Outcomes of laparoscopic proximal gastrectomy with jejunal interposition for proximal early gastric cancer

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Abstract

Introduction: Proximal gastrectomy is one of the modified surgical approaches for early gastric cancer located in the upper stomach instead of total gastrectomy. The preserving stomach helps for storage, digestion, and absorption of food and prevents anemia. Proximal gastrectomy with jejunal interinterposition has been reported to prevent and diminuate postoperative complications, such as reflux esophagitis and anastomotic stricture. Laparoscopic proximal gastrectomy (LPG) with jejunal interposition has been reported in the world with promising results. Aim of this study is to evaluate the feasibility and results of LPG with jejunal interposition for proximal early gastric cancer.

Material and Methods: Descriptive prospective study ofconsecutive cases of laparoscopic proximal gastrectomy for early gastric cancer located in the upper stomach was conducted at Department of Digestive Surgery of Cho Ray hospital from 1/2015 to 6/2018, .

Results: Of 8 cases of LPG for early gastric cancer located in the upper stomach was enrolled. Patients mean age was 55,5. Male/female ratio was 3/1. Tumor located at cardia in 7 cases and in fundus in 1 case. All the tumors were adenocarcinoma at cT1N0M0 stage. Mean operative time was 150 minutes. There was no intraoperative accident. Mean harvested lymph nodes were 5. There was no lymph node metastasis. No morbidity was noted. Mean postoperative hospital stay was 7 days. All patients tolerated well with food and have no regurgitation. With mean follow-up period of 28 months, there was no recurrence and mortality.

Conclusion: Our initial case series demonstrated that LPG with jejunal interposition is a feasible, safe procedure and offering good functional and oncological outcomes. Futher follow-up time and more data should be needed to evaluate the effectiveness of this operation.

Introduction

Proximal gastrectomy is one of the surgical methods for treating early cancer of the upper stomach [5]. This method improves the patients capability to store, digest, absorb food and prevent anemia. However, proximal gastrectomy with eosphagogastric is less popular due to high rate of postoperative complications, especially reflux esophagitis and anastomosis stricture[20].

In order to minimize these complications, in 1955, Merendino and Dillard [13] recommended the use of a separate jejunal loop to anastomose between esophagus and stomach (jejunal interposition). However, this is a complicated surgery, requiring a lot of surgical experience and especially with three anastomosis. Recently, the development of surgical instruments as well as surgical techniques has allowed more complex surgery to be performed by laparoscopic procedures, and laparoscopic proximal gastrectomy (LPG) is one of them highly appreciated. We report 8 cases of LPG performed at Cho Ray Hospital to evaluate the preliminary results of this technique and the feasibility.

Materials and methods

Subjects: From January 2015 to June 2018, we performed eight cases of LPG for early gastric adenocarcinoma in upper third of stomach (T1-2N0M0) at the Digestive Surgery Department, Cho Ray Hospital.

Preoperative diagnosis:

Patients were evaluated preoperatively by gastric endoscopy, Gastric barium meal, abdominal CT scan, Endoscopic ultrasound, chest X-ray.

Methods: Descriptive prospective study, case series report.

Surgical Techniques:

We performed LPG associated with lymph node resection in accordance of standards of the Japanese Gastric Cancer Association (JGCA) [5]. The method of reconstruction was esophagogastric anastomosis with isoperistaltic jejunal interposition modified by Merendino procedure.

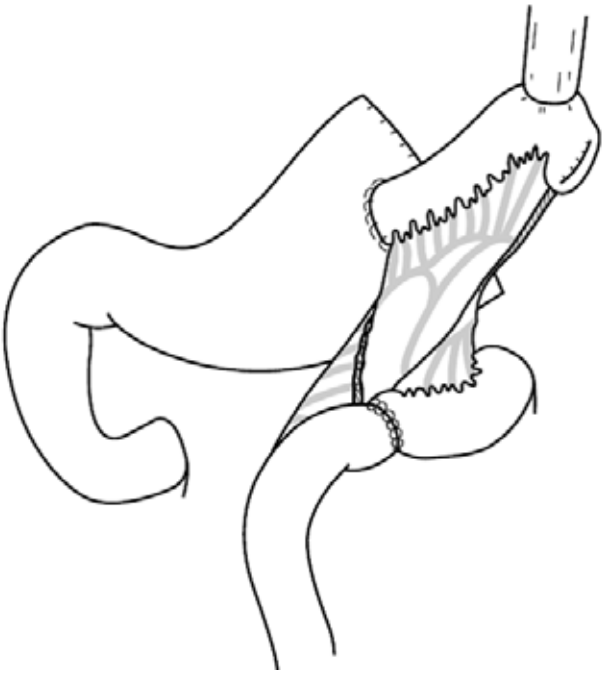

Figure 1: Esophagogastric anastomosis with isoperistaltic jejunal interposition modified by Merendino procedure . [7]

Techniques: LPG with D1+ lymph node dissection

Patient was positioning on his back. The main surgeon and the camera man stand to the right side of the patient. Second assistant stands to the left of the patient. We used 5 trocars as shown in Figure 2. Nathanson retractor was used to retract the left lobe of the liver. To locate the tumor position, we performed intraoperative endoscopy in combine with laparoscopy to determine the exact location of the tumor and suturing for marking. Great omentum might be resected or not. The right gastroepiploic vessels were preserved. Lymph node dissection was performed included lymph node around cardia (1 and 2), lesser curvature (3a) and greater curvature with lymph node 4sb, 4sa. On the lesser cuvature, caution was needed to preserve the right gastric vessels, hepatic branches for better functional recovery.

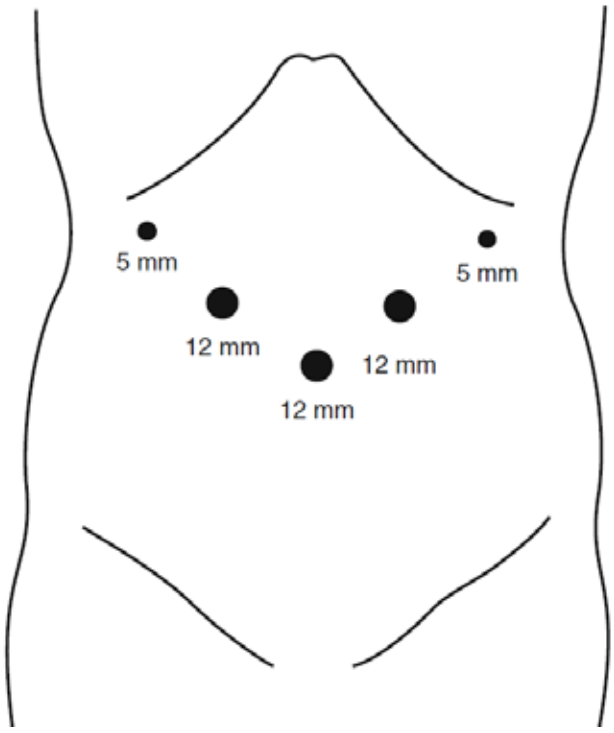

Figure 2: Trocars positions

The stomach was resected 3 cm below the tumor (with protruding type) or 5cm below the tumor (with infiltrated type) by endoscopic linear stapler. Normally it need two catridges to complete gastric resection. Abdominal esophagus was also resected 1-2 cm above the cardia by linear stapler.

Reconstruction:

The reconstruction with the isoperistaltic jejunal interposition was performed as the modification of Merendino procedure. The first mesenteric arcard of jejunum was selected for cutting. A 10cm segment of jejunum with vessels pedicle was resected by linear stapler extracorporeally via a 4cm minilaparotomy. The two ends of jejunum was anastomosed by end-to-end fashion by handsewn. The jejunum segment was retrocolic bought up to perform anastomosis. Esophago-jejunal anastomosis was performed by endoscopic linear stapler in Delta shape overlap or functional fashion. Jejuno-gastric anastomosis was performed also by endoscopic linear stapler in the anterior side of remnant stomach.

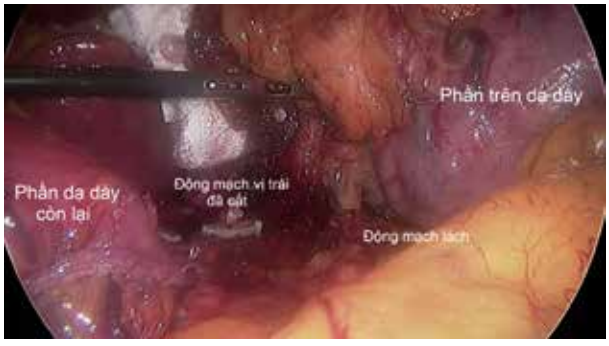

Figure 3: Upper border of pancreas after lymph node dissection

Figure 4: The jejunal interposition and two anastomoses

Continue the dissection to the right crus with lymph node dissection No.1. Starting dissection on the upper border of pancreas with lymph node dissection 8a, 7 and 9 with clip and transect the left gastric artery and vein at origins. Lymph node 11p was also been dissected along splenic artery. Lymph node in the splenic hilum (No.10) was not dissected.

Postoperative care:

The postoperative care depends on the actual state of the operation and the specific condition of each patient. In most of cases, we follow the postoperative care protocol of the JGCA [5] (Table 1). All patients would be underwent gastric contrast study with water soluble contrast on postoperative day 5-7 before discharge.

Table 1: Postoperative care protocol (as JGCA) [5]

Procedures	Postoperative Days
Antibiotics	As prophylactic antibiotic before operation
Removal of nasogastric tube	≤ Postop day 1
Clear liquid by mouth	≤ Postop day 1
Solid food by mouth	Postop day 2-4
Removal of urine catheter	≤ Postop day 1
Parenteral nutrition	Postop Day 1 until day 5-7
Abdominal drain removal	≤ Postop day 5
Discharge	Postop day 7-10

Table 2: Preoperative Tumor characteristics

Desprition	N
Degree of invasion (cT)	
cT1	8
cT2	0
Lymnode metastasis	0
Tumor characteristics	
Protrusion	6
Ulceration	1
Polyp	1
Differentiation by histopathologic examination	
High	0
Medium	7
Low	1

Results

From January 2015 to June 2018, eight cases of LPG have been performed at Cho Ray Hospital for treatment of early gastric cancer located in the upper third of stomach.

Patient characteristics

Patients were admitted into hospital due to pain in epigastric area and or gastrointestinal tract disorder. There were 6 male patients, 2 female patients. The median age of the patient was 55.5. The youngest was 39 years old, the oldest was 74 years old. Only one patient with a performance status (PS) was 1 point as per Eastern Cooperative Oncologic Group (ECOG) [16]. All seven patients had a PS score of 0. Patients did not report any previous reflux symptoms.

Tumor characteristics:

The preoperative tumor features are shown in table 2. All cases were gastric adenocarcinoma.

Surgical results

Median operation time was 150 minutes, the shortest time is 120 minutes, the longest time is 210 minutes. No complications during operation occurred. The blood loss was almost negligible. The mean number of cartridges used in a surgery was 7 (2 cartridges for gastric resection, 1 for esophageal resection, 2 for esophagojejunal anastomosis and 2 for Jejuno-gastric anastomosis).

The median number of nodes harvested were 5 (0 - 8 nodes). Operative specimen anapathologic results were similar to preoperative staging and without lymph node metastasis.

The lenght of hospital stay after surgery was 7 days (at shortest 6 days, at longest 9 days). There was no postoperative complication. Most patients were caring as the postoperative protocols recommended by JGCA. All patients underwent water soluble contrast gastric study showed good flow with no sign of leakage. All patients had no symptoms of gastroesophageal reflux and gain weight after surgery. No chemotherapy was

indicated for patient after surgery.

All the patient followed, and median follow-up time was 28 months, (6 - 36 months) and they survived without the recurrence or distant metastasis.

Discussion

About indication of operation: According to the JGCA [5], non-ulcerated gastric cancers ≤ 2 cm, moderately or well differentiated, cT1a and N0, should be treated with endoscopic resection. However, endoscopic mucosal resection (EMR) or endoscopic submucosal dissection (ESD) techniques are new techniques that require a lot of technical proficiency, equipments and especially the accuracy of staging as well as specimen examination and follow-up. In order to achieve good results for patients, especially on oncologic outcome, good collaboration of all the above steps is required. Therefore, in the mean time, most cases of early gastric cancer in Cho Ray hospital are still managed by laparoscopic gastrectomy.

In the past, most cases of gastric cancer in upper 1/3 of of stomach including early gastric cancer are treated by total gastrectomy. Proximal gastrectomy was limited because of the two main concerns: First is oncological safety and the second is the frequent complications of direct esophago-gastric anastomosis likes: reflux esophagitis, anastomotic stricture... [17].

The main hinderance of proximal gastrectomy for gastric cancer is lymph node dissection. Because of the need to preserve the right gastric vessels and right gastroepiploid vessels as well as the hepatic and cardia branches of vagus nerve in proximal gastrectomy, the extended lymph node dissection is more difficult than in total gastrectomy. However, Kitamura et al. (11) have noticed that the upper gastric cancer which has not invaded muscular layer (≤ T2) do not have metastatic lymph nodes in lower part of stomach. Kong et al. [12] reported that early gastric cancer in upper stomach only metastasized to lymph nodes No. 2, 3, and 7. According to the JGCA [5], proximal gastrectomy can be indicated for early gastric cancer in upper stomach which has negative clinical metastatic lymph node (cN0), the extend of D1+ lymph node dissection is comparable to D1+ on total gastrectomy except those lymph node group 3b, 4d, 5 and 6 which located in lower stomach. Long-term survival rates after proximal gastrectomy were not significantly different from those after total gastrectomy for early gastric cancer [1], [3], [4], [15], [19], [21], [22].

At Cho Ray hospital, we follow the guidelines of JGCA, proximal gastrectomy is indicated only for patients with early gastric cancer in upper stomach. D1 + lymph node dissection was performed for these patients. In addition, laparoscopic gastrectomy for early gastric has many advantages such as less pain, minimal blood loss, faster patient recovery and shorter hospitalization stay. [2], [8], [9], [10].

About method of reconstruction:

There are two main types of reconstruction after proximal gastrectomy: Esophago-gastric anastomosis and esophago-jejuno - gastric anastomosis. Esophago-gastric anastomosis is simpler, has only one anastomosis, shorter operation time and less blood loss [6]. However, this method has a high rate of complications related to the anastomosis, namely reflux esophagitis and anastomotic stricture. Although there are many modifications such as preservation of the lower esophageal sphincter, gastric tube formation, gastric folding ... however, the rate of these complications is still quite high compared with total gastrectomy with Roux-en-Y anastomosis [1], [19].

Using the jejunal interpostion between the esophagus and the remnant of stomach is actually a modification to reduce reflux and anastomotic stricture. Technically, this method is much more complicated than the direct esophagogastric anastomosis with 3 anastomosis and prolonged operation time and theoretically higher risk of anastomotic leakage. However, the advantage of the method is that the rate of reflux and anastomotic stricture is similar to that of the total gastrectomy with Roux-en-Y [1], [7], [14], [22]. Some authors modify the method by jejunal pouch or double tract

method to reduce the rate of complications but the results so far unclear.

One of the notable issues of proximal gastrectomy is the monitoring of the cancer that occurs in the remaining stomach. The patients with esophagogastric anastomosis, following up by endoscopy check is usually not difficult. However, in the case of jejunal interposition, endoscopy exam may be difficult, especially in cases where the jejunum segment is too long. If the jejunum segment is longer than 10 cm, the endoscopy to assess the remaining stomach will be difficult [18], if the jejunum segment is too short, it will lose the effect of preventing reflux esophagitis. Therefore, careful consideration should be given to the length of the jejunum interposition.

With the experiences gained in laparoscopic distal and total gastrectomy, we performed LPG with a 10cm jejunal interposition. Advances in endoscopic instruments, new staplers and surgical techniques have made laparoscopic surgery much faster and safer even with three anastomosis. We performed intracorporeal anastomosis in Delta shape method with 2 catridges of endoscopic linear stapler. There was no anastomotic leakage in our series. Continuous follow up over 3 years since the forst case, no cases of reflux esophagitis or anastomotic stricture been noted. There was no cases of local recurrence or distant metastasis.

Conclusion

Laparoscopic proximal gastrectomy is a complex procedure, however safe and technically feasible. Initial results show that the surgery results in good oncological outcomes and reduced complications such as reflux esophagitis and anastomotic stricture. Careful and accurate patient selection as well as experienced surgeon in laparoscopic gastric surgery are crucials for successful operation.

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