

Totally laparoscopic D2 radical distal gastrectomy for gastric cancer

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Abstract: Laparoscopic radical gastrectomy has many advantages, compared with conventional surgery, such as less trauma, less blood loss, faster recovery, less postoperative pain, etc. It has been increasingly accepted. Two major difficulties were found in laparoscopic radical gastrectomy procedure, the standard lymph node dissection and the reconstruction of the digestive tract. Those difficulties hinder the popularization of this technology in clinical practice. In this video, we present the whole operation process of totally laparoscopic D2 radical distal gastrectomy for gastric cancer.

Keywords: Delta-shaped anastomosis; gastric cancer; totally laparoscopic D2 radical distal gastrectomy

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Introduction

Laparoscopy-assisted distal gastrectomy for gastric cancer was firstly reported in 1994. Since this technique has many advantages, such as less trauma, less blood loss, faster recovery, less postoperative pain, etc., it has been gradually applied in many countries with high incidence of gastric cancer including Japan, South Korea, and China. So far the most extensively applied laparoscopic radical operations for gastric cancer are laparoscopy-assisted radical gastrectomy and totally laparoscopic radical gastrectomy. This video shows the whole process of totally laparoscopic D2 radical distal gastrectomy for gastric cancer. The standard D2 lymph node dissection and the adoption of triangular anastomosis for gastrointestinal reconstruction are also presented (*Figure 1*).

Operative techniques

A 53-year-old male patient (BMI 25 kg/m²) was admitted to our department with a complaint of distension in upper abdomen, acid reflux and belching for 2 months. Gastroscopy showed an ulcer in gastric angle, and biopsy confirmed a histologic diagnosis of lowly and moderately differentiated adenocarcinoma. Preoperative evaluation



Figure 1 Totally laparoscopic D2 radical distal gastrectomy for gastric cancer (1).

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indicated a diagnosis of early gastric cancer. Totally laparoscopic D2 radical distal gastrectomy was then scheduled.

Under general anesthesia, the patient was placed in the supine position, and both legs were set apart. The operator stood on the left of the patient, the assistant on the right, and the camera holder between the legs of the patient. After pneumoperitoneum was established with carbon dioxide insufflated at a pressure of 12 mmHg, five working ports

were introduced. Exploration of abdominopelvic cavity was conducted to exclude distant metastasis and carcinomatosis.

Lymph node dissection (D2): Similar to those described previously, the main steps include: divide the gastrocolic ligament at the border of transverse colon from the middle position to the splenic flexure of colon, rightward to the hepatic flexure of colon. Ligate and divide left gastroepiploic vessels and denude the greater curvature of stomach, dissect No. 4d and 4sb lymph nodes. Divide and expose right gastroepiploic artery and vein along the surface of the head of the pancreas for ligation and transection at the root, and then dissect No. 6 lymph nodes. Expose gastroduodenal artery in the groove between duodenum and pancreatic head, strip the retroperitoneal membrane along the upper border of the pancreas to expose the coronary vein, ligate and transect it near its basilar part. Separate the common hepatic artery and divide it along the arterial sheath, and dissect the No. 8 lymph nodes. Expose the celiac trunk, proximal splenic artery and left gastric artery, and then ligate and cut off the left gastric artery at the root, meanwhile, dissect No. 7, 9 and 11p lymph nodes. By following the gastroduodenal artery, ligate and cut off the root of the right gastric artery to dissect No. 5 lymph nodes. Expose the proper hepatic artery and dissect No. 12a lymph nodes. Dissociate the lesser omentum to the right side of the cardia, and then denude the lesser curvature to dissect No. 1 and 3 lymph nodes.

The delta-shaped anastomosis for gastrointestinal reconstruction was adopted with endoscopic linear staplers (Tri-Staple™ Technology, Covidien, United States). The stomach and duodenum were transected with endoscopic linear staplers (Tri-Staple™ Technology), after that the specimen was placed into a plastic specimen bag intracorporeally. The duodenum is rotated 90 degrees and transected with a 60 mm linear stapler, which creates a duodenal transection in the ventrodorsal direction, and a small incisions were made at the corner of the greater curvature side of the remnant stomach and the dorsal side of the duodenum. After inserting a 45 mm linear stapler into the remnant stomach, the linear stapler gently holding the posterior wall of the remnant stomach was rotated clockwise to the duodenal side. The other jaw of the stapler was inserted at the incision site of the duodenal stump. Then the stapler was closed and fired. A V-shaped anastomosis on the posterior wall was created. Finally, the common entry hole was intracorporeally closed with a single application of a 60 mm linear stapler under three traction suture. The resected specimen was removed out through the extended

umbilical incision using a plastic tissue bag.

Comments

At present, it is generally accepted that D2 radical resection is the standard procedure for the treatment of middle and lower gastric cancer. However, it is still difficult for the successful implementation of totally laparoscopic radical surgery for gastric cancer. One of major technical difficulties is the standard lymph node dissection because of complex gastric blood vessels and numerous lymph nodes around the stomach. For distal gastric cancer, the extent of D2 dissection according to the Japanese Gastric Cancer Surgery Guidelines and the Treatment Guideline for Gastric Cancer involves No. 1, 3, 4sb, 4d, 5, 6, 7, 8a, 9, 11p, and 12a lymph nodes. During lymph node dissection, clear knowledge about the vascular anatomy around the stomach, accurate recognition of surgical landmarks, comprehensive application of laparoscopic techniques and close cooperation among the members of surgical team are crucial for successful performance of D2 lymph node dissection. Clear exposure of the surgical site and maintaining adequate tissue tension also play an important role in the laparoscopic operations for gastric cancer. For the clear exposure of the surgical site, triangular traction may be a practical skill to facilitate the surgical operation.

Owing to the advances in laparoscopic surgical techniques and laparoscopic instruments, it is possible to perform all of the necessary surgical procedures in the treatment of gastric cancer, including an intra-abdominal gastrointestinal reconstruction. In a totally laparoscopic distal gastrectomy, the Billroth I gastroduodenostomy can also be performed intra-abdominally. One of the effective techniques is to make a delta-shaped anastomosis, which was first introduced by Kanaya in 2002, and was a Billroth I side-to-side anastomosis of the posterior walls of the remnant stomach and the duodenum using laparoscopic linear staplers. A successful performance of delta-shaped anastomosis depends on the size of the remnant stomach and the sufficient length of the remnant duodenum to ensure an R0 tumor resection and reduce the anastomotic tension, therefore, delta-shaped anastomosis may be more suitable for the patients with early gastric cancer. Sometimes intraoperative gastroscopy may be needed for accurate position of the lesion, which is often difficult to identify during total laparoscopy. During the delta-shaped anastomosis, operators should pay attention to some skill details. The duodenum is rotated 90 degrees and transected

with a linear stapler to create a duodenal transection in the ventrodorsal direction. The linear stapler gently holds the posterior wall of the remnant stomach and is rotated clockwise to the duodenal side. Before the common opening of the stomach and the duodenum is intracorporeally closed, careful exploration of anastomosis should be made to confirm no leakage and bleeding.

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Footnote

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

References

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