

# Rupture of the Ascending Aorta after Surgical Resection for Lung Cancer —A Case Report—

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**ABSTRACT:** A rupture of the ascending aorta which occurred in a woman on the 13th postoperative day following a right upper lobectomy with mediastinal lymph node dissection for lung cancer is reported herein. Fortunately, the patient was rescued from a cardiac tamponade and hemothorax by emergency operation. The operative findings suggested a traumatic rupture of the aorta, however, lymph node dissection of the mediastinum could not be excluded as a possible cause. Therefore, careful mediastinal lymph node dissection should be carefully performed in operations for lung cancer.

**KEY WORDS:** rupture of the ascending aorta, surgical resection for lung cancer, mediastinal lymph node dissection

## INTRODUCTION

Complications, which are related to the technical aspects of pulmonary resections, include bronchopleural fistula, bronchioalveolar fistula, recurrent laryngeal and phrenic nerve paresis, intra- and postoperative hemorrhage and, in cases of rare surgical complications, cardiac herniation, closed chest-wall dehiscence and others.<sup>1</sup> In addition, a rupture of the ascending aorta after thoracic surgery is also another rare complication.

## CASE REPORT

A 72 year old female with a long-standing history of hypertension and without any pul-

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monary symptoms was admitted to Shinshu University Hospital, Matsumoto, Japan as a suspected case of lung cancer on January 21, 1988. Both X-ray and bronchoscopic examinations revealed a tumor, 26 × 28 mm in size, with spike formations and a pleural indentation in the right upper lobe (S<sub>3</sub>) and no findings in the mediastinum. Cytology on the bronchoscopy revealed adenocarcinoma. On physical examination, the patient was found to have blood pressure of 140/86 mmHg in both arms, in addition, no rales and heart murmurs were audible on the chest. No abdominal masses were present either, while both femoral pulses were even. A right upper lobe resection and mediastinal lymph node dissection were performed by posterolateral thoracotomy without any complications except for a small injury to the pericardium corresponding to the ascending aorta during pretracheal lymph nodes dissection. Such minor bleeding is usually controlled by electrocoagulation. The chest drain was removed on the second postopera-

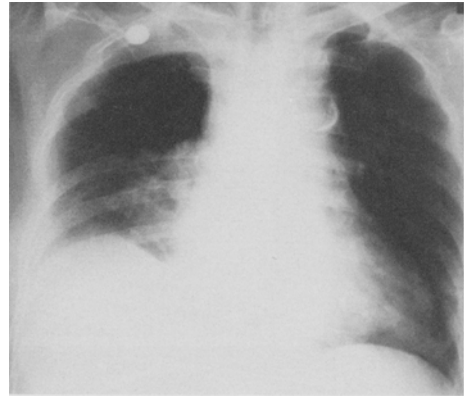
tive day. A chest X-ray (Fig. 1) on the 11th postoperative day showed no signs of pleural effusion or cardiomegaly.

On the 13th postoperative day, a nurse discovered that the patient had suddenly fainted after a brief bout of coughing. Her blood pressure dropped to 60 mmHg and she developed both sinus tachycardia (120 beats per min) and tachypnea (24 breaths per min). Immediately, shock therapy was

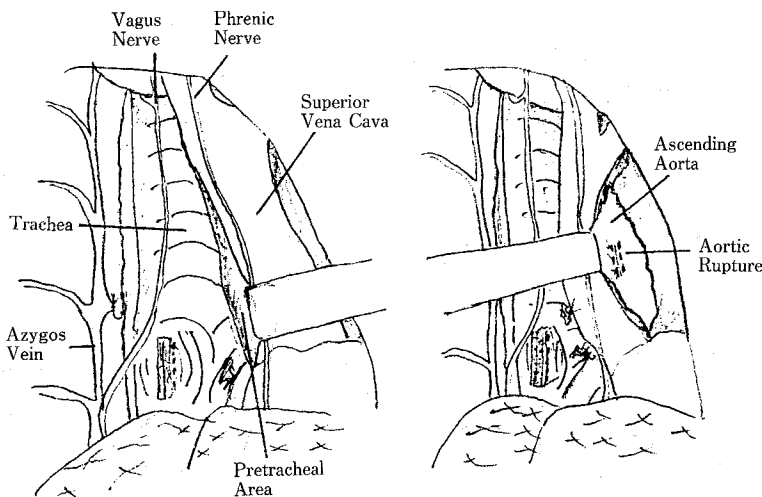
undertaken. A chest X-ray (Fig. 2) demonstrated a right pleural effusion and an enlargement of the cardiac and mediastinal silhouette, while a needle aspiration revealed fresh blood in the right pleural cavity. A hemorrhage from either the right hilum or upper mediastinum was suspected as the possible cause of shock. The patient underwent immediate surgery, at which time about 400 ml of thin blood was drained from the



**Fig. 1.** A chest X-ray on the 11th postoperative day showed no dilatation of the central silhouette.



**Fig. 2.** A chest X-ray on the 13th postoperative day showed a right pleural effusion and dilatation of cardiac and mediastinal silhouette.



**Fig. 3.** Schematic drawings of the right upper mediastinum after an upper lobectomy and lymph node dissection (left), and the closure of the aortic laceration (right).

right pleural cavity by the same thoracotomy and no bleeding was observed except from the small pericardiotomy which had been caused by the previous operation. However, a 2 cm long, longitudinal laceration on the right lateral wall of the ascending aorta was found after extension of the pericardiotomy and elimination of about 100 ml fresh blood including a clot from the pericardial cavity. No other lesion was discovered in the peri-

cardial and pleural cavity and the hemorrhage from the laceration had already diminished in amount. The laceration was then closed with three buttress-mattress sutures (Fig. 3). Postoperatively, the patient followed an uneventful course. Postoperative computed tomography of the chest (Fig. 4) showed no abnormal findings in the thoracic aorta.

#### DISCUSSION

The standard surgical treatment for lung cancer is generally considered to consist of either lobectomy, right bilobectomy or pneumonectomy accompanied with a complete lymph node dissection of the mediastinum in Japan. Therefore, we performed lymph node dissection of the right mediastinum after a right upper lobectomy, and the pathological examination revealed metastasis to one of the tracheo-bronchial lymph nodes.

Mediastinal lymph node dissection does not indicate the removal of the lymph nodes alone but also include the clearing of various tissues including the lymph nodes and fatty tissues. This procedure is carried out in order to completely expose the organs composing the hilum and mediastinum.<sup>2</sup> After the dissection of the right upper mediastinum, parts of the ascending aorta and pericardium become visible between the trachea and superior caval vein. In this patient, the aorta and pericardium might have suffered injuries from the electric cauterization during pretracheal lymph node dissection. We then discovered an aortic laceration located below the pericardial reflection. It might have caused hemothorax as well as hemopericardium since the pericardiotomy was left open. However, the hypotension resulting from the shock helped to diminish any further hemorrhaging from the laceration. Therefore, this patient was saved not only from cardiac tamponade but also from a lethal hemorrhage.

Thoracic aortic rupture can occur, most commonly, from either direct or external

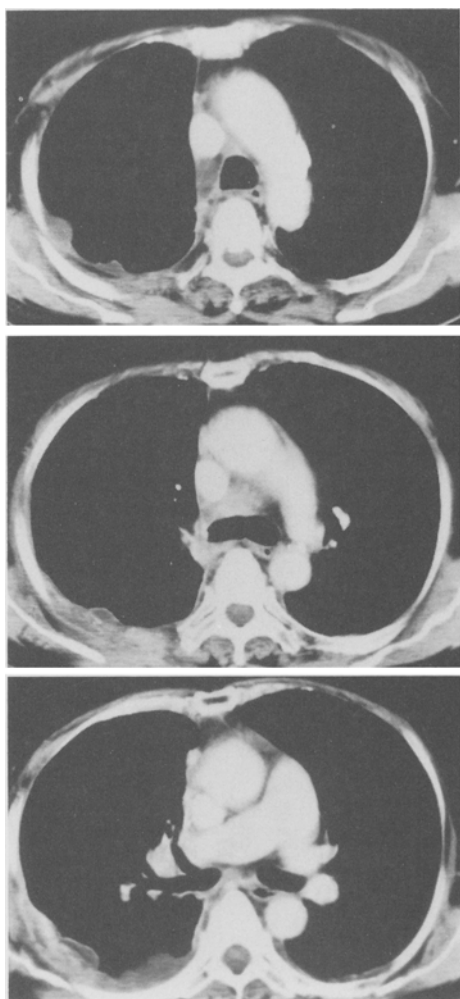


Fig. 4. Computed tomograms of the chest at the level of carina showing slight pleural effusion and no dissecting or aneurysmal change on the thoracic aorta except for calcification.

trauma and arise as either a complication of aortic mural disease, or an erosion of a contiguous inflammatory or neoplastic mass. A rupture of the thoracic aorta may also accompany aortic dissection and aneurysm.<sup>3</sup> In addition, Widder et al.<sup>3</sup> have reported that spontaneous aortic perforation was apparently provoked by long-term steroid therapy.

Since the postoperative computed tomograms of the chest showed no evidence of aneurysm, dissection or atheromatous change in the thoracic aorta and the patient was not administered any steroid therapy, even though she was given hypotensive drugs, there was no apparent predisposing factor indicating an aortic rupture in this patient. Accordingly, we feel that the cause of rupture was direct trauma on the ascending aorta under mediastinal dissection which lead to an injury of the aortic wall, which was not recognized intra-operatively, and later ruptured from instantaneous hypertension due to a cough on the 13th postoperative day.

It is important to perform as many curative operations with mediastinal lymph node dissection for lung cancer as possible to improve the end results.<sup>4</sup> However, complete lymph node dissection yields hoarseness, difficulty of expectoration, atelectasis in some cases, and, in rare cases, bronchopleural fistula and chylothorax after operation. Respective complications can occur due to damage to the recurrent laryngeal nerve,

removal of branches of vagi and sympathetic nerves, cutting of the bronchial artery and injury to the thoracic duct. Regarding lymph node dissection of the upper mediastinum, it is important to preserve the above mentioned nerves and the bronchial artery, in addition the organs composing the mediastinum should not be injured in order to prevent such complications as the rupture of the ascending aorta in this patient. The mediastinal lymph nodes, in particular the pretracheal lymph nodes which are surrounded by the trachea, superior caval vein and aorta, should therefore be carefully dissected without causing damage to the vessels. Finally, such an operation should always be performed under direct vision.

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