

## Gao's double-way approach for laparoscopic D2 radical surgery for gastric cancer

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### Abstract

Laparoscopic D2 radical surgery for gastric cancer is minimally invasive but complex. In this path: (1) Repeated operation of lesser curvature side; (2) The gastrohepatic ligament is relatively fixed. Hence, it is not easy to expose the suprapancreatic area; and (3) It is not easy to dissect No. 1, 12 lymph nodes. This area may not be sufficiently cleaned or surrounding vessels may be injured during a resection. So it is critical to choose position fixing, and a clear, fast and convenient operation path. The author, based on his experience, has established a set of procedural steps called "Gao's double-way", lesser omentum approach and traditional greater omentum approach, which are described in detail in this article. The path of this first approach is described as a "W" type of dissection. The second way is the traditional greater omentum approach, whose path is described as a "M" type of dissection. This will enable laparoscopic surgeons to select a suitable path. This new approach not only simplifies the surgery but also provides more space for the subsequent operation, thereby making the surgery more simple, safe and easy.

**Key words:** Laparoscopic; Gastric cancer; Path; Surgery; Operation

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**Core tip:** This new approach not only simplifies the surgery but also provides more space for the subsequent operation, thereby making the surgery more simple, safe and easy.

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## INTRODUCTION

### *Clinical vignette*

For the traditional laparoscopic D2 radical surgery, the abdominal cavity and lesser curvature side were initially explored. Then the gastrocolic ligament was opened to enter the greater omental bursa. That is: Open the gastrocolic ligament → Splenic hilar lymph node dissection (No. 10, 11d) → Cardial area lymph node dissection (No. 2, 110) → Infrapyloric area lymph node dissection (No. 6) → Suprapancreatic area lymph node dissection (No. 7, 9, 11p, 12p), which can be described as a "W" type of dissection<sup>[1-3]</sup>. But the following problems exist in this path: (1) repeated operation of lesser curvature side; (2) the gastrohepatic ligament is relatively fixed. Hence, it is not easy to expose the suprapancreatic area; and (3) it is not easy to dissect No. 1, 12 lymph nodes (LN). This area may not be sufficiently cleaned or surrounding vessels may be injured during a resection. Since the hepatogastric ligament and plica gastropancreatica are anatomically complex and difficult to expose, it will be more difficult for a new surgeon to learn, especially with a less skilled assistant<sup>[4]</sup>. So choosing a position fixing, and a clear, fast and convenient surgical path is critical. Based on our experiences of laparoscopic D2 radical surgery in more than 200 gastric cancer patients, we gradually explored a set of procedural steps called "Gao's double-way", that is, the lesser omentum approach and the traditional greater omentum approach. Herein, the detailed procedures are described.

### *Surgical techniques*

The patient is placed in supine position, with right leg abduction, described as a "才" word, that is right leg separated position. The surgical table is declined by 10°-20° into the reverse Trendelenburg position. Therefore, the patient's upper body is elevated. This causes the intestine to move towards the lower abdomen. The surgeon stands on the patient's left side, the assistant on the right side and the camera operator stands between the patient's legs. Audio core tip lists the detailed steps of the procedure [Audio core tip: Detailed surgical steps presented in the video clips (Video core tip)].

The first way (the lesser omentum approach): Cut the hepatogastric ligament at the thinnest area and enter the lesser omentum. The location is fixed with no anatomic variation.

The first step: Assistant's left hand holds the intestinal forceps to push the liver lobe up. Fully expose the hepatogastric ligament. Right hand holds the intestinal forceps to press the liver side of the hepatogastric ligament. The surgeon's left hand provides downward traction of the gastric side of the hepatogastric ligament, so as to produce moderate tension. The right hand holds an ultrasonic knife to cut the hepatogastric ligament at the thinnest area.

The second step: Along the edge of the liver, clean left to the front of cardia, and complete the dissection of No. 1, 2 LN. When separating, be close to the liver. This area can be thoroughly cleaned, which makes it easy to separate the organization. Do not damage the inferior vena cava. Assistant's left hand holds the intestinal forceps to fully reveal the front of cardia. The surgeon dissects No. 1, 2 LN from right to left along the esophageal hiatus, from right diaphragmatic angle of esophageal gastric junction to left diaphragmatic angle.

The third step: Along the edge of the liver, clean right to hepatoduodenal ligament, and complete the dissection of No. 12 a, p LN. Assistant's left hand holds the intestinal forceps to push the liver lobe up to fully expose the hepatoduodenal ligament. Right hand holds the intestinal forceps to press the liver side of the hepatoduodenal ligament. The surgeon's left hand provides downward traction of the gastric side of the hepatoduodenal ligament, so as to produce moderate tension. The right hand holds an ultrasonic knife to dissect this area from the liver side to tumor side. Protect the hepatic artery and left portal vein.

The path of this first approach is described as a "W" type of dissection. The second way is the traditional greater omentum approach, whose path is described as a "M" type of dissection.

## DISCUSSION

At present laparoscopic D2 radical surgery is a simple, greater omentum approach. However, the author's path combined the lesser omentum and the traditional greater omentum approaches. The lesser omentum approach (the first way) is as follows: Open the lesser omentum, left to cardial area lymph node dissection (No. 1, 2 LN), right to hepatoduodenal ligament lymph node dissection (No. 12a, p LN), which can be described as "M" type of dissection (Video core tip). The advantages of this approach include: (1) Due to the rapid development of modern medical imaging, the pre-surgical evaluation is quite explicit<sup>[5]</sup>, so exploration of the local lesions can be prevented. Typically, surgeons would push the liver up and explore the lesser omentum, then release the liver and continue other steps. However, the author combined the exploration and dissection to avoid repeat surgery of lesser curvature side; (2) It could also provide a convenient way of cardial area lymph node dissection (No. 1, 2, 110 LN) and hepatoduodenal ligament lymph node dissection (No. 12a, p LN); (3) When cleaning the infrapyloric area lymph node (No. 6 LN) and the suprapancreatic area (No. 7, 9, 11p, 12p LN), the area can be easily exposed thereby making the dissection more safe and convenient; (4) Open the lesser omentum, so the stomach can be lifted, which can provide larger space for dissection; (5) It can provide a larger space for the dissection of infrapyloric area LN and suprapancreatic area, thereby saving time by not changing the patient's posture; (6) The lesser side

has high incidence of gastric cancer, so after opening the lesser omentum, chemotherapy drugs could be poured into it. So the lesion area of tumor and exfoliated cells (especially gastric juice) was soaking in drugs, thereby preventing tumor spread caused by surgery; and (7) Due to the first path, the cleaning of greater omentum approach could be easier thereby making the operation more safe. For example, the dissection of hepatoduodenal ligament LN can be simplified (No. 12a, p LN). Besides, with the first approach, the space is enough for cleaning cardial area LN (No. 110 LN).

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## CONCLUSION

Based on the author's experiences with laparoscopic D2 radical surgery in more than 200 gastric cancer patients, this approach was summarized as "W + M".

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