

*Case  
Report*

## A Case of Primary Angiosarcoma of the Lung Presenting as a Hemorrhagic Bronchial Tumor

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**Pulmonary angiosarcomas are usually secondary tumors, and only a few primary cases have been reported. Effective strategies for treating this tumor have not been established, and the prognosis of affected individuals is generally very poor. We report a case of primary angiosarcoma presenting as a hemorrhagic solitary nodule at the bifurcation of the left main bronchus, followed for two years before surgery. Bronchial arteriography revealed a tumor stain sign, and racemose hemangioma of the bronchial artery was excluded. The hemoptysis was not controlled by repeated bronchial artery embolization, and the patient underwent left pneumonectomy with routine mediastinal lymph node dissection. Histopathologically, the excised tissue revealed a highly-cellular growth of atypical spindle cells with a storiform pattern. These atypical cells showed relatively low mitotic activity; the MIB-1 index was 10%. The tumor was diagnosed as a primary angiosarcoma of the lung by the following immunohistological findings: positivity for factor VIII-related antigen and CD31. One year after resection, the patient remains well without signs of recurrence.**

**Keywords:** pulmonary angiosarcoma, hemorrhagic bronchial tumor, bronchial arteriography, surgical resection, immunostaining

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Received: May 27, 2011; Accepted: September 26, 2011

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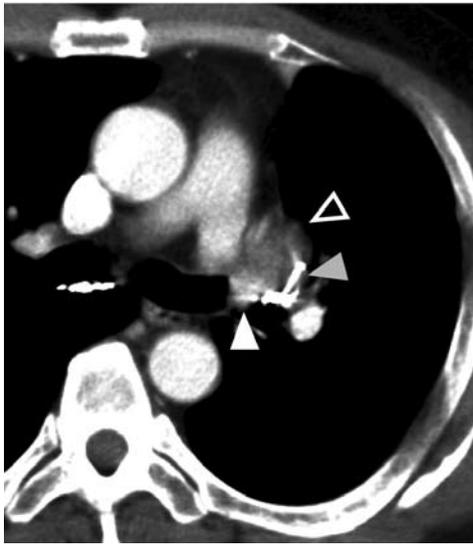
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### Introduction

Primary pulmonary angiosarcoma is extremely rare. An angiosarcoma found in the lung most likely represents metastasis from a primary tumor of the skin, heart, breast, or liver.<sup>1)</sup> Although the clinical manifestations and course of angiosarcomas in the lung are not well known, it is clear from reported cases that these angiosarcomas are associated with pulmonary hemorrhage and generally have a poor prognosis. We report a rare instance of primary angiosarcoma of the lung presenting as a hemorrhagic solitary nodule at the bifurcation of the left main bronchus.

### Case Report

A 45-year-old man, a non-smoker with no significant prior medical illness, presented with cough and bloody sputum. A bronchoscopic examination was performed in



**Fig. 1** Chest computed tomography. Contrast-enhanced computed tomography of the chest showed a 12-mm hyperdense nodule in the left main bronchus (white arrow), atelectasis of the left upper lobe (black arrow), and the coils set into the left bronchial artery near the nodule (gray arrow). The tumor made contact with the left pulmonary artery, but no invasion was found.



**Fig. 2** Left bronchial arteriography. Left bronchial arteriography performed before the bronchial artery embolization showed a tumor stain.

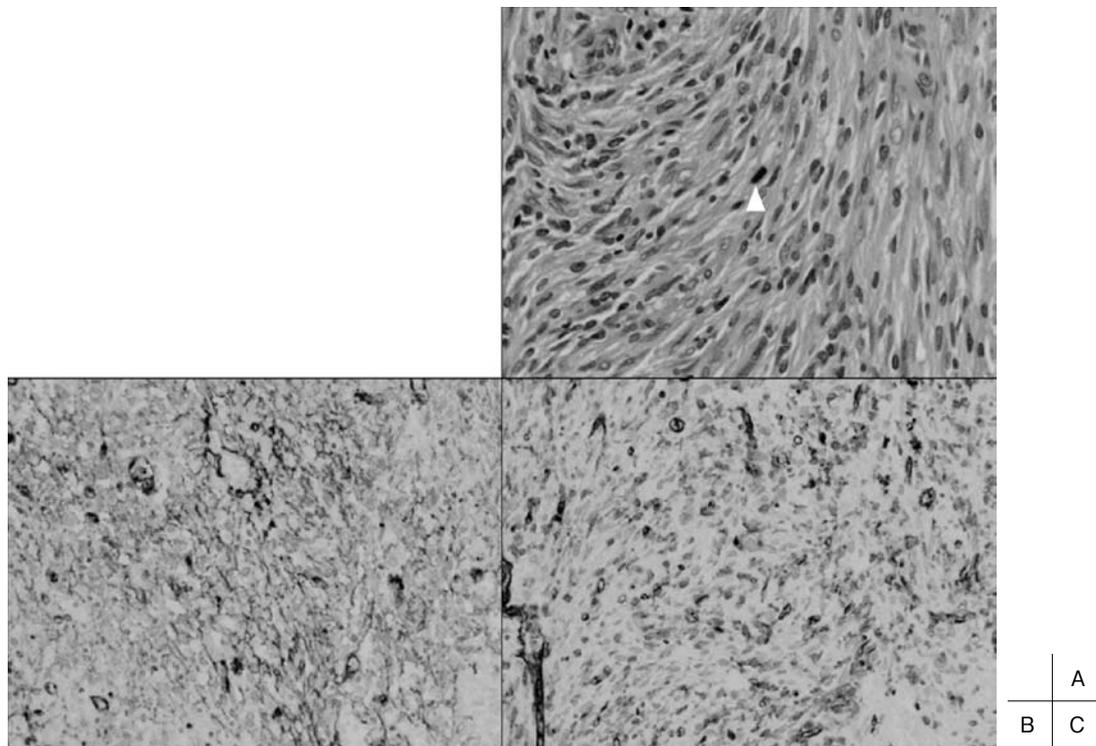
another hospital, and a hemorrhagic small raised nodule was observed at the bifurcation of the left main bronchus. Biopsy was not performed because of the risk of massive hemorrhage from the nodule. Although bronchial arterial embolization was performed, bloody sputum was not completely controlled. Because the tumor gradually became larger over one year following the first admission, he was admitted to our hospital for surgical treatment.

The results of peripheral blood cells counts and biochemistry examinations were normal. Tumor markers, including CEA, CYFRA and Pro-GRP, were all within normal limits. Arterial blood gas analysis revealed mild hypoxia pH 7.419, pCO<sub>2</sub> 42.1 mmHg, pO<sub>2</sub> 70.7 mmHg, BE 1.9, SaO<sub>2</sub> 94.8%. Chest radiography showed a mass-like opacity at the left hilum accompanied by volume loss of the left upper lobe and the micro coils used by the bronchial artery embolization. Computed tomography of the chest showed a 12-mm nodule in the left main bronchus, atelectasis of the left upper lobe, and the coils along the bronchial arteries (**Fig. 1**). Left bronchial arteriography, performed before the bronchial artery embolization, showed a tumor stain (**Fig. 2**). Based on these findings, a racemose hemangioma of the bronchial artery was ex-

cluded, and this growing tumor was thought to be a bleeding neoplasm. A metastatic survey, including CT of the abdomen, MRI of the head, and bone scan revealed no evidence of metastatic disease.

The patient underwent thoracotomy. A hemorrhagic soft tumor on the left main bronchial wall was detected between the main pulmonary artery and superior pulmonary vein, and the wall of the main bronchus, invaded by the tumor, was fragile and easily torn by pulling of the upper lobe. The nodule bordered the left main pulmonary artery and fatal bleeding was predicted if the tumor invaded the artery. Because these findings strongly indicated that the tumor was malignant, left pneumonectomy with routine mediastinal lymph node dissection was performed. Sleeve resection of the left upper lobe was not appropriate for complete resection because the tumor was located on the bifurcation of the left main bronchus and had also invaded the left lower lobe. The patient recovered well from surgery, and no relapse has been found in the one year since the operation.

Histological examination of the excised tissue revealed a highly-cellular growth of atypical spindle cells with a storiform pattern (**Fig. 3A**). These atypical cells showed a relatively low mitotic activity; MIB-1 index was 10%. There was extensive intra-alveolar hemorrhage. No lymph node metastasis was detected. On immunohistochemical testing using a standard avidin-biotin technique, the tumor cells stained positively for markers including factor



**Fig. 3** Histological examination of the excised tissue revealed a highly cellular growth of atypical spindle cells with storiform pattern. The arrow is pointing the mitosis (A). (Hematoxylin-Eosin,  $\times 400$ ) On immunohistochemical testing using a standard avidin-biotin technique, the tumor cells were stained positively for the markers, including factor VIII-related antigen (B) and CD31 (C).

VIII related antigen (**Fig. 3B**) and CD31 (**Fig. 3C**), and negatively for anti-cytokeratin (AE1/AE3, CAM5.2), carcinoembryonic antigen, epithelial membrane antigen, S-100 protein, smooth muscle actin, desmin, CD68, anaplastic lymphoma kinase-1, CD34, CD99, and human herpes virus 8 (HHV8). The diagnosis of angiosarcoma was made. The tumor was microscopically resected completely, and no adjuvant chemoradiotherapy was given.

## Discussion

An angiosarcoma found in the lung most likely represents metastasis from a primary tumor at other sites including the skin, heart, breast, or liver,<sup>1)</sup> and a primary pulmonary angiosarcoma is extremely rare. We checked case reports of primary pulmonary angiosarcoma and only 14 cases have ever been reported in the English literature (**Table 1**).<sup>2-15)</sup> The mean age of these 15 cases, including our patient, was 55 years (range, 23-79 years), and they included 13 men and 2 women. Hemoptysis was found in 6 cases. In 8 cases, a single or double mass was detected without distant metastasis, and surgical resection

was performed in 6 cases. Generally, the prognosis was poor, but 2 of 6 resected cases, including our patient, were alive for more than 1 year after the surgery. This may indicate that primary angiosarcoma of the lung can be cured by surgical resection if the tumor is localized.

As for the characteristics of this case, the tumor was detected when it was still small and was localized in the bronchial epithelium without distant metastasis. The tumor was observable and followed up for 2 years by bronchoscopy. Bronchial angiography showed a tumor stain, so the tumor was thought to be a type of neoplasm receiving blood flow from the bronchial artery, thus excluding racemose hemangioma, which usually shows enlarged and convoluted vessels and shunts between the bronchial arteries and pulmonary veins.<sup>16)</sup>

Biopsy and immunohistochemistry are required for a confirmed diagnosis.<sup>17)</sup> From the findings of H-E staining, the following differential diagnoses were considered; spindle cell carcinoma, liposarcoma, inflammatory myofibroblastic tumor, and Kaposi's sarcoma. Because D2-40 was positive, Kaposi's sarcoma was also considered as a possible diagnosis, but HHV8 was negative,

**Table 1 Primary pulmonary angiosarcoma: Reported cases in the English literature**

Case No.	Published year	Authors	Age	Sex	Symptoms	Number of Tumors	Treatment	Survival Duration (Months)	Outcome
1	1954	Castleman B	48	M	Hemoptysis	Multiple	NA	1	death
2	1963	Tralka GA	64	M	Chest pain, Shortness of breath, Malaise	Single + Hemothorax	Supportive care	1	death
3	1983	Spragg RG	75	M	Dyspnea, Malaise	Multiple	Steroid	<1	death
4	1987	Ott RA	60	M	Dyspnea, Chest pain, Cough	Single	Surgery	2	death
5	1987	Palvio DH	59	M	Hemoptysis, Chest pain	Single	Surgery	<1	death
6	1988	Segal	72	F	Malaise, Dyspnea	Multiple	Steroid	<1	death
7	1997	Sheppard MN	65	M	Pulmonary hemorrhage	Multiple	Steroid	<1	death
8	2001	Atasoy	50	M	Chest pain, Malaise, Hoarseness	Multiple	Chemotherapy	9	death
9	2003	Kojima	25	M	Chest pain, Dry cough	Single	Radiotherapy and rIL-2	12	alive
10	2005	Pandit SA	79	F	Shortness of breath, Chest pain	Multiple	Supportive care	18	death
11	2006	Ozcelik	62	M	Haemoptysis	Single	Surgery	5	death
12	2009	Kuroda	43	M	Cough	Single	Surgery	15	alive
13	2010	Chen YB	50	M	Haemoptysis	Double	Surgery + Chemotherapy	5	alive
14	2010	Wan Musa	23	M	Chest pain, Left shoulder pain	Single + Bone metastasis	Chemotherapy	4	death
15	2011	Kakegawa S	45	M	Hemoptysis	Single	Surgery	12	alive

NA: not available

and the patient had no history of acquired immune deficiency syndrome (AIDS) or immunological disorders. Therefore, Kaposi's sarcoma was also ruled out. In our patient, the tumor growth was not so fast, and the intra-operative and histopathological findings revealed that the tumor was resected completely, even though the surgery was performed 2 years after the initial presentation. The low MIB-1 index score confirmed a relatively low-grade malignancy.

## Conclusion

A localized primary pulmonary angiosarcoma was completely resected after a 2-year bronchoscopic observation. The tumor stain sign on bronchial angiography may be useful in the differential diagnosis of hemorrhagic bronchial tumors, and the MIB-index score could be used as a prognostic factor of postoperative recurrence.

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