

Primary Lung Cancer with Growth into the Lumen of the Pulmonary Artery

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We describe a 68-year-old man with primary lung cancer, misdiagnosed as pulmonary thromboembolism, with growth into the lumen of the pulmonary artery (PA). The tumor was surgically unresectable because of difficulty with the bronchoplasty; however, it was progressing rapidly and obstructing the main PA. We urgently performed a partial resection of this tumor and occluded the left PA ostium with autologous pericardium to avoid spread into the main PA. (Ann Thorac Cardiovasc Surg 2009; 15: 186–188)

Key words: cardiopulmonary bypass, lung cancer, partial resection

Introduction

Primary lung cancer that spreads into the intrapulmonary artery is very rare.^{1–3} It is often misdiagnosed as a more common disease, such as primary pulmonary artery (PA) tumor or pulmonary thromboembolism (PE).⁴ We urgently performed a partial resection of this tumor to avoid occlusion of the main PA.

Case Report

A 68-year-old man with no significant medical history was examined carefully in a regional hospital because of a slight fever and a cough of 3-month duration. A diagnosis of PE was made, and he was admitted to our hospital to treat this condition. He received appropriate anticoagulation therapy, but no improvement occurred. Computed tomography (CT) at our hospital strongly suggested that a huge mass was either a primary PA tumor or infiltration from a primary lung cancer. CT revealed a

massive space-occupying mass in the superior and inferior segments of the left PA and a primary unknown tumor without metastasis. Furthermore, extensive intraluminal filling defects involving the main PA were identified (Fig. 1A). Magnetic resonance imaging and positron emission tomography also showed no metastasis. Laboratory tests showed no evidence of a hypercoagulable state or the presence of tumor markers. Echocardiography demonstrated moderate tricuspid regurgitation and a gradient across the PA (66 mmHg). Bronchography was normal, and CT and lower limb venous Doppler examinations detected no deep vein thrombosis. The thoracic surgeons commented that the tumor could not be surgically resected because of difficulty with bronchoplasty. However, the tumor progressed rapidly and obstructed the main PA (Fig. 1A). We urgently performed a partial resection of this tumor followed by pathological examination.

At surgery, a median sternotomy was performed. After cannulation of the ascending aorta and the bicaval vein, extracorporeal circulation was instituted. The right atrium was vented, and a longitudinal incision was made on the main PA. A yellowish and elastic soft mass was found adherent to the left PA (Fig. 2A). This mass wasn't continuous with the main PA and was removed up to the left PA ostium. We occluded the left PA ostium with autologous pericardium to avoid spread into the main PA. Lavage cytology was not done, but dissemination was not

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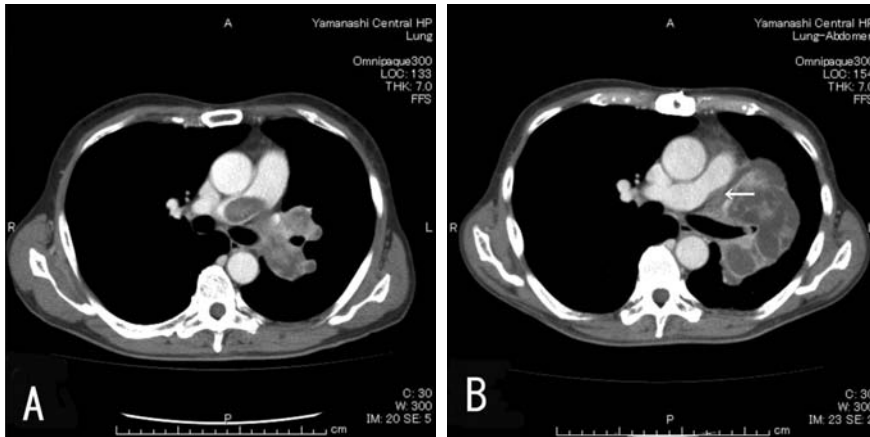


Fig. 1.
A: Preoperative CT revealed a huge mass with growth into the lumen of the main and left pulmonary arteries.
B: CT on postoperative day 88 revealed the tumor had not spread into the main PA because of the autologous pericardium patch (arrow).

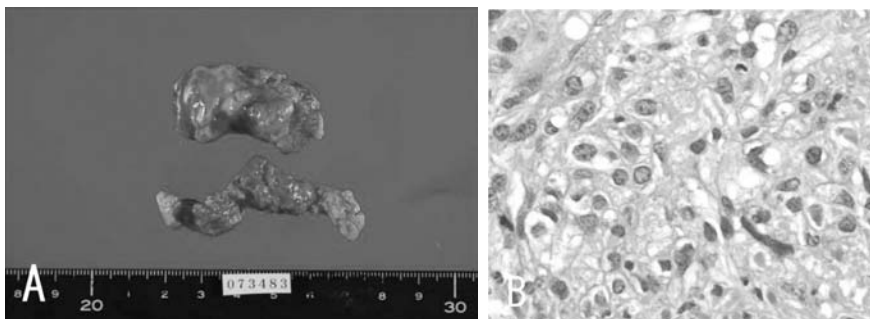


Fig. 2.
A: The surgical specimen was soft.
B: Histological findings of squamous cell carcinoma. (hematoxylin-eosin, original magnifications: $\times 40$)

observed around the operative field. A 43-minute period of total cardiopulmonary bypass (CPB) was required. The patient was extubated on postoperative day 1. His postoperative course was uneventful and his major symptoms improved. Histopathologic examination of the specimen was consistent with poorly differentiated squamous cell carcinoma (Fig. 2B).

The patient was treated with two cycles of doublet chemotherapy. These drugs were also not effective in improving his condition. He was discharged from our hospital on postoperative day 89. He was followed up at the outpatient clinic; however, he died of sudden dyspnea on postoperative day 102.

Comment

Primary lung cancers that spread into the intrapulmonary artery are quite rare. To our knowledge, only 4 cases have been reported in the literature (Table 1).¹⁻³⁾

Primary lung squamous cell carcinomas very likely arise from the pulmonary hilum and could invade into the great vessels and heart. There are masses capable of

existing in the intrapulmonary artery, such as primary PA tumors or PE, but their presumptive diagnosis before surgery or autopsy is difficult because their clinical presentations and diagnostic imaging are similar.⁴⁾

Locally advanced non-small cell lung cancers infiltrating adjacent organs commonly have poor prognoses, and surgical indication remains controversial. Some authors reported survival outcomes to be relatively favorable for patients undergoing extended surgery with postoperative pathological N0 disease.^{5,6)} Although our patient had no lymph node metastases on imaging and the bronchography results were normal, we abandoned extended surgery for the lung cancer invading the PA because of difficulty with the bronchoplasty, judging from the CT. However, this tumor was progressing rapidly and obstructing the main PA. We urgently performed a partial resection of it followed by pathological examination with CPB. We were careful not to transfuse blood aspirated from the surgical fields back into the patient to avoid tumor dissemination. A recently developed pump system, which washes and concentrates blood aspirated from the surgical field for subsequent

Table 1. Primary lung cancer with growth in the pulmonary artery

Author (year)	Age/ sex	Symptoms	Location	Therapy	Pathological diagnosis	Outcome
Yamaguchi et al. (2000) ¹⁾	66/M	Dry cough	Right PA	Pneumonectomy	SCC	Alive
	55/F	Dry cough	Left PA	Pneumonectomy	ASC	Alive, brain metastasis
Estrera et al. (2002) ²⁾	63/F	Left shoulder pain	Right PA	Pneumonectomy	LCNEC	Alive
Kamigaki et al. (2005) ³⁾	69/F	Uveitis (screening test for sarcoidosis)	Left descending PA	Chemotherapy, radiation	Small cell carcinoma	Alive
Present case (2009)	68/M	Fever, cough	Main and left PA	Tumor resection, chemotherapy	SCC	Died after discharge

M, male; F, female; PA, pulmonary artery; SCC, squamous cell carcinoma; ASC, adenosquamous cell carcinoma; LCNEC, large cell neuroendocrine carcinoma.

transfusion back into the patient, has allowed for safe and reliable circulatory support.^{5,7)} We safely performed the surgery with CPB and found that fortunately the tumor had not infiltrated the main PA. This tumor was resected and removed, and we occluded the left PA ostium with autologous pericardium. The postoperative CT showed that the tumor had not spread into the main PA because it was impeded by the autologous pericardium patch (Fig. 1B). Although chemotherapy was ineffective for the patient, this operation improved his symptoms and quality of life.

References

1. Yamaguchi T, Suzuki K, Asamura H, Kondo H, Niki T, et al. Lung carcinoma with polypoid growth in the main pulmonary artery: report of two cases. *Jpn J Clin Oncol* 2000; **30**: 358–61.
2. Estrera AL, Cagle PT, Azizzadeh A, Reardon MJ. Large cell neuroendocrine carcinoma: an unusual presentation. *Ann Thorac Surg* 2002; **73**: 1957–60.
3. Kamigaki M, Yamazaki K, Tsujino I, Suga M, Sakaue S, et al. Small cell carcinoma of the lung exclusively localizes within the left descending pulmonary artery. *Chest* 2005; **127**: 2273–6.
4. Parish JM, Rosenow EC 3rd, Swensen SJ, Crotty TB. Pulmonary artery sarcoma. Clinical features. *Chest* 1996; **110**: 1480–8.
5. Ohta M, Hirabayashi H, Shiono H, Minami M, Maeda H, et al. Surgical resection for lung cancer with infiltration of the thoracic aorta. *J Thorac Cardiovasc Surg* 2005; **129**: 804–8.
6. Borri A, Leo F, Veronesi G, Solii P, Galletta D, et al. Extended pneumonectomy for non-small cell lung cancer: morbidity, mortality, and long-term results. *J Thorac Cardiovasc Surg* 2007; **134**: 1266–72.
7. de Perrot M, Fadel E, Mussot S, de Palma A, Chapelier A, et al. Resection of locally advanced (T4) non-small cell lung cancer with cardiopulmonary bypass. *Ann Thorac Surg* 2005; **79**: 1691–6.