



Laparoscopic surgery for gastric cancer in patients with high body mass index

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Abstract: Laparoscopic gastrectomy has gained much popularity in the treatment of gastric cancer in China. But it is more difficult to perform than open gastrectomy. In recent years, the prevalence of obesity is rapidly increasing and the application of laparoscopic surgery for these patients still exists controversial. The major obstacle of its application is mainly associated with its higher risk of complication, technical difficulties, longer operative time and higher conversion rates. The surgical difficulties mainly come from the accumulated visceral fat tissue that may induce bleeding, increase the difficulty of lymph nodes dissection and prolong the operative time. However, with the development of laparoscopic techniques and the increasing experience of surgeons, many skilled surgeons could perform the surgery well and accumulate some experience. The safety and feasibility of laparoscopic surgery for obese patients become acceptable to more and more surgeons. Considering of the surgical difficulties, mastering the surgical skills of laparoscopic surgery of obese patients is critical for performing the surgery successfully. Thus, in our present study, we will introduce some experience to overcome these surgical difficulties and shorten the learning curve.

Keywords: Laparoscopic surgery; gastric cancer; high body mass index (high BMI)

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Introduction

Laparoscopic gastrectomy has gradually matured from the exploratory stage, many Chinese clinical center have formed their unique style. The operation process is smooth and highly skillful, and surgeons have measures to deal with intraoperative complications timely. After nearly 5 years of clinical practice, our current laparoscopic surgery team is stable and accumulates some of our own understanding and experience. In recent years, the prevalence of obesity is rapidly increasing and it becomes a serious health problem worldwide. Patients who are obese are initially a relative contraindication for laparoscopic surgery, mainly because of its higher risk of complication, technical difficulties, longer operative time and higher conversion rates (1-3).

However, with the development of laparoscopic techniques and the increasement of surgeons' experience, the safety and feasibility were verified in several studies and the laparoscopic surgery become acceptable for obese patients (4,5). The patients in our hospital are usually obese and with relatively advanced stage. Thus, for laparoscopic gastrectomy in patients with higher body mass index (BMI), we gained some clinical experience as reference to share. Patients with higher BMI are usually divided into two types: subcutaneous obesity and visceral obesity. The surgical difficulties mainly come from the accumulated visceral fat tissue, which may induce bleeding, increase the difficulty of lymph nodes dissection and prolong the operative time. On the other hand, previous studies also showed that visceral fat is a significant factor of complication (6,7). Thus, we will



Figure 1 Dissociation greater omentum (8).

Available online: <http://www.asvide.com/articles/1198>



Figure 2 Breaking right gastroepiploic vein (9).

Available online: <http://www.asvide.com/articles/1199>

mainly focus on visceral obesity patients and introduced some surgical skills and precautions in our present study.

Patients position and the trocar placement

For patients with lower BMI, the body position has less effect on operation. However, for patients with higher BMI, body position is particularly important for exposure of surgical field. In this case, it is our experience that the patient is placed in the supine position with both legs abducted and tilted to the reverse Trendelenburg position (tilted angle $>20^\circ$). Since the position of pancreas in obesity patient is usually high, insufficient tilted angle is not enough to perform the dissection of the lymph nodes in suprapancreatic area. When we perform the splenic hilar lymphadenectomy, the body position should tilt to the right side.

When the trocar is placed, the distance between each Trocar should be as wide as possible. The observation hole should be placed possibly low and the main operating hole should be placed near the midline as much as possible.

Dissociation greater omentum

Greater omentum of obese patients is rich and thick, and adhesion and anatomic abnormalities usually occur. Therefore surgeons should dissociate greater omentum of obese patients more carefully, and violent traction is not allowed to avoid bleeding. In addition, surgeons should also avoid damaging transverse colon because it is often wrapped with greater omentum. We recommend that dissociation starts near splenic flexure and then enters omental bursa, which is a breakthrough point for dissociation. We think our recommendation can avoid vice-damage and repetitive operations. The anatomic landmark is gastric wall (*Figure 1*).

Breaking right gastroepiploic vein

Anatomical position of middle colic vein is fixed, of which anatomic variation rarely occurs. Therefore middle colic vein is the anatomic landmark of lymph node dissection. Firstly, surgeons should find inferior margin of pancreas. And then surgeons should continue dissociating to the lateral aspect to show head of pancreas and to release duodenum absolutely. We advise that surgeons should not break right gastroepiploic vein at its root. The capillaries of obese patients are abundant, and therefore bleeding always occurs when breaking vessels by hemoclip. If bleeding occurs, surgeons could use another hemoclip at vessel root. On the contrary, if surgeons break right gastroepiploic vein at its root and then bleeding occur, hemostasis is hard. Right gastroepiploic artery processing is conventional (*Figure 2*).

Dissection of lymph node of superior border of the pancreas

Surgeons should place dissociated greater omentum between stomach and liver. Assistants should not hold it too lowly to avoid vision blocked by slipped greater omentum and stomach. Find splenic artery, and dissect No. 11p lymph nodes. Then reveal left side of left gastric artery, and reveal further left gastric vein along hepatic common artery. Before break left gastric vein, we advise that surgeons firstly dissect lymphoid and adipose tissue behind blood vessels.



Figure 3 Dissection of lymph node of superior border of the pancreas (10).

Available online: <http://www.asvide.com/articles/1200>



Figure 4 The dissection of No. 1 and No. 3 lymph node groups (11).

Available online: <http://www.asvide.com/articles/1201>

This is because that hemoclip may disturb the next step of dissection of lymph node. In addition, we also advise that surgeons should not break left gastric vein at its root (*Figure 3*).

The dissection of No. 1 and No. 3 lymph node groups

The lesser omenta of the obese patients usually also be thick, which always warp extensive stomach wall of the lesser curvature. We suggest to dissect the No. 1 and No. 3 lymph node by two steps. Firstly, dissect the posterior lobe of lesser curvature from behind. And then dissect the anterior lobe from the front. Thus, the No. 1 and No. 3 lymph node groups can be resected entirely with few omentum left (*Figure 4*).



Figure 5 The ligation of left gastroepiploic vessels (12).

Available online: <http://www.asvide.com/articles/1202>

The ligation of left gastroepiploic vessels

The common methods we suggested are moving the greater omentum to the lower abdomen with turning the patient position to left side lifted, so that the left upper quadrant can be exposed distinctly. Mobilize the greater omentum from the transverse colon until to the root of left gastroepiploic vessels. Then, ligate the left gastroepiploic artery and vein. Therefore, the greater omentum could be removed easily and avoid damaging the short gastric vessels by mistake (*Figure 5*).

Removal of the specimen

The specimens of the obese would usually be of larger volume, and hard to take out from the abdomen especially when total laparoscopic surgery performed. In this condition, our suggestion is catching and taking the stomach out firstly, then taking out the greater omentum. Thus, the incision for removing the specimen could be as small as possible.

Key points

- (I) Carefully dissecting along the space between different layers;
- (II) Operating patiently and making more use of the slower cutting model of ultrasonic scalpel;
- (III) Leaving some distance from the root of vessels when ligating;
- (IV) Continually draw lessons from the experiences.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/ales.2016.10.02>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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