

# Delta-shaped anastomosis in totally laparoscopic D2 radical distal gastrectomy

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**Abstract:** With less injury and faster postoperative recovery, laparoscopic techniques have been widely applied in D2 radical gastrectomy for distal gastric cancer. Billroth I anastomosis is a common reconstruction procedure in D2 radical gastrectomy for distal gastric cancer. The delta-shaped anastomosis, an intra-abdominal Billroth I reconstruction, has been increasingly applied by gastrointestinal surgeons. This surgical video demonstrates the delta-shaped anastomosis in laparoscopic-assisted D2 radical gastrectomy for distal gastric cancer.

**Key Words:** Gastric cancer; delta-shaped anastomosis; laparoscopy



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In 2002, Professor Seichiro Kanaya from Japan Himeji Medical Center first introduced the delta-shaped anastomosis (1), which was a Billroth I side-to-side anastomosis of the posterior walls of the remnant stomach and the duodenum using a laparoscopic linear stapler. During the anastomosis, the staple line was in a “V” shape, which would turn into a triangular shape after the anastomosis was closed, hence the name “delta-shaped anastomosis”. With increasing application of laparoscopic techniques in the D2 radical treatment of distal gastric cancer, the delta-shaped reconstruction has been gradually adopted in China.

In April 2013, a 54-year-old woman presented with dull abdominal pain for three months was diagnosed with adenocarcinoma of the gastric angle by gastroscopic biopsy. The lesion had a diameter of about 3 cm. After routine preoperative preparation, total laparoscopic D2 distal gastrectomy was performed; the delta-shaped anastomosis was used to reconstruct the gastrointestinal tract during operation. An ultrasonic scalpel (Johnson & Johnson, U.S.) was used for anatomical separation, and the anastomosis was completed with a gastroscopic linear stapler (Tri-Staple).

After general anesthesia, the patient was put in supine

position with the head elevated and legs apart. During the surgery (*Video 1*), five trocars were inserted. CO<sub>2</sub> pneumoperitoneum of 12 mmHg was established. Standing on the left side of the patient, the surgeon divided the stomach and duodenum using an ultrasonic scalpel, and dissected the related lymph nodes according to the 2002 edition of the Gastric cancer treatment guidelines in Japan (2). A 60 mm gastroscopic linear stapler was inserted through the left upper trocar, which was used to transect the duodenum by rotating 90° from back to front. This would help to ensure the blood supply for anastomotic stoma. The stomach was then resected by successively transecting from the greater curvature to the lesser curvature with the stapler. A small incision was made to the remnant stomach and the edge of the duodenum respectively by the ultrasonic scalpel. The upper and lower anvils of a 60 mm linear stapler were inserted into one end respectively to close the posterior walls of the stomach and the duodenum. The stapling length was adjusted to 45 mm. Then the anastomosis of both ends was triggered. Upon confirmation of no leakage and bleeding of the anastomosis, the gastric tube was inserted into the distal anastomotic end of the duodenum. Finally, the common opening of the stomach



**Video 1** Delta-shaped anastomosis in totally laparoscopic D2 radical distal gastrectomy

and the duodenum was closed with the linear stapler.

Throughout the surgery, the delta-shaped anastomosis procedure lasted about more than 10 minutes. Both resected specimens had negative margins. A total of 30 lymph nodes were dissected. Pathological staging was T2N0M0. Flatus occurred three days after the surgery. Liquid diet was

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started on the fourth day, and the patient was discharged on the eighth day. Based on the follow-up so far, the patient has been free of postoperative complications.

In short, the application of delta-shaped anastomosis with a linear stapler as part of the intraperitoneal Billroth I reconstruction is safe and feasible (3), allowing satisfying postoperative recovery and outcomes.

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