

## Aneurysm of a systemic artery supplying the normal basal segments of the left lower lobe

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**Abstract** The case of an aneurysm of a systemic artery supplying otherwise normal basal segments of the left lower lobe is presented. The diagnosis was correctly made postprocessed with three-dimensional reformatting using a multidetector row CT (MDCT) scanner. Conventional angiography was obviated.

**Key words** Aneurysm · Aberrant systemic artery to the lung

### Introduction

The basal segments of the lower lobe that have normal bronchial trees may be supplied by an anomalous artery arising from the descending aorta instead of pulmonary arteries.<sup>1</sup> Radiographic and computed tomography (CT) findings of this rare condition have been described.<sup>1–3</sup> The patient had an aneurysm of an anomalous artery branching from the descending aorta, which supplied otherwise normal basal segments of the left lower lobe. The diagnosis was accurately made with a 16-detector row CT scanner. To our knowledge, only three cases in this condition were previously reported in the literature.<sup>4–6</sup>

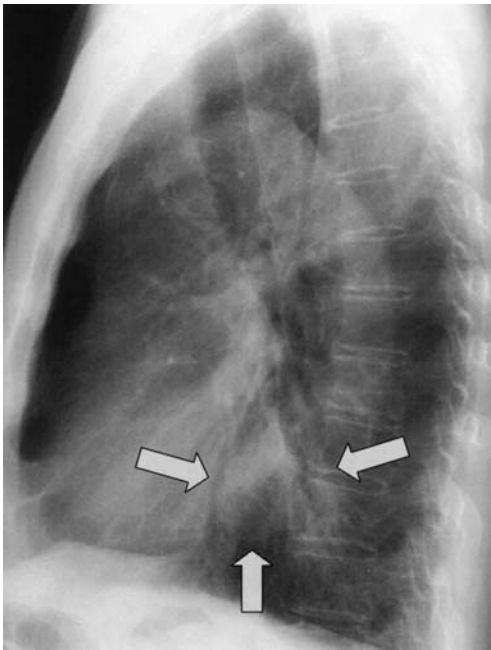
### Case report

A 78-year-old man was referred to our institution because of a mass at the left lower lobe, which was discovered on his annual checkup chest radiograph. He had no history of previous cardiopulmonary disease. Physical examination was unremarkable. Laboratory tests were within the normal range.

A posteroanterior chest radiograph showed no abnormality. A round well-circumscribed mass measuring 4 cm in diameter was identified behind the heart on the lateral radiograph (Fig. 1).

Contrast-enhanced CT was performed on a 16-detector row CT scanner (Toshiba, Tokyo, Japan) with 150 mA, collimator width of 1 mm, slice thickness of 1 mm, and a table speed of 15 mm per rotation. Scan was initiated 25 s after the start of intravenous injection of nonionic contrast material (Iopamiron370; Nihon Schering, Osaka, Japan) at a dose of 2 ml/kg body weight with an injection rate of 3 ml/s. Contrast-enhanced CT (Fig. 2) showed a 4-cm aneurysm originating from an anomalous artery that was arising from the distal descending aorta. The artery distal to the aneurysm gave off branches to the basal segments of the left lower lobe. On coronal MPR CT image, venous return of the involved basal segments was via the pulmonary vein into the left atrium. Three-dimensional (3D) CT angiography (Fig. 3) showed an anomalous systemic artery with an aneurysm and venous drainage simultaneously. The need for conventional angiography was obviated. Transverse CT scans with a lung window setting (Fig. 4) showed normal bronchial branching of the left lower lobe; the pulmonary artery to the superior segment was normal, but those to the basal segments were absent (Fig. 4). Because

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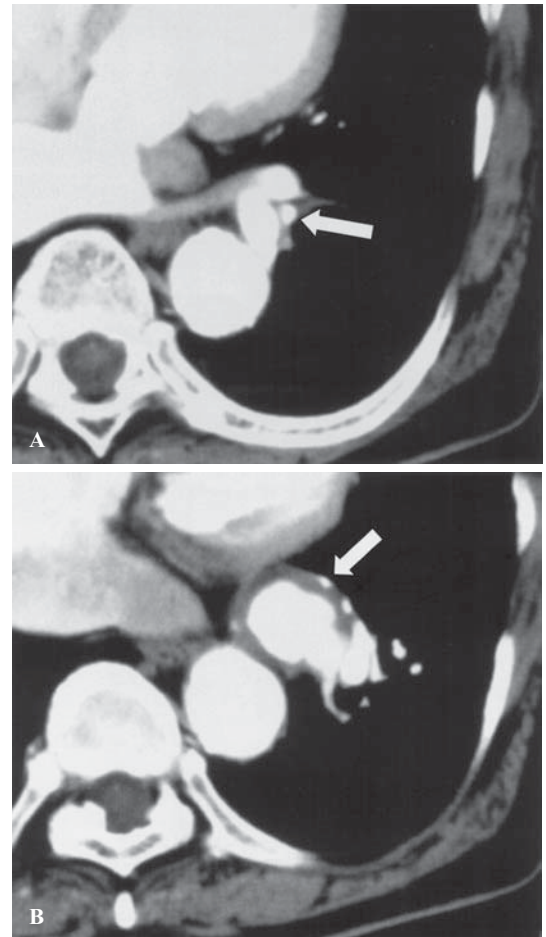
**Fig. 1.** There is a 4-cm round well-circumscribed mass (*arrows*) behind the heart on the lateral chest radiograph

of a lack of symptoms, the patient declined surgical intervention.

### Discussion

The systemic arterial supply to the normal basal segments of the lower lobe differs from the intralobar type of pulmonary sequestration in that the involved lung retains a normal connection to the bronchial tree. The left lower lobe is more frequently involved than the right lower lobe. A systemic artery originates from the descending thoracic aorta on the left, whereas it usually arises from the abdominal aorta or the celiac artery on the right.<sup>2</sup> In three reported cases of an aneurysm of an anomalous systemic artery in this congenital lesion, lower lobectomy was carried out with resection of the aneurysm.<sup>4–6</sup> The resected aneurysms were atherosclerotic in all cases. Intimal calcification was prominent at the thoracic aorta in our case. It is presumed that the aneurysm was also arteriosclerotic.

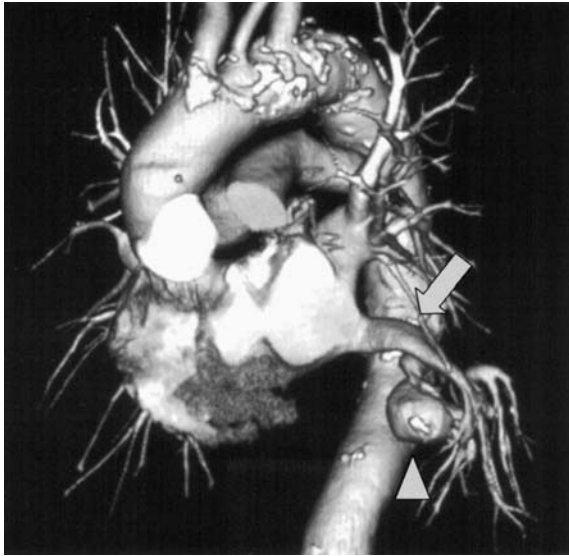
Systemic arterial supply to the normal basal segments may produce a continuous murmur in pediatric age groups. Adult patients are usually asymptomatic or have episodes of hemoptysis. Two reported cases with an aberrant systemic artery had hemoptysis and fever, respectively,<sup>4,6</sup> and the other was asymptomatic.<sup>5</sup> An aneurysm of a systemic artery may undergo rupture, but such a complication has not previously been reported.



**Fig. 2.** Contrast-enhanced computed tomography (CT) scans demonstrate an anomalous artery (*arrow*) arising from the descending aorta on a more cephalad scan (A) and an aneurysm (*arrow*) on a more caudad scan (B)

Although the etiology of an aberrant systemic arterial supply to the normal lung is unknown, the persistence of an embryonic connection between the aorta and the pulmonary parenchyma could be responsible for this anomaly. The vascular plexus of the primary lung buds originates from the segmental arteries that arise from the dorsal aorta. These aortic connections normally disappear as the vascular plexus from the ventral aorta differentiates into a channel, which finally becomes the main pulmonary artery.<sup>7</sup> Failure of this transition from the systemic to the pulmonary artery circulation may lead to persistent systemic arterial supply to an otherwise normal lung.

Chest radiography is normal or shows a retrocardiac nodular opacity obliterating a portion of the descending aorta in patients with systemic arterial supply to the normal basal segments of the left lower lobe. The opacity is much larger in patients with an aneurysm of a systemic artery. The diagnosis is made with contrast material-



**Fig. 3.** Three-dimensional CT angiography postprocessed with volume rendering demonstrates an aneurysm (*arrowhead*) of an aberrant systemic artery and the left inferior pulmonary vein (*arrow*) draining the left basal segments



**Fig. 4.** Transverse CT scan with lung window setting shows normal bronchial branching of the left lower lobe. B<sup>8</sup> (*arrow*) and B<sup>9+10</sup> (*arrowhead*) are not accompanied by corresponding pulmonary arteries

enhanced CT by depicting a normal bronchial connection, the absence of an accompanying pulmonary artery at the basal segments, and an anomalous artery originating from the descending aorta and supplying the basal

segments.<sup>2,3</sup> An associated aneurysm of the systemic artery is also depicted with contrast-enhanced CT.<sup>4,6</sup> CT angiography of the aorta using an MDCT scanner is particularly of value for visualizing arteries and veins in the involved area.<sup>5</sup>

The differential diagnosis includes vascular pulmonary masses, a false or true aneurysm of the pulmonary artery, and a pulmonary arteriovenous malformation. These conditions can be differentiated from the systemic arterial supply to otherwise normal basal segments of the lower lobe with the aid of multiplanar reformations and 3D reconstruction provided by MDCT.

Options for treatment in symptomatic patients include resection of the basal segments of the lower lobe after ligation of the anomalous artery<sup>4,6</sup> and resection of the aneurysm followed by anastomosis of the anomalous artery with the left distal pulmonary artery. Because the number of reported cases associated with the aneurysm is small, it is uncertain whether asymptomatic patients require surgical treatment.

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