CLINICAL VIGNETTE

Massive Hemoptysis with Tuberculosis-Remember Rasmussen's Aneurysm

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Case Report

A 25-year-old man presented to the ER with severe hemoptysis. He was working at a restaurant and was noted to be pale, diaphoretic, then complained of shortness of breath and began coughing up blood. Evaluation in the ER found him to be in respiratory distress with an oxygen saturation of only 77%. He was confused, agitated, tachypneic, and smelled of alcohol. There was blood in his mouth, and he had decreased breath sounds in the right chest; he was emergently intubated.

The post-intubation CXR showed a moderately severe consolidative right upper lobe infiltrate with some volume loss and a small cavitary lesion in the left upper lung lobe (CXR-Image 1). A chest CT angiogram showed no evidence of pulmonary emboli but extensive consolidation with small cavities in the right upper lobe and scattered infiltrates in the right middle and lower lobes. There were also patchy infiltrates and consolidation throughout the left lung with several small cavities in the left upper lobe. The initial CT report did not describe any vascular abnormalities.

He was admitted to the ICU, and due to suspicion of tuberculosis, he was started on ethambutol, rifampin, pyrazinamide, and isoniazid. Sputum was sent for AFB and mycobacterial cultures along with routine bacterial and fungal cultures. He continued to have persistent bleeding from the endotracheal tube and underwent flexible bronchoscopy. The endobronchial mucosa was coated with blood, and there were thick blood clots throughout the airways but no active bleeding was seen. Bronchial specimens were positive for AFB on smear.

The next morning his hemoptysis worsened. He became hypotensive and was placed on norepinephrine. He was scheduled for bronchial artery angiography to ascertain the site of bleeding, but upon re-review of the chest CT angiogram, a focal abnormality of a subsegmental right upper lobe pulmonary artery was identified (Chest CT-Image 2). Instead of a bronchial artery angiogram, a selective right pulmonary artery angiogram was obtained. A focal pseudo-aneurysm supplied by a right upper lobe subsegmental pulmonary artery was identified and embolized using three detachable embolization coils (Angiogram-Image 3) After the embolization, there was no further bright red blood via ETT.

Due to his severe respiratory failure with diffuse lung involvement, he remained intubated for another two weeks. After extubation, he was transferred to a medical floor with nasal cannula oxygen at 2 LPM. His sputum AFB smears slowly decreased from 4+ to rare AFB over the next month and he was subsequently transferred to the LA County TB ward for continued care.

Discussion

Massive hemoptysis is generally defined by the amount of expectorated blood or the rate of bleeding. The precise threshold is controversial, but the most frequently accepted definition is over 500 mL in a 24-hour period or more than 100 mL/hour. The goal of initial management is always to stabilize the patient by establishing an airway, ensuring adequate gas exchange, and optimizing hemodynamics. Simultaneously, the cause and location of the bleeding should be identified.

The causes of hemoptysis are numerous and can be from multiple pathologies. Possible etiologies include bronchiectasis; bronchogenic carcinoma, tuberculosis; and various lung infections including mycetomas, broncholiths, and vascular complications. Massive hemoptysis from vascular complications are most commonly from bronchial artery bleeding and rarely (5-10%) from the pulmonary artery.[1]

The initial CXR may give an indication of the possible cause and location of the bleeding. Bronchoscopy is frequently helpful to localize the bleeding site and occasionally the etiology, such as endobronchial carcinoma. Bronchoscopy may also be helpful therapeutically. Topical vasoconstrictive medications may be administered to a visible lesion or balloon tamponade of a segmental or subsegmental bronchus or even electrocautery or laser therapy can be applied.

Since the source of vascular bleeding is predominately the bronchial arteries, most patients have initially undergone bronchial artery angiography.

Greater use of chest CT angiography has helped lead to early localization of the site and source of bleeding. CT angiography can help differentiate bleeding from bronchial arteries versus the pulmonary artery. This is important because hemoptysis from pulmonary artery bleeding has a reported mortality of 50%.[2]

Pulmonary TB usually presents with a variety of symptoms including low grade fevers, weight loss, cough, night sweats,

and mild hemoptysis. The hemoptysis from TB is usually self-limited. Severe and life threatening hemoptysis is less common.

This patient's chest CT angiography was initially thought to be nondiagnostic, but upon review, it was suspicious for a pulmonary artery abnormality, thereby avoiding bronchial angiography and proceeding directly to pulmonary angiography. A focal pseudo-aneurysm of the right upper lobe subsegmental pulmonary artery was identified. This type of pseudo-aneurysm has been called Rasmussen's aneurysm.

Fritz Rasmussen was a Danish physician who in the 1860's described a pulmonary vessel passing through the wall of a tuberculosis cavity with an aneurysmal dilatation of this vessel into the cavity. Pathologically there is a weakening of the pulmonary artery wall from adjacent cavitary tuberculosis, and there is a progressive weakening of the arterial wall as granulation tissue replaces both the adventitia and the media. This is gradually replaced by fibrin, resulting in thinning of the arterial wall, pseudo-aneurysm formation, and subsequent rupture with hemorrhage.[3]

Rasmussen's aneurysms can be present in up to 5% of patients with chronic cavitary tuberculosis on autopsy. Chest CT angiography is now felt to be mandatory to assess for vascular complications and to differentiate between bleeding from bronchial or pulmonary arteries, though occasionally it is difficult to diagnose. In patients with massive hemoptysis and cavitary lung disease suspicious for tuberculosis, bleeding from the pulmonary artery, specifically a pseudoanuerysm (Rasmussen's aneurysm) should always be considered, due to its high mortality and the safe and effective treatments that are available.

Images

Image 1. A moderately severe consolidative right upper lobe infiltrate with some volume loss and a small cavitary lesion in the left upper lung lobe.

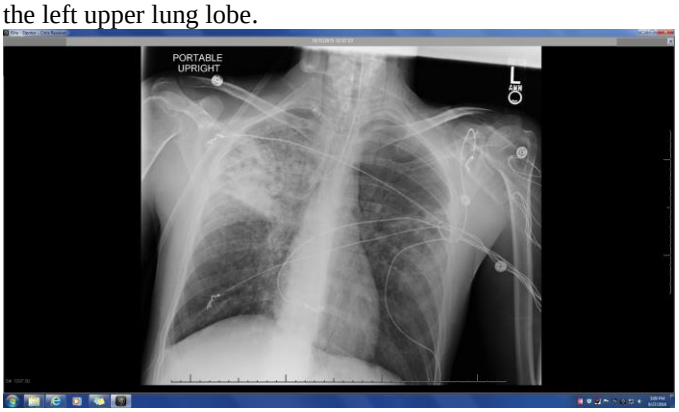
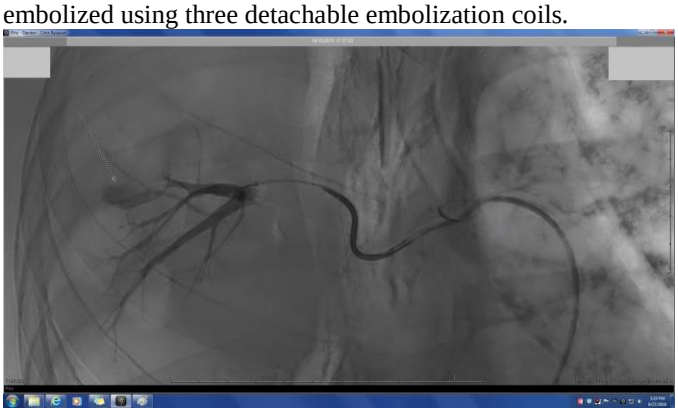


Image 2. A focal abnormality of a subsegmental right upper lobe pulmonary artery.

Image 3. A focal pseudo-aneurysm supplied by a right upper lobe subsegmental pulmonary artery was identified and embolized using three detachable embolization coils.



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