



Laparoscopic spleen-preserving splenic hilum lymph nodes dissection in total gastrectomy

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Abstract: Complete removal of splenic hilum lymph nodes (LN) while preserving the spleen and pancreas during laparoscopic total gastrectomy is considered challenging and technical demanding. Based on our accumulated laparoscopic surgical experiences and anatomical understanding of peripancreatic structures, we developed a strategy using retro-pancreatic approach for laparoscopic spleen-preserving splenic hilum LNs dissection for locally advanced proximal gastric cancer.

Keywords: Stomach neoplasm; laparoscopy; lymph node excision (LN excision); splenic hilum

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Introduction

Splenic hilum (No. 10) lymph nodes (LN) dissection should be conducted in order to achieve complete D2 lymphadenectomy in total gastrectomy for locally advanced proximal gastric cancer (1). The recent popularization of laparoscopic surgery should follow the identical treatment principles. Traditional No. 10 LN dissection was mainly achieved through combined resection of pancreas and/or spleen. However, due to the increased postoperative morbidity, and no significant survival benefit, spleen-preserving gastrectomy was subsequently suggested through JCOG 0110 (2). Nevertheless, spleen-preserving No. 10 LN dissection in laparoscopic total gastrectomy was considered difficult due to the tortuous splenic vessels and possibility of parenchymal injury to the spleen or pancreas. Based on our anatomical understanding of peripancreatic structures, we combined the characteristics of laparoscopic surgery and developed a strategy using retro-pancreatic approach for laparoscopic spleen-preserving splenic hilum LNs dissection for locally advanced proximal gastric cancer since 2009 (3). With the accumulated experiences, we have also made several modifications to this procedure in the past two years. Here we would describe our procedure in detail

Case presentation

In 2015, a 37-year-old female patient with upper abdominal pain was incharged in our department. Gastroscopy with biopsy identified a poorly-differentiated adenocarcinoma with a diameter of 1.5 cm located at the middle-third of the stomach near the lesser curvature. Enhanced abdominal computed tomography (CT) showed no distant metastasis, gross involvement of the gastrosplenic ligament or LN No. 4sb, at the splenic hilum or along the splenic artery (SA). The estimated clinical stage was cT2N1M0.

Surgical procedure

Under general anesthesia, the patient was placed in the supine position with legs set apart in a reverse Trendelenburg position. The surgeon stood on the patient's left side; the assistant surgeon took the patient's right side; and the camera operator stood between the patient's legs. After pneumoperitoneum was established with carbon dioxide insufflated at a pressure of 12 mmHg, five working ports were introduced (4). Exploration of abdominopelvic cavity was conducted to exclude distant metastasis and carcinomatosis.



Figure 1 Laparoscopic total gastrectomy with D2 lymphadenectomy (5). Available online: <http://www.asvide.com/articles/1343>

In order to better expose the surgical field and facilitate the assistant, liver retraction was introduced as shown in the video to lift up the left lobe of the liver, which would help in the following dissection of LN No. 1 and 3 (*Figure 1*).

The greater omentum was then divided along the border of the transverse colon toward the splenic flexure. By dividing the gastrocolic ligament, the less sac was entered. The stomach was then overturned cephalad, the left gastroepiploic vessels (LGeA & V) was identified near the pancreatic tail, which were then ligated at the root and allowing dissecting LN No. 4sb. Then the dissection continued rightward toward the duodenum. the right gastroepiploic vein was identified by dissecting the mesogastrum inferior to the gastric antrum off the transverse mesocolon. The ligation point of RGeV should be above the abouchement of ASPDV. The right gastroepiploic artery (RGeA) was usually identified posterior to the vein, which was also divided to allow the removal of LN No. 4d and 6. Subsequently, the gastroduodenal artery (GDA) could be located in the groove between duodenum and pancreatic head, which served as a clue to trace the common hepatic artery (CHA) and proper hepatic artery (PHA). Then the stomach was placed in its original position to allow the supra-pyloric mobilization. The duodenum was transected 2 cm distal to the pylorus using an endoscopic linear stapler (Power Echelon 60 Endopath Stapler), By following the PHA, right gastric artery (RGA) could be located and ligated at its origin allowing complete removal of LN No. 5. After the assistant turned the mobilized stomach antrum cephalad again and lift up the gastropancreatic fold, the supra-pancreatic area could be better exposed, continue the dissection by opening the sheath of CHA, at the junction of CHA and the

origin of SA, the retropancreatic space near the top of the pancreatic arch was entered, in this surgical plane, splenic vein (SV) could also be exposed and LN No. 8a and 11p were removed. Opening the Gerota's fascia, celiac artery (CA) could be seen and the root of left gastric artery (LGA) was ligated and cut, allowing dissection of LN No. 7 and 9. Also, by opening the sheath of left gastric vein (LGV), portal vein (PV) was traced. Ligation of LGV and removal of LN No. 12a was subsequently achieved. Then continued the dissection of LN No. 11d by following SA toward the spleen.

By retracting the pancreas meticulously in the caudal direction by the assistant, the surgeon dissected near the lower border of the pancreas and entered the retropancreatic space which was anterior to the fatty renal capsule until the pancreatic tail was mobilized. SA sheath was opened and skeletonized from the proximal portion towards the distal portion. When the bifurcation was reached, two secondary branches of the SA could be seen. The inferior branch had two third-grade branches. These secondary and third-grade branches of the SA were then skeletonized cautiously until they reached the spleen parenchyma. Meanwhile, the short gastric arteries (SGA) originating from the SA were all ligated. By skeletonizing the SA, fatty tissues bearing LN No. 10, 11d, 4sa were removed and all vessels in the splenic hilum area were saved with the preservation of the spleen.

Subsequently, the left cardia was mobilized and both vagus nerves were divided and LN No. 2 was dissected. The Roux-en-Y esophagojejunostomy and jejunojunctionostomy were carried out extracorporeally through a 5 cm midline minilaparotomy just below the xiphoid process.

Results

The operating time was 173 min and estimated blood loss was 20 mL. Pathological findings suggested the TNM stage was T1aN0M0 (stage IA) according to AJCC cancer staging manual-7th edition, the number of retrieved total LN and No. 10 LN was 71 and 5 respectively. Postoperatively, the patient experienced the first flatus on day 2, began oral intake of liquid diet on day 3 and discharged on day 7. Within 30 days after surgery, no complication was observed. At the last follow-up of 13 months, the patient didn't experience recurrent disease.

Discussion

With the treatment innovations including the popularity

of minimally invasive surgery for fighting against gastric cancer, the prognosis was greatly improved. However, the situation in China, where the majority of GC patients suffered from advanced stage diseases, still poses great challenges for Chinese clinical practitioners. The role of laparoscopic surgery for advanced gastric cancer is still controversial due to the lack of powerful evidence on the comparable long-term oncologic outcomes with open surgeries. Although the interim result of CLASS-01 trial showed promising safety and feasibility of laparoscopic surgery, the final results are awaited (6).

In treating locally advanced proximal gastric cancer, total gastrectomy with D2 lymphadenectomy is considered standard procedure (1), however, the achievement of No. 10 LN dissection has been heatedly debated. Results of JCOG 0110 suggested no necessity of performing splenectomy added evidence to this topic (2), however, laparoscopic spleen-preserving splenic hilum LN dissection in total gastrectomy is still challenging and technical demanding. Only a few experienced laparoscopic surgeons from high volume centers have reported this procedure through various approaches, including left, medial and retropancreatic approaches (3,7,8).

In our center, pancreas- and spleen-preserving laparoscopic total gastrectomy with D2 lymphadenectomy was first attempted in 2009 using retropancreatic approach. The benefit of our strategy could gain sufficient control of the splenic pedicle and thus better expose the splenic hilum area together with the inferior secondary and third-grade branches of SA (3). Also, if unexpected bleeding occurred during dissection, the mobilized pancreatic tail and splenic pedicle could allow in-time handling with less difficulties to prevent severer consequences. On this basis, we also made small modifications to this procedure: (I) routine liver retraction at the beginning of the surgery; and (II) duodenum transection after finishing infra-pyloric LN dissection. These two small tips could both achieve better exposure of the surgical field and pose less challenges for the assistant. To be specific, after retraction of the liver, when dissection LN No. 1 and 3, the assistant could easily expose the hepatogastric ligament with the left hand atraumatic clamp without fearing causing device-related injury to the left lobe of the liver. Similarly, after transection of the duodenum beforehand, and folding the mobilized gastric antrum toward the left upper quadrant of the patient's abdomen, the assistant could just use the clamp to insert between the two leaves of gastropancreatic fold and

lift up to expose the suprapancreatic area without fearing the cephalad turned stomach may fall down and interrupted the surgical procedure. These tips might be helpful for surgeons who wish to perform similar procedures.

Conclusions

Laparoscopic total gastrectomy with spleen-preserving splenic hilum LNs dissection through retro-pancreatic approach could be technically safe and feasible in experienced hands.

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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.2016.12.02>). 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. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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