Rasmussen's aneurysm

Introduction

Pulmonary artery aneurysms and pseudoaneurysms are uncommon and have many aetiologies. Pulmonary artery aneurysms are defined by a focal dilatation of a pulmonary artery involving all three layers of the vessel wall whereas pseudoaneurysms do not involve all three layers, resulting in a higher risk of rupture (Nguyen et al, 2007). In 1868 Danish physician Fritz Rasmussen was first to describe the rupture of a lesion associated with a pulmonary cavity commonly associated with tuberculosis, so this rare pseudoaneurysm was named after him. A review of autopsy reports revealed Rasmussen's aneurysms in 5% of tuberculosis patients (Santelli et al, 1994). This article describes a fatal case of this rare lesion in a 32-year-old man.

Discussion

Tuberculosis is caused by *Mycobacterium tuberculosis* resulting in pulmonary or extrapulmonary disease. Common symptoms associated with tuberculosis are a productive cough, haemoptysis, fever, chills, night sweats, asthenia, dyspnoea, wheezing and chest pain. Despite stark disparities between rates in western and eastern European countries, tuberculosis rates have been increasing throughout Europe for the last decade with a concomitant increase in drug resistance (Walls and Shingadia, 2007).

In adults, primary tuberculosis typically appears as air-space consolidation, hilar and mediastinal lymphadenopathy (10–30% of patients), and pleural effusions (30–40% of patients) whereas post-primary tuberculosis appears most commonly as heterogeneous consolidation involving the apical and posterior segments of the upper lobes and the superior segments of the lower lobes. Other common findings of post-primary tuberculosis are small nodules and linear opacities and single or multiple cavities.

The most common computed tomography findings are centrilobular nodules and branching, linear and nodular opacities (i.e. tree-in-bud pattern), patchy or lobular areas of consolidation, and cavitation (Silva and Muller, 2010). A variety of sequelae and complications can occur in treated or untreated patients. A common group of complications include vascular disease, which include pulmonary or bronchial arteritis and thrombosis, bron-

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Case Report

Emergency medical services were called to attend a 32-year-old man with active haematemesis. He was alert and orientated but lost cardiac output during hospital transfer with a cardiac rhythm consistent with pulseless electrical activity. He was intubated and successfully resuscitated following 45 minutes of cardiopulmonary resuscitation.

His past medical history revealed chronic lower back pain for which he took naproxen. In addition, he had recently presented to the emergency department with a 3-week history of intermittently productive cough (green sputum) with concomitant non-cardiac right-sided chest pain. At that time, a chest radiograph was obtained and was positive for a 'left suprahilar opacity'. The emergency physician suspected this to be early findings of a respiratory illness and asked the patient to follow up with his family physician.

At the patient's emergency admission his haemoglobin was 7.2 g/dl. Two units of packed whole cells were infused increasing the haemoglobin to 9.0 g/dl. Despite administration of three more units of red blood cells, the haemoglobin level did not improve. The patient was referred to the gastroenterology unit and a repeat emergency gastroscopy again noted blood in the upper gastrointestinal tract with clots reported to be 'too large to be aspirated'.

Emergency imaging showed progressive chest X-ray changes in keeping with an enlarging consolidation in the left upper lobe. The differential diagnosis included consolidation from haemorrhage or less likely aspiration and infection. In the face of respiratory failure, bronchoscopy was performed demonstrating blood in the left main stem bronchus. The patient was urgently referred to interventional radiology for angiography and embolization; cross-sectional imaging was obtained and an enhanced computed tomography angiogram of the chest (*Figure 1*) was performed demonstrating 'extensive ground-glass change within both upper lobes with a large pseudoaneurysm projecting off the anterior segmental branch of the left upper lobe measuring 25x27x36 mm. There was a short narrow neck measuring approximately 3 mm.' The differential was narrowed to a granulomatous infection given the concomitant enlarged anterior-posterior window lymph nodes and numerous thick-walled areas of cavitation in the left upper lobe apex. The patient was transferred for an emergency pulmonary artery angiogram and pseudoaneurysm embolization.

The main pulmonary artery was selectively catheterized. A pulmonary artery arteriogram confirmed active extravasation from a large pseudoaneurysm arising superiorly from the anterior segmental branch of the left upper lobe artery. Embolization was achieved using a combination of coils and an 8 mm vascular plug. Post-embolization a repeat pumped arteriogram revealed no filling of the pseudoaneurysm. Post-treatment chest radiographs show the coil mass/plug in the left hilar region and dense left mid and upper lung zone consolidation (*Figure 2b*).

The patient remained stable throughout the procedure and was transferred to a quaternary care centre for extracorporeal membrane oxygenation. Owing to difficulty at extubation a computed tomography of the brain was performed, demonstrating findings in keeping with global anoxic brain injury from which the patient was unable to recover.

chial artery dilatation, and Rasmussen's aneurysm (Kim et al, 2001).

Rasmussen's aneurysm, a relatively rare phenomenon, results from weakening of the pulmonary artery wall from adjacent cavitary tuberculosis (Kim et al, 2001). Progressive weakening of the arterial wall occurs as granulation tissue replaces both the tunica adventitia and tunica media. The granulation tissue is gradually replaced by fibrin, resulting in further weakening and thinning of the arterial wall. This thinning of the arterial wall forms a pseudoaneurysm resulting in an emergent risk of rupture (Kim et al, 2001).

On radiographs, aneurysms may appear as hilar enlargement or a lung nodule. Computed tomography provides useful information regarding the size, number, location and extent of aneurysms and pseudoaneurysms (Nguyen et al, 2007). In addition to computed tomography, pulmonary angiography and angiography of the bronchial vasculature and other thoracic systemic arteries are all indicated for a definitive diagnosis, especially in the case of haemoptysis associated with a necrotic cavity (Noë et al, 2011).

Haemoptysis is the usual presenting symptom and if left untreated, can lead to life-threatening massive haemoptysis. Adding to the complexity of this rare case was the patient's initial presentation with haematemesis and recent non-steroidal anti-inflammatory drug use. Owing to the patient's use of naproxen for lower extremity pain, the initial referral was to the gastroenterology department for gastroscopy. Despite revealing evidence of blood products in the upper gastrointestinal tract the patient's respiratory status continued to decline with evidence of worsening left upper lobe consolidation.

Following bronchoscopy and consultation by the interventional radiologist, at which time a computed tomography angiogram chest was recommended, the patient's working diagnosis altered from a likely gastrointestinal bleed secondary to non-steroidal anti-inflammatory drug use, to a ruptured vascular lesion (with aspiration of blood) secondary to granulomatous disease. This stark alteration in the diagnosis highlights the importance of considering haemoptysis as a cause of haematemesis.

Figure 1. Computed tomography of the thorax demonstrating a left upper pulmonary artery pseudoaneurysm with extensive bilateral upper lobe consolidation.

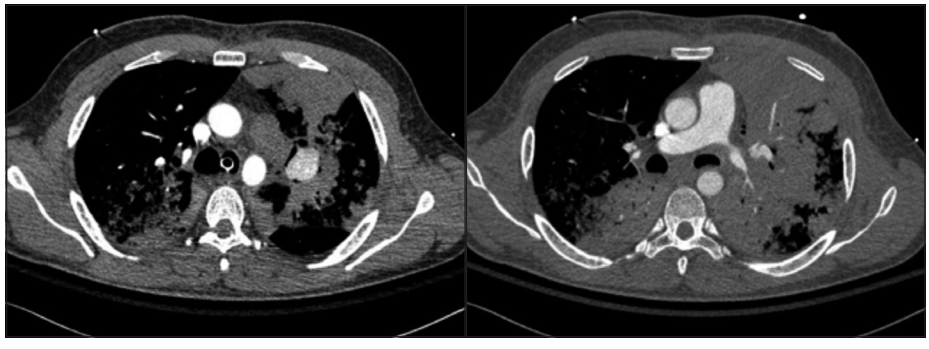
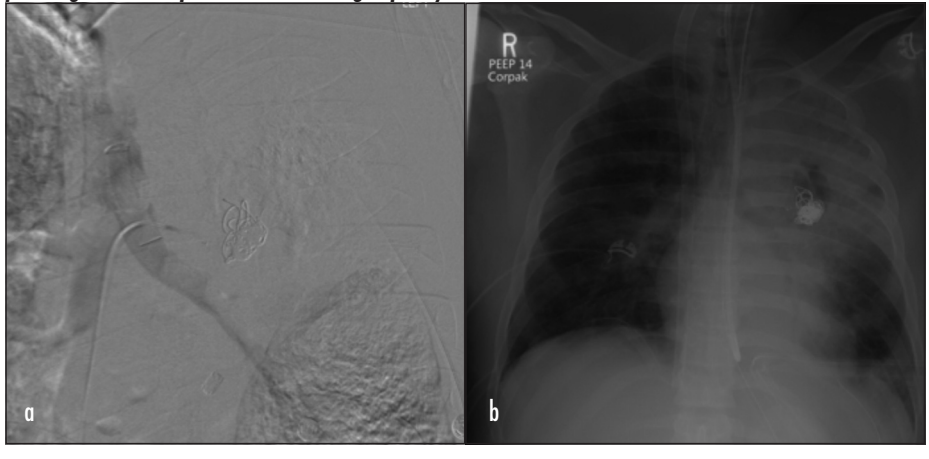


Figure 2. a. Pulmonary artery arteriogram selectively demonstrating a C2 catheter with the tip positioned in the aneurysm neck and coils deployed in the pseudoaneurysm. The Amplatzer Vascular Plug is poorly visualized. b. Post embolization posterior-anterior chest radiograph with left suprahilar coil pack. Again, the Amplatzer Vascular Plug is poorly visualized.



Conclusions

Despite a relatively low prevalence in the developing world, tuberculosis must remain on the differential diagnosis for its numerous presenting symptoms. Early diagnosis is essential in avoiding complications of this disease. As was evident with this case, radiologists play an important role in the diagnosis of tuberculosis including its vascular sequelae such as Rasmussen's aneurysm. These rare pseudoaneurysms require emergent care and are best treated surgically or by embolization. **BJHM**

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LEARNING POINTS

- It is important to differentiate haemoptysis from haematemesis, as they can be easily complicated and may delay proper management.
- Tuberculosis remains an important differential diagnosis of chronic cough with or without other symptoms.
- Rasmussen's aneurysms are rare but lethal complications of tuberculosis.
- Contrast-enhanced computed tomography, angiography and coil embolization play a central role in the diagnosis and treatment of Rasmussen's aneurysm.