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Coil Embolization of Rasmussen Aneurysm Diagnosed by Helical CT: A Case Report[1]

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We report a case of Rasmussen aneurysm diagnosed by helical CT that well shows vascular imaging. Coil embolization of Rasmussen aneurysm stopped the bleeding successfully.

Index words : Computed tomography,helical
Aneurysm, pulmonary

Rasmussen aneurysm is a pseudoaneurysm of a pulmonary artery caused by erosion into the artery by an adjacent tuberculous cavity (1, 2).

Pseudoaneurysm were present in 4% of autopsies of patients who died of chronic cavitary tuberculosis (3). A conventional contrast enhanced CT may suggests pseudoaneurysm that shows enhancing mass with an adjacent vessel (4, 5). Helical CT can show vascular imaging more than conventional contrast enhanced CT. Therefore, we report a case of coil embolization of Rasmussen aneurysm detected by helical CT.

Case report

A 42-year-old man was admitted to the respiratory internal medicine department due to massive hemoptysis(about 300 ml/day). He had a past history of medication for pulmonary tuberculosis three times during the last 10 years. A chest X-ray film showed longstanding destructive lung changes with thin wall cavities in the both lungs. Bronchoscopic finding revealed active bleeding in the left lower lobe bronchus. Emergent left bronchial arteriogram using 5 F Cobra 2 catheter(Cook, Bloomington, U.S.A.) showed hypervascularity, enlargement and tortuosity of bronchial artery (Fig. 1A). Transcatheter embolization of this vessel was performed with use of 500 - 710 micron polyvinyl alcohol particle(Contour, Boston Scientific, Minnesota, U.S.A.) and gelfoam after microcatheter (Cook, Bloomington, U.S.A.) insertion through Cobra catheter. Postembolization images demonstrated occlusion of distal branches of left bronchial artery (Fig. 1B). After one week, massive hemoptysis recurred. Repeated bronchial angiogram showed complete obstruction of left bronchial artery and no collateral vessels including internal mammary artery, subclavian artery, intercostal artery. We didn't perform embolization due to non-visualization of hypervascular vessels. Fortunately patient stopped the bleeding spontaneously. Chest X-ray film showed a large thin wall cavity in the left lower lobe (Fig. 1C). But, after 20 days on admission, recurrent massive hemoptysis occurred. We noticed that large thin wall cavity in left lower lobe changed into cavity with meniscus sign (Fig. 1D). On suspicion of possibility of Rasmussen aneurysum, we performed helical CT scan. Helical dynamic CT scan(8-mm collimation with a pitch 1 and 15 seconds delay from the start of contrast media injection to scanning) showed highly enhancing round nodule (Fig. 1E) on arterial phase(3 cc/s IV, 15 seconds delay) and isodense nodule (Fig. 1F) on delay phase(220s delay)

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in left lower lobe, indicating Rasmussen aneurysm. Pulmonary angiogram using 5 F pigtail catheter (Cook, Bloomington, U.S.A.) showed 1cm sized pseudoaneurysm of anterior basal segment of pulmonary artery in the left lower lobe (Fig. 1G). The segmental artery was embolized with 0.038-inch, three 3 cm×1 mm coils and three 2 cm×2 mm coils (Hilal microcoil, Cook, Bloomington, U.S.A.) by deploying coil proximal and distal to pseudoaneurysm (Fig. 1H) using microcatheter through Cobra 2 catheter. After embolization, pulmonary infarction occurred in left lower lobe with symptom of dyspnea. After antituberculous medication for 2 months, chest X-ray film showed thin wall cavity in the left lower lobe without size change (Fig. 1I). The disappearance of air-meniscus sign in the cavity suggested disappearance of hematoma and pseduoaneurysm.

Discussion

The presenting symptom of pulmonary artery pseudoaneuryms is usually massive hemoptysis that cause the death of patients (1). The most common cause

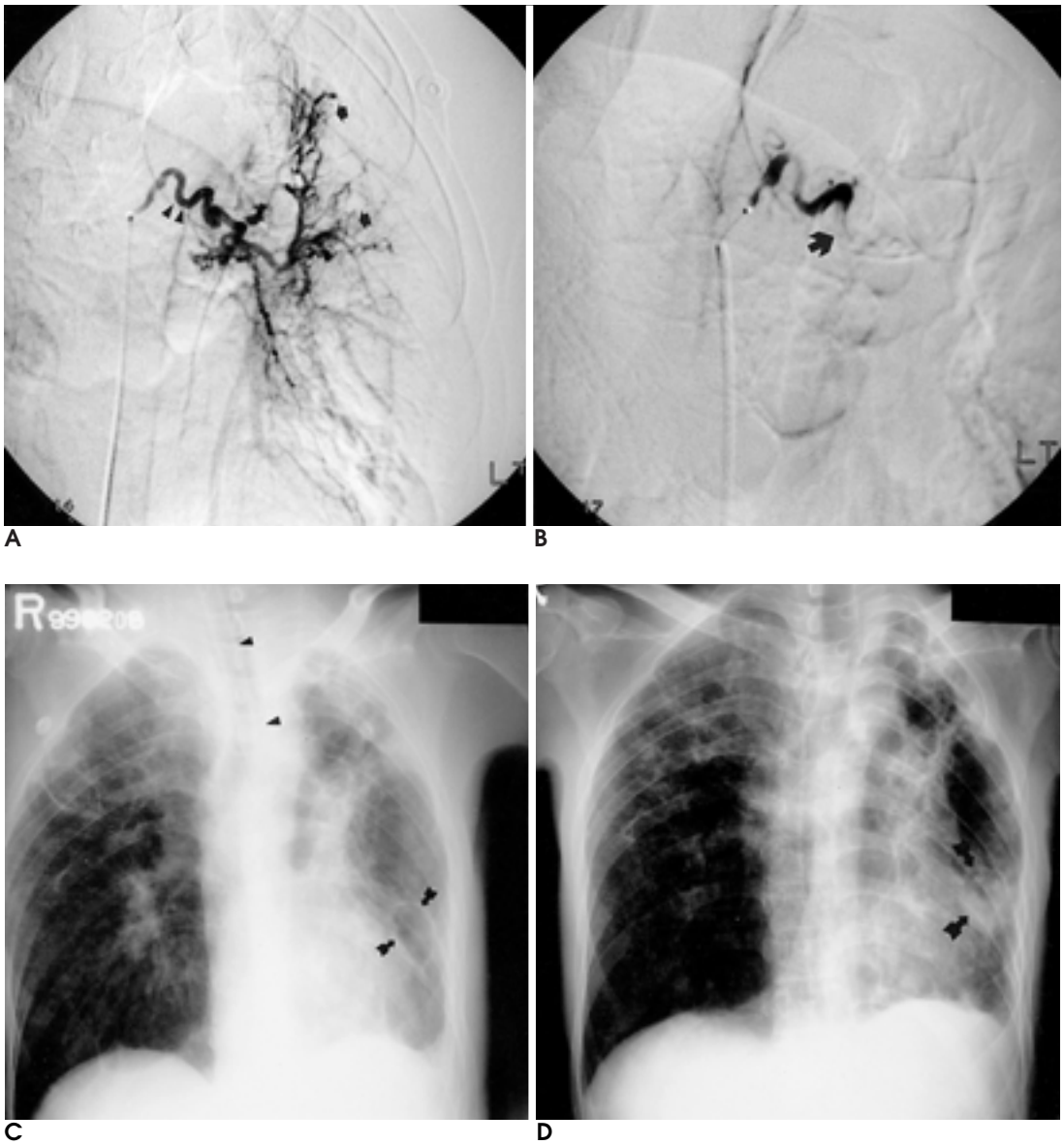
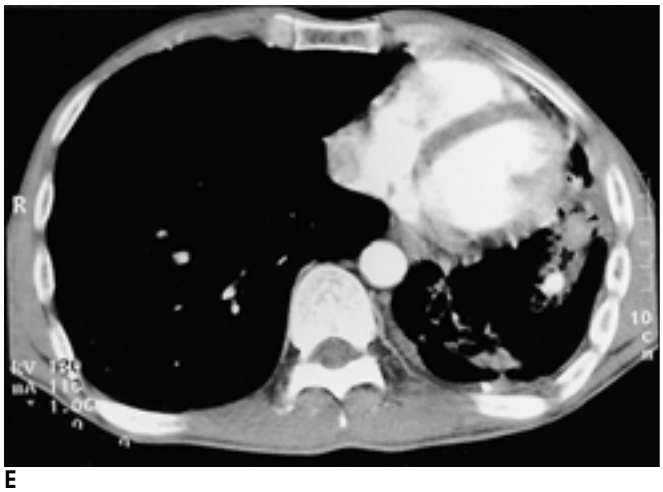


Fig. 1. A. Left bronchial angiogram shows hypervascularity(arrows), enlargement and tortuosity(arrowheads) of bronchial artery.
B. Postembolization image of left bronchial artery demonstrates complete occlusion of bronchial artery.
C. Chest radiograph shows destructive changes in the both upper lobes and thin wall cavity (arrows) in the left lower lobe. Double lumen intubation set in the trachea (arrowheads).
D. Chest radiograph shows air meniscus sign in the thin wall cavity in the left lower lobe.



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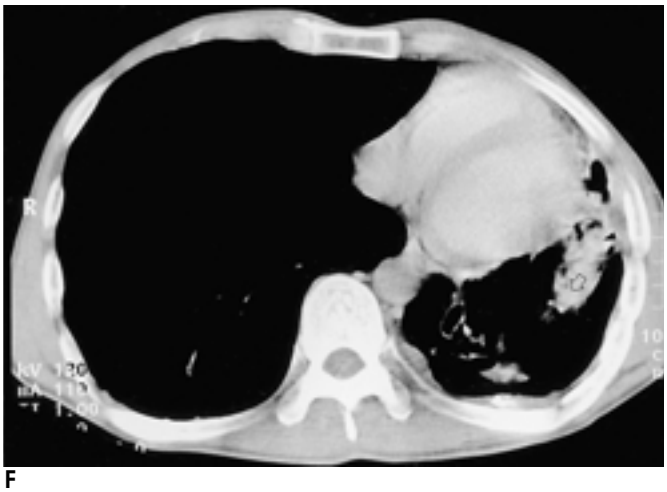

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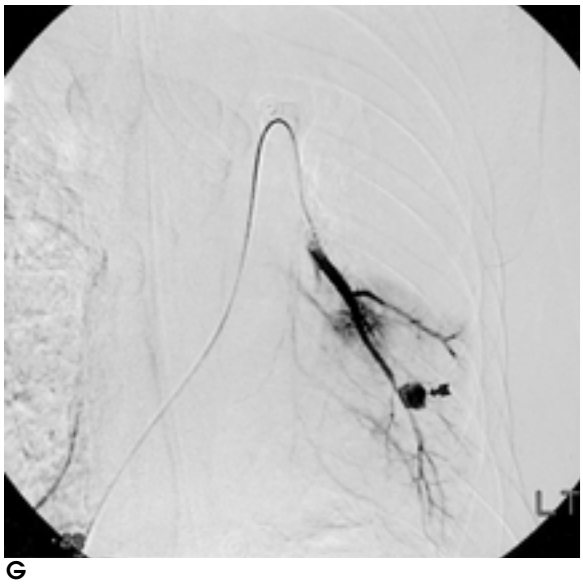

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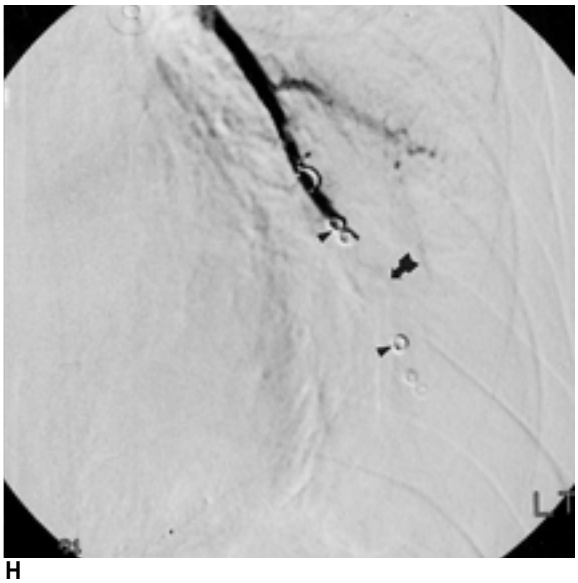

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E. Helical CT shows highly enhancing nodule (arrow) and hematoma (arrowhead) in the left lower lobe cavity on arterial phase.

F. Helical CT shows isodense nodule (arrow) and hematoma (arrowhead) in the left lower lobe cavity on delay phase.

G. Left pulmonary angiogram shows 1cm sized pseudoaneurysm of anterior basal segment of pulmonary artery in the left lower lobe (arrow).

H. After coil embolization (arrowheads), pulmonary angiogram shows disapperance of pseudoaneurysm (arrow).

I. Chest radiograph shows only thin wall cavity without air meniscus sign and coils abutting medio-inferior wall of cavity, suggesting relationship of aneurysm and cavity.

of pulmonary artery pseudoaneurysm is tuberculosis(1 - 3). Pulmonary artery pseudoaneurysms can also be caused by syphilis, thoracic trauma, Swan-Ganz catheter and septic emboli (5). Rasmussen aneurysms occur exclusively in chronic fibrocaseous tuberculosis and can develop despite of adequate antituberculous treatment (3). They are most often single and are usually located in upper lobe (1). The pathogenesis involves progressive arterial weakening as granulation tissue replaces both the adventitia and media. The granulation tissue in the vessel wall is later gradually replaced by fibrin, producing thinning of the arterial wall and pseudoaneurysm formation and rupture (3). A necrotic cavity spreads directly into surrounding lung, destroying all tissue. Erosion into the artery by an adjacent tuberculous cavity causes a Rasmussen aneurysm (4 - 6). The relationship between massive hemoptysis and a cavity is well known (1 - 3).

The majority of patients with hemoptysis and active tuberculosis bleed from the bronchial arteries. If the bronchial arteries and other systemic arteries(intercostal, subclavian, internal mammary arteries) are normal or if embolization does not stop the hemorrage, pulmonary arteries should be studied (1). But, we didn't perform pulmonary angiography because we should puncture femoral vein invasively and monitor pulmonary wedge pressure and check the amount of contrast media using for bronchial angiography and other systemic collateral vessels angiography before pulmonary angiography. That was our mistake. We thought that the delay of pulmonary angiography caused recurrent bleedings in this patient.

Transcatheter embolization of a pulmonary artery pseudoaneurysm secondary to cavitary tuberculosis has been shown to be both safe and effective (1, 7). Detachable balloons and steel coils are most commonly used for embolization, because they are permanent large vessel occlusive devices. We occluded psedoaneurym by deploying coil proximal and distal to aneurysm because of the report that direct coiling of aneurysm sac may cause rupture (7).

Helical CT has already been proven efficacious for vascular and airway imaging as for well as identifying and characterizing pulmonary nodules in the thorax (8). Vascular imaging of pulmonary arteriovenous malformations and pulmonary embolism by helical CT can replace pulmonary angiography. Helical CT seems to be the most appropriate technique because it is noninvasive and provides excellent vascular images of pulmonary aneurysms (9).

Seo (4)et al. and Remy (5) et al. reported that conventional contrast enhanced CT scan showed a Rasmussen aneurysm within a cavity. But helical CT may be helpful of showing aneurysm of pulmonary artery more than conventional contrast enhanced CT due to scanning of arterial phase of pulmonary artery. CT scanning protocol of this case to detect a Rasmussen aneurysm was 8-mm collimation with pitch 1 and 5-mm interval reconstruction. But, because of possibility of missing a small size aneurysm and to gain good quality of images, we recommend 5-mm collimation with pitch 2 in patients who are unable to hold their breath for more than 10 seconds or 3-mm collimation with pitch 2 during quiet respiration.

High resolution CT(HRCT) is superior to chest radiography in assessing the disease activity and is helpful in judging the activity of tuberculosis when findings of bacteriologic studies are negative and the activity cannot be determined by chest radiography alone (10). Therefore, if helical CT vascular imaging is obtained with HRCT as a noncontrast image, we may evaluate disease activity of tuberculosis, and detect pulmonary pseudoaneurysm noninvasively.

In conclusion, if patient with cavitary tuberculosis, in spite of bronchial artery embolization, complains of recurrent hemoptysis, helical CT may be helpful in detecting Rasmussen aneurysm and planning the treatment. Also, transcatheter embolization of a pulmonary artery pseudoaneurysm secondary to cavitary tuberculosis using coil may be safe and effective

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혈관 영상을 잘 볼 수 있는 나선식 전산화 단층촬영술로 진단된 라스뮤센 동맥류을 코일을 이용하여 성공적으로 객혈을 치료한 1예를 보고하고자 한다.