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A left thoracic approach in a prone position for thoracoscopic thoracic duct ligation in a patient with post-esophagectomy chylothorax: A case report

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ABSTRACT

INTRODUCTION: We debate whether or not to approach from right thorax for the left chylothorax after esophagectomy.

PRESENTATION OF CASE: A 50 s-year-old female underwent right-sided thoracoscopic esophagectomy with three-field lymphadenectomy for esophageal carcinoma (type 0-IIa, 3.4 × 2.2 cm, T1bN0M0, Stage IA), followed by reconstruction with esophago-gastric anastomosis through the posterior mediastinum. The thoracic duct was excised and ligated. The left thoracic drainage increased to 2115 mL/day on the fifth postoperative day. Thoracic duct injury was diagnosed, and surgery was performed on sixth postoperative day. With the patient in a prone position, the thoracic duct was ligated successfully under thoracoscopy in the left thorax. The leakage point was found in the crushed duct by 8.8-mm titanium clips. Then, we performed mass ligation of the thoracic duct with 11-mm titanium clips below the leakage point after careful dissection. The surgery took 58 min, with an estimated total blood loss of 0 g.

DISCUSSION: Although thoracic duct is anatomically located on the right side of the descending aorta, we employed a left-sided thoracoscopic approach due to the chylous leakage in the left thorax. With the patient in the prone position, surgeons can easily convert from a left thoracic approach to a right thoracic approach immediately without postural change if the thoracic duct cannot be found in the left thoracic cavity.

CONCLUSION: This technique is useful and should be considered for patients with left chylothorax.

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1. Introduction

The occurrence of substantial chylous leakage after esophagectomy for cancer remains a well-known yet uncommon complication, with a reported incidence of 1–4% [1,2]. Conservative management with intrapleural drainage and total parenteral nutri-

tion for a low-output leakage may be appropriate [3]. However, the lack of a response to conservative treatment can rapidly result in a serious condition with nutritional losses, immunologic deficiency and respiratory distress. Early surgical treatment is therefore recommended for the patients with high-output chyle loss before patients become severely weakened [4–6].

A right-sided thoracoscopy is generally undertaken for thoracic duct ligation, as it is anatomically located on the right side of the descending aorta [6]. However, in case of a chylothorax in the left pleural cavity, it is highly likely in the right pleural cavity that adhesion of the lung or gastric tube in the posterior mediastinum will obscure recognition of the duct. We performed thoracic duct ligation for a post-esophagectomy chylothorax in the left thorax with the patient in a prone position.

Abbreviations: POD, postoperative day; ICS, intercostal space (ICS); PAL, posterior axillary line; CT, computed tomography.

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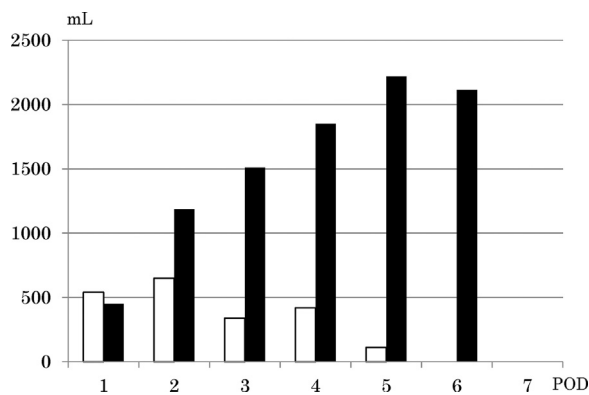


Fig. 1. The volume of left thoracic drainage was increasing up to 2115 mL on the 5th postoperative day. POD: postoperative day □ right pleural effusion ■ left pleural effusion.

2. Presentation of case

A 50-year-old female underwent right-sided thoracoscopic esophagectomy in a prone position with three-field lymphadenectomy for squamous cell carcinoma in the lower esophagus, followed by reconstruction with esophagogastric anastomosis through the posterior mediastinum. The thoracic duct was excised and ligated with 8.8-mm titanium clips just below the inferior pulmonary vein. The left mediastinal pleura was caudally opened in the lower mediastinum. Histopathological examination of the specimen revealed type 0-IIa (3.4 × 2.2 cm) squamous cell carcinoma with T1bN0M0, Stage IA (International Union Against Cancer TNM, 7th Edition). She was administered antitubercular medications of 6 months prior to the esophagectomy for tuberculous lymphadenitis in the cervix and mediastinum.

While the volume of the right thoracic drainage was decreasing daily, the volume of left thoracic drainage increased to 2115 mL on the fifth postoperative day (POD; Fig. 1). Therefore, a “milk test” was conducted on the sixth POD. Oral milk intake (200 mL) showed a visible change in the drainage fluid to a milky white color and an increase in the volume to 1200 mL/3 h. We diagnosed thoracic duct injury definitely based on the clinical findings. Because of the chylous leakage to the left thorax and possibility of the adhesion between the gastric tube and the descending aorta in the right thorax, we performed thoracoscopic thoracic duct ligation using a left-thoracic approach on the same day.

The operation was performed under double-lumen intubation, and the left lung was collapsed with artificial pneumothorax during the procedure. The patient was placed in a prone position. For thoracoscopic surgery, two 12-mm trocars and two 5-mm trocars were used. The 12-mm trocar was inserted in the ninth intercostal space (ICS) below the inferior angle of scapula for the camera. For the right hand of an operator, another 12-mm trocar was inserted in the eighth ICS on the posterior axillary line (PAL). For the left hand of the operator, 5-mm trocar was inserted in the sixth ICS on the PAL. For the assistant, a 5-mm trocar was inserted in the fourth ICS on the PAL. We did not observe any adhesion and achieved a direct approach to the mediastinum. First, the operator made a parallel incision of mediastinal pleura above the aorta upward to the stump of thoracic duct clipped in the lower mediastinum. As expected, it was difficult to adequately visualize the thoracic duct on the right side of aorta, so the aorta was softly displaced by the assistant. Furthermore, continuous feeding of milk through the nasogastric tube 2 h before the operation made it possible to identify the damaged stump of the thoracic duct as a leakage point. The leakage point was easily found in a prone position as the milky fluid trickling from above (Fig. 2). The leakage point was

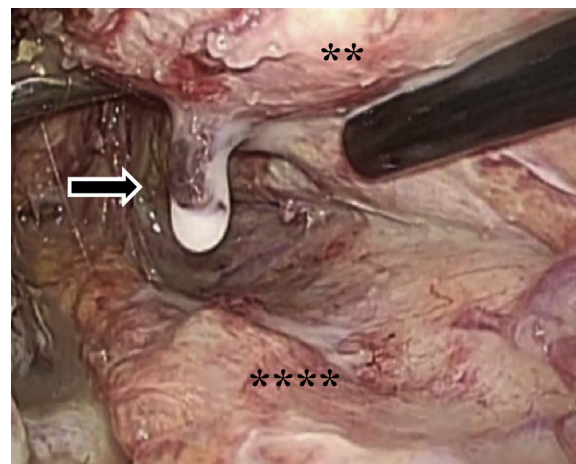


Fig. 2. The chylous leakage point (black arrow) was easily found near the stump of thoracic duct. Milky lymphatic fluid was dropping from it. **Aorta ****Greater omentum.

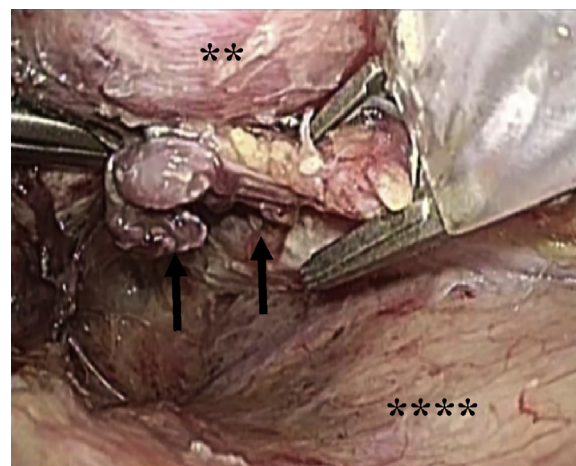


Fig. 3. The thoracic duct dissected (black arrows) was ligated with 11 mm titanium clips below the leakage point. **Aorta ****Gastric tube.

found in the crushed duct by 8.8-mm titanium clips. Then, we performed mass ligation of the thoracic duct with 11-mm titanium clips below the leakage point after careful dissection (Figs. 3 and 4). The surgery took 58 min, with an estimated total blood loss of 0 g.

After surgery, chylous leakage ceased immediately. She resumed oral intake on the eighth day after the ligation and was discharged on 21st POD after the first operation without further complications.

3. Discussion

The management of post-esophagectomy chylothorax is controversial. Previous reports have described the benefits of early ligation of thoracic duct for chylothorax [5,7]. Our indication of surgical treatment for chylothorax occurring after esophagectomy is based on the duration and large volume of leakage. Thoracic duct injury should be suspected if the chest drain output continues to exceed 2000 mL/day for up to 2 days. In such cases, milk test is conducted. If the drain output changes to a milky color and the volume exceeds 1000 mL/3 h following oral intake of milk (200 mL) or injection of milk from jejunostomy, we diagnose

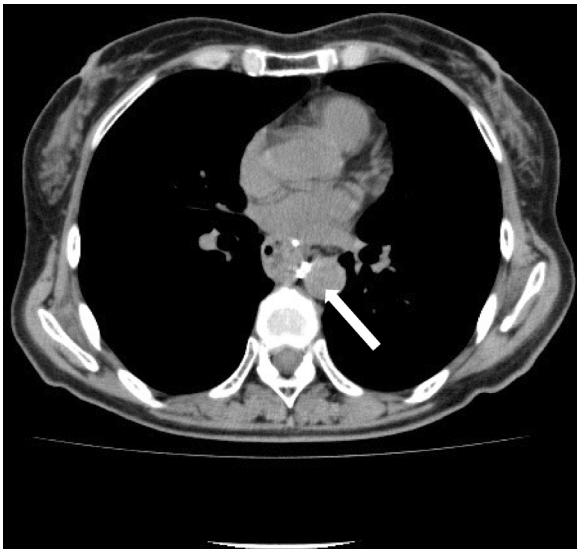


Fig. 4. The thoracic duct was ligated on the right side of the aorta behind the inferior pulmonary vein (open arrow).

thoracic duct injury definitely. Thoracoscopic surgery is planned without delay, as surgical treatment is urgently required in order to avoid severe complications due to cardiopulmonary depression, especially in patients after esophagectomy. Continuous feeding of milk 2 h before and during surgery enabled us to visualize the leakage point. Even in cases where the leakage point has not been identified, ligation of the thoracic duct just above the diaphragm will stop the leakage. Although computed tomography (CT) were not performed in this case, the clipping point of thoracic duct in the initial operation was confirmed with the recorded image (DVD) before the re-operation. In case of leakage from a left thoracic duct or an accessory duct in the upper mediastinum, lymphangiography may be effectively capable of detection of the leakage point. Although lymphangiography was not performed in this case, we diagnosed the injury of the main thoracic duct from the massive volume of pleural effusion. In case of leakage from the left thoracic duct, the leakage point can be probably detected in the left pleural cavity.

In our patient, the thoracic duct was injured at the clipping point during esophagectomy by the 8.8-mm titanium clips used during esophagectomy. Perhaps such fine and sharp clips crashed the thoracic duct and resulted in the chylous leakage. We use a firmer but gentler 12-mm absorbable thick clip for fragile thoracic duct ligation after this case.

Although thoracic duct is anatomically located on the right side of the descending aorta, we employed a left-sided thoracoscopic approach due to the chylous leakage in the left thorax. With the patient in the prone position, surgeons can easily convert from a left thoracic approach to a right thoracic approach immediately without postural change if the injured thoracic duct cannot be found in the left thoracic cavity. In our patient, gentle displacement of the aorta enabled us easily to detect the injured thoracic duct. Although an injured thoracic duct should be re-ligated in the right thoracic cavity, a left thoracic approach should be considered in case of chylous leakage into the left thoracic cavity likely, as in our patient, or in case of leakage from a left thoracic duct. Additionally, use of the prone position without the necessity for manual compression of the lung was extremely helpful during this procedure. And the leakage point was easily found in a prone position as the milky fluid trickling from above.

4. Conclusion

We present the case of successful surgical treatment of chylothorax with a left thoracic approach in a prone position. This technique is useful and should be considered for patients with left chylothorax.

Authors' contributions

KM drafted the manuscript and conducted the literature search. KM, KS, TH and SS participated in the surgical procedure. KS, KG and MM reviewed the manuscript. YS advised as to the surgical procedure. SK provided the final approval for publication. All authors read and approved the final manuscript.

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Conflict of interest

All the authors declare that they have no conflict of interest.

Ethical approval

As there was a report of an interesting case and was not a trial or an observational research, there was no need for an ethical approval.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal.

Guarantor

Kiyotomi Maruyama accept full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

Registration of research studies

No applicable.

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