Brief Report on Esophageal Surgery

Recurrent laryngeal nerve lymph node dissection in minimally invasive esophagectomy

Miao Lin, Yaxing Shen, Hao Wang, Mingxiang Feng, Lijie Tan

Department of Thoracic Surgery, Zhongshan Hospital, Fudan University, Shanghai 200032, China

Correspondence to: Lijie Tan. Department of Thoracic Surgery, Zhongshan Hospital, Fudan University, Shanghai 200032, China. Email: tan.lijie@zs-hospital.sh.cn.

Abstract: Minimally invasive esophagectomy (MIE) has become increasingly important in the treatment for resectable esophageal cancer. However, it's still controversial about the effects of recurrent laryngeal nerve (RLN) lymph node dissection in MIE. Patient was placed in the lateral prone position. RLN lymph node dissection was performed in MIE. MIE can get comparable results of RLN lymph node dissection as open surgery. The number of dissected lymph nodes is 9.8±4.3 pieces and the time of lymphadenectomy is about 24 mins. RLN lymph node dissection is feasible and safe in MIE. The helpful surgical techniques include clear exposure of RLN, good collaboration with assistant, esophageal suspension, and so on.

Keywords: Lymph node dissection; esophageal cancer; recurrent laryngeal nerve (RLN); minimally invasive esophagectomy (MIE)

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Introduction

Minimally invasive esophagectomy (MIE) has been widely accepted for the treatment of resectable esophageal cancer in the world. Studies proved the advantages of short-term benefits, including small invasiveness, enhanced recovery after surgery, low incidence of perioperative complications, and so on (1,2). However, it remains doubtful whether MIE can achieve the same lymph node dissection results for each anatomical site as open surgery (3). Recurrent laryngeal nerve (RLN) lymph nodes locate along the RLNs which travel in trachea esophageal groove. Thus, RLN lymph nodes are classified as thoracic lymph nodes and named as 106 rec in Japanese Classification of Esophageal Cancer (4). The incidence of lymph node metastasis is reported as high as 13.6% of 106 recL and 30.3% of 106 recR in patients with upper thoracic esophageal cancer (5). Thus, it's necessary to perform RLN lymph node dissection. We herein describe our experience of RLN lymph node dissection.

Methods

Patient position and thoracic port design

Commonly, we place patient in the left lateral prone position. The observation port is selected in the 7th intercostal spaces of the posterior axillary line. Other trocars are located: the 3rd intercostal spaces of the mid-axillary line, the 9th intercostal spaces of the subscapular line, and the 6th intercostal spaces of the subscapular line.

Right RLN lymph node dissection (Figure 1)

Artificial pneumothorax with 8–10 mmHg CO_2 pressure can provide clear exposure of surgical area. Assistant uses a grasping forcep to help expose the mediastinum through the trocar in the 9th intercostal spaces. The mediastinal pleura are opened with electronic hook posteriorly alongside the esophagus and anteriorly from the right stem bronchus. Right vagus nerve can be found beneath the pleura and above the bronchus. Right RLN arises from the trunk of right vagus nerve and loops the right subclavian artery. Scissor and isolating forcep could help separate right RLN safely, while the electronic hook and ultrasonic knife may induce nerve injury. After the exposure of right RLN, the lymph nodes and connective tissue between the right RLN and esophagus are removed. The upper boundary of lymph node dissection could reach to the anus perineum of the thyroid pole.

Figure 1 Right recurrent laryngeal nerve (RLN) lymph node dissection (6).
Available online: http://www.asvide.com/articles/1206

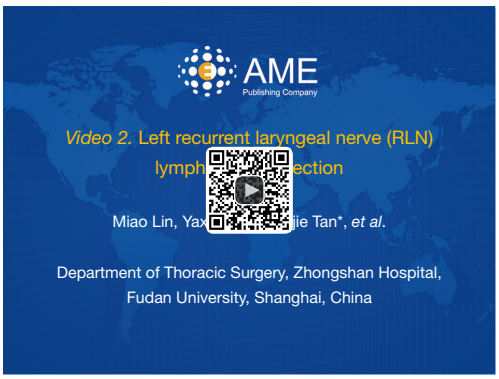

Figure 2 Left recurrent laryngeal nerve (RLN) lymph node dissection (7).
Available online: http://www.asvide.com/articles/1207

Left RLN lymph node dissection (Figure 2)

After cutting the arch of the azygos and mobilizing the middle and lower part of esophagus, the upper part of esophagus is partly dissociated from the membranous part of the trachea. A silk thread is put into the thorax through puncture to lift esophagus. The puncture point is the inner edge of scapula in the 5th intercostal space. After looping the esophagus and fixation with clip, the out thorax part of thread is pulled up by assistant to lift esophagus. The left RLN is then expose and separated in the space between lifted esophagus and the trachea. Scissor and isolating forcep is preferred during the separation because of safety concern. During the subsequent mobilization of esophagus and dissection of left RLN lymph nodes, the assistant uses the grasping forcep to press the trachea so as to better expose the space between esophagus and trachea. Then, the thread is relaxed and the esophagus is dissociated from the inner and posterior side with gauze placed between the left RLN and esophagus to protect the left RLN from injury. Finally, left RLN lymph nodes are removed from esophagus.

Results

In 2015, our center performed 155 cases of MIE. It took about 24 mins to do RLN lymph node dissection with blood loss of about 30 mL. The mean number of left RLN lymph nodes is 3.1±2.7 pieces, and the mean number of right RLN lymph nodes is 6.7±5.2. Eight patients suffered postoperative RLN injury.

Discussion

Lymph node dissection is important for pathological staging and treatment of esophageal cancer. Lymph node metastasis along the long axis of esophagus can reach upward to the neck. Metastasis of RLN lymph nodes is not rare, especially in upper esophageal cancer (5). MIE has always been widely accepted as a significant approach for resectable esophageal cancer in Japan and China (8,9). However, radical lymph node dissection in MIE is still a controversial problem. RLN lymph nodes are not easy to dissect in MIE. Some surgeons doubt the effects of lymph node dissection in MIE. However, researches support that surgeons could get the same lymphadenectomy results in MIE as open surgery (10). Technical development is a key element in RLN lymph node dissection (11).

Good exposure of surgical area is the first thing to do in lymph node dissection. Clear view of operative field eases the operation and reduces the risk. Thoracoscope provides enlarged operative field, which is much vivid than the field of open surgery. Besides, assistants share the same screen with surgeon, making the team work smooth. Thus, better exposure is one of the advantages of MIE. Position of patient also relates to exposure in MIE. The left lateral decubitus was widely adopted in the past. The left lateral decubitus positon has the anatomically similar operative field as open surgery, but poor exposure of mediastinal lymph nodes. In our center, the lateral prone position with artificial pneumothorax is adopted, which has the advantages of clear exposure of surgical area, and simplified operation.

Protecting RLN from injury is another key point during the surgery. Exposure of nerve is the first step of dissection. Right RLN can be found along the vagus nerve under the subclavian artery. Left RLN cannot be seen through the right thorax because of the block of esophagus. We use a silk thread to lift esophagus. Then the left RLN

can be observed in the space between lifted esophagus and the trachea. Esophageal suspension provides a better exposure of nerve, large operation room, and the tension of surround tissue which facilitate the following mobilization. The number of dissected lymph nodes is 3.55±1.20 with esophageal suspension and 1.46±1.22 without esophageal suspension recently in our center. A significant difference can be observed in this result.

The experience of surgeon could affect the result of RLN lymph node dissection. Obvious learning curve could be observed in MIE. Reports mentioned that the ability to execute a complete lymphadenectomy during MIE might require the operation of 25–40 cases (11,12). MIE performed by a skilled surgeon could reach comparable outcome as open surgery. The incidence of RLN injury is also comparable to open surgery. As mentioned in the results part, our center performed 155 cases of MIE in 2015. Meanwhile, we performed 169 cases of open surgery. The mean time of RLN lymph node dissection is about 21 mins. The mean number of left RLN lymph nodes is 3.6±1.9 pieces, and the mean number of right RLN lymph nodes is 7.2±4.8. Blood loss is about 45 mL. Eleven cases had postoperative RLN injury. There is no significant difference between the data of MIE and the data of open surgery.

Assistant is also important during the RLN lymph node dissection. With a grasping forcep, assistant help expose the surgical area and free one hand of the operator. The grasping forcep could be used to press the trachea, push organs and tissue, form tension and so on. Besides, the forcep from assistant also helps free one instrument of the operator, which greatly improves the speed and safety of surgery. During the mobilization of RLN, scissor and isolating forcep is a better choice. Electronic hook might induce nerve injury through electrical conduction, and the ultrasonic scalpel might induce nerve injury through the generated heat during work. Injury of RLN will result in a weakened voice because the vocal cord is fixed. Choke after drinking is common after unilateral injury, while dyspnea can be seen after bilateral injury.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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