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Massive Haemoptysis in a Pulmonary Tuberculosis Patient

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Abstract—Haemoptysis is the clinical features of pulmonary tuberculosis (PTB) (32.5%) in Malaysia, in which if massive and left untreated it carries out a mortality risk of more than 50%. In the majority of cases, the main bleeder arises from the bronchial artery, with the pulmonary arterial circulation as a rare cause of bleeding, accounting for less than 10% of cases. Rasmussen aneurysm is a rare phenomenon following the weakening of the pulmonary artery wall resulting from adjacent cavitory tuberculosis. The sequelae which follow include pseudoaneurysm formation and subsequent rupture.

Keywords – false aneurysm, hemoptysis, interventional radiology, tuberculosis

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1 INTRODUCTION

A 60-year old Chinese male, presented with acute onset of pleuritic chest pain, associated with shortness of breath (SOB) and hemoptysis for the past 1 month. He had underlying diabetes mellitus (DM) and was recently diagnosed with pulmonary tuberculosis (PTB). He was on day-20 of the intensive phase of antituberculosis treatment (tablet AKURIT 3 tablet OD).

Upon admission, the patient was pink with hemoglobin (Hb) level of 10.4g/dl. A day after admission, the patient complained of worsening dyspnoea and persistent hemoptysis with expectoration of a large amount of blood. He became pale and Hb level dropped to 8.3g/dl. Thoracic computed tomography angiography (CTA) was performed on the same day.

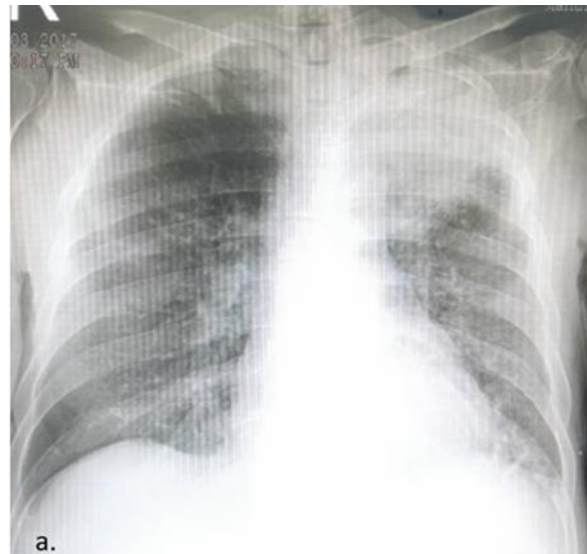


Figure 1a: Chest radiograph performed in the emergency department.



Figure 1b: Contrast CT angiography (maximum intensity projection – MIP) done on the day of admission. CT, Computed Tomography

2 QUESTIONS

- 2.1 Describe the abnormalities in Figure 1a and 1b
- 2.2 What is the most likely diagnosis and what is the possible pathophysiology behind it?
- 2.3 What is the next step to confirm the diagnosis and what is the treatment?

3 ANSWERS

- 3.1 Chest radiograph in Figure 1a. taken during initial diagnosis, showed left upper lobe consolidation. In Figure 1b, thoracic CTA in coronal reconstruction, maximum intensity projection (MIP) showed contrast extravasation arising from the anterior segmental branch of the left pulmonary artery (arrow). There was left upper lobe consolidation with multiple hypodense areas representing necrotic areas.
- 3.2 Based on the history of recently diagnosed pulmonary tuberculosis and radiological findings, the most likely cause of massive hemoptysis in this patient was pseudoaneurysm formation arising from the pulmonary artery, namely Rasmussen aneurysm. Other causes of massive hemoptysis in a PTB patient include bronchiectasis, aspergilloma, broncoliths and vascular abnormalities that have been excluded from the CTA study [1]. Rasmussen

aneurysm is a rare phenomenon following the weakening of the pulmonary artery wall resulting from adjacent cavitory tuberculosis. The granulation tissue replaces the outer tunica adventitia and tunica media layer of the pulmonary arterial wall, which is then replaced by fibrin, causing wall thinning, pseudoaneurysm formation and subsequent rupture [2].

- 3.3 Pulmonary arterial angiography was done one day later and confirmed the presence of the left upper lobe pulmonary artery pseudoaneurysm (Figure 2). Percutaneous embolisation was performed using Gelfoam slurry (Gelfoam; Upjohn, Kalamazoo, MI, USA) infusion and 0.018" coil 2mm x 2mm. No residual contrast seen on the post coiling angiographic runs, indicating a successful procedure (Figure 3). The patient was symptom-free after the procedure and discharged the next day. No recurrence reported at two years of follow up.

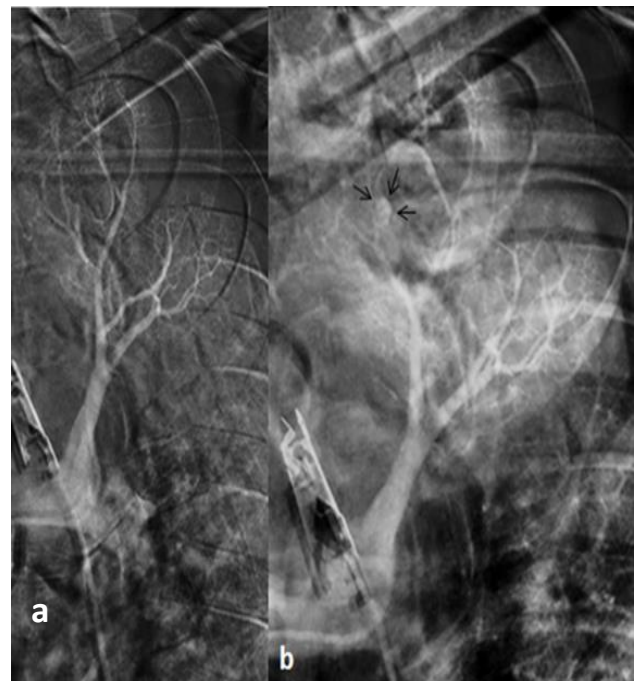


Figure 2: Selective cannulation of the left pulmonary artery **a**. Normal initial run of left pulmonary artery **b**. Pseudoaneurysm at anterior segmental branch confirmed (black arrow) on delay run

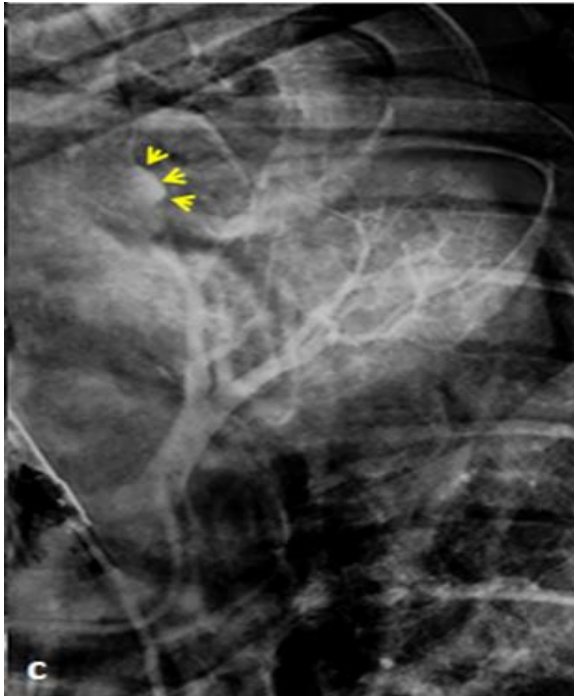


Figure 2c: Contrast extravasation from the pseudoaneurysm (yellow arrow) on further delay.



Figure 3b: Angiographic run post Gelfoam slurry and coiling (arrow), no more contrast extravasation.



Figure 3a: Superselective cannulation. Pseudoaneurysm of the left anterior segmental branch (round marker) with contrast extravasation.

4 DISCUSSION

Hemoptysis in the setting of pulmonary tuberculosis could be scanty or massive in amount. Hemoptysis is one of pulmonary tuberculosis (PTB) manifestation (32.5%), in which if massive and left untreated it carries out mortality risk of more than 50% [2, 3]. Hence, further assessment is required to ascertain the origin of the bleeder. CTA is an appropriate tool to demonstrate the location of the bleeder, either from the bronchial artery or pulmonary artery [4, 5].

Massive hemoptysis in PTB patients may be due to multiple causes [1]. Rasmussen's aneurysm is a pseudoaneurysmal dilatation of the segmental/subsegmental pulmonary artery adjacent to cavitary tuberculosis [5, 6]. Rasmussen aneurysm is peripherally located following the involvement of small to medium-size branch vessels. One literature reported the occurrence of Rasmussen's aneurysm within the cavitary aspergilloma in old PTB [7]. In the majority of cases, the main bleeder arises from the bronchial artery (<10%), with the pulmonary arterial circulation as a rare cause of bleeding with the prevalence of 5% [5, 6]. Bleeders arising from the bronchial artery are more difficult to control as the pressure within the bronchial artery

is higher in comparison to pulmonary artery pressure [2]. Therefore, the distinction of bleeders is important to guide the management. CTA effectively depicts the source of the bleeders. Bronchoscopy may be used as a complimentary evaluation to correctly locate the bleeders [1]. Endovascular therapy is the first line of treatment in both pulmonary artery/bronchial artery aneurysms and it is life-saving procedure in the emergency setting [1, 4, 6]. The surgical management is recommended when there is a marked destructive process within the lung causing infections like coccidioides immitis or aspergilloma [7].

5 CONCLUSION

This case illustrates the typical presentations and radiological features of Rasmussen aneurysm. Early recognition and prompt actions had led to successful treatment outcome. The medical fraternity should be alert regarding such condition in tuberculosis patient to avoid deadly complications. Percutaneous pulmonary arterial embolization is minimally invasive and may be a good alternative to surgical treatment.

6 COMPETING INTERESTS

No competing interests declared.

7 CONSENT FOR PUBLICATION

Written consent was obtained from the patient for publication of this case report and the accompanying images. Institutional Review Board approval is not required at the authors' institutions for the presentation of case report.

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