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Comparision of Peri-Operative Findings between Proximal Laparoscopic Gastrectomyand Total Laparoscopic Gastrectomy for Proximal Gastric Cancer

Dipak Kumar Singh[1], Chen Zou[1], Heng Zhang[1], Pengcheng Jiang [1]
[1] *Department of General Surgery, Affiliated People's Hospital of Jiangsu University, Zhenjiang 212002, China*

Correspondence to: *Pengcheng Jiang, Department of General Surgery, Affiliated People's Hospital of Jiangsu University, Zhenjiang 212000, China. E-mail: professorjinghua@yahoo.cn.*

Abstract: *Gastric Cancer is one of the major causes of cancer specific deaths worldwide and incidence of Proximal Gastric Cancer is increasing with time. Laparoscopic gastrectomy has increased in popularity in recent years due to lesser complications and higher functional preservation. In this study we have compared the peri-operative findings of 72 patients with proximal gastric cancers who underwent tumor excision surgery and were diveded into two groups according to different surgical approach; Laparoscopic Proximal Gastrectomy and Laparoscopic Total Gastrectomy. After statistical analysis, no significant differences were found in peri-operative outcomes between two groups. Prospective studies with larger sample size are required to validate the findings of this study.*
Keywords: *Laparoscopic Proximal Gastrectomy; Laparoscopic Total Gastrectomy; Proximal Gastric Cancer*

Abbreviations: MIS, Minimally Invasive Surgery; LPG, Laparoscopic Proximal Gastrectomy; LTG, Laparoscopic Total Gastrectomy; LAG, Laparoscopic Assisted Gastrectomy; PPG, Pylorus Preserving Gastrectomy

I. Introduction:

Gastric cancer is the second leading cause of cancer specific mortality worldwide. [1] Japan and South Korea have highest incidence and prevalence gastric cancer. It is one of the most common malignant tumors in China, whereas, Europe and America are regions with intermediate incidence. According to the evidences from the recent studies the 5-year survival rate of gastric is increasing and the increased survival rate is attributed to earlier disease diagnosis due to screening programs and more aggressive surgical treatment[2]. Gastrectomy with regional lymphadenectomy is considered to be the most potential curative treatment available for early gastric cancer.

Laparoscopic surgery is also called minimally invasive surgery (MIS). It is relatively new technique but already has been well incorporated in different types of surgeries along with gastrecomy for gastric cancer [3]. Laparoscopic gastrectomy was first reported in 1992 [4],and since then laparoscopy-assisted gastrectomy (LAG) has been carried out not only in distal gastrectomy, but also in proximal gastrectomy and total gastrectomy [5-7]. In recent years, minimally-invasive and function-preserving surgery for treating proxima gastric cancer has gained populatiry among surgeons and become one of the general modalities to manage patients with early-stage gastric cancer [8]. Several recent small-sized, randomized clinical trial has suggested that the outcomes from laparoscopic surgery for all stages of gastric cancer were not inferior to those from open surgery.[9]

Recently, minimally invasive approaches has been focusing in function-preserving surgeries (e.g., pylorus-preserving gastrectomy, proximal gastrectomy). Initially, pylorus-preserving gastrectomy (PPG) was used for gastric ulcers. This method, has also been found to provide a better quality of life and oncologic safety when used for selected types of gastric cancer. Although total gastrectomy has been widely performed as standard surgery for proximal gastric cancer, proximal gastrectomy has recently been applied as a minimally invasive and function-preserving surgery for selected patients with proximal early gastric cancer. However, use of a laparoscopic approach for this procedure is difficult for inexperienced surgeons [10]. Whereas experienced surgeons have investigated, and reported on, various types of reconstruction methods and their technical feasibility after laparoscopic proximal gastrectomy[11]. In this study we have compared surgical outcomes and peri-operative findings between patients undergoing LPG and LTG for proximal gastric cancer.

II. Patients and Methods

Patients

Between January 2009 and August 2014, a total of 77 patients underwent LPG with B1 reconstruction or LTG with Roux-en-Y (R-Y) reconstruction for gastric cancer in the proximl stomach in Affiliated People's Hospital of Jiangsu University (Zhenjiang, Jiangsu, China). LPG was performed in 15 cases with tumor located in the upper third of the stomach. The resection line in the stomach was kept at least 5 cm apart from the gastric angle. On the other hand, LTG was performed in 57 cases of proximal gastric cancer. Each tumor was histologically diagnosed as gastric adenocarcinoma, and was classified according to the Japanese classification of gastric carcinoma [12].

Ethical approval of the study protocol

This study was approved by the Review Board of Jiangsu University (Zhenjiang, China). We have complied with the World Medical Association Declaration of Helsinki regarding ethical conduct of research involving human subjects and/or animals.

Statistical Analysis

Statistical analysis was performed using SPSS for Windows to compare the peri-operative findings between LPG and LTG. Differences between Demographic Characteristics, intra-operative findings and post-operative findings along with short term complications were evaluated using the χ^2 test.

III. Results

Demographic Characteristics:

Demographic Characteristics of patients are listed in Table 1. There were 13 males and 2 females in LPG group with Mean Age of 61.9±7.6 years and Mean BMI of 23.9±4.2. 7 patients had co-morbidity and 4 patients had undergone previous abdominal surgery. For LTG group there were 41 male patients and 16 female patients with Mean Age of 66.0±6.2 and Mean BMI of 22.9±3.1. 29 patients had co-morbidities and 18 patients had undergone previous abdominal surgery in this group.

Pathological Findings:

The pathological findings in both groups are listed in Table 2. The Mean Tumor Size in LPG group was 2.9±1.4cm and LTG group was 4.8±2.4cm (P = 0.004). Histopathological study demonstrated that there were 2 well differentiated adenocarcinoma in LPG group and 5 in LTG group. 9 cases were with moderately differentiated adenocarcinoma in LPG group and 31 cases in LTG group. Poorly differentiated adenocarcinoma were found in 4 cases of LPG group and 21 cases of LTG group.

Intra-operative and Post-operative Findings:

Intra- and post-operative findings are listed in Table 3. Among all cases in both groups there was one open conversion due to severe adhesion. There were no significant differences in volume of operation time (P = 0.530), estimated blood loss (P = 0.400), time to first flatus (P = 0.491), time to first oral intake (P = 0.195) and duration of post operative hospital stay (P = 0.263).

Post-operative complications occurred in 3 cases in LPG group and 11 cases in LTG group. Pulmonary infection was the most common complication which occurred in 4 patients in LTG group. Incision site infection was second most common complication and occurred in 1 patient from LPG group and 2 patients in LTG group. Anastomotic fistula occurred in single patient from both groups. Among rest of the complications GERD occurred in 1 patient from LPG group and Myocardial Infarction in 1 patient, chylous fistula in 1 patient, post-operative psychosis in 1 patient and peritonitis in 1 patient from LTG group.

Table 1. Characteristic of patients

Variable	B-I (n=15)	Roux-en-Y (n=57)	P value
Age(yr)	61.9±7.6	66.0±6.2	0.034
Gender			0.241
Male	13	41	
Female	2	16	
BMI (kg/m^2)	23.9±4.2	22.9±3.1	0.306
Comorbidity	7	29	0.772
Previous abdominal surgery	4	18	1.000

Table 2. Pathologic findings

Variable	B-I (n=15)	Roux-en-Y (n=57)	P value

Tumor size (cm)	2.9±1.4	4.8±2.4	0.004
Histological type			0.690
Well diff	2	5	
Moderately diff	9	31	
Poorly diff	4	21	
TNM stage			0.242
IA	1	6	
IB	4	3	
IIA	3	6	
IIB	4	18	
IIIA	2	9	
IIIB	1	11	
IIIC	0	4	

Table 3. Surgical outcomes and postoperative courses

Variable	B-I (n=15)	Roux-en-Y (n=57)	P value
Operation time (min)	253.7±56.1	263.5±53.1	0.530
Estimated blood loss (mL)	187.3±105.8	145.4±183.3	0.400
Open conversion	0	1	1.000
Time to first flatus (d)	5.5±1.4	5.8±1.8	0.491
Time to first oral intake (d)	8.7±6.8	7.5±1.5	0.195
Hospital stay (d)	17.9±11.0	15.2±7.3	0.263
Postoperative complications	3	11	1.000

IV. Discussion

Gastric cancer is one of the most common causes of cancer-related death in the world and incidence of Proximal Gastric Cancer has been found in increasing trend[13]. With the advancement in technology, minimally invasive surgery has become very popular in the field of surgery. These days, laparoscopic surgery has become mainstay of treatment for Gastric Cancer. In the present study, laparoscopic proximal gastrectomy and laparoscopic total gastrectomy surgical approach were used for proximal gastric cancer. LPG was used for smaller tumor size and was concentrated on preservation of as much organ as possible for the functional restoration. LTG was used for comparatively larger tumor size. The extent of lymph node dissection was D2 in both the groups.

The major limitations for the study were the possible biases because of a retrospective study and the sample size was not large enough to identify all the differences in patient characteristics and surgical outcomes between two groups. We limited our study to comparison of intra-operative and short term post-operative findings due to non-compliance of patients for long-term follow up. The result of present study should be validated by prospective studies with larger sample size.

V. Conclusion

We found that there are no any significant differences in peri-operative findings between Laparoscopic Proximal Gastrectomy and Laparoscopic total gastrectomy surgical approach for proximal gastric cancer.

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