CASE REPORT

Aspergilloma and massive haemoptysis

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SUMMARY

A 40-year-old homeless woman who was a known intravenous drug user and heroin smoker, presented with massive haemoptysis. Initial CT-pulmonary angiogram (CT-PA) did not show active haemorrhage but found an opacity in a right upper lobe cavity likely to represent a mycetoma. She was started on antifungal therapy but haemoptysis persisted and bronchial angiography was performed. Again no active haemorrhage was identified but abnormal vasculature was seen supplying the right upper lobe. This was empirically embolised with particles which did not improve her symptoms. A subsequent CT-PA identified a pulmonary artery pseudoaneurysm in the cavity wall which was successfully embolised. There was no further haemoptysis and a repeat CT-PA 3 weeks later showed continuing occlusion of the pulmonary artery aneurysm. Investigations for tuberculosis were negative and she was discharged clinically well and on long-term antifungal therapy.

BACKGROUND

Aspergilloma is a fungus ball (mycetoma) that develops in a lung cavity most commonly due to tuberculosis (TB), bronchiectasis, pulmonary neoplasm or sarcoidosis.¹ Affected patients are usually asymptomatic² but may occasionally present with haemoptysis, originating from the bronchial arteries. Haemoptysis may also be due to pulmonary artery pseudoaneurysms which are rarely associated with aspergilloma.

CASE PRESENTATION

A 40-year-old homeless woman who was a known intravenous drug user and heroin smoker, presented to our accident and emergency department following an episode of haemoptysis of about 500 mL of fresh blood. She had a further 200 mL of haemoptysis in the resuscitation department. A right upper lobe cavity was noted on multiple chest X-rays, up to 18 months prior to the admission. She reported ongoing symptoms of cough productive of green sputum, night sweats and weight loss of about 6 kg over the preceding 3 weeks. Her medical history included previous hospital admissions with lobar pneumonia, three previous left pneumothoraces, a single left kidney and chronic obstructive pulmonary disease. HIV and hepatitis status were negative. She was a current tobacco smoker with a 25-pack-year history and denied drug usage or overseas travel in the preceding year. On examination, she was non-feverish but hypoxic. She had generalised inspiratory wheeze, and crepitations in the right mid-zones and upper-zones of her lung.

INVESTIGATIONS

Haemoglobin 8.8 g/dL, platelets $411 \times 10^9/L$, white cell count $11.5 \times 10^9/L$, coagulation profile was normal.

Arterial blood gas on room air showed hypoxia with compensated type 2 respiratory failure—pH 7.37, pCO₂ 7.47 kPa, pO₂ 4.55 kPa, HCO₃⁻ 28.9 mEq/L.

Five sputum smear and cultures were negative for TB and initial TB-interferon γ release assay (TB-IGRA) result was equivocal. Repeat TB-IGRA was found to be negative. Antineutrophil cytoplasmic antibody screen was negative.

TREATMENT

The patient was initiated on intravenous antibiotics (piperacillin/tazobactam) and kept nil by mouth. A decision to transfuse two units of red blood cells was made on the basis of her persistent haemoptysis and clinical deterioration.

A CT-pulmonary angiogram (CT-PA) was performed but did not identify any active haemorrhage. However, the radiologist noted a 24 mm $\times$ 37 mm new opacity in the existing right upper lobe lung cavity compared to her chest CT 5 weeks previously (figure 1) and suggested that it was likely to represent a mycetoma (figures 2 and 3). She subsequently underwent a bronchial angiogram, which did not reveal any active haemorrhage. However, there was abnormal vasculature seen supplying the region corresponding to the suspected mycetoma on CT-PA.

Figure 1 CT-pulmonary angiogram showing the mycetoma in the right upper lobe cavity.

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Figure 2 CT-pulmonary angiogram 5 weeks later in the coronal plane demonstrating the mycetoma in the right upper lobe which had evolved, with pleural thickening seen adjacent to the mycetoma and surrounding consolidation which may be attributable to pulmonary haemorrhage.

Empirical embolisation of her right bronchial arterial trunk and two intercostal arteries was performed because of the history of recent massive haemoptysis. Following discussion with a consultant microbiologist, she was also started on antifungal therapy (intravenous voriconazole) for aspergilloma, which was later confirmed to be caused by *Aspergillus fumigatus* on three separate sputum cultures and a raised IgG anti-*Aspergillus* of 143 mg/L (reference range of <40 mg/L). Despite the bronchial artery embolisation, she continued to have further small episodes of haemoptysis. At this point, her previous CT-PA and angiogram images were reviewed with another consultant radiologist, who did not identify any other bleeding source. As her haemoptysis persisted on day 17, a repeat CT-PA was performed, which revealed a pseudoaneurysm arising from a right upper lobe segmental pulmonary artery. To make matters more complicated, she had very poor venous access and occluded bilateral common femoral veins. The right

Figure 3 CT-pulmonary angiogram 5 weeks later in the axial plane demonstrating the mycetoma in the right upper lobe which had evolved, with pleural thickening seen adjacent to the mycetoma and surrounding consolidation which may be attributable to pulmonary haemorrhage.

Figure 4 Maximum intensity projection coronal reconstruction of pre-embolisation CT revealed pulmonary pseudoaneurysm.

pulmonary artery was accessed via a small right jugular vein with a sheath inserted to the level of the pulmonary trunk. The segmental pulmonary arterial branch was accessed with a microcatheter and embolised with 3 mm coils both beyond and proximal to the origin of the pseudoaneurysm (figures 4–6).

OUTCOME AND FOLLOW-UP

The patient had no further episodes of haemoptysis and her antifungal therapy was changed to long-term oral itraconazole, according to the culture sensitivities. Her history and images were reviewed with a cardiothoracic surgeon, who decided that she would not be a suitable operative candidate for surgical resection of the cavity and removal of the fungus ball. A chest X-ray 4 weeks later demonstrated improved surrounding consolidation (figure 7). Repeat CT on day 38, did not identify any active haemorrhage and the pulmonary artery aneurysm remained occluded. She was discharged following a prolonged

Figure 5 Digitally subtracted angiography image of the pulmonary artery pseudoaneurysm before embolisation.

Figure 6 Digitally subtracted angiography image of the pulmonary artery pseudoaneurysm postembolisation with multiple 3 mm coils.

hospital stay due to social circumstances. Follow-up bronchoscopy was not performed as she was not keen to have it.

DISCUSSION

Massive haemoptysis due to aspergilloma is an uncommon but life-threatening complication, with an estimated mortality rate of 38%.³ The disease rarely occurs independently and is often preceded by TB or other cavitating lung diseases such as bronchiectasis, lung neoplasia, sarcoidosis and necrotising pneumonia.

She had a total of five sputum cultures and two TB-IGRA which did not lead to a diagnosis of TB. Two other regional hospitals where she had previous hospital admissions were contacted and there was again no evidence of TB.

Bronchiectasis is a permanent and abnormal dilation of bronchi diagnosed on CT scan with high sensitivity (96%).⁴ Multiple CT scans on our patient did not demonstrate any evidence of bronchiectasis.

Cavitating pulmonary neoplasm was not thought likely because of her age coupled with the imaging and clinical findings.

Upper lobe cavities can be found in sarcoidosis,⁵ but our patient had no convincing pulmonary or extrapulmonary features to suggest this diagnosis and no supporting biochemical abnormalities.

The other differential diagnosis that was considered was necrotising pneumonia as she had previous hospital admission with lobar pneumonia. This is believed to have caused the cavity in this case.

The initial investigation of the haemoptysis with arterial phase CT scanning and systemic embolisation was based on the knowledge that most haemoptysis is of systemic origin.⁶ It is recommended that persistent bleeding should then prompt investigation of the pulmonary vessels.⁶ It was only after diagnosis and embolisation of the pulmonary artery pseudoaneurysm that haemoptysis ceased in our patient.

Recurrence of haemoptysis following bronchial artery embolisation is an acknowledged complication that is associated with a high mortality rate. Some regard bronchial artery embolisation

Figure 7 Postembolisation chest X-ray 4 weeks later demonstrating improved surrounding consolidation.

merely as a bridging therapy until more definitive treatment can be provided. The risk factors for recurrence are aspergillosis,⁷ absence of active TB, haemoptysis requiring blood transfusion and continuing haemoptysis beyond the first week following bronchial artery embolisation.⁸ All of these risk factors were present in our patient and it was recognised that she should undergo definitive surgery. Unfortunately, it was deemed that she would not survive the operation due to poor pulmonary reserve, multiple comorbidities and high risk of mortality from pneumonia, acute myocardial infarction and invasive pulmonary aspergillosis.

From our literature search, we identified two similar cases. An article in French, described a woman with aspergillosis and pulmonary artery aneurysms secondary to bronchial lesions.⁹ Greillier *et al*¹⁰ has also previously reported a patient who died of massive haemorrhage from the iatrogenic rupture of a left mycotic pulmonary artery aneurysm which presented as an endobronchial mass. Subsequent examination of the mass revealed features consistent with *Aspergillus*.

Learning points

- ▶ The diagnosis of aspergilloma should prompt further investigations for underlying lung disease.
- ▶ Aspergilloma may occur as a complication of necrotising pneumonia.
- ▶ In patients with haemoptysis, CT-pulmonary angiogram and angiography may fail to identify active haemorrhage at the first instance.
- ▶ The majority of haemoptysis is systemic in origin, but occasional involvement of the pulmonary vessels (such as pulmonary pseudoaneurysm) should not be overlooked.
- ▶ It is important to identify patients at a high risk of recurrent haemoptysis and offer definitive treatment as early as possible.

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Competing interests None.

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