Case report

Massive hemoptysis from Rasmussen's aneurysm in active pulmonary tuberculosis; A case report of successful treatment with bronchial artery embolization

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ABSTRACT

Rasmussen's aneurysm, a very rare complication of active pulmonary tuberculosis (TB), is a pulmonary artery aneurysm adjacent to or within a tuberculous cavity. It may lead to rupture and life threatening massive hemoptysis, an uncommon but challenging medico-surgical emergency.

This complication warrants attention in view of the resurgence of tuberculosis and increasing occurrence of multi-drug resistant TB, especially in resource-poor, high-TB burden countries like India.

We present a case of an elderly man who presented to the emergency room with low-grade fever, cough and hemoptysis.

Thoracic Multidetector row Computed Tomographic Angiography (MDCTA) showed left upper lobe consolidation with thick walled cavitary lesions and aneurysm along the apical segmental branch of left upper lobar pulmonary artery. Hemoptysis was successfully controlled with systemic artery embolization using polyvinyl alcohol (PVA) particles. He was treated with antitubercular chemotherapy and was followed for more than a year without further recurrence of hemoptysis.

1. Introduction

‘Tuberculosis is not a relic of the past; it is a disease that will dominate the future. Today, its story continues’ [1]. Pulmonary tuberculosis continues to be a challenge even in 21st century in view of the rising trends in its incidence, glove in hand with HIV infection. This is challenging to the National TB programmes, especially in countries like India where nearly half of the ‘missing cases’ occur [2]. Apart from the diagnostic and treatment challenges this “slow-stain” poses, the attendant complications of the disease per se are much more demanding.

Massive hemoptysis from Rasmussen’s aneurysm can be life threatening, which emphasises the early diagnosis and intervention. Minor hemoptysis from active tuberculosis is usually self-limiting and responds to anti-tuberculous therapy. Once considered for surgical resections of the lung, massive hemoptysis is now increasingly being managed through trans arterial catheter embolization procedures, performed by interventional radiologists. In the present-day standard of care, embolization would be the first-line therapy. Though bronchial arteries are the usual source of bleeding from chronic parenchymal disease, pseudoaneurysms of the pulmonary artery, known as Rasmussen’s aneurysm, could be the cause of hemoptysis which is often massive. In a study by Auerbach in 1939, Rasmussen’s aneurysms were noted in 45 of the 114 autopsies (4%) with chronic cavitary tuberculosis [3]. Modern imaging techniques and advances in interventional radiology have provided an array of treatment modalities to this potentially fatal clinical scenario. Contrast enhanced - multidetector row computed tomographic angiography (MDCTA) enabled us to detect Rasmussen’s aneurysm and to localize the site of arterial bleeding for further treatment. In this context, we report a patient of active pulmonary tuberculosis presenting with massive hemoptysis from a Rasmussen’s aneurysm, requiring emergent arterial embolization, emphasising the importance and role of MDCTA in the diagnosis and the role of interventional radiology in the management of this clinical scenario.

2. Case report

A 63-year-old male, never-smoker, alcoholic and a known diabetic and hypertensive, was admitted to our hospital with a 7 days history of low-grade fever and cough with expectoration and recent development of mild hemoptysis, two days prior to admission.

He reported no weight loss. His vitals were stable and chest radiograph revealed left upper lobe cavitating lesion. Flexible bronchoscopy was done which showed bleeding from the apicoposterior segment of
the left upper lobe. His postbronchoscopy sputum and bronchial washings were positive for acid-fast bacilli (AFB).

One day after admission, the patient developed an episode of massive hemoptysis of more than 400 mL that later continued amidst resuscitative measures.

He was adequately resuscitated. CTPA (Computed Tomographic Pulmonary Angiography) was done, which showed an aneurysm measuring 8.6 × 7.3 mm along the apical segmental branch of the left upper lobar pulmonary artery suggestive of Rasmussen’s aneurysm. Dense consolidation in the apicoposterior and lingular segments of the left upper lobe-probably secondary to pulmonary hemorrhage and thick-walled cavities in the apical segment of left upper lobe were also noted. (Fig. 1 & Fig. 2).

His hemoptysis further worsened and an urgent attention of interventional radiologist was sought. He underwent emergent embolization procedure. Initially a 5F cobra catheter was used to catheterize the right bronchial and intercostal arteries. These runs appeared unremarkable for any abnormal findings. Left bronchial artery had to be catheterized with Mikaelson catheter, this run revealed significant blush in the left upper zone with associated pseudoaneurysm. Microcatheter was used to obtain purchase distally into the largest branch of the left bronchial artery. The runs were reviewed to rule out any significant spinal vascular contribution before injecting PVA particles. PVA particles of 500–700 μm mixed with saline and contrast were injected under subtracted fluoroscopy. Angiogram revealed absent parenchymal blush and non-opacification of the previously detected aneurysm. (Fig. 3 & Fig. 4).

Check angiography of the serial intercostal arteries on either side did not reveal any significant bronchial supply. The left subclavian artery, left internal mammary artery, the cervical branches of the left subclavian artery were angiographically assessed and they appeared unremarkable for significant supply to the left upper lobe cavitary lesion.

Post procedure, there was no further hemoptysis and patient’s clinical status improved. He was discharged with instruction to continue antitubercular therapy as advised. Patient completed treatment course for six months. He was followed for more than a year and half from discharge and there was no further recurrence of hemoptysis.

3. Discussion

Hemoptysis in the presence of tuberculosis can be due to varied etiopathologies like bronchiectasis, aspergillomas, broncholiths, TB reactivation, scar carcinoma, chronic bronchitis, microbial colonization within a cavity and vascular abnormalities such as pseudoaneurysms. Bronchial artery abnormalities are the most common source of hemorrhage and the pulmonary arteries account for < 10% of hemoptysis [4]. Rasmussen’s aneurysm, a very rare cause of hemoptysis, is reported in up to 4% of autopsy series of patients with chronic cavitory tuberculosis [3]. In the series of Khalil et al., the incidence of hemoptysis of pulmonary arterial origin was reported as 6.9% and four of the 18 of their patients with active tuberculosis had hemoptysis from pulmonary artery pseudoaneurysm [4]. Extension of tuberculous (TB) lesion into the adventitia and media of the vessel wall causes herniation.
into the lumen of the cavity and the formation of an aneurysm. Continued inflammation of the cavity wall from TB causes rupture of the aneurysm into the cavity, resulting in massive hemoptysis [5]. Arteries involved are small to medium-sized branch vessels; therefore, the aneurysms are usually peripherally located, distal to the secondary bronchi. Hemoptysis may occur during active TB or after completion of chemotherapy for TB. One third of the patients of pulmonary tuberculosis can develop hemoptysis during the course of their illness [6]. Minor hemoptysis in tuberculosis is usually self-limiting or controlled with anti-tubercular therapy. However, massive haemoptysis is a life-threatening condition associated with a mortality rate of > 50%, in the absence of adequate, timely management [7]. Rasmussen’s aneurysm can present as repeated episodes of minor hemoptysis or as episodes of major hemoptysis as in our case.

Ruptured aneurysm presents with life-threatening hemoptysis. Clinically it is not possible to differentiate hemoptysis between the pulmonary and bronchial-systemic arterial origin. Early diagnosis of the precise source of hemoptysis will guide the nature of intervention.

With the advent of contrast-enhanced MDCTA, a non-invasive method for detecting the source of hemoptysis has been established. Emergency endovascular techniques like arterial embolization are the preferred treatment modality for massive haemoptysis. And majority of these patients pose a high surgical risk.

In our patient fiberoptic bronchoscopy and CTPA could identify the site of bleeding from a pulmonary artery pseudoaneurysm helping in prompt intervention. Our patient underwent bronchial artery embolization as a first step treatment using PVA particles of 500–700 μ which could effectively achieve the vasoocclusion of the area of the left upper lobe lesion with the pseudoaneurysm. There was no further recurrence of hemoptysis during a follow up of more than a year.

Khalil A. et al. in their study of 189 patients who underwent treatment by endovascular means noted 13 patients to have hemoptysis of pulmonary arterial origin. Four of these patients of active tuberculosis were treated by systemic arterial embolization as a first treatment, but hemoptysis recurred in all of them within a week, which was managed by specific pulmonary artery vasoocclusion [4].

4. Conclusion

Arterial embolization procedure is considered the first line treatment approach for massive hemoptysis from either bronchial or pulmonary circulation.

MDCTA can be considered as the initial choice of imaging for both diagnosis and guide in the endovascular management of massive hemoptysis. It will help identifying the source of bleeding and in differentiating the systemic versus pulmonary artery bleeding. MDCTA will guide us in planning the most appropriate and early interventional method. We preferred systemic arterial embolization in view of financial constraints of the patient. This may be considered as an initial and a cost-effective approach, especially in resource-poor, high TB-burden countries.

Conflicts of interest

None.

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