Case Report

Pulmonary artery pseudoaneurysm showing rapid growth in a patient with lung cancer✩

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Abstract

Pulmonary artery pseudoaneurysm is rare and is usually associated with infection. In this report, we describe the case of a patient with pulmonary artery pseudoaneurysm in association with pulmonary squamous cell carcinoma. A 64-year-old man with a previous history of lung cancer showed massive hemoptysis and large consolidation in the right lower lung. Emergency radiologist interpreted this lesion as cancer progression or hematoma. Thus, emergency bronchial and intercostal angiography were performed. However, during admission, the patient presented with another episode of massive hemoptysis. A thoracic radiologist reviewed the previous computed tomography scans and noted the presence of a large hematoma in the right lower lobe of the lung; a pseudoaneurysm was seen within the hematoma arising from the pulmonary artery. On follow up computed tomography, the pseudoaneurysm showed rapid growth. Thus, the patient underwent embolization for the branch of the right lower lobar pulmonary artery using coil and histoacryl. Misdiagnosis of pulmonary artery pseudoaneurysm could be fatal; hence, radiologists should be familiar with the features of pulmonary artery pseudoaneurysm.

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Introduction

Pulmonary artery pseudoaneurysm is a rare and life-threatening condition [1]. The most common cause of pulmonary artery pseudoaneurysm is infection. Historically, the tuberculosis-related pulmonary artery pseudoaneurysm, called Rasmussen’s aneurysm, is a well-known cause for hemoptysis in tuberculosis [2]. Pulmonary artery pseudoaneurysm can be associated with pulmonary hypertension, vasculitis, or primary or metastatic lung cancer [1]. Here, we report the case of a pulmonary artery pseudoaneurysm that demonstrated rapid growth in a patient with primary lung cancer.
A 64-year-old man was admitted to our hospital with massive hemoptysis (300 mL). His breathing was hoarse on auscultation. He revealed a relevant history of squamous cell carcinoma of the right lower lobe of the lung. A chest radiograph showed a newly appeared large consolidation in the right lower lung zone (Fig. 1A). Further, a chest computed tomography (CT) scan showed a large soft tissue density lesion at the previous cancer site (Figs. 1B and C). A radiologist on night duty interpreted this lesion as cancer progression or hematoma. For the treatment of hemoptysis, emergency bronchial and intercostal angiography were performed, which revealed abnormal staining in the right lower lung zone. Thus, the patient underwent arterial embolization with polyvinyl alcohol particles. Upon admission, the patient’s symptoms gradually improved. On the sixth day of hospitalization, the patient underwent radiation therapy for the lung cancer. On the 12th day of hospitalization, the patient presented with another episode of massive hemoptysis (300 mL). A thoracic radiologist reviewed the previous CT scans. The CT scan obtained in the emergency room showed a large hematoma in the right lower lobe of the lung and a contrast media filling sac, measuring approximately 1.5 cm at the center of the hematoma. Thus, we presumed that the pseudoaneurysm arose from the pulmonary artery (Fig. 2A). Further, the CT scan for radiation therapy obtained on the 6th day of hospitalization showed an increase in the size of the pseudoaneurysm to 2.5 cm (Fig. 2B). Hence, additional interventional angiography was performed, which revealed an aneurysmal sac measuring approximately 6.5 cm × 3.7 cm, from the branch of the right lower lobar artery (Fig. 2C). Embolization was achieved using 3 tungsten coils, 4 mm in diameter and 10 mm long, and a
Fig. 2 – Chest computed tomography (CT) scans in a 64-year-old man with pulmonary artery pseudoaneurysm. (A) A 1.5 cm contrast media filling sac (arrow) seen in the right lower lobe, probably arising from the right lower lobar pulmonary artery. (B) Chest CT scan obtained on the sixth day of hospitalization for the planning of the radiation therapy shows interval increase in the pseudoaneurysm. Note the aneurysmal neck (arrows) arising from the right lower lobar pulmonary artery. (C) Conventional angiography with selection of the right lower lobar pulmonary artery demonstrates a lobulated pseudoaneurysm arising from the right lower lobar artery. CT, computed tomography.

Discussion

Pulmonary artery pseudoaneurysm is the focal dilation of a segment of the pulmonary artery. Unlike true aneurysm, pseudoaneurysm involves only the external layers of the arterial wall [3]. Because of relatively low resistance of the surrounding tissue, a pseudoaneurysm is more likely to rupture than a true aneurysm [4]. The reported mortality rate associated with the rupturing of a pulmonary artery pseudoaneurysm is as high as 50%; death is owing to aspiration and asphyxia after intrapulmonary hemorrhage [1,4].

Pulmonary artery pseudoaneurysm is rare, and its incidence ranges from 5% to 11% among patients who have undergone embolization because of hemoptysis. Infection (75%), idiopathic factors (29%), and trauma (17%) are the common causes for pulmonary artery pseudoaneurysm [1]. Occurrence of a pseudoaneurysm with a tumor is rare; however, it has been reported to develop with right ventricular myxoma, metastatic sarcoma, and hemangiopericytoma [5–7]. To the best of our knowledge, there are only a few reports of its association with primary lung cancer [1,8–11]. In these reports, the major pathological type of primary lung cancer involved in pulmonary artery pseudoaneurysm was
Interventional angiography is the treatment of choice for pulmonary artery pseudoaneurysm [2,8]. Embolization of the aneurysm’s feeding vessel, direct coil embolization, or endovascular stents, are the reported effective occlusion modalities. Our patient underwent glue and direct coil embolization.

In our patient, pulmonary artery pseudoaneurysm was misdiagnosed. The follow-up CT scan and conventional angiography showed that the pulmonary artery pseudoaneurysm demonstrated rapid growth, and this could be a sign of impending rupture.

**Conclusion**

In this paper, we reported a case of pulmonary artery pseudoaneurysm developed in a patient with a 10-month history of pulmonary squamous cell carcinoma. In patients with lung cancer, hemoptysis is a common symptom. However, the cause of hemoptysis may vary, and a misdiagnosis of pulmonary artery pseudoaneurysm can be fatal. Thus, radiologists should be familiar with the features of a pulmonary artery pseudoaneurysm.

**Patient Consent**

Written informed consent was not necessary because no patient data has been included in the manuscript.

**References**

[1] Chen Y, Gilman MD, Humphrey KL, Salazar GM, Sharma A, Munirpann A, et al. Pulmonary artery pseudoaneurysms: clinical features and CT findings. Am J Roentgenol 2017;208(1):84–91. doi:10.2214/AJR.16.16312.

[2] Barter T, Irwin RS, Nash G. Aneurysms of the pulmonary arteries. Chest 1988;94(5):1065–75.

[3] Guillaume B, Vendrell A, Stefanovic X, Thony F, Ferretti GR. Acquired pulmonary artery pseudoaneurysms: a pictorial review. Br J Radiol 2017;90(1073):20160783. doi:10.1259/bjr.20160783.

[4] Shuaib W, Tiwana MH, Vijayasarathi A, Sadiq MF, Anderson S, Amin N, et al. Imaging of vascular pseudoaneurysms in the thorax and abdomen. Clin Imaging 2015;39(3):352–62. doi:10.1016/j.clinimag.2015.01.013.

[5] Dong A, Lu J, Zuo C. Multiple peripheral pulmonary artery aneurysms in association with a right atrial myxoma. Circulation 2016;133(4):444–62. doi:10.1161/CIRCULATIONAHA.115.019729.

[6] Agarwal PP, Dennie CJ, Matzinger FR, Peterson RA, Seely JM. Pulmonary artery pseudoaneurysm secondary to metastatic angiosarcoma. Thorax 2006;61(4):366.

[7] Nakamura Y, Nishiya Y, Kawada M, Ishikawa T, Kaseno K, Fujimura M, et al. Primary hemangiopericytoma of the heart associated with pseudoaneurysm of the pulmonary artery—a case report. Angiology 1987;38(10):788–92.
[8] Zhang J, Jiang S. Massive haemoptysis from a central pulmonary arterial pseudoaneurysm secondary to advanced lung cancer: successful treatment by Guglielmi detachable coil embolization. Clin Respir J 2017;11(2):258–62. doi: 10.1111/crj.12333.

[9] Camargo Jde J, Camargo SM, Machuca TN, Bello RM. Large pulmonary artery pseudoaneurysm due to lung carcinoma: pulmonary artery pseudoaneurysm. J Thorac Imaging 2010;25(1):W4–5. doi:10.1097/RTI.0b013e3181981b40.

[10] Akpinar E, Turkbey B, Canyigit M, Peynircioğlu B, Hazirolan T, Pamuk AG, et al. Bleeding pulmonary artery pseudoaneurysm secondary to squamous cell lung cancer: computed tomography findings and endovascular management. Acta Radiol 2006;47(9):944–946.

[11] Gomez-Jorge J, Mitchell SE. Embolization of a pulmonary artery pseudoaneurysm due to squamous cell carcinoma of the lung. J Vasc Interv Radiol 1999;10(8):1127–30.