

# Station 10 lymph node dissections in laparoscopic-assisted spleen-preserving radical gastrectomy for advanced proximal gastric cancer

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**Abstract:** D2 gastric resection has been increasingly recognized as the optimal surgical treatment for advanced gastric cancer. Dissection of the station 10 splenic lymph nodes is required in the treatment of advanced proximal gastric cancer. Based on vascular anatomy and anatomical plane of fascial space, integrated with our experience in station 10 splenic lymph node dissection in open surgery and proven skills of laparoscopic operation, we have successfully mastered the surgical essentials and technical keypoints in laparoscopic-assisted station 10 lymph node dissection.

**Key Words:** Stomach neoplasm; laparoscopy; lymph node excision; splenic hilar



Submitted Jul 25, 2013. Accepted for publication Aug 15, 2013.

doi: 10.3978/j.issn.1000-9604.2013.08.18

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The incidence of station 10 lymph node metastases is 9.8-20.9% in advanced proximal gastric cancer (1). The thoroughness of resection is an important prognostic factor. With further research, the critical role of the spleen as an immune organ in protecting the body against infection and tumors has been increasingly recognized (2). Meanwhile, the spleen-preserving station 10 lymph node dissection has also been accepted (3) since its first report by Hyung and colleagues in 2008 (4). In view of the complicated anatomical structures of the adjacent vessels, anatomical variations, limited space and deep location of the splenic region, as well as the bleeding-prone splenic parenchyma and the difficulty to manage splenic or vascular bleeding, the station 10 lymph node dissection is a technically demanding challenge for surgeons. Thus, a skilled and cooperative team of surgeons with experience in open surgery, solid grounding in anatomy and proven laparoscopic techniques will be needed to complete the task.

## Appropriate patient selection

Surgical indications should be strictly observed: patients are eligible only when they had a preoperative stage of c (T2,

T3, T4a) N1M0 as confirmed by preoperative pathological diagnosis, endoscopic ultrasound and CT scan, without evidence of fusion of the station 10 lymph nodes or spleen involvement, or potential adhesion. At the preliminary stage, patients who were obese, had surgery history or were elderly should not be considered.

In the present video (*Video 1*), the patient is a 53-year-old man confirmed as poorly differentiated adenocarcinoma by preoperative gastroscopic biopsy, with a preoperative staging of cT4aN1M0.

## Procedure

### *Patient positioning*

The patient is placed in a supine position with the head raised and legs apart. The surgeon stands on the left side of the patient, with the first assistant on the right side and the camera assistance between the patient's legs.

### *Surgical procedures*

The omentum is lifted to expose the gastrocolic ligament.



**Video 1** Station 10 lymph node dissections in laparoscopic-assisted spleen-preserving radical gastrectomy for advanced proximal gastric cancer

The anterior lobe of transverse mesocolon is separated to expose the anterior pancreatic space. The right gastroepiploic vein is ligated and cut above the anterior inferior pancreaticoduodenal vein. The right gastroepiploic artery to the left posterior region is then ligated and cut, followed by dissection of the station 6 lymph nodes. The gastropancreatic ligament is cut towards the posterior wall of the duodenal bulb along the right gastroepiploic artery, and the location of the gastroduodenal artery is confirmed. The gastroduodenal artery is the total trigger to locate the common hepatic artery, proper hepatic artery, and right gastric artery above the upper edge of the pancreas. The hepatopancreatic ligament is cut along the upper edge of the pancreas to expose and denude the common hepatic artery, which is in a shape of transverse arch. The right gastric artery to the upper left, mostly emerging from the proper hepatic artery, is ligated and cut. The proper hepatic artery is denuded towards the superior area. Stations 8, 5 and 12a lymph nodes are dissected. The gastric coronary vein joins the portal vein mostly at the upper third of the tip of the common hepatic artery, and is thus prone to injury as it is not easily exposed during retraction. Dissection is performed towards the pancreatic tail along its upper edge to enter Toldt's space at the posterior pancreatic area, and is continued towards the left upper region along the common hepatic artery to expose the celiac trunk, left gastric artery and the root of the splenic artery. Stations 7, 9 and 11p lymph nodes are dissected.

The dissection of station 10 lymph nodes is completed

from both sides into the central region. The Toldt's space is enlarged along the pancreatic artery above the pancreatic upper edge, and the pancreatic artery is denuded towards the left side. Since the non-I pancreatic artery is partly embedded in the pancreatic tissue, caution is needed to avoid injury to the pancreas to prevent postoperative pancreatic leakage. Dissection is continued to the junction between the body and tail of the pancreas. The divided omentum and greater curvature are retracted towards the upper right direction, and the splenocolic ligament is transected to expose the gastrosplenic ligament. The pancreatic capsule is cut open at the lower edge of the tail of the pancreas to expose the anterior pancreatic space. The left gastroepiploic artery is ligated and cut at the upper edge of the lower splenic pole artery, and the pancreatic capsule is separated towards the right until the end. The splenogastric ligament is then divided towards the superior area. The lymph nodes along the trunk of the splenic artery and the splenic lobar arteries are dissected. Due to the considerable variations and tortuosity of branches of the splenic lobar artery, as well as the thin venous wall, the non-functional surface of the ultrasonic scalpel should be as close to the surface of the terminal branch of the splenic artery and the branches of the splenic vein as possible during the alternate sharp and blunt stripping, cutting and separation with extreme caution. During the dissection, as the posterior gastric artery mostly emerges from the splenic artery, the ligation should be carefully carried out to avoid injury to the upper splenic lobar artery emerging from the splenic artery to prevent ischemia of that lobe. There are around two to six branches of the short gastric artery emerging from the terminal branch of the splenic artery, denudation should be performed at their roots where the ultrasonic scalpel is directly used to cut off. The gastrosplenic ligament is cut along the surface of the spleen through to the left side of the cardia and the left crus of the diaphragm. Stations 4sb, 11d, 10, 4b and 2 lymph nodes are dissected in this area. The stomach and the omentum are retracted towards the left lower direction, and the hepatogastric ligament is transected along the surface of the liver through to the right side of the cardia and the right crus of the diaphragm. Station 1 lymph nodes are dissected.

## Results

The length of operation was 220 min with bleeding of about 90 mL. Postoperative pathology suggested poorly differentiated adenocarcinoma, pathological stage

T4aN2M0 (IIIB). The overall lymph nodes were 5/34 (+), station 10, 0/3 (+). Postoperative recovery was uneventful without any significant complication. Flatus was present three days after surgery. Liquid diet was given on the fourth day, and the patient was discharged on the seventh day.

### Conclusions

Laparoscopic-assisted radical gastrectomy with station 10 lymph node dissection is a safe and feasible treatment for gastric cancer. Proper patient selection and experience in surgical techniques is the key to successful operation.

### Acknowledgements

*Disclosure:* The authors declare no conflict of interest.

**Cite this article as:** Li Y, Wang J. Station 10 lymph node dissections in laparoscopic-assisted spleen-preserving radical gastrectomy for advanced proximal gastric cancer. Chin J Cancer Res 2013;25(4):465-467. doi: 10.3978/j.issn.1000-9604.2013.08.18

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