Esophagectomy via Left Thoracotomy for Esophageal Cancer with Situs Inversus Totalis: Report of a Case

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Abstract
We report a case of successful esophagectomy via a left thoracotomy for esophageal cancer in a 57-year-old Japanese man with situs inversus totalis. An upper gastrointestinal endoscopy, performed to investigate the cause of dysphagia, revealed a 7-cm irregular shaped mass occupying more than half of the circumference of the middle-third of the esophagus. Computed tomography (CT) showed enlarged mediastinal lymph nodes and situs inversus totalis. Histological examination of a biopsy specimen revealed squamous cell carcinoma of the esophagus. Although esophagectomy is usually performed through a right thoracotomy because of the left position of the aortic arch, we performed successful subtotal esophagectomy with radical lymph node dissection through a left thoracotomy. During surgery, we modified the standard surgical technique in a mirror-image fashion to complete the esophagectomy safely. The patient had an uneventful postoperative course.

Key words Situs inversus totalis · Esophageal cancer · Left thoracotomy

Introduction
Esophagectomy for esophageal cancer is usually performed through a right thoracotomy to avoid the aortic arch, which flanks the left side of the esophagus. However, embryological events during primary aortic arch morphogenesis can result in anatomical variations. Situs inversus totalis is one such unusual disorder, in which the organs are arranged in a mirror image of their normal positions. We describe the successful surgical treatment of a 57-year-old Japanese man with thoracic esophageal cancer associated with situs inversus totalis. Intraoperative pictures show the mirror-imaged anatomical abnormalities.

Case Report
A 57-year-old Japanese man was admitted to our hospital for treatment of thoracic esophageal cancer, after presenting initially with dysphagia. Preoperative esophageal endoscopy showed an irregular-shaped tumor, 7 cm in diameter, occupying more than half the circumference of the middle third of the esophagus (Fig. 1A). The histological diagnosis of a biopsy specimen was squamous cell carcinoma. Chest X-ray showed dextrocardia (Fig. 1B). Computed tomography (CT) showed esophageal wall thickening (Fig. 2A), swollen mediastinal lymph nodes (Fig. 2B), and situs inversus totalis (Fig. 2C). The treatment options for this cancer; namely, esophagectomy and chemoradiotherapy, were explained to the patient, who elected to undergo surgery. Thus, we performed subtotal esophagectomy with radical lymph node dissection through a left thoracotomy.

After the induction of general anesthesia, the patient was placed in the right decubitus position, which is opposite to the standard position. The surgeon stood on the abdominal side of the patient. The fifth intercostal space was opened with one-lung ventilation. To enable us to perform esophagectomy, we divided the azygos arch and the left bronchial artery, which was too thin to be preserved. During radical lymph node dissection we preserved the lung branches of the left vagus nerve, the left recurrent laryngeal nerve passing behind the left subclavian artery and ascending posteriorly, and the right recurrent laryngeal nerve ascending along the posterolateral tracheal margin (Fig. 3). These anatomical abnormalities through the left thoracotomy were a
Fig. 1. A Esophageal endoscopy revealed an irregular-shaped tumor on the back wall of the middle thoracic esophagus. B Chest X-ray film showing dextrocardia and a right aortic arch.

Fig. 2. Computed tomography scan showing A the main tumor, B an enlarged upper mediastinal lymph node, and C the abdominal mirror-imaged abnormalities.

Fig. 3. Intraoperative picture (A) and its schema (B) showing the mirror-imaged anatomical abnormalities through a left thoracotomy after lymph node dissection. 1, esophagus; 2, left subclavian artery; 3, left recurrent laryngeal nerve; 4, lung branches of the left vagus nerve; 5, right recurrent laryngeal nerve (retracted with rubber tape); 6, membranous part of the right main bronchus; 7, divided azygos arch (retracted with silk strings); 8, left vagus nerve (retracted with rubber tape); 9, left lung.