CASE REPORT

RASMUSSEN'S ANEURYSM - AN UNCOMMON FATAL COMPLICATION OF PULMONARY TUBERCULOSIS - ROLE OF MDCT

Sanjay M. Khaladkar, Vigyat Kamal, Anubhav Kamal, Keyur Kalaria

Department of Radiology, Dr. D. Y. Patil Medical College and Research Centre, Pune, Maharashtra, India.

PJR October - December 2016; 26(4): 348-351

ABSTRACT

The incidence of pulmonary tuberculosis is high in developing countries. It can present with minor haemoptysis which is usually self-limiting and controlled with anti-tubercular therapy. Life threatening haemoptysis in pulmonary tuberculosis, which needs urgent intervention is usually arterial in origin. Rasmussen's aneurysm is an inflammatory pseudo aneurysmal dilatation of a subdivision of pulmonary artery adjacent to a tuberculous cavity. It is an extremely uncommon cause of haemoptysis in pulmonary tuberculosis. The usual site of haemorrhage is from a hypertrophied bronchial artery. Its association with atuberculous cavity is about 5 %. Its rupture can cause massive haemoptysis and death. We present a case of 44 year old male patient, known case of pulmonary tuberculosis presenting with massive haemoptysis. Contrast enhanced CT thorax showed focal contrast enhancement within the cavity suggestive of aneurysm. This case highlights significance of swift recognition of Rasmussen's aneurysm in a patient of pulmonary tuberculosis presenting with massive haemoptysis.

Key words: Inflammatory pseudoaneurysm, hemoptysis, pulmonary tuberculosis, tuberculous cavity, Rasmussen's aneurysm.

Introduction

Massive haemoptysis is defined as expectoration of more than 30 ml blood in 24 hours. If untreated, its mortality is 50-80 % and hence is a life threatening medical emergency.[1] Massive haemoptysis in tuberculosis occurs due to underlying pathologies like bronchiectasis, aspergilloma, broncholiths, and vascular complications. In vascular complications, bronchial arteries are a common source, while pulmonary artery accounts for less than 10 % of haemoptysis.

As bronchial arteries have higher pressure than pulmonary arteries, hence bleeding from these arteries is difficult to control. Rasmussen's aneurysm is pseudo-aneurysmal dilatation of branch of pulmonary artery in a contiguous tuberculous cavity due to chronic inflammation.

Correspondence : Dr. Sanjay M. Khaladkar
Department of Radiology,
Dr.D.Y.Patil Medical College and Research Centre,
Pune, Maharashtra, India
Phone: +91 9850154497
Email: drsanjaymkhaladkar@gmail.com

Submitted 27 May 2016, Accepted 27 July 2016

Its incidence is 5 % in cavitary tuberculosis. Recognition of this entity and distinction from bronchial artery bleeding is important for further management.[2] Prior to the era of MDCT, commonly used approach was to perform bronchial artery embolization followed by pulmonary artery embolization if the former was ineffective.

Multi detector computed tomography angiography has led to early localization of source of bleeding. It differentiates Rasmussen's aneurysm from bronchial or systemic source of bleeding, localizes the lesion and guides further therapy.[2]

Case Report

A 44 years old male patient was referred for CT

thorax for the complaints of breathlessness, cough, streaks of blood in sputum, chest pain on right side. He was a known case of diabetes mellitus since last 10 years. Previously, he had undergone several investigations and was found to have high blood glucose, presence of ketones in urine, sputum smear positive for tuberculosis and pleural fluid adenosine deaminase positive. These investigations along with clinical representation were suggestive of diabetic ketoacidosis and pulmonary tuberculosis.

Chest radiograph PA view revealed consolidation with air bronchogram in right middle zone and right lower zone (Fig. 1).

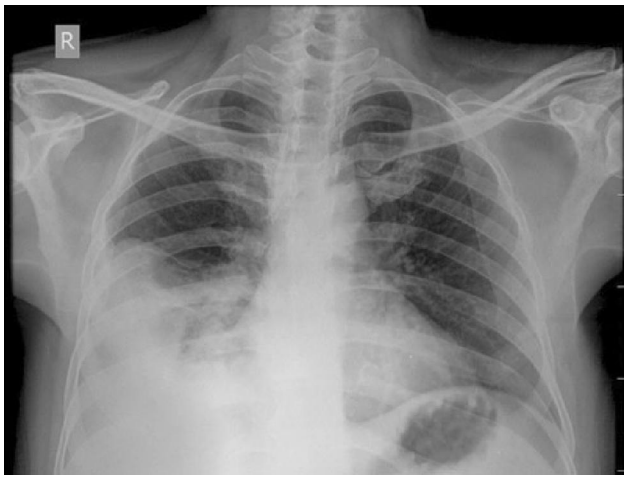
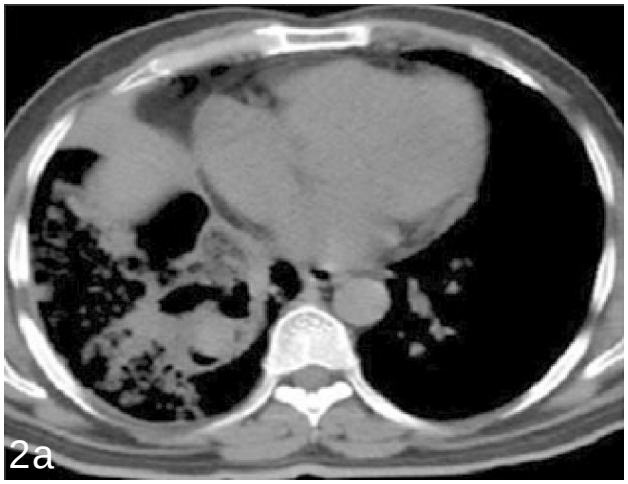


Figure 1: Chest x-ray PA view showing consolidation in right middle zone and right lower zone.

CT scan of thorax (plain and contrast) revealed dense consolidation with cavitation in the basal and the superior segments of right lower lobe (Fig. 2). A well-defined, round, intensely enhancing lesion in



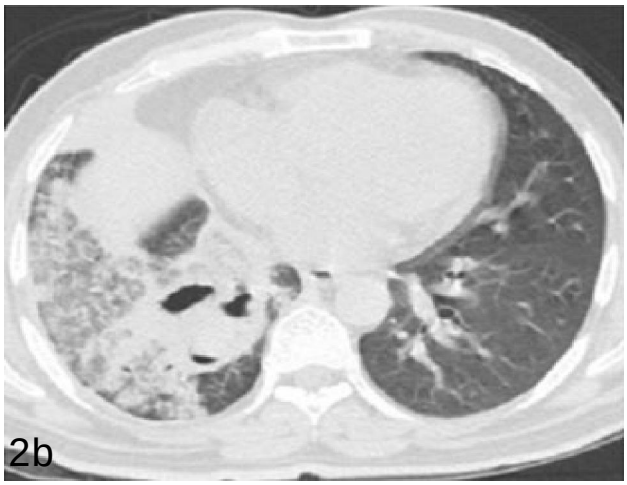


Figure 2: Plain CT thorax in mediastinal and lung window respectively showing dense consolidation with cavitation in apical and basal segments of right lower lobe.

continuity with right pulmonary artery measuring approximately 2.5 x 2 cm was noted in relation to wall of fluid filled cavity - suggestive of pulmonary artery aneurysm (Fig. 3,4). Mediastinum appeared normal. There was no mediastinal or hilar lymphadenopathy.

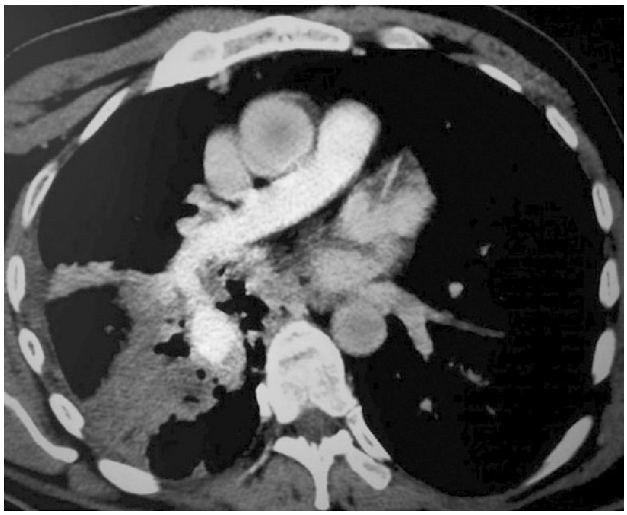


Figure 3: Contrast CT thorax in axial plane showing well defined intensely enhancing lesion in relation to wall of fluid filled cavity in right lower lobe.

Discussion

A Danish physician named Fritz Valdemar Rasmussen defined a special type of pulmonary artery aneurysm consisting of pulmonary vessel coursing the wall of the tuberculous pulmonary cavity with its

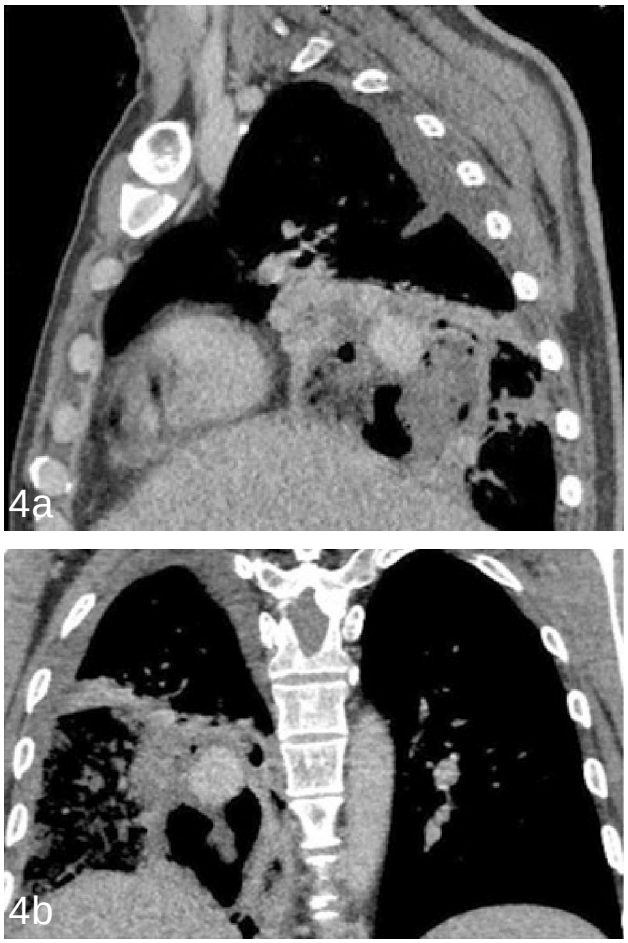


Figure 4: Contrast CT thorax in sagittal and coronal planes respectively showing well defined intensely enhancing lesion measuring 2 x 2.5 cm in relation to wall of fluid filled cavity in right lower lobe.

terminal portion showing focal aneurysmal dilatation into the cavity.[3] It was originally reported by Fearnand Plessinger and Jolly as they made use of intra-arterial radio-paque material injection into the lung vessels of patients who died following massive pulmonary haemorrhage and demonstrated formation of this aneurysm in a tuberculous cavity.[4]

Mycobacterium Tuberculosis is a known causative agent of pulmonary tuberculosis. The infection is caused by inhalation of droplet nuclei laden with bacilli. Tuberculosis can be pulmonary or extra-pulmonary and hence shows multiple variable complications like parenchymal (thin walled cavitation, cicatrisation, tuberculoma, end stage lung destruction, aspergilloma, bronchogenic carcinoma), airway lesions (tracheobronchial stenosis, bronchiectasis, broncholithiasis), vascular lesions (bronchial artery dilatation, Rasmussen's aneurysm, pulmonary or bronchial arteritis and thrombosis), mediastinal lesions (lymph nodal calcification and extra nodal extension, oesophagomediastinal or oesophago-bronchial fistula, constrictive pericarditis, fibrosing-mediastinitis), pleural lesions (chronic empyema, fibrothorax, bronchopleural fistula, pneumothorax) and chest wall lesions (rib tuberculosis, tuberculous spondylitis, malignancy associated with chronic empyema).[5]

An aneurysm is defined as a focal dilatation of blood vessel involving all three layers of the vessel wall in contrast to pseudoaneurysm which does not involve all three layers of the arterial wall and shows a high risk of rupture. Pulmonary artery pseudoaneurysms are not common and potentially lethal. These lesions may show variation from being clinically silent lesions increasing in size over a period of months to years or present with life threatening haemorrhage. These pseudoaneurysms may be congenital or acquired. Congenital entities are seen in pulmonary trunk and major branches whereas acquired entities are seen associated with infections (tuberculosis, syphilis, mucormycosis and endocarditis), neoplasms, trauma and iatrogenic causes. Pulmonary artery pseudoaneurysm associated with tuberculosis is called Rasmussen's pseudoaneurysm.[6]

Patients usually present with haemoptysis which may be life threatening when it's massive. Progressive arterial wall weakening occurs due to replacement of tunica media and adventitia layers with granulation tissue. The granulation tissue is then replaced by fibrin, resulting in arterial wall thinning leading to pseudoaneurysm formation which may rupture subsequently.[5] Rupture often leads to massive haemoptysis which being potentially fatal causes death due to aspiration of blood and consequential asphyxiation.[7]

Bleeding in cases of acute tuberculosis from pulmonary vessels is lesser in volume and caused by necrosis of smaller branch of the pulmonary artery or vein.[7] In cases of chronic cavitary tuberculosis, massive haemoptysis results from rupture of Rasmussen's aneurysm through the wall of the cavity.[7]

Chest radiographs show variable appearance ranging from non-specific focal lung consolidation, solitary pulmonary nodule, or early consolidation evolving to

a nodule or a mass.[8]

Multi detector computed tomography angiography demonstrates focal dense contrast enhancement within a tuberculous cavity suggestive of Rasmussen's aneurysm. CT also demonstrates the condition of underlying lung - consolidation, cavity, bronchiectasis, pleural effusion and mediastinal lymph nodes.

Conclusive diagnosis is usually done by performing angiography, which shows pathological anatomy along with a road map and aids in planning of a treatment strategy by embolization.[8]

Minimally invasive alternative approach to open thoracotomy and resection of the involved lobe with underlying pseudoaneurysm is percutaneous embolization.[9] It has been ascertained that arterial embolization is an effective technique to attain crucial control of bleeding associated with chronic tuberculous cavities.[10] Another practical and safe therapeutic option is transcatheter embolization using stainless steel coils, platinum coils, or detachable balloons.[8]

Conclusion

Life threatening haemoptysis can occur in pulmonary tuberculosis due to bronchial or systemic source or Rasmussen's aneurysm. Multi detector computed tomography angiography is exceptionally useful in differentiating inflammatory pseudoaneurysm of pulmonary artery from systemic source. It localizes the lesion and guides therapy. An emergency endovascular management technique like pulmonary artery transcatheter embolization is the preferred therapeutic modality for massive haemoptysis due to rupture of Rasmussen's aneurysm in tuberculous cavity.

References

1. Corr P. Pulmonary artery aneurysm as a cause of massive hemoptysis: diagnosis and management. Case Rep Radiol. 2011;

2. Chatterjee K, Colaco B, Colaco C, Hellman M, Meena N. Rasmussen's aneurysm: A forgotten scourge. Respir Med Case Rep. 2015 Aug 12; **16:** 74-6.

3. Rasmussen V. On haemoptysis, especially when fatal, in its anatomical and clinical aspects. Edinburgh Medical Journal. 1868; **14:** 385-401.

4. Remy J, Smith M, Lemaitre L, Marache P, Fournier E. Treatment of massive hemoptysis by occlusion of a Rasmussen aneurysm. AJR Am J Roentgenol. 1980 Sep; **135(3):** 605-6.

5. Kim HY, Song KS, Goo JM, Lee JS, Lee KS, Lim TH. Thoracic sequelae and complications of tuberculosis. Radiographics. 2001 Jul-Aug; **21(4):** 839-58.

6. Prakash V, Verma AK, Kant S, Bhatia A, Bajaj DK, Srivastava A. Pulmonary artery pseudoaneurysm: An uncommon fatal complication associated with tubercular empyema. J Mahatma Gandhi Inst Med Sci 2015; **20:** 176-8.

7. Patankar T, Prasad S, Deshmukh H, Mukherji SK. Fatal hemoptysis caused by ruptured giant Rasmussen's aneurysm. AJR Am J Roentgenol. 2000 Jan; **174(1):** 262-3.

8. Lafita V, Borge MA, Demos TC. Pulmonary artery pseudoaneurysm: etiology, presentation, diagnosis, and treatment. SeminInterventRadiol. 2007 Mar; **24(1):** 119-23.

9. Ghaye B, Dondelinger RF. Imaging guided thoracic interventions. EurRespir J. 2001 Mar; **17(3):** 507-28.

10. Leung AN. Pulmonary tuberculosis: the essentials. Radiology. 1999 Feb; **210(2):** 307-22.