

# Laparoscopically Assisted Distal Partial Gastrectomy for Early-Stage Gastric Carcinomas

SEIGO KITANO, M.D., F.I.C.S., ASSOCIATE PROFESSOR OF SURGERY  
SEIGO MAEO, M.D., RESEARCH FELLOW  
NORIO SHIRAIISHI, M.D., ASSISTANT PROFESSOR OF SURGERY  
KATSUHIRO SHIMODA, M.D., ASSISTANT PROFESSOR OF SURGERY  
MASAKI MIYAHARA, M.D., ASSISTANT PROFESSOR OF SURGERY  
TOSHIO BANDO, M.D., CLINICAL FELLOW  
KOUICHIRO SHUTO, M.D., CLINICAL FELLOW  
TAKANORI YOSHIDA, M.D., ASSISTANT PROFESSOR OF SURGERY  
DEPARTMENT OF SURGERY I  
OITA MEDICAL UNIVERSITY  
OITA, JAPAN

**E**ndoscopic mucosal resection (EMR) is now in clinical use for the management of small, early-stage gastric carcinomas, although some patients are treated via laparotomy when the lesions are not suitable for EMR due to their size, depth, and location.<sup>1-3</sup> In many cases of invasive mucosal carcinoma with submucosal involvement, the regional lymph nodes along with the distal portion of the stomach must also be resected. In order to remove the whole resected specimen, a mini-laparotomy of appropriate length (5 cm) is performed which can be located at the optical port site after removing the laparoscope. By applying an abdominal wall elevator<sup>4</sup> through the mini-laparotomy, direct vision is possible which facilitates resection of the regional lymph nodes and intestinal anastomosis.<sup>5</sup> We describe our technique for laparoscopically assisted distal gastrectomy and present our early clinical results.

## INDICATIONS FOR LAPAROSCOPICALLY ASSISTED DISTAL PARTIAL GASTRECTOMY (LADPG)

The operative parameters for patients undergoing LADPG are shown in Table 1.

Mucosal lesions were resected by means of EMR or laparoscopic wedge resection if they were elevated type IIa carcinomas (less than 20 mm in diameter) or depressed type IIc carcinomas (less than 10 mm) in the absence of peptic ulcers. Mucosal carcinomas of

type IIa (greater than 20 mm) and type IIc (greater than 10 mm) and carcinomas with minimal submucosal invasion were selected for LADPG with lymphadenectomy. As we have performed both partial gastric resection and distal partial gastrectomy via laparotomy

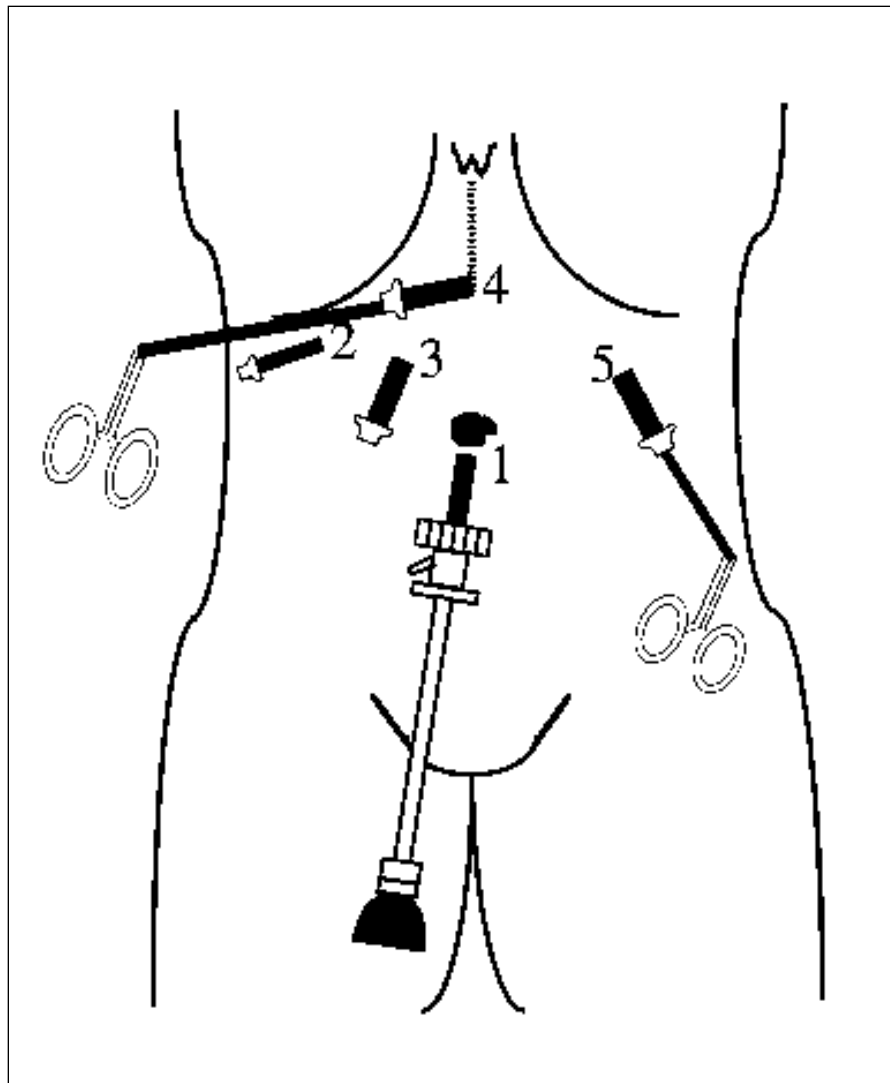


Figure 1. Sites of trocars for laparoscopically assisted distal partial gastrectomy.

without radical lymph node dissection in patients with these characteristics, we simply applied the same criteria for the laparoscopic approach. Patients with peptic ulcers and mucosal lesions, or with minimal submucosal invasion, were also treated by LADPG regardless of the size of the lesion. On the other hand, carcinomas with massive submucosal invasion were resected by open surgery, combined with radical lymph node dissection. Lesions of an early-stage gastric carcinoma are difficult to dissect using the endoscopic approach; rather, it is recommended that they be resected by the laparoscopically assisted method.

**TECHNIQUE FOR LAPAROSCOPICALLY ASSISTED DISTAL PARTIAL GASTRECTOMY (LADPG)**

Two video monitors are placed obliquely above the patient's shoulders. The surgeon and camera operator stand on the right side of the patient and the two assistants on the left. With the patient in the supine position, the initial pneumoperitoneum (10 mm Hg) is created through the subumbilical Hasson cannula inserted via the open technique. An angled laparoscope is inserted through this cannula under pneumoperitoneum. Four additional trocars are placed in the upper abdomen (Fig. 1). Port positions and their functions are noted in Table 2.

**Table 1. Operative parameters in patients undergoing laparoscopically assisted distal partial gastrectomy**

Patients	Skin incision (cm)	Operating time (min)	Blood loss (mL)
1	5	180	100
2	6	250	120
3	6	255	130
4	9	225	200
5	5	255	45
6	6	353	500
7	6	180	90
8	6	200	120
9	5	300	390
10	6	240	150

**Table 2. Port positions**

- Port site No. 1:** for the laparoscope—the subumbilical position (10 mm).
- Port site No. 2:** for a retractor to elevate the liver (5 mm).
- Port site No. 3:** for the operator's left hand to manipulate a grasping forceps (10 mm).
- Port site No. 4:** for the operator's right hand (10 mm).\*
- Port site No. 5:** for the first assistant (10 mm).

\* This incision is to be extended to 5 cm (mini-laparotomy) to remove the resected specimen and to enable direct manipulation through the enlarged opening (laparoscopically assisted surgery).



Figure 2. Dissection of the gastrocolic ligament close to the transverse colon.

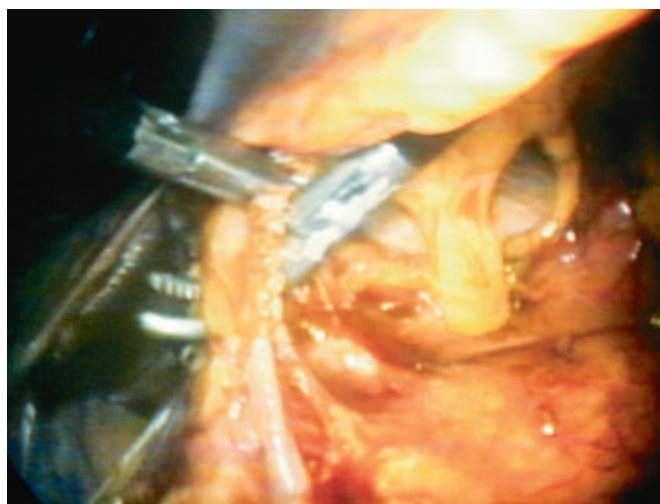


Figure 3. Dissection of the gastroepiploic artery and lymph node at the surface of the pancreas.

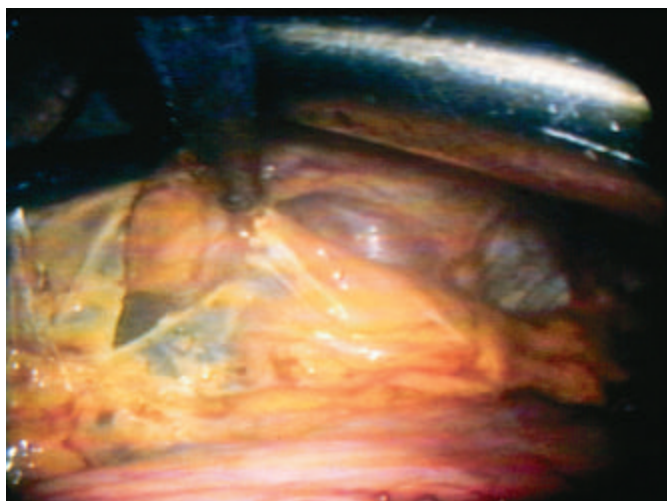


Figure 4. Avascular area is utilized for safe dissection of the lesser omentum.

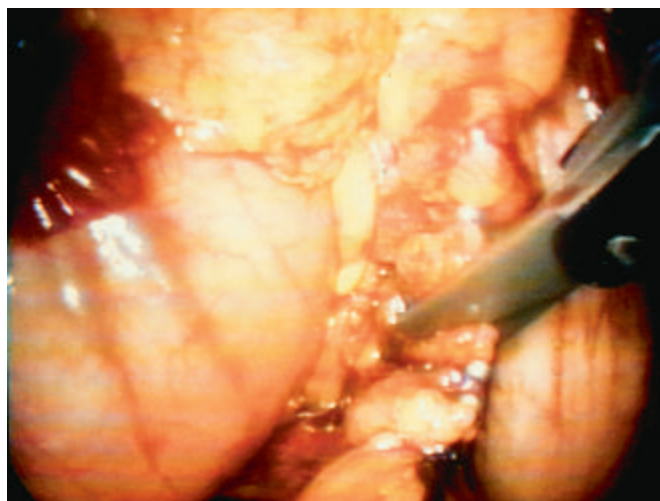


Figure 5. Left gastric artery and vein divided after double ligation.

**Table 3. Gross and histological features of the resected specimens**

Pts	Age	Location	Size (mm)	Depth	Ulcer	Gross Aspect	Histology
1.	74	A, Pos.	20	sm1	(-)	IIc	tub2, n(-)
2.	53	M, Ant.	60	m	uIII	IIc	tub1, n(-)
3.	70	M, Min.	70	sm3	(-)	IIc	tub2, n(-)
4.	67	M, Min.	25	m	uIIII	IIc+III	tub1, n(-)
5.	80	C, Min.	20	m	uIII*	IIc	tub2, n(-)
6.	57	M, Ant.	20	m	uIII	IIc	tub2, n(-)
7.	78	A, Min.	30	m	(-)	IIa+IIc	tub1, n(-)
8.	74	M, Ant.	35	sm1	uIII*	IIc+IIa	tub1, n(-)
9.	59	M, Ant.	65	m	uIII	IIc	tub2, n(-)
10.	61	M, Min.	2	m	(-)	IIc	tub1, n(-)

\*: post-EMR



Intraoperative gastroscopy is usually not necessary when the site of the lesion has been precisely confirmed by preoperative endoscopy.

The greater curvature of the stomach is held with the grasping forceps by



Figure 6. A 5-cm long skin incision is made for the removal of the resected specimen. With use of the abdominal wall lift technique, a clear field of vision is obtained without pneumoperitoneum.

the operator's left hand and elevated with countertraction by the assistant's Babcock grasper. The greater omentum is dissected outside the epiploic arcade making use of avascular planes (Fig. 2). The dissection of the gastrocolic ligament is carried out proximal to the level of the lower pole of the spleen and distally down to the pylorus. The right gastroepiploic vessels are cut at the surface of the pancreatic head to facilitate dissection of the subpyloric lymph nodes (Fig. 3). The lesser omentum is initially dissected through the avascular area close to the liver (Fig. 4). More proximally, the left gastric vessels are skeletonized using an ultrasonic dissector and divided after double ligation with extracorporeal knotting technique (Fig. 5). The left cardiac and superior gastric lymph nodes are dissected down to the distal portion of the stomach. The suprapyloric lymph nodes are also dissected after ligation of the right gas-

tric artery. After complete mobilization of the lower two-thirds of the stomach, a 1-cm midline skin incision is extended toward the xyphoid in the upper abdomen. A clear field of vision, both laparoscopic and direct with laparoscopic illumination, is obtained (Fig. 6). The first portion of the duodenum is mobilized adequately to provide space for safe transection with clamping forceps for open surgery (Fig. 7). After transecting, the duodenum is exteriorized through the 5-cm skin incision; the distal portion of the stomach is extracted extracorporeally to apply the stapler at the resection line, from the greater curvature to the lesser curvature. The distal two-thirds portion of the stomach containing the superficial carcinoma is resected with the Proximate Linear stapler (Ethicon Endo-Surgery, Inc.) (Fig. 8). The regional lymph nodes are dissected along with the distal portion of the stomach, as is performed in open



Figure 7. Transection of the duodenum exteriorized through a small skin incision.

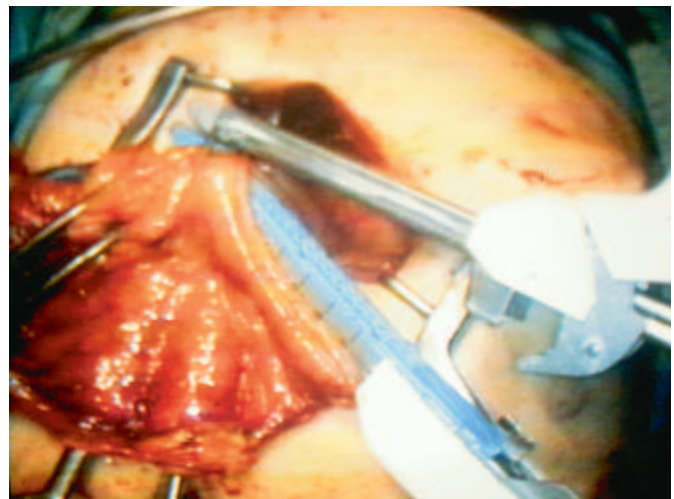


Figure 8. Transection of the middle third of the stomach with the use of a stapler.

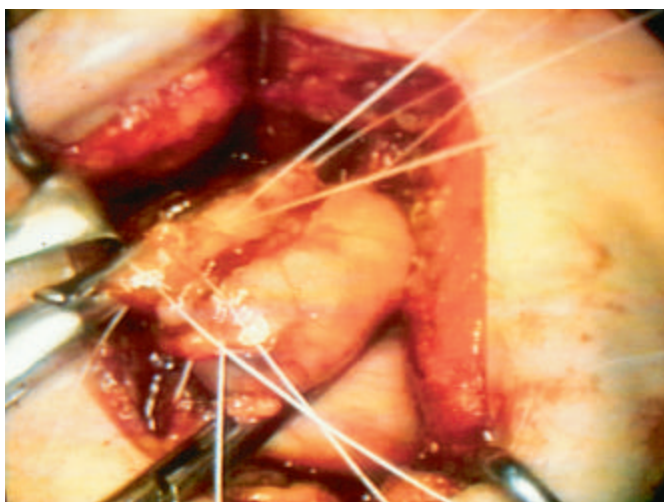


Figure 9. Gastroduodenostomy with extracorporeally hand-sewn anastomosis.

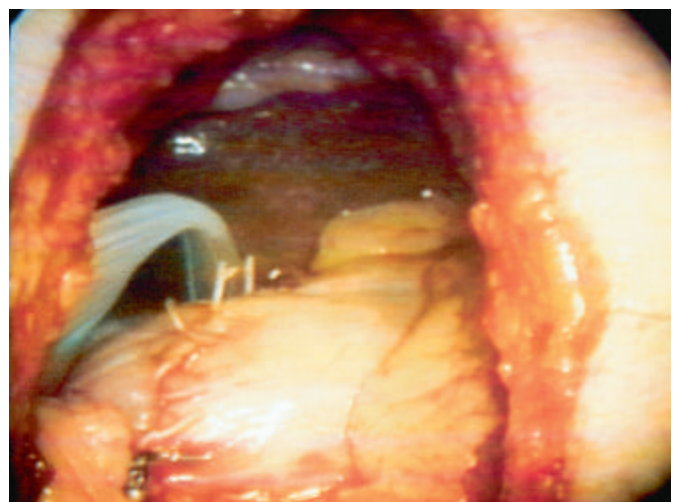


Figure 10. Completion of gastroduodenal anastomosis.

surgery. At this point, a U-shaped retractor<sup>4</sup> is applied at the epigastric portion to elevate the upper abdominal wall. Introduction of the retractor provides a clear field of vision without infusing gas into the abdominal cavity. As the 5-cm incision has been placed just above the celiac trunk, it is easy to dissect the celiac and retropyloric lymph nodes. Gastroduodenostomy is carried out in the usual manner (i.e., as it is done in open surgery, through the 5-cm skin incision after lowering the U-shaped retractor) (Fig. 9).

Irrigation and careful inspection of the operative site can be easily performed by re-elevating the abdominal wall with the retractor (Fig. 10). The 5-cm skin incision is then closed in layers.

## RESULTS

Eight males and two females, with an average age of 67 years, are presented in this series. The mean operating time was 240 minutes (with a range from 180 to 350 min). Blood loss was minimum, and no blood transfusion was required (Table 1).

Histological examination revealed early-stage gastric carcinomas localized in the mucosal and submucosal layers of the stomach (Table 3). There was no evident metastasis to the surrounding lymph nodes. These patients, who underwent laparoscopically assisted surgery, left the hospital on the 7th to

10th postoperative day and returned to work early.

## DISCUSSION

Laparoscopic cholecystectomy is now widely accepted as a preferred treatment of choice for resection of the diseased gallbladder and therefore has opened a door to a new era for surgeons and patients.<sup>2</sup> In some patients with early-stage gastric carcinoma and with lesions grouped close together in accessible sites, partial resection of the stomach can be done totally in the abdominal cavity under pneumoperitoneum.

When extensive resection of the gastrointestinal tract and anastomosis are required, laparoscopic surgery is technically difficult, mostly due to the lack of appropriate operative instruments and devices. In these instances, laparoscopically assisted surgery, as described in the literature,<sup>6</sup> can offer an alternative treatment approach. Standard operative forceps or graspers inserted into the abdominal cavity facilitates lymphadenectomy, as in open surgery.<sup>5</sup>

With the laparoscopic view, and direct observation through a 5-cm skin incision under laparoscopic illumination, Billroth I partial gastrectomy was carried out. In the series presented, these patients had less pain and shorter recovery times. Thus, a laparoscopically assisted approach can be applied to gastric surgery for patients with an

early-stage gastric carcinoma because there is an increasing number of patients whose carcinomas are detected earlier than previously due to the development of diagnostic modalities. High-risk patients, in whom simple resection of the stomach is performed along with limited dissection of the regional lymph nodes, are also indicated for minimally invasive surgery.

In conclusion, early-stage gastric carcinoma can benefit from the laparoscopically assisted approach, specifically the LADPG, which results in reduced pain, early discharge, and good cosmesis. **STI**

## REFERENCES

1. Takechi K. A modified technique for endoscopic mucosal resection of small early gastric carcinomas. *Endoscopy* 1992; 24:232-8.
2. Kitano S, Sugimachi K. Peritoneoscopic cholecystectomy has opened the door to minimally invasive surgery. *J Gastroenterol Hepatol* 1993;8:476-82.
3. Goh PMY, Tekant Y, Kum CK, et al. Total intra-abdominal laparoscopic Billroth II gastrectomy. *Surg Endosc* 1992;6:160.
4. Kitano S, Tomikawa M, Iso Y, et al. A safe and simple method to maintain a clear field of vision during laparoscopic cholecystectomy. *Surg Endosc* 1992;6:197-8.
5. Kitano S, Moriyama M, Sugimachi K. Laparoscopy assisted abdominal surgery for common bile duct stones. *Endoscopy* 1992;24:804.
6. Kitano S, Iso Y, Moriyama M, et al. Laparoscopic assisted Billroth I gastrectomy. *Surg Laparosc Endosc* 1994;2:146-8.