

Reconstruction after laparoscopic assisted distal gastrectomy: technical tips and pitfalls

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Abstract: After the advent of the concept of laparoscopic assisted distal gastrectomy (LADG), the digestive reconstruction poses arguments among surgeons. There are three major different ways including Billroth I gastroduodenostomy, Billroth II gastrojejunostomy and Roux-en-Y gastrojejunostomy, and each of them has its own trick. In this article, the technical tips and pitfalls of each reconstruction will be discussed based on studies and author's experience.

Keywords: Reconstruction; gastric cancer; laparoscopy

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Laparoscopic assisted distal gastrectomy (LADG) is normally performed in far eastern countries such as China, Japan and Korea, where the incidence of gastric cancer is relatively high. The choice of digestive reconstructions (i.e., Billroth I gastroduodenostomy, Billroth II gastrojejunostomy with or without Braun anastomosis, Roux-en-Y gastrojejunostomy and Uncut Roux-en-Y gastrojejunostomy, etc.) is usually depended on surgeons or institutions.

Gastroesophageal reflux disease (GERD) and cancer of gastric stump (CGS) are two major complications after distal subtotal gastrectomy (1). However, any type of reconstruction after laparoscopic distal gastrectomy is not recommended in most guidelines (2).

Symptomatic bile reflux esophagitis is one of most important factors influencing postoperative quality of life. Regardless of any type of reconstruction, the bile reflux occurs in 5% of patients, although various reconstruction improvements have been introduced to reduce reflux preventing symptoms (3). Billroth I and Billroth II

reconstructions are the most performed anastomotic methods in Asia (4), whereas Roux-en-Y gastrojejunostomy is more widely accepted in North America and Europe with an attempt to prevent GERD, to reduce the incidence of CGS and to improve the functional outcome (5). However, there is no clear evidence showing that one type of reconstruction is better than another from both carcinogenetic and functional point of view (6,7).

Therefore, in this article, the author will not discuss the advantages and disadvantages of each method, but to describe the tips in reconstruction based on our own experience.

Billroth-I reconstruction

The Billroth-I gastroduodenostomy is recommended for tension-free anastomosis which is easily performed and physiologically adaptable. The risk of postoperative complications such as dumping syndrome, malnutrition, reflux gastritis and gall stones are significantly lowered

after the Billroth-I gastroduodenostomy. After dissection of duodenum under laparoscopy, a 28–29 mm circular stapler is often used with a 4–5 cm abdominal incision to extract the specimen. There are two kinds of anastomosis: (I) duodenal stump with greater curvature end of linear stapler line, this is more compatible for radicality of tumor; (II) duodenal stump with gastric posterior wall, which requires one more linear stapler to close the gastric opening, and it will provide a high superior margin. Meanwhile, the first method will be preferred as it guarantees a smoother food pathway.

The preservation of posterior gastric vessels and short gastric vessels is crucial for the blood supply of anastomosis in Billroth-I reconstruction. Meanwhile, a 3-cm distance should be left between the anastomosis and the gastric stapler line to avoid ischemia of anastomosis.

Billroth-II reconstruction

Billroth-II gastrojejunostomy is usually applied to the anastomosis for those Billroth-I is not feasible for. It is characterized by tension-free, easily performed and smaller incision, whereas with a higher risk of complications. Among all the complications, the bile leak of duodenal stump due to obstruction of afferent loop and internal hernia are most common. And it is usually related to unclosed mesenteric hole. The duodenal stump leakage often leads to some lethal consequence, so it is better to close the mesenteric hole after anastomosis.

Although the retro-colic anastomosis with or without the Braun anastomosis, the incidence of severe complications is effectively reduced, alkaline reflux gastritis and inflammation of anastomosis will be inevitable. Therefore, Billroth II reconstruction is not suitable for early gastric cancer patients, as it is more prone to remnant gastric cancer.

Roux-en-Y reconstruction

We prefer Roux-en-Y reconstruction if the remnant stomach is relative small or the tumor is near the pylorus.

The major advantage of Roux-en-Y gastrojejunostomy is that it forms an anastomosis without tension, and it reduces the incidence of complications such as bile reflux, anastomotic leakage, residual gastritis, and stricture of anastomosis. It is also reported to ameliorate the type 2 diabetes mellitus.

For gastrojejunostomy, we are now performing side-to-side anastomosis by linear stapler instead of side-to-end anastomosis by circular stapler, and it might reduce the occurrence of stasis. Either iso-peristaltic or anti-peristaltic can be the option for anastomosis, whereas it is preferred to close the common opening of iso-peristaltic anastomosis by running suture to avoid jejunal stricture. However, the linear stapler can be used to close the common opening of anti-peristaltic anastomosis.

However, the Roux-en-Y reconstruction also has some problem such as stasis syndrome, which is manifested by vomiting, bloating, nausea and postprandial pain. The gastric intubation will help to alleviate the symptoms in these patients. Both smaller gastric remnant and shorter Roux loop can prevent the symptoms effectively. Based on our experience in practice, we recommend shortening the length of the Roux loop from 40 to 30 cm to lower the risk of Roux stasis syndrome.

The pathogenesis of Roux stasis is thought to be associated with electrical and motor abnormalities in the Roux limb after the jejunum is transected. Thus, the occurrences of Roux stasis syndrome would be theoretically reduced by the “uncut Roux-en-Y” reconstructive technique. A non-knife stapler is used to transect the afferent jejunum 3 cm below the gastrojejunostomy. In one of our studies, neither postoperative remnant gastritis nor bile reflux was diagnosed. There is no recorded postoperative Roux stasis syndrome. It is believed that the uncut Roux-en-Y reconstruction can not only keep the advantages of the conservative method, but also reduced the incidence of Roux stasis syndrome by the jejunal transection (8).

The comprehensive knowledge on gastric anatomy and laparoscopic surgery skill are required in laparoscopic assisted gastrectomy for gastric cancer. A proper strategy should be selected during the operation especially encountering problem. The choice of reconstruction is based on surgeon's experience, both the surgical outcome and postoperative quality of life should be considered.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare

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