Case Report

Pulmonary arteriovenous malformations diagnosed through hemoptysis: A case report

Risako Minamikawa, M.D. a,*, Yasuji Ryu, M.D. a, Junichiro Sanada, M.D. b, Harumi Takata, M.D. a, Toshiya Okumura, M.D. c

a Department of Radiology, Tonami General Hospital, 1-61 Shintomicho, Tonami City, Toyama Prefecture 939-1395, Japan
b Department of Radiology, Ageo Central General Hospital, Ageo City, Saitama Prefecture, Japan
c Department of Internal Medicine, Tonami General Hospital, Tonami City, Toyama Prefecture, Japan

Abstract

There have been few reports of pulmonary arteriovenous malformations complicated by hemoptysis. Herein, we present our experience and provided a review of the literature. A man in his 80s came to our hospital with a chief complaint of hemoptysis, and a simple computed tomography showed a consolidation in the right lower lobe of the lung. He was treated for bacterial pneumonia, and his symptoms and a consolidation resolved, but similar episodes continued afterwards. About 18 months after the initial disease onset, the patient had hemoptysis and came to our hospital again. He was diagnosed with pulmonary arteriovenous malformation due to the presence of a lumpy, mass-like dilatation in the peripheral arteries. With the suspicion that the hemoptysis was caused by pulmonary arteriovenous malformations, the patient underwent coil embolization, and his symptoms gradually resolved. Computed tomography also showed improvement in shadowing. The hidden arteriovenous malformation was buried by a dense pulmonary field shadow; thus, it was diagnosed after a long time. This case highlights that pulmonary arteriovenous malformations should be considered in differentiating cases presenting with hemoptysis.

Keywords:
Pulmonary arteriovenous malformations
Hemoptysis
Imaging findings
Computed tomography (CT)
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Case report

A man in his 80s was attending our hospital for diabetes, hypertension and dyslipidemia. He came to our hospital with the chief complaint of hemoptysis and was treated with antimicrobial agents for pneumonia due to a consolidation on simple computed tomography (CT). The symptoms of hemoptysis gradually disappeared, along with the consolidation on the lung field. However, similar episodes have occurred since then. Symptoms of hemoptysis varied from blood in the sputum to almost bloody, and were not enough to cause significant...
effects on vital signs. About 18 months after the initial visit for hemoptysis, the sixth episode occurred, and the patient was seen again and complained of severe hemoptysis symptoms, so he was evaluated with contrast-enhanced CT at this time.

On physical examination, there were no specific findings except for wet rales on the back. Laboratory findings showed a negative inflammatory response (white cell count $6.2 \times 10^9$ /L, C reactive protein 0.8 mg/L, procalcitonin 0.06 μg/L), and his hemoglobin, which had originally been approximately 120 g/L had dropped to 90. The chest radiograph showed infiltrative shadow in the right middle and lower lung field (Fig. 1). Contrast-enhanced CT showed 2 aneurysmal structures within a consolidation, contiguous to the pulmonary artery. Outflow into the pulmonary vein can also be identified (Fig. 2). Thus, we suspected a pulmonary arteriovenous malformation, and hemoptysis was caused by the ruptured arteriovenous malformation.

The patient underwent a standby coil embolization for a pulmonary arteriovenous malformation. Pre-embolization CT showed what appeared to be a single inflow artery; as a result, we performed a dense embolization within the aneurysm and into the inflow artery. Postembolization digital subtraction angiography showed a new inflowing artery, so coiling was performed here as well (Fig. 3).

The symptoms of hemoptysis gradually disappeared after coil embolization, and the consolidation seen around the arteriovenous malformation on CT scan gradually disappeared. After 4 months, complete disappearance was observed (Fig. 4). In this case, pulmonary arteriovenous malformations were discovered by the presence of hemoptysis.

Discussion

A review of pulmonary arteriovenous malformations was published in 1998, and dyspnea was considered a frequent symptom [1]. Hemoptysis related to pulmonary arteriovenous malformations was found in 5%-13% between 1952 and 1992 [1–3]. On the contrary, Shovlin reported that bleeding pulmonary arteriovenous malformations leading to hemoptysis or hemotherax can be fatal, but it is a relatively rare feature of pulmonary arteriovenous malformations, with the 2 main exceptions, that is, the patient is pregnant and pulmonary arteriovenous malformations are perfused at systemic pressure [4]. From these results, the present incidence of hemoptysis is presumed lower than that in 1998 due to an increase in the number of cases and detection sensitivity caused by the widespread knowledge of pulmonary arteriovenous malformations.

Although some textbooks state that pulmonary arteriovenous malformations can cause hemoptysis, we could not diagnose it correctly for quite some time. It would have been difficult to diagnose on a noncontrast study. In addition,
Coil embolization was performed on the arteriovenous malformation. The coils were densely filled within the aneurysm and in the 2 incoming arteries.

Hemoptysis can be nonspecific and thus it may be difficult to diagnose a pulmonary arteriovenous malformation based on a symptom alone. When the patient presented with hemoptysis, a consolidation was seen on CT (Fig. 5). However, CT taken when he was asymptomatic showed 2 nodules in the same area, which were considered pulmonary arteriovenous malformations confirmed by contrast-enhanced CT (Fig. 6).

The consolidation around the pulmonary arteriovenous malformation measured 42-51 H.U. Considering the symptoms, we believe that the consolidation is consistent with blood. Therefore, it is likely that the blood from the pulmonary arteriovenous malformation was misidentified as a consolidation caused by pneumonia.

Since no clinical findings suggested infection when the patient presented with hemoptysis, it might have been a good idea to differentiate it from conditions other than pneumonia.

The consolidation of the lower lobe of the right lung seen around the arteriovenous malformation gradually disappeared. The symptoms of hemoptysis also disappeared accordingly. (A) 11 days after the coil embolization, and (B) 4 months later.
Fewer cases of pulmonary arteriovenous malformations with hemoptysis have been reported in recent years. In the presented case, reaching a definitive diagnosis was delayed because of the consolidation that buried the arteriovenous malformation and the failure to recognize the nodule as a vascular lesion. Pulmonary arteriovenous malformations should be considered in the differential diagnosis of cases presenting with hemoptysis.

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