

Modified Billroth-I Delta-Shaped Anastomosis After Distal Gastrectomy

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35.1 Introduction

Laparoscopic distal gastrectomy is increasingly implemented worldwide according to the positive outcomes of some randomized studies. In terms of reconstruction, several methods have been attempted such as Billroth-I, Billroth-II, or Roux-en-Y. Each method has pros and cons, and probably decisions are made according to the individual patient's conditions, surgeon's preference, or regional trends. Advantages of Billroth-I are simplicity, save of time, and physiological passage of foods. In our center, we choose Billroth-I when meeting the following criteria; (i) large enough size of a remnant stomach, (ii) no duodenal invasion, and (iii) no reflux esophagitis or hiatus hernia. Therefore, in general, localized tumors at the antrum or lower stomach body seem to be suitable candidates. As an intracorporeal Billroth-I reconstruction, delta-shaped anastomosis only using a linear stapler is broadly accepted [1], which was originated from the concept of functional end-to-end anastomosis.

35.2 Description of the Surgical Technique (See Video 35.1)

The key steps to perform a Billroth I Delta-shaped anastomosis are:

1. Port placement and patient's position

The patient is positioned in supine and legs apart with head-up tilt. Five ports are used and the operator stands at the right side of the patient (Fig. 35.1). The first assistant stands at the left side of the patient and the camera assistant between the legs (Fig. 35.2). Lateral segment of the liver should be retracted in either method to attain sufficient operative space (Fig. 35.3).

Technical steps

2. Transection of the duodenum

After infrapyloric lymphadenectomy, dissection of the station No. 6 according to the Japanese Classification [2], the duodenal bulb is skeletonized for consequent transection. Therefore, the duodenum should be normally divided just beneath the pyloric ring in anterior–posterior direction as much as possible using a 60-mm linear stapler advanced from a left lower port.

3. Resection of the stomach

After suprapancreatic and lesser curvature site lymphadenectomy (No. 1 and No. 3), the stomach is resected. If the tumor is invisible from the serosal surface, intraoperative peroral endoscopy is employed to confirm the tumor location. Recently, indocyanine green (ICG) injection is also conducted for this purpose. Resection line should be dyed on the stomach wall (Fig. 35.4), and usually requiring twice firing of a 60-mm stapler (Fig. 35.5). The resected specimen is placed in an extraction bag.

4. Testing the tension

After resection of the stomach, simulation should be done to test whether the tension is adequate between the remnant stomach and the duodenum. Both the remnant stomach and the duodenum stump are moved medially to be overlapped (Fig. 35.6). If the tension seems too tight, relevant adhesion

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Fig. 35.1 Placement of ports. Close (a) and schematic view (b)

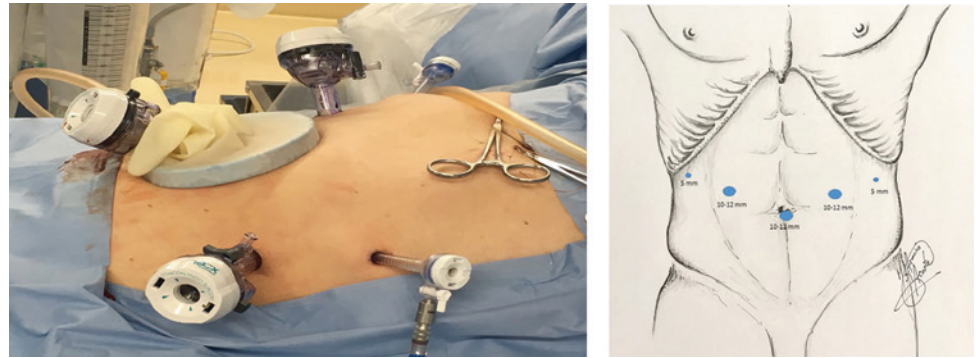


Fig. 35.2 Position of patient and surgical team (a, b)

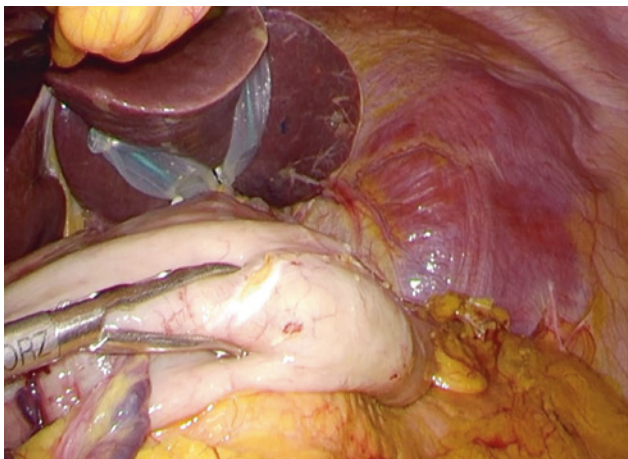
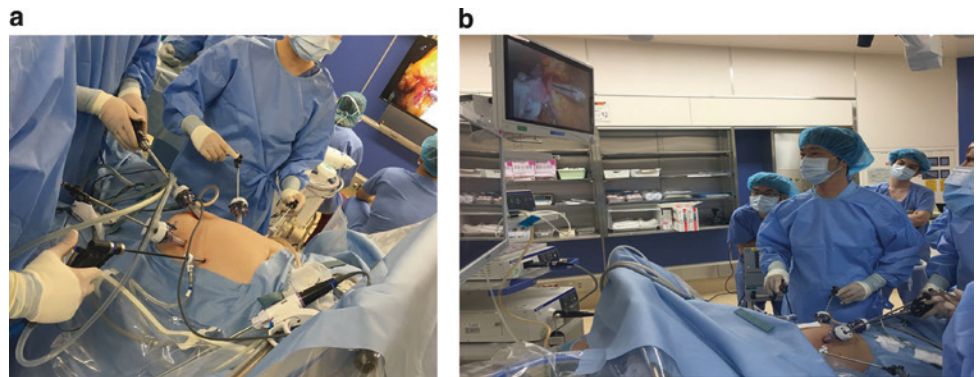


Fig. 35.3 Liver retraction

should be lysed or switch to another method should be considered.

5. Creating entry holes for stapler insertion

First, the edge at the greater curvature site of the stomach stump is held by forceps to be cut in 1 cm in length, being adjusted for stapler's caliber (Fig. 35.7). A suction device is put into the remnant stomach through this hole to withdraw contents. Then, the edge of the posterior side of the duodenal stump is held to be cut in a similar way (Fig. 35.8).

6. Gastroduodenostomy using a linear stapler

A 45-mm stapler is introduced from the left lower port and a cartridge site is inserted into the stomach (Fig. 35.9). The stapler is temporarily clamped at the posterior wall site and moved toward the duodenal stump. The duodenal stump is

Fig. 35.4 Gastric resection line dyed. Close (a) and schematic view (b)

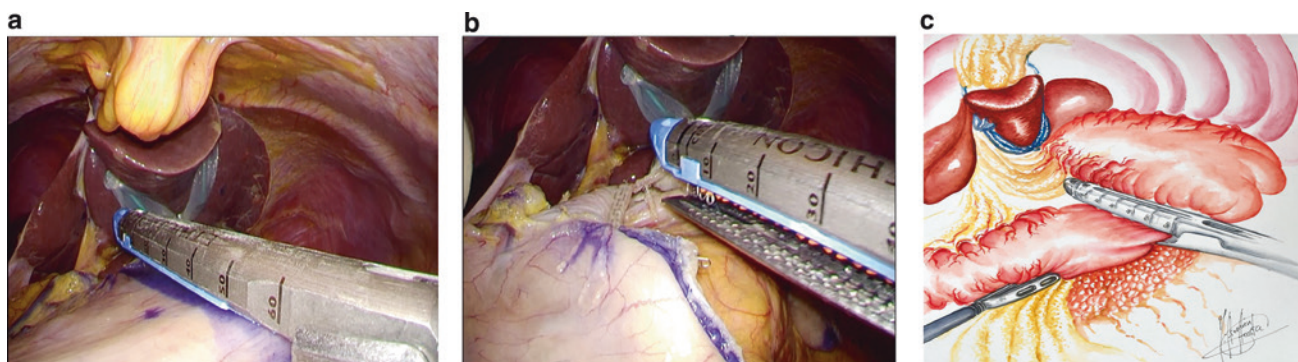
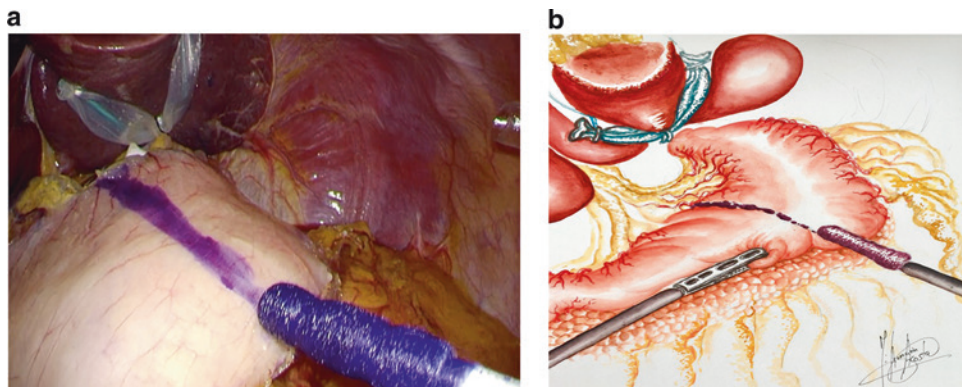


Fig. 35.5 Stomach is divided by linear stapler. Close (a, b) and schematic view (c)

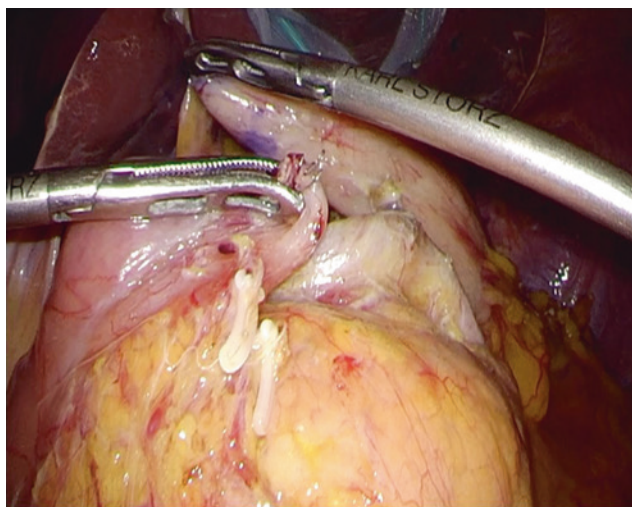


Fig. 35.6 After resection of the stomach, simulation should be done to test whether the tension is adequate between the remnant stomach and the duodenum

grasped by forceps to be lifted up and moved a little medially. Temporary clamp is released and an anvil fork of the stapler is gently inserted into the duodenum (Fig. 35.10). The remnant stomach is a slightly twisted to keep a certain distance between the stomach stump and the anastomotic line aiming no ischemic area. Regarding the duodenum, such a twisting is not required because the stump will be resected together when closing the common entry hole by stapler. After verifying that both intestinal walls are fastened in 40–45 mm in length with no gap, the stapler can be fired (Fig. 35.11). After removal of the stapler, hemostasis on the staple line should be proved using the suction device.

7. Closure of the common entry hole

Using a 3-0 suture material, three or four stay sutures are placed in advance. These sutures should be stitched at the stomach and duodenal walls to expand a V-shape of the anastomotic stapling line (Fig. 35.12). Closure of the entry hole is made by twice firing of linear staplers. As a first

Fig. 35.7 Opening in the gastric stump. Close (a) and schematic view (b)

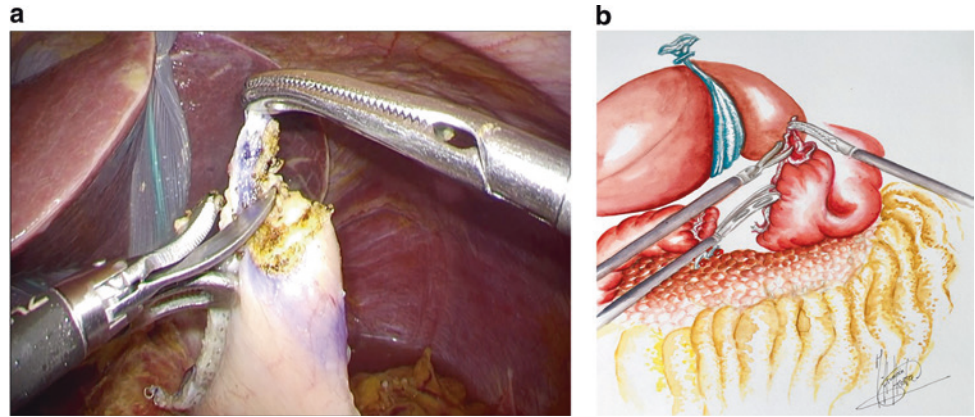


Fig. 35.8 Opening in the duodenal stump. Close (a) and schematic view (b)

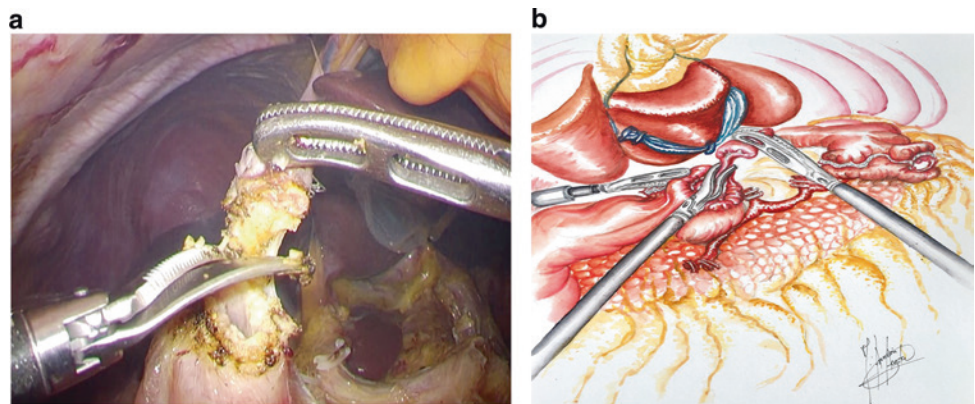


Fig. 35.9 A 45-mm stapler is introduced from the left lower port and a cartridge site is inserted into the stomach. Close (a) and schematic view (b)

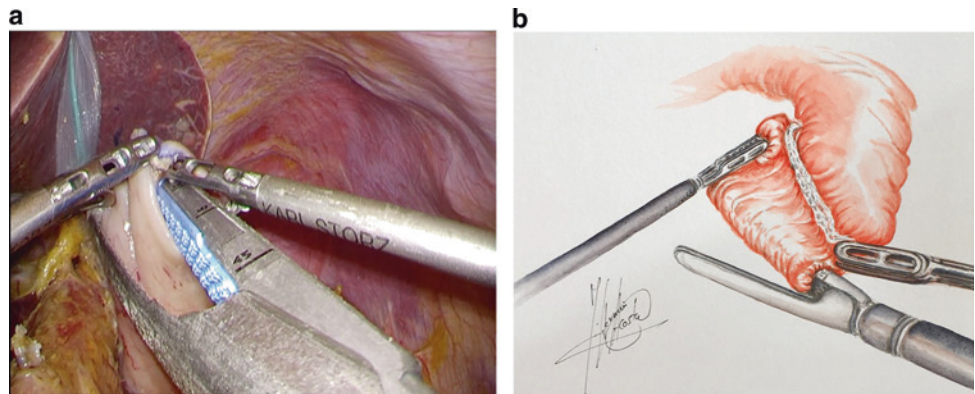
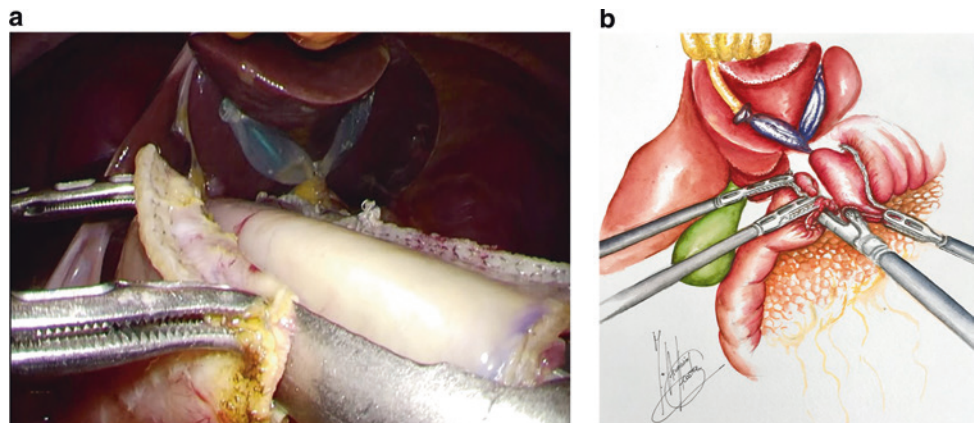


Fig. 35.10 The other cartridge site is introduced into the duodenum. Close (a) and schematic view (b)



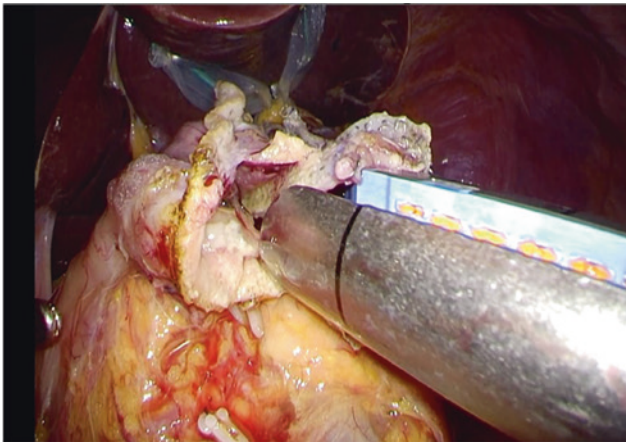


Fig. 35.11 The stapler can be fired

stapling, the 45-mm stapler is used. Only 30-mm length is utilized very close to the edge of the hole to avoid anastomotic stricture. Stretching the entry hole in straight line by retracting the stay sutures is mandatory. As a second stapling, the 60-mm stapler is used. In this stapling, the duodenal stump is resected at the same time so that the operator should control the position of it. The stapler must be clamped and released several times to find the best stapling position (Fig. 35.13).

8. After finishing the anastomosis, a nasogastric tube is introduced into the stomach and air-tight test is employed to confirm the integrity (Fig. 35.14).

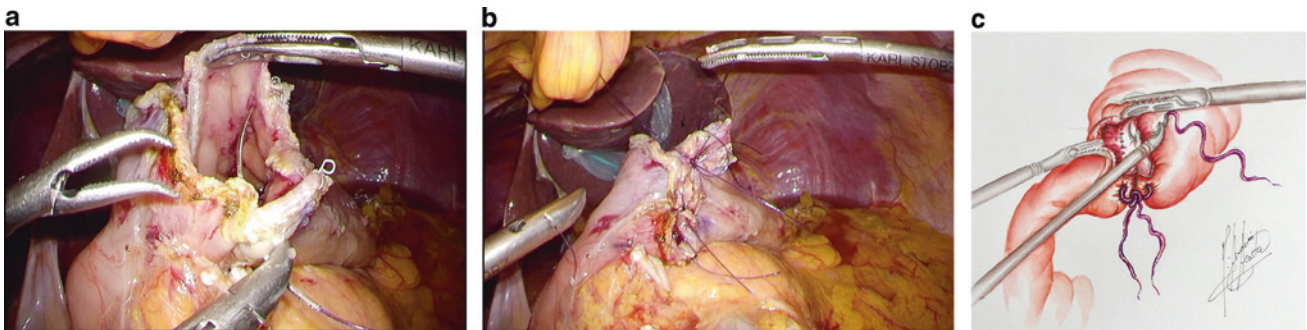
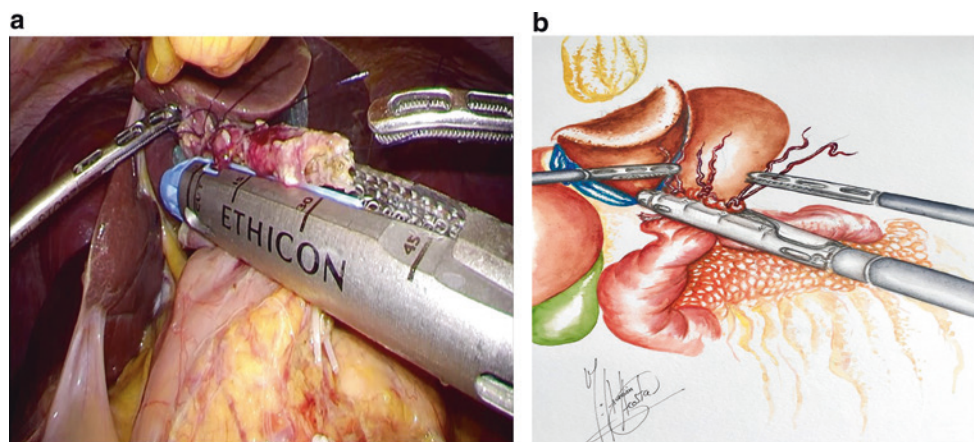


Fig. 35.12 Using a 3-0 suture material, three or four stay sutures are placed in advance. These sutures should be stitched at the stomach and duodenal walls to expand a V-shape of the anastomotic stapling line. Close (a, b) and schematic view (c)

Fig. 35.13 Closure of the entry hole is made by twice firing of linear staplers. As the first stapling, the 45-mm stapler is used. Only 30-mm length is utilized very close to the edge of the hole to avoid anastomotic stricture. Close (a) and schematic view (b)



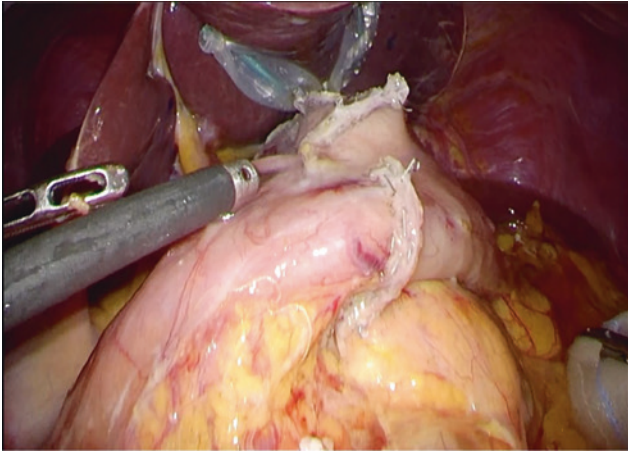


Fig. 35.14 Final aspect of the anastomosis

References

1. Kanaya S, Gomi T, Momoi H, et al. Delta-shaped anastomosis in totally laparoscopic Billroth I gastrectomy: new technique of intraabdominal gastroduodenostomy. *J Am Coll Surg.* 2002;195:284–7.
2. Japanese Gastric Cancer Association. Japanese classification of gastric carcinoma: 3rd English edition. *Gastric Cancer.* 2011;14(2):101–12.