How-to-do-it

Wound retraction system for lung resection by video-assisted mini-thoracotomy

Yoshio Tsunezuka *, Makoto Oda, Hideki Moriyama

Department of General Thoracic Surgery, Ishikawa Prefectural Central Hospital, Kuratsukiigashi 2-1, Kanazawa 920-8530, Japan

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Abstract

Wound retraction system (WR; Alexis Wound Retractor, Applied Medical, CA, USA), designed for laparoscopic abdominal surgery, is instrumental in offering retraction and protection when an organ or specimen requires removal through a small incision. We performed lobectomy or segmentectomy with systematic lymph nodes dissection by video-assisted mini-thoracotomy for patients with primary lung cancer using this tool. This technique was used for elective operations in 24 men and 10 women; the length of major skin incision was 6.5 ± 0.7 cm. The operative views and the ease of using endoscopic instruments were good. Only two patients required initial pleurectomy for pleuro-pulmonary adhesions before using WR. There were no patients with severe postoperative chest pain, wound infection and contamination.

Keywords: Wound retraction system; Wound retractor; Polyether; Primary lung cancer; Video-assisted thoracic surgery (VATS); Mini-thoracotomy

1. Introduction

Wound retraction system (WR; Alexis Wound Retractor, Applied Medical, CA, USA), designed for laparoscopic abdominal surgery, is instrumental in offering retraction and protection when an organ or specimen requires removal through a small incision. We have performed lung resection on patients with primary lung cancer using this tool and describe the advantages and disadvantages of WR.

2. Technique

After double lumen endotracheal intubation, the patient is positioned in a lateral position. A 30˚ thoracoscope was introduced through the seventh intercostal space at the anterior axillary line. A skin lateral incision approximately 5–7 cm long was made. Generally, the fourth intercostal thoracotomy from the mid-axillary line is made for upper lobe or middle lobe diseases or the fifth intercostal on auscultatory triangle thoracotomy for lower lobe. The WR (M size) is then placed through the incision (Fig. 1). WR is constructed as a cylindrical membrane sheath that has two rings (the upper and the lower rings) attached to each open end. The rings are molded from a plastic material. First, the lower ring of the WR is inserted into thoracic cavity after deforming the shape. Next, the sheath is placed in traction and folded over itself until it contacts the chest wall. If the lung adheres to parietal pleura, pneumolysis or pleurolysis is needed to obtain some space in the thoracic cavity for insertion of the lower ring. In case the ring size is greater than the thoracic space, the circumference of the ring is shortened.

3. Results

This technique was used for elective operations in 24 men and 10 women, aged 63.4 ± 11.7 (means ± standard deviation) years. The length of major skin incision was 6.5 ± 0.7 cm. Of the 34 cases of video-assisted mini-thoracotomy (VAMT) with WR, there were 18 lobectomies, 15 segmentectomies and 1 lobectomy and segmentectomy. All patients underwent systematic lymph nodes dissection by VAMT with WR. Of the 34 cases, 32 were at pathological stage I and 2 were at stage IIA. Two patients required initial pleurectomy for pleuro-pulmonary adhesions before using WR. There were no patients with severe postoperative chest pain, wound infection and contamination.

4. Comment

Postoperative scar pain and cosmetic results are improved after video-assisted thoracic surgery (VATS) compared to the open thoracotomy. However, it is difficult to perform technically VATS lobectomy on some patients...
with lung cancer for a number of reasons. Especially, we hold that systematic lymph nodes dissection, including hilar lymph nodes (#10) and deep subcarinal lymph nodes (#7), by VATS is technically difficult for some patients. For this reason, we recently performed mini-thoracotomy with systematic lymph nodes dissection on some limited patients with tumor size above 20 mm in diameter or in clinical stage II. Because N2 disease existed at a high rate among patients with a tumor size above 20 mm.

Although VATS reduced chest pain after surgery, after VATS some patients actually complained of severe intercostal pain associated with access incisions. One of the reason is owing to many tools that are used for the access incisions which can injure intercostal nerves and muscles even if the ribs are not spread. A general metallic rib spreader is hardly able to spread intercostal space which causes chest pain. WR provides a traumatically circumferential retraction and maximal intercostal space is not spread, and protects the intercostal muscles and nerves. WR can be used regardless of the size of the wound. There are four sizes of WR and a large size WR accommodates 10—15 cm thoracotomies. Therefore, WR is comparatively a very useful tool for standard muscle-sparing posterolateral thoracotomy so as to exclude musculus serratus anterior and musculus latissimus dorsi.

As a tool similar to WR, "Lap-Protector (LP)" is generally used for laparoscopic surgery [1,2]. This tool has some faults; one of them is that the length of the cylindrical membrane sheath is not flexible. When the length of the LP is longer for chest wall, it moves during operation. While in the case of WR, the cylindrical membrane sheath can be versatilily changed according to the thickness of the chest wall. Secondly, a sheath of LP, which is made of silicon, is very weak and easily torn by contact of metallic endoscopic instruments. However, the WR sheath is made of polyether-PU, which is very strong in spite of its 0.08 mm of thickness.

It is reported that the use of a wound protector in contaminated cases of transabdominal surgery for gastrointestinal disease resulted in an 84% reduction in postoperative wound infection rates when compared with cases not using a wound protector [3]. However, Kercher et al. [4] demonstrated that a wound protector did not significantly diminish the rate of wound infection at the bowel resection/anastomotic site. Almost all thoracic surgery for lung cancer are non-contaminated cases; therefore, it is not more useful from a viewpoint of inhibition of wound infection compared to gastrointestinal disease. Also, the cause of wound/port contamination of cancer is not a wound retractor or an Endopouch but residual cancer cells of the intrathoracic space [5].

References