



Rasmussen Aneurysm secondary to Covid-19 : A case report

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ABSTRACT

Rasmussen's aneurysm is an inflammatory dilation arising in the branch of pulmonary artery adjacent to or within tubercular cavity. COVID-19 co-infection in the circumstances of Rasmussen aneurysm is an infrequent incident. A 44-year old female patient was hospitalized with chief complaints of recurrent episodes of large hemoptysis. The patient was diagnosed with Rasmussen aneurysm latterly assessed by computed tomography pulmonary angiogram. She was reported having category C COVID-19 infection and doesn't have any history of tuberculosis in the past. After recovering from COVID-19 infection, her cough became worse and had first episode of hemoptysis in small amount. Two weeks later a second episode of hemoptysis of about 15 ml with clot, followed by third episode after three days about 100ml. The clinician planned for embolization of pulmonary artery since it was a non-tuberculous Rasmussen's Aneurysm. Our case report highlights the importance of Rasmussen's aneurysm as contrasting diagnosis when presented with post COVID-19 infection and immediate start of haemoptysis symptomatically and radiologically. Pulmonary artery pseudoaneurysm is unusual and may be linked with increased mortality rate if not treated, secondary to haemoptysis. Timely diagnosis and management are solutions to prevent mortality.

INTRODUCTION

Rasmussen's aneurysm is classically defined as an uncommon and potentially lethal complication of inflammatory dilation arising in the branch of pulmonary artery (PA) adjacent to or within tuberculosis cavity [1]. Epidemiology suggests that only 5% of patients with chronic cavitary tuberculosis on autopsy showed presence of Rasmussen's Aneurysm [2]. Rasmussen's Aneurysm can cause progressive weakening of arterial wall, as adventia and media layers are swapped with granulation tissue and fibrin resulting in thinning of vessel wall and risk of pseudo aneurysm formation. Patients with a history of destructive lung disease are more vulnerable to cause Rasmussen's Aneurysm (HIV infection, tuberculosis, COVID-19) [3,4,5]. Realistically, syphilis and tuberculosis were the common cause of pulmonary artery aneurysm leading to Rasmussen aneurysm, but incidence of this has declined with the invention of higher antibiotics. [6]. Rasmussen's aneurysm with non-tuberculosis mycobacterium is infrequent, it's timely diagnosis and management is very important. Management of

non-tuberculosis mycobacterium associated aneurysm is arduous than tuberculosis associated Rasmussen's aneurysm. [7] Haemoptysis is a most common symptom of Rasmussen's aneurysm and it is a life-threatening condition which leads to death, if massive. The mortality rate is >50% and ruptured aneurysm should be examined in patients with massive haemoptysis. Besides haemoptysis, some may have cough, purulent sputum, palpitations and dyspnoea [8]. Investigational choice for the diagnosis of Rasmussen's Aneurysm in patients presenting with haemoptysis is Computed Tomography (CT) pulmonary angiogram [9]. Treatment options for this disease condition are endovascular treatment and affected lobectomy. Endovascular treatments are a good choice due to the high risk of surgical interventions in patients with Rasmussen's aneurysm [10].

CASE REPORT

We present a case of an adult female who came to our hospital with periodic events of heavy hemoptysis and was diagnosed to

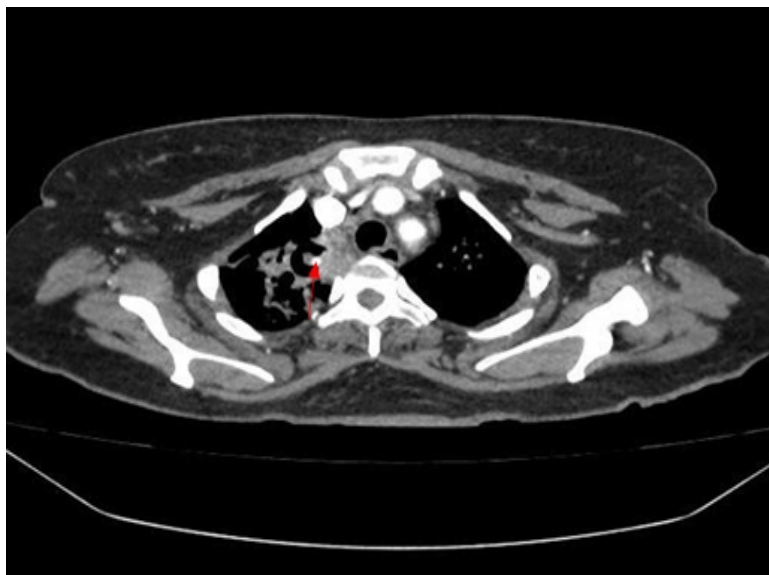


Fig 1 : Contrast Enhanced Computed Tomography of the lung image showing Rasmussen aneurysm.

have Rasmussen aneurysm secondary to post COVID 19 infection. We highlight the unusual incidence of Rasmussen's aneurysm following COVID 19 infection and the convenient therapeutic options through this case.

We are reporting on a 44 year old female patient who was hospitalized with chief complaints of recurrent episodes of large hemoptysis, under pulmonology department. Her hemoptysis was allied with occasional episodes of tachypnoea and dry cough. She didn't have any history of tuberculosis in the past. She had an unremarkable medical history till two months back except diabetes mellitus for which she was on treatment, she was diagnosed with category C COVID- 19 infection. Grade 3 / 4 dyspnoea on exertion (DOE) was persisting since COVID-19. After recovering from COVID -19 infection her cough became worse and had first episode of hemoptysis in small amount. Two weeks later a second episode of hemoptysis of about 15 ml with

clot, followed by third episode after three days about 100ml. On examination, blood pressure was 130/90mmHg, pulse rate 98 beats per minute, oxygen saturation (SPO₂)-94%, respiratory rate was 41 per minute and respiratory examination revealed bilateral creps with wheeze. Besides, right suprascapular harsh vesicular breathing was noted. Biochemistry and hematological parameters were as follow: HbA1C-8.7%, haemoglobin-9.2g/dl, total count 21100/mm³, ESR-65mm/hr, aPTT of 39.7 seconds and INR-1.19. D dimer test showed an elevated value of 322ng/dl and HIV rapid test was negative. Her chest X-ray (Fig1) and axial image of high-resolution contrast tomography lungs manifested a wedge-shaped area of consolidation with air bronchogram noted in apical and posterior segment of right upper lobe and superior segment of right lower lobe. Ground glass opacity with interstitial thickening in bilateral lung fungal fields were present in this patient in consistent with Post COVID effect.



Fig 2 : 3 D Volume rendering image depicting Rasmussen's Aneurysm of right pulmonary artery of upper lobar branch.

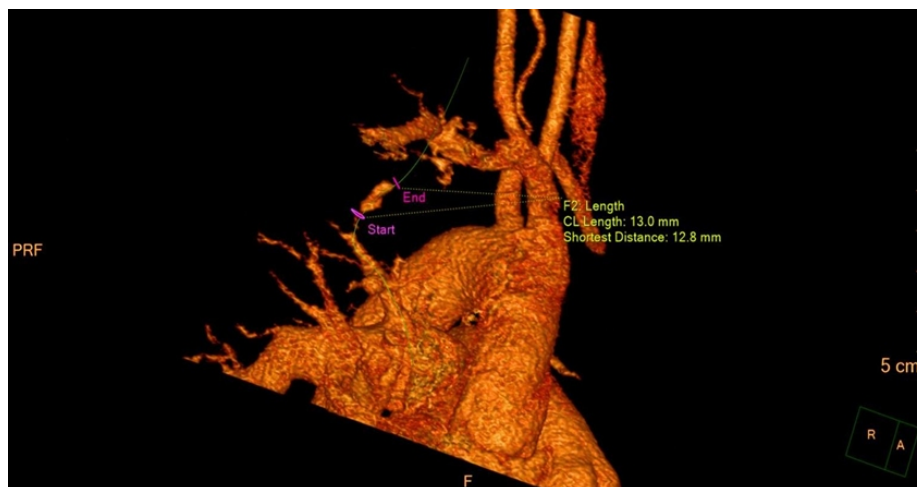


Fig 3 : Distal proximal area of heart showing diameter of aneurysm.

Sputum culture and sputum acid fast bacilli (AFB) test were negative. She had received apixaban and vitamin supplements as post COVID treatment. Apixaban was stopped after the first episode of hemoptysis. IV antibiotics and antifungals were prescribed in the current management. Dry cough was treated with syrup containing codeine/triprolidine combination and levocloperastine. Dyspnea was managed with formoterol/budesonide nebulization and doxofylline. Contrast Computed Tomography was done, and it showed an aneurysmal dilation of upper lobar branch of right pulmonary artery (Fig 1)

Rasmussen's aneurysm was confirmed by Volume rendering 3D image of heart exposing right pulmonary artery (Fig 2).

There was an aneurysm of upper lobar branch of right pulmonary artery which measured 4.1mm diameter in the distal end and 3.8mm diameter in the proximal end. Its shortest distance was 12.8mm (Fig 3).

Two options were considered in the management of this aneurysm, right upper lobectomy and coil embolization. Since the patient was unlikely to tolerate single lung ventilation due to damaged lungs and post-operative risks after pneumonectomy, coil embolization of Rasmussen's aneurysm of pulmonary artery was considered to be a better option for this patient.

A femoral arterial and venous access was taken. Descending thoracic aortogram was done using 6 F PIGTAIL diagnostic catheter. Thoracic aortogram showed normal intercostal bronchial trunk and right bronchial artery. The pulmonary artery angiogram was done which showed normal main pulmonary artery and left pulmonary artery. Apical division of the right pulmonary artery showed ectasia, no active bleeding seen. A selective right pulmonary artery injection was taken using 6 F ENVOY MPC guiding catheter for the visualisation of Rasmussen's Aneurysm in the right upper lobe branch of right pulmonary artery. Aneurysm was accessed with 2.7 F Progreat Micro Catheter and 014" x 180cm fielder FC guide wire. Aneurysm was then coiled using 18-3-4 Hilal Embolization Microcoil™ (Cook Medical). Check angiogram showed a residual flow across aneurysm therefore a second coil of 18-5-5 Nester® was deployed. After a few minutes, check angiogram was taken which showed complete occlusion of the aneurysm. No antegrade flow in the vessel after embolization.

DISCUSSION

Rasmussen's aneurysm is a pulmonary artery pseudoaneurysm (PAP), usually associated with tuberculous cavity. Pulmonary artery pseudoaneurysm is unusual and may be linked with increased mortality rate if not treated, secondary to haemoptysis [11]. Patient may present with multiple episodes of haemoptysis which can be minor or massive [12]. Any destructive lung pathology that wears down the neighbouring structure can be described as the pathophysiology of Rasmussen aneurysm. When a branch of pulmonary artery comes adjacent or within a cavity, its wall gets weaker gradually as granulation tissue replaces the layers of adventia and media. Subsequently the wall of artery expands until it results in a pseudoaneurysm. These false aneurysms can eventually lead to massive haemoptysis due to rupture [13,14].

Rasmussen's aneurysm can occur after an infection which affects lungs such as Tuberculosis, HIV infections, SARS-COV-2 etc. Our patient presented with pulmonary aneurysm caused by non tuberculous infection. Pulmonary infections due to COVID-19 (SARS-COV-2) can multiply in the mucosa of bronchioles or alveolar epithelium which results in the tear of pulmonary parenchyma and interstitial tissue of alveoli, interlobular septa and peri acinar microvascular system. After the treatment of viral pneumonia, majority of the lesions will be absorbed and scattered progressively but in fewer cases fibrosis in the lungs remain. Among COVID-19 patients recovery period change due to the formation of pulmonary cavity in later stages within 41 days [15,16]. A case on Pulmonary artery pseudoaneurysm secondary to COVID-19 was treated with endovascular embolization. 74-year-old man developed haemoptysis after being treated for COVID-19 pneumonitis and concomitant treatment with anticoagulants [5]. In our case report the patient had a history of COVID-19 and cavitary lungs were present and she had no history of tuberculosis.

Diagnosis of Rasmussen's aneurysm can be done by Computed Tomography (CT) or Magnetic Resonance imaging of pulmonary angiography, where the pulmonary artery focal dilation is visualized by IV contrast. Radiological studies including thoracic Multi Detector Computed Tomography (MDCT) angiography is used to differentiate between bleeding from pulmonary or bronchial origins [17]. Helical Computed Tomography is efficacious in imaging vascular and airways as

well as for identifying and characterizing pulmonary lesions. Conventional contrast enhanced Computed Tomography can show Rasmussen's aneurysm within a cavity [18]. But helical Computed Tomography can show pulmonary artery lesions more than conventional contrast Computed Tomography. High Resolution Computed Tomography was performed in our patient.

Surgical lobectomy and endovascular are the two surgical interventions in the management of Rasmussen's Aneurysm. But surgical lobectomy has great risk in patients with haemoptysis. The preferred therapeutic option in the management of Rasmussen's Aneurysm is the endovascular embolization using coils, plugs, gel foams, n-butyl cyanoacrylate (NBCA). In our case, patient was stabilized after the coil embolization [19]. We used Hilal Embolization Microcoil™ (COOK(CANADA)INC) and Nester® (Bloomington, Indiana) which are specifically designed with synthetic fibres. It promotes clot formation and provides positive clinical outcomes. Ed Santelli et al reported a case on Embolization of multiple Rasmussen's Aneurysm treated successfully by embolization with coils [20]. Embolization of systemic arteries only may not be adequate in the treatment. There are certain limitations in the embolization procedures. Firstly, some pulmonary artery pseudoaneurysms may not be visible in the arteriogram. Secondly, catheterisation of the selective supplying arteries may not always be conceivable. Thirdly, it may cause proximal embolization. Endovascular embolization may not be the ultimate choice for every case [10]. Surgical excision is recommended where expertise for radiological interventions is not available or when there is considerable destructive process in the lung, producing infections such as Aspergilloma, Coccidioides immitis. A case on Stubborn Case of Massive Haemoptysis: Rasmussen's aneurysm, in this case, patient who was treated for Tuberculosis in childhood, had multiple episodes of haemoptysis. Bleeding was temporarily ceased with coil embolization. Risk for life threatening rebleeding and severe lung disease led the physician to resect diseased lobe. Open left upper lobectomy without rebleeding was performed [21].

CONCLUSION

While a sea of details and knowledge is frequently appearing with regard to the limitless aspects of the COVID 19 clinical range, our case report narrates a novel existence of cavitating COVID allied Rasmussen aneurysm in giving rise to heavy haemoptysis as the root cause and our patient didn't have a history of tuberculosis in the past. She was managed using coil embolization of pulmonary artery. Immediate identification and treatment is crucial to avert mortality. The clinicians should be well informed of this occurrence in the circumstances of COVID 19, mainly in patients' anticoagulated for associated venous thromboembolism

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