

*Case Report*

## Bilateral Approach for Thoracoscopic Esophagectomy in a Patient with Esophageal Cancer and Solitary Posterior Thoracic Para-aortic Lymph Node Metastasis

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We report a successful dissection of metastatic posterior thoracic para-aortic lymph node (No. 112aoP) via bilateral thoracoscopic surgery. With the anesthetized patient (a 73-year-old Japanese woman) in the prone position, two working ports were inserted for the left-side approach, and artificial pneumothorax was created. Thoracoscopic examination revealed a swollen LN posterior to the descending aorta. Fat and metastatic LNs posterior to the aorta were dissected from the aortic arch level to the diaphragm while preserving intercostal arteries. For the right-side approach, two working ports were inserted and a routine thoracoscopic esophagectomy was performed. Gastric conduit reconstruction was achieved laparoscopically. Operation time for the left thoracic procedure: 54 min; estimated blood loss: almost none. No recurrence was detected 24 months post-operatively. There are several surgical options for approaching No. 112aoP, including transhiatal, left thoracotomy, and thoracoscopy. Although a wide dissection of the posterior thoracic para-aortic area has not been reported, it may be feasible and safe if the artery of Adamkiewicz and intercostal arteries are preserved. A minimally invasive bilateral thoracoscopic approach for a thoracoscopic esophagectomy is safe and useful for esophageal cancer patients with solitary No. 112aoP metastasis.

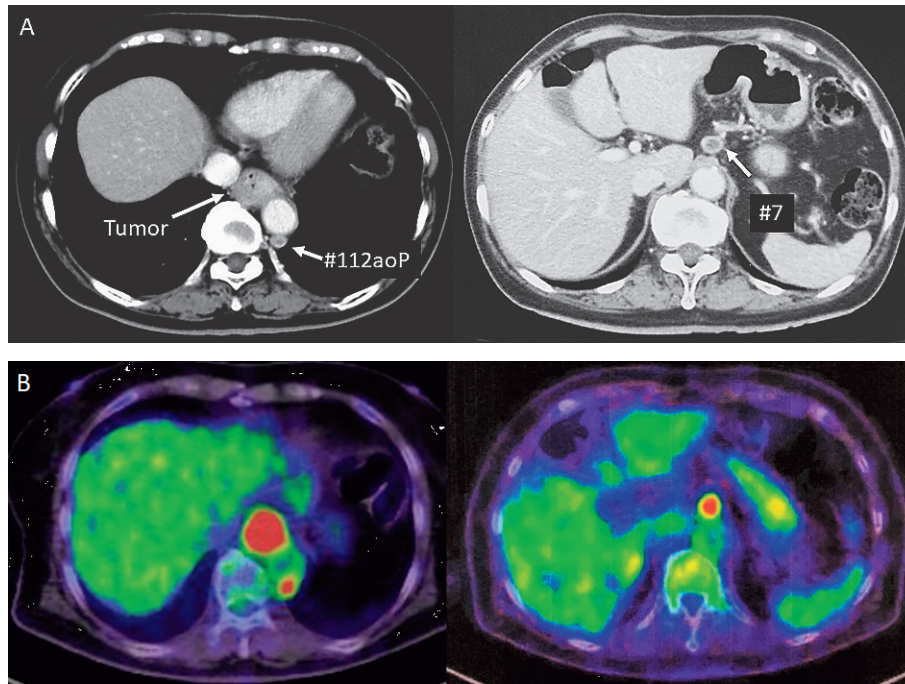
**Key words:** bilateral approach, posterior thoracic para-aortic lymph node, thoracoscopic esophagectomy

Esophageal cancer is one of the most prevalent malignant tumors worldwide, with a high incidence and mortality rate. The extent of lymph node (LN) metastasis is significantly associated with long-term outcomes in esophageal cancer [1]. According to the 11th edition of the Japanese Classification of Esophageal Cancer, the thoracic para-aortic lymph nodes (No. 112ao) are divided into ventral (No. 112aoA) and dorsal sides (No. 112aoP) [2]. No. 112aoP LNs are classified as distant LNs, and patients with metastasis in these LNs are classified as Stage IVa, regardless of

tumor depth. Although surgery is still one of the most effective treatments for esophageal cancer, it is difficult to dissect No. 112aoP LNs via a right thoracic approach because of its anatomical characteristics [3]. Here, we report the case of a successful dissection of solitary metastatic No. 112aoP LNs via bilateral thoracoscopic surgery.

### Patient and Surgical Technique

A 73-year-old Japanese woman with dysphagia was referred to our hospital with a diagnosis of esophageal



**Fig. 1** Preoperative CT (A) and FDG/PET CT (B). **A**, CT scan reveals a tumor in the lower thoracic esophagus and swollen lymph nodes (LNs) in the posterior thoracic para-aortic region (No. 112aoP) and along the left gastric artery (No. 7); **B**, FDG/PET CT shows abnormal uptake of FDG in the tumor, No. 112aoP LN, and No. 7 LN.

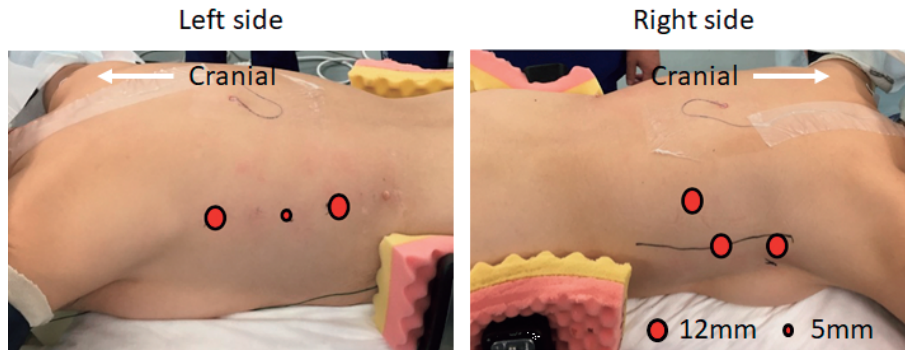
cancer. Both the gastrointestinal X-ray series and the endoscopic examination revealed a type 3 tumor located in the lower thoracic and abdominal esophagus. Computed tomography (CT) showed swollen No. 112aoP LNs along the left gastric artery (No. 7), both of which exhibited an abnormal uptake of  $^{18}\text{F}$ -fluorodeoxyglucose (FDG) on FDG-positron emission tomography (PET)/CT (Fig. 1). No abnormal FDG uptake was observed at other sites. We thus diagnosed the patient with T3 N4 M0, stage IVa squamous cell carcinoma of the esophagus [2].

We treated the patient with two cycles of chemotherapy at a 4-week interval: cisplatin  $80\text{ mg/m}^2$  on day 1 and 5-fluorouracil  $800\text{ mg/m}^2$  on days 1-5. The CT after chemotherapy revealed that the No. 112aoP LN had reduced in size from 13.4 mm to 6.5 mm, but the size of the primary tumor and No. 7 LN remained unchanged. Due to the solitary No. 112aoP LN metastasis, we planned a thoracoscopic esophagectomy with a bilateral approach after obtaining informed consent from the patient and her family. The pathological examination of the resected specimen revealed T3N4 (No. 112aoP, No. 7) M0, stage IVa. At 24 months post-

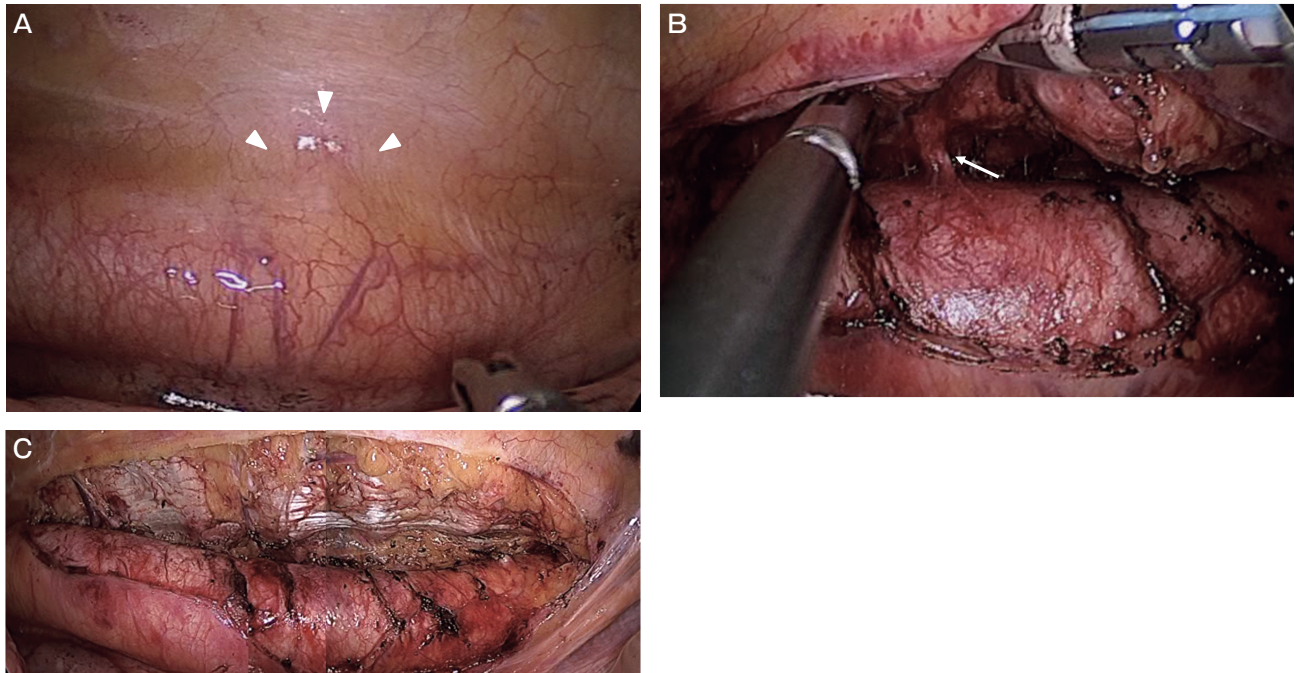
surgery, the patient was well and remained recurrence-free.

After the induction of general anesthesia with intubation using a single-lumen endotracheal tube, the patient was placed in a fixed prone position with both arms abducted above the head. The operating table was rotated to the right while operating on the left side, and vice versa. The procedure was performed by 2 surgeons (a surgical operator and an endoscopist), with the video monitor placed on the opposite side of the operating table.

First, for the left-approach, 2 working ports were inserted at the fifth and seventh intercostal spaces (12 and 5 mm, respectively), and the camera port was inserted at the ninth intercostal space on the posterior axillary line (Fig. 2).  $\text{CO}_2$  was insufflated to a pressure of 6 mmHg to create an artificial pneumothorax. A thoracoscopic examination revealed a swollen LN posterior to the descending aorta (Fig. 3A). The pleura was then incised with an ultrasonically activated sealing device and vessel-sealing system. Fat and metastatic LNs posterior to the aorta were dissected from the level of the aortic arch to the diaphragm while preserving the



**Fig. 2** Positioning of the ports. For the left-side approach, two working ports are inserted at the fifth and seventh intercostal spaces (12 mm and 5 mm, respectively); and the camera port is inserted at the ninth intercostal space on the posterior axillary line. For the right-side approach, two working ports were inserted at the fifth and seventh intercostal spaces on the posterior axillary retrograde line (both 12 mm); the camera port is inserted at the ninth intercostal space on the scapular line.



**Fig. 3** Intraoperative images of the left-side approach. **A**, A swollen lymph node (LN) is seen posterior to the descending aorta (arrowheads); **B**, Fat and metastatic LNs posterior to the aorta were dissected from the level of the aortic arch to the diaphragm while preserving intercostal arteries (arrow); **C**, Intraoperative image after the dissection of LNs.

intercostal arteries (Fig.3B,C), because an LN suspected of metastasis was also found near the aortic arch.

For the right-side approach, two working ports were inserted at the fifth and seventh intercostal spaces (both 12 mm) on the posterior axillary retrograde line, and the camera port was inserted at the ninth intercostal

space on the scapular line [4]. Gastric conduit reconstruction was achieved laparoscopically. The gastric conduit was then pulled through the posterior mediastinum to the neck, and anastomosis was manually performed in the cervical portion.

The operation time for the left thoracic procedure was 54 min, and the estimated blood loss was almost

none. The total operation time was 498 min, and the estimated blood loss was 63 mL. The patient had an uneventful postoperative course and was discharged on the fifth postoperative day. Postoperative chemotherapy was not administered, and no recurrence was noted on radiographic imaging at 15 months postoperatively.

## Discussion

In the present case, we performed a bilateral thoracoscopic esophagectomy as a technique for the successful dissection of a solitary posterior thoracic para-aortic LN metastasis. Solitary posterior thoracic para-aortic LN (No. 112aoP) is rarely observed in esophageal cancer [3, 5, 6]. Although No. 112aoP is classified as a distant LN according to the Japanese Classification of Esophageal Cancer, Shishido *et al.* reported that some patients can achieve long-term survival after the resection of No. 112aoP metastasis [3]. There are several surgical options for approaching No. 112aoP, including transhiatal [5], left thoracotomy [3], and thoracoscopy [6, 7] approaches; however, Shimada *et al.* reported the only previous case of bilateral thoracoscopic surgery [8]. Because we had previously performed the enucleation of a swollen No. 112aoP LN for diagnostic purposes [6], we were able to easily introduce the left-side thoracoscopic approach in the present case. In this patient, a wide range of dissection of the posterior thoracic para-aortic area was successfully performed from the level of the aortic arch to the diaphragm. Although this procedure has not been reported previously, it may be feasible and safe if the artery of Adamkiewicz and intercostal arteries are preserved.

In conclusion, we believe that a minimally invasive bilateral thoracoscopic approach for the thoracoscopic esophagectomy in patients with esophageal cancer with

solitary No. 112aoP metastasis is useful and may be associated with favorable outcomes.

**Acknowledgments.** All authors certify that they have no commercial associations that might pose a conflict of interest in connection with submitted article. All authors declare that they have no conflict of interest.

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