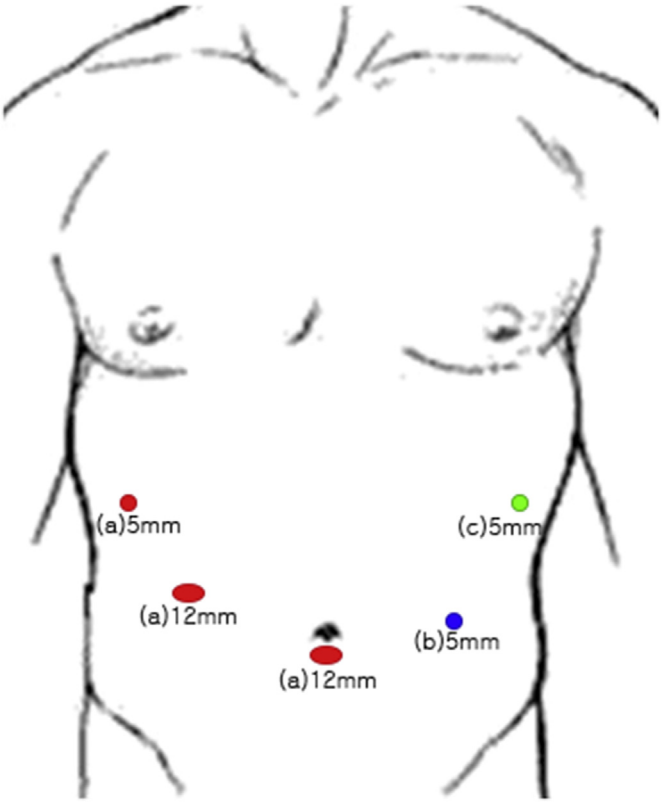

Fig. 1. Port location according to each technique. (a) 3-port reduced-port totally laparoscopic gastrectomy (RepTLG) (12 mm in the umbilical area, 12 mm in the RLQ area and 5 mm in the RUQ area), (a) + (b) 4-port RepTLG (3-port RepTLG ports and 5 mm in the LLQ area), (a) + (b) + (c) conventional totally laparoscopic gastrectomy (4-port RepTLG ports and 5 mm in the LUQ area).

2.3. Statistical analysis

Student's *t*-test and χ^2 test or Fisher's exact test were used to evaluate differences between groups with continuous variables and categorical variables, respectively. Statistical analyses were performed with SPSS ver. 13.0 software (SPSS, Inc., Chicago, IL, USA). Values of $P < 0.05$ were considered significant.

3. Results

Preoperative characteristics showed that patients in the RepTLG group were significantly older than the cTLG group (63.5 ± 11.1 vs. 59.3 ± 10.6, respectively; $p = 0.014$). However, there were no significant differences between groups in other categories, including sex, body mass index (BMI), ECOG, and comorbidity (Table 1).

There were no significant differences between groups with regard to the extent of resection and estimated blood loss (EBL). Lymph node dissection of D2 and over was more frequently performed in the RepTLG group, however, there was no statistical significance. Operating time was significantly shorter in the RepTLG group compared with the cTLG group (187.5 ± 67.7 min vs. 219.6 ± 43.3 min, respectively; $p < 0.001$), although the RepTLG group had a significantly greater number of combined resections (Table 2). With respect to pathological features, including TNM stage, no significant differences were observed between the two groups (Table 3).

The duration of flatus was shorter in the RepTLG group compared to the cTLG group (2.7 ± 0.6 days vs. 2.9 ± 0.8 days, respectively; $p = 0.016$), but the difference between two groups for