Review Article

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Completely Robotic Surgical System Combined With Intraoperative Gastroscopy For Pylorus -Preserving Midgastrectomy In Gastric Body Cancer

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Abbreviations:
PPG: pylorus-preserving gastrectomy; FRPPG : Fully robotic pylorus-preserving gastrectomy;
RAPPG: Robot-assistedpylorus-preservinggastrectomy; LAPPG: Laparoscopy-assistedpylorus-preservig gastrectomy;
TLPPG: Totally laparoscopic pylorus-preserving gastrectomy; LADG: Laparoscopic assisted distal gastrectomy;
EGC:Early gastric cancer; GBC:gastric body cancer; EUS:Endoscopic ultrasonography; QOL:Quality of life;

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1. Abstract

1.1. Objective: This study aims to evaluate the feasibility and safety of totally robotic surgery combined with intraoperative gastroscopy for pylorus-preserving middle gastric resection in the treatment of middle gastric body cancer, which can improve the postoperative quality of life of patients.

1.2. Methods: A descriptive case series study was used. Four patients who met the inclusion criteria underwent the surgical procedure, which consisted of intraoperative gastroscopy titanium clip to locate the lesion position, using 5-hole method to place Trocar, totally robotic surgery for middle gastric resection, and end-to-end manual suture of gastric fundus and body. The surgical situation, perioperative situation, postoperative pathology and follow-up situation were observed.

1.3. Results: The surgery was successfully performed in all cases, without conversion to open surgery or intraoperative blood transfusion. The operation time, blood loss, incision length, postoperative recovery and complications were within acceptable range. The pathological examination confirmed the negative margin and no lymph node metastasis of all cases. The follow-up at 3 months after surgery showed that all patients had good wound healing, no serious postoperative discomfort or malnutrition, and no tumor recurrence or metastasis.

1.4. Conclusion: Totally robotic surgery combined with intraoperative gastroscopy for pylorus-preserving middle gastric resection is a safe and feasible surgical option for middle gastric body cancer, with good short-term prognosis. It has unique advantages in preserving the normal anatomy and physiology of the pylorus and gastric antrum.

2. Keywords:
Gastric body cancer; early gastric cancer;pylorus-preserving gastrectomy; intraoperative gastroscopy;

3. Introduction

EGC is defined as gastric cancer confined to the mucosa and submucosa, irrespective of the presence or absence of lymph node metastasis. ESD, which stands for endoscopic resection, is the main treatment modality for EGC. It has advantages such as being minimally invasive and preserving gastric function, and it is reported that its 5-year survival rate can exceed 90%. However, it also has some limitations.1-3 The indications for ESD are mainly some cT1a cases, while cT1b gastric cancer has a very high risk of residual tumor cells after endoscopic resection, and the probability of lymph node metastasis is about 19.6%. Therefore, ESD is not recommended by domestic and international guidelines for this group of patients. Some EGCs are more suitable for surgical resection, especially those with suspected lymph node metastasis. When such tumors are located in the upper or lower part of the stomach, selective proximal gastrectomy or distal gastrectomy can be performed to preserve some gastric function. When the lesion is located in the middle part of the stomach, total gastrectomy is usually chosen.4,5 However, total gastrectomy will have different degrees of impact on the patient's physiology, endocrine, dietary habits, postoperative QOL and so on. With the advent of the minimally invasive era, EGC treatment has gradually abandoned the traditional

open surgery method and turned to minimally invasive methods such as endoscopic treatment, multi-port laparoscopy, single-port laparoscopy and even robotic surgery. The emergence of robots has opened up a new horizon for gastric cancer surgery. The extent of gastric cancer surgery resection has also changed from 2/3 or more distal gastrectomy and total gastrectomy to proximal gastrectomy, PPG, segmental gastrectomy, local gastrectomy and other surgical methods. The extent of lymph node dissection has also changed from standard D2 dissection to D1 or D1+ 6,7 Since the 1980s, PPG surgery has gradually been applied to EGC resection surgery limited to the middle 1/3 of the stomach, and it has been widely used in Japan and South Korea. At present, the minimally invasive surgical methods for PPG include LAPPG, totally laparoscopic TLPPG, RAPPG. Among them, LAPPG is the mainstream surgical method for PPG. And previous related retrospective studies have found that LAPPG surgery has no difference in overall survival and recurrence-free survival compared with traditional LADG surgery.8 In addition, compared with ESD and other endoscopic EGC treatment methods, LAPPG has safer margins and solves the risk of possible lymph node metastasis. But FRPPG is rarely reported. Now we summarize and report 4 cases of totally robotic surgery combined with intraoperative gastroscopy for pylorus-preserving middle gastric resection in our hospital in recent years. This article collects the clinical data of these patients, conducts retrospective analysis, and reviews relevant literature.

4. Data and methods

4.1. Data acquisition

The inclusion criteria for dual-scope surgery in this study were: (1) preoperative gastroscopy showed that the lesion was located in the middle 1/3 of the stomach, and the distal margin of the tumor was more than 4 cm from the pylorus (the lower margin of the tumor was 2 cm from the lower cutting edge, and the lower cutting edge was at least 2 cm from the pyloric ring); (2) no distant metastasis or regional lymph node metastasis; (3) preoperative EUS suggested that the tumor invasion depth was mucosa or submucosa, i.e., T1, without invading the muscular layer. The exclusion criteria were: (1) patients with severe cardiopulmonary diseases or other serious diseases who could not tolerate surgery; (2) patients with a history of gastric surgery, major upper abdominal surgery, gastric ESD surgery or malignant tumors of other abdominal organs; (3) patients with concomitant malignant tumors in other parts. A descriptive case series study was conducted. The clinical data of 4 patients with cT1a-b gastric cancer who underwent totally robotic surgery combined with intraoperative gastroscopy for pylorus-preserving middle GBC radical resection in the Department of Gastrointestinal Surgery, Xiangya Second Hospital of Central South University from July 2022 to June 2023 were analyzed. Among them, there was one male and three females, with a mean age of 61 (56-67) years; the mean body mass index was 22.52 (19.81, 25.95) kg/m2; all four patients had tumors located in the middle 1/3 of the stomach, none of them had a family history of tumors, a history of abdominal surgery, among which two patients had a history of hypertension, and the other two had no relevant underlying diseases. This study was approved by the Ethics Committee of Xiangya Second Hospital of Central South University (approval number: 2023-KY-0402-003). All patients signed informed consent forms. The specific preoperative clinical data of the 4 patients are shown in Table 1

Table 1: Preoperative clinical data of 4 cases of midgastrectomy with pylorus preservation performed by fully robotic surgical system combined with intraoperative gastroscopy

	Case 1	Case 2	Case 3	Case 4
Genders	**Women**	**Men**	**Women**	**Women**
Age (years)	63	67	56	58
Body Mass Index (kg/m2)	22.43	25.95	19.81	21.88
Family history of cancer	No	No	No	No
Previous history of abdominal surgery	No	No	No	No
Underlying disease	No	Hypertension	No	Hypertension

4.2. Surgical method

All patients underwent totally robotic surgery combined with intraoperative gastroscopy for pylorus-preserving middle GBC radical resection by the same surgical team, and the chief surgeon had rich experience in robotic gastric surgery.

4.2.1. Use of FRPPG in combination with intraoperative gastroscopy

Intraoperative gastroscopy was used to re-evaluate the tumor location and mark the gastric wall with titanium clips, and confirmed that the lesion was EGC in the middle 1/3 of the gastric body.

4.2.2. Surgical steps

4.2.2.1. Anesthesia and position

The patient underwent endotracheal intubation and general anesthesia. The patient was placed in a supine position, with both legs apart, head elevated and foot lowered, tilted 20-30 degrees.

4.2.2.2. Number and location of Trocars

Trocars were placed using a 5-hole method. A 12mm Trocar was placed at the lower edge of the umbilicus as the observation port, and an 8mm Trocar was placed under the rib margin of the left anterior axillary line as the main operative port for the first robotic arm. A 12mm Trocar was placed 2cm below the umbilicus on the left midclavicular line as the assistant operative port, mainly used for assistant auxiliary operation. An 8mm Trocar was placed under the rib margin of the right anterior axillary line as the operative port for the third robotic arm, and an 8mm Trocar was placed 2cm below the umbilicus on the right midclavicular line as the

operative port for the second robotic arm. The distance between adjacent Trocars was >8cm to avoid interference between robotic arms(Fig.1)

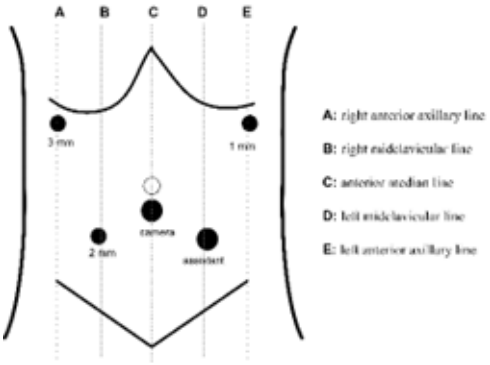

Fig. 1: Schematic diagram of Trocar position for fully robotic lower midgastrectomy surgery

4.2.2.3. Abdominal exploration

Pneumoperitoneum was established and maintained at a pressure of (1.6 kPa), and totally robotic surgery was performed to explore the abdomen sequentially, further confirming that the lesion had no serosal layer infiltration, no obvious enlargement of perigastric lymph nodes, and no metastasis in the abdominal and pelvic cavity.

4.2.2.4. Greater curvature lymph node dissection

The gastrocolic ligament was cut to the left, and the No.4sa and No.4sb lymph nodes were first dissected along the left side of the upper edge of the pancreas, and the left gastroepiploic artery and vein were ligated at the origin. Then, the splenogastric ligament was cut along the left gastroepiploic vessels to the greater curvature of the stomach, and the greater curvature was exposed from left to right to the junction of the middle and lower 1/3 of the stomach, while performing No.4d lymph node dissection.

4.2.2.5. Subpyloric lymph node dissection

Subpyloric No.6 lymph node dissection is the key to PPG: Starting from the origin of the right gastroepiploic vessels, No.6 lymph nodes were dissected along the vessels to the distal end, preserving the blood supply of the subpyloric area of the gastric antrum, and ligating the right gastroepiploic artery and vein at the distal end of the subpyloric branch.

4.2.2.6. Upper edge of pancreas lymph node dissection

Then, enter the retropancreatic space behind the pancreas to skeletonize the three major branches of the celiac artery, and ligate and transect the left gastric vessels at the origin, while sequentially dissecting No.11p, 9, 7, 8 lymph nodes. The vagal nerve abdominal branch can be selectively preserved under the premise of ensuring complete dissection of No.7 lymph nodes.

4.2.2.7. Lesser curvature lymph node dissection

The anterior branch of the vagus nerve was transected at a distance from the origin of the hepatic branch of the vagus nerve, and No.1 and No.3 lymph nodes were dissected along the lesser curvature, while No.5 and No.12a lymph nodes were not dissected

4.2.2.8. Removal of the specimen and reconstruction of the digestive tract

Using a cutting stapler, transect the stomach 3 cm distal to the pylorus and then transect the specimen 2 cm proximal to the tumor edge. Send the specimen for frozen section analysis to confirm negative margins. After verifying complete tumor resection, perform end-to-end hand-sewn anastomosis of the remaining gastric fundus and body with 1B-405 barbed suture and reinforce the seromuscular layer (Fig.2). Make a 3-4 cm midline incision below the xiphoid process and enter the abdominal cavity in layers. Place a retractable wound protector and extract the specimen.

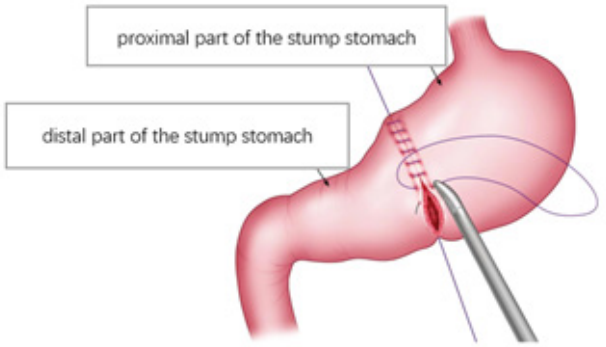

Fig.2: Schematic diagram of manual anastomosis of remnant stomach

4.3 Outcome measures and follow-up:

(1) Intraoperative outcomes: including operative duration, blood loss during surgery, conversion to open surgery, length of surgical incision; (2) Postoperative outcomes: including time to ambulation, time to flatus, time to bowel movement, time to liquid intake, time to urinary catheter removal, time to abdominal drain removal, length of hospital stay, postoperative complications; (3) Postoperative pathology: including tumor location, depth of tumor invasion, maximum tumor diameter, total number of lymph nodes harvested, histological type, status of proximal and distal margins, presence of vascular and neural invasion, degree of differentiation and pathological stage; (4) Follow-up outcomes: telephone follow-up of patients at 3 months after surgery, including wound healing status, occurrence of postoperative gastric perforation, anastomotic bleeding, anastomotic fistula or anastomotic stricture; gastrointestinal function status (gastric paresis or delayed gastric emptying causing acid reflux symptoms such as belching or abdominal bloating); patient-reported subjective global assessment (PG-SGA); tumor recurrence or metastasis; patient survival status.

4.4. Statistical methods:

This study employed descriptive statistics. Quantitative data were presented as mean (range) or M (range), and categorical data were presented as frequency

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5. Results

5.1. Surgical outcomes

All 4 patients successfully underwent totally robotic pylorus-preserving middle gastrectomy with intraoperative gastroscopy, without requiring open conversion or intraoperative blood transfusion. The average operative time was 180 (165-195) min, the average intraoperative blood loss was 45 (40-60) ml, the average surgical incision size was 3.5 (3-4) cm, and the ASA grade was 3 for all patients (Table 2).

Table 2: Intraoperative clinical data of 4 cases of midgastrectomy with pylorus preservation performed by fully robotic surgical system combined with intraoperative gastroscopy

	Case 1	Case 2	Case 3	Case 4
Surgical time (min)	165	185	175	195
Intraoperative bleeding (ml)	60	40	40	40
ASA classification	3	3	3	3
conversion to laparotomy	No	No	No	No
Reconstruction mode	PPG	PPG	PPG	PPG
Surgical incision length (cm)	3	4	3	4

5.2. Postoperative outcomes

The average time to pass gas was 3 (2-4) d, the average time to have a bowel movement was 4 (3-5) d, the average time to start liquid diet was 4 (3-5) d, the average hospital stay was 8 (7-9) d, the average time to remove abdominal drain was 5 (4-6) d, the average time to remove urinary catheter was 1.5 (1-2) d, and the average time to get out of bed was 2.5 (2-3) d. No major surgery-related complications (such as postoperative bleeding [abdominal or gastrointestinal], anastomotic leak, anastomotic narrowing, gastric emptying disorder, lymphatic leak, bowel obstruction, wound infection or wound breakdown) were observed during hospitalization (Table 3)

Table 3: Postoperative clinical data of 4 cases of midgastrectomy with pylorus preservation performed by fully robotic surgical system combined with intraoperative gastroscopy

	Case 1	Case 2	Case 3	Case 4
Postoperative urinary catheter removal time (d)	1	2	1	2
Postoperative abdominal drain removal time (d)	4	6	4	6
First postoperative time out of bed (d)	2	3	3	2
Time to first postoperative expiration (d)	2	4	3	3
Time to first postoperative bowel movement (d)	4	5	4	3
Time to first postoperative fluid intake (d)	4	5	4	3
Length of postoperative hospitalization (d)	7	9	7	9

5.3. Postoperative pathology

The 4 tumors varied in their depth of invasion, with 2 confined to the mucosal layer and 2 extending to the submucosal layer. All cases had clear margins (proximal and distal), no lymph node involvement, vascular invasion or neural invasion. The histological type of the tumors was adenocarcinoma, with 1 case of well-differentiated adenocarcinoma, 2 cases of moderately differentiated adenocarcinoma and 1 case of poorly differentiated adenocarcinoma. The average maximum tumor diameter was 1.0 (0.6-1.5) cm, and the average number of lymph nodes harvested was 19 (18-20) (Table 4).

Table 4: Postoperative pathology of four cases of midgastrectomy with pylorus preservation performed with a fully robotic surgical system combined with intraoperative gastroscopy

	Case 1	Case 2	Case 3	Case 4
Depth of tumor infiltration	Submucosa	Inner layer of mucous membrane	Submucosa	Inner layer of mucous membrane
Tumor location	Lower and middle part of the body of the stomach	Upper middle part of the body of the stomach	Lower and middle part of the body of the stomach	Upper middle part of the body of the stomach
Maximum tumor diameter(cm)	1	1.5	0.8	0.6
Otal number of lymph nodes dissected	20	19	18	19
Subincisal margin	Negative	Negative	Negative	Negative
Distal incisal margin	Negative	Negative	Negative	Negative
LVI+	No	No	No	No
PNI+	No	No	No	No
Pathologic stage	pT1bN0M0 Phase IA	pT1aN0M0 Phase IA	pT1bN0M0Phase IA	pT1aN0M0 Phase IA
Degree of differentiation	Middle	Middle	Low	High

5.4. Follow-up outcomes

Telephone follow-up at 3 months after surgery showed that all patients had

good wound healing, no postoperative gastric perforation, anastomotic bleeding, anastomotic fistula, anastomotic stricture, gastroparesis or delayed gastric emptying causing acid reflux symptoms such as belching or abdominal bloating. None of the patients had severe malnutrition, and their patient-reported subjective global assessment (PG-SGA) scores were all in A or B level. None of the patients had tumor recurrence, metastasis or death, and all patients were satisfied with their postoperative diet, bowel habits and quality of life (QOL) (Table 5).

Table 5: Postoperative 90-day follow-up results of midgastrectomy with pylorus preservation performed with a fully robotic surgical system combined with intraoperative gastroscopy in 4 cases

	Case 1	Case 2	Case 3	Case 4
Ventosity	No	No	No	No
Sour regurgitation	No	No	No	No
Eructation	No	NO	No	No
Nutritional score	Grade B	Grade A	Grade A	Grade A
Incision healing	I/A	I/A	I/A	I/A
Gastric perforation	No	No	No	No
Anastomotic Bleeding	No	No	No	No
Anastomotic fistula	No	NO	No	No
Anastomotic stenosis	No	No	No	No
Recurrence or metastasis	No	No	No	No
Status of survival	No	NO	No	No

6. Discussion

As the multidisciplinary team (MDT) model continues to evolve, disease treatment is increasingly becoming personalized, and so is the surgical management of gastric cancer. The conventional radical gastrectomy for gastric cancer involves removing at least two-thirds of the stomach along with D2 lymphadenectomy. While this approach is effective, it also leads to many complications, such as dumping syndrome, residual gastritis, alkaline reflux gastritis, malnutrition, weight loss and other related problems that are very common.9-12 Therefore, the surgical treatment of gastric cancer should not only aim for curative resection, but also for preserving the relevant functions of the stomach. In recent years, function-preserving gastrectomy (FPG) has gained attention from many surgeons. Its goal is to preserve the postoperative quality of life (QOL) of patients with gastric cancer.8,13 Pylorus-preserving gastrectomy (PPG) is one of the classic examples of FPG. PPG was first introduced by Maki and applied to benign gastric ulcer resection in 1967.14 Initially, PPG was mainly used for resecting benign ulcers in the middle portion of the stomach. However, with the introduction of proton pump inhibitors for gastric ulcer treatment, the surgery rate for gastric ulcers declined gradually, and PPG surgery became less popular among surgeons. It was not until the 1980s that PPG surgery was applied to early gastric cancer (EGC) resection confined to the middle third of the stomach. It has been widely used in Japan and South Korea ever since. Currently, most PPG surgeries are performed laparoscopically,15,16 mostly LAPPG, less TAPPG and RAPPG (Table 6), but few people perform totally robotic surgery system combined with intraoperative gastroscopy. PPG is a surgical method that preserves the cardia and pylorus, resects the middle part of the stomach, and applies to EGC (or benign gastric diseases). Its purpose is to maintain the normal anatomy and physiological functions of the stomach, reduce postoperative complications, and improve postoperative QOL.17,18 According to the fifth edition of Japan's "Guidelines for Gastric Cancer Treatment", PPG indications are: middle third of stomach, distal lesion distance from pylorus more than 4 cm (tumor lower edge distance from lower cutting edge 2 cm, the lower cutting edge is at least 2 cm away from pylorus), clinical stage cT1N0M0 EGC. The preoperative endoscopic ultrasonography in our center suggested that all four patients with gastric body cancer had tumor locations in the middle third of the gastric body, and infiltration depth was limited to mucosa and submucosa layers. The clinical stage was cT1N0M0. The distance from pylorus was more than 4 cm in all cases, so they met PPG's surgical indications. Robotic surgery system has been shown to be safe and feasible for gastrectomy for gastric cancer in recent years.19 Da Vinci robotic surgery can reduce gastrectomy-related complications and speed up patient recovery after surgery. Compared with conventional laparoscopy, robotic surgery system has a clearer 3D vision, mechanical arm can rotate in multiple angles in a narrow space without blind spots , more stable , more accurate , flexible movement can effectively avoid excessive traction and vascular injury to abdominal tissue , resulting in less trauma to patients.20 Minimally invasive lymph node dissection (LND) is an essential component of minimally invasive gastrectomy .

Due to complex vascular anatomy around stomach , intraoperative bleeding can easily occur during lymph node dissection around stomach . Some surgical experts are concerned that laparoscopic surgery may compromise lymph node dissection.21 Robotic surgery has obvious advantages over laparoscopy in LND; robot 3D vision and mechanical arm can overcome the limitations of traditional laparoscopic instruments. According to Kinami S et al. 22reported that in EGC surgery, the robot gastrectomy group had a significantly higher number of lymph nodes removed than the laparoscopy group. EGC tumors are usually small, and tumor invasion depth is limited to mucosa and submucosa layers. At the same time, they are characterized by low lymph node metastasis rate. The existing reports show that EGC patients have a lymph node metastasis rate between 5%-15%.23-25 As we all know, in order to preserve vagus nerve innervation and blood supply at pylorus part during FRPPG surgery , FRPPG surgery may cause incomplete dissection of lymph nodes above the pylorus. But the previous two retrospective studies showed that the lymph node metastasis rate of early middle gastric cancer above and below the pylorus was extremely low,26,27 which provided scientific evidence for the omission of lymph node dissection above the pylorus. Similarly, previous retrospective studies have found that for T1 GBC located in the middle 1/3 of the stomach, the No.5 lymph node metastasis rate is only 0 0.5%,27,28 and as the second station lymph node of gastric cancer metastasis, No.12

The lymph node metastasis rate is even lower. For example, Kong et al. 27After statistically describing the lymph node metastasis of each group of gastric cancer radical specimens, it was found that when the tumor was ≥6 cm away from the pylorus, the No.5 lymph node metastasis rate was 0 (T1a stage) and 0.9% (T1b stage), and No.6 The lymph node metastasis rate was 0 and 1.8%. Therefore, our center did not clear the lymph nodes above the pylorus, No.5 and No.12, and no tumor recurrence or metastasis was seen during follow-up. The totally robotic PPG surgery is routinely checked by gastroscopy, and the titanium clip is used to mark the outside of the gastric wall to ensure negative margins. As mentioned earlier, the robot has more advantages than laparoscopy. The relevant literature points out 8,29 that patients who receive LAPPG, whether it is the overall survival rate or the recurrence-free survival rate after surgery, are similar to patients after LADG surgery. We consider that the totally robotic middle gastric resection surgery also has the same tumor-related safety as LAPPG and LADG. The results of a recent retrospective study reported 30 that the 5-year overall survival rate and 3-year disease-free survival rate of PPG surgery and DG surgery were 98.4% and 96.6%, respectively, and there was no statistical significance between them. Confirmed the tumor safety of PPG surgery. So far, none of the four patients who underwent totally robotic middle GBCradical surgery in this study have found tumor recurrence or metastasis. Therefore, in terms of tumor radicality, totally robotic middle GBCradical surgery can achieve the same treatment effect as standard D2 radical surgery, and enable patients to achieve ideal long-term survival.

Chen K et al.31 and Ma J L et al.32 reported Meta analysis respectively, which showed that compared with laparoscopic gastrectomy, the blood loss during completely robotic gastric cancer radical surgery was less than that of laparoscopy group, and the first time to enter liquid was faster after surgery , The time for anal defecation and exhaust was shorter, and the postoperative complications were less. Pylorus-preserving gastrectomy (PPG) is a classic function-preserving surgery for EGC.16 By preserving the pylorus and vagus nerve to maintain the normal anatomy and nerve innervation of the stomach, and PPG surgery The digestive tract reconstruction did not change the normal running path of food, which is beneficial to food digestion and absorption. FRPPG performed by our center completely preserves the normal anatomy and physiological functions of pylorus and gastric antrum, thus significantly reducing postoperative dumping syndrome and bile reflux disease. It is undeniable that PPG is more likely to cause gastric emptying disorder after surgery. The relevant literature 33-36 reports that the probability of gastric retention symptoms after PPG is about 6.2% 10.3%. Many factors may affect PPG's postoperative gastric emptying function, including blood supply to gastric antrum29, surgical anastomosis distance from pylorus and patient's age.37-39 Therefore, by reasonably selecting patients and standardizing and standardizing surgical operation procedures, PPG's postoperative gastric retention can be effectively prevented. In our center's four patients who underwent FRPPG, none of them had postprandial upper abdominal distension discomfort, belching, etc. after surgery. In summary, for patients with EGC located in the middle third of the stomach, totally robotic surgery system combined with intraoperative gastroscopy is a safe and feasible surgical alternative to LAPPG, which can achieve similar tumor radicality as conventional distal radical surgery, without increasing additional surgical risk, and can significantly improve patient's postoperative nutritional status and QOL. However, this study has the following limitations: (1) This study is a retrospective study, which may have some bias in choosing surgical methods, and still requires high-quality randomized clinical trials to further confirm. (2) This study is a single-center study, with narrow surgical indications, so the sample size is small, and still needs multi-center large-sample studies to further validate. (3) There is no comparison with other surgical methods in the same period, and the follow-up time after surgery is too short, so it is impossible to fully evaluate the long-term efficacy of totally robotic surgery system combined with intraoperative gastroscopy. Therefore, based on this preliminary study, our center plans to further conduct relevant prospective controlled studies, and further verify the effectiveness, safety and benefits of this surgical method.

7. Conclusion

Totally robotic surgery combined with intraoperative gastroscopy for pylorus-preserving middle gastric resection is a safe and feasible surgical option for middle gastric body cancer, with good short-term prognosis. It has unique advantages in preserving the normal anatomy and physiology of the pylorus and gastric antrum.

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