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Bronchial Artery Embolization for Life-Threatening Massive Hemoptysis in a young female patient: A case report

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Introduction:

Massive hemoptysis is a potentially life-threatening respiratory emergency mandating immediate management. It is defined as expectoration of 300 to 600 mL of blood in a period of 24 hours. The most common etiologies include bronchiectasis, cystic fibrosis, neoplasm, sarcoidosis, tuberculosis, and other infections. While only five percent of hemoptysis is massive, some studies report a mortality rate of up to 80 percent in this subgroup, mainly due to asphyxiation. One of the novel ways to manage the later condition is trans-arterial embolization of the bronchial artery, which is minimally invasive, well tolerated relatively safe procedure. Here we present a case presents with massive hemoptysis due to iatrogenic arteriovenous fistula happened as a complication of previous right middle lobectomy treated successfully by coils.

Case presentation:

A 25-year-old female patient, a known case of right middle lobectomy 3 years ago due to lobar bronchiectasis presented complaining of less than one day of dyspnea and hemoptysis which was moderate in amount of fresh red blood, there was no fever, cough, recent history of upper respiratory tract infection, chest pain, symptoms of deep vein thrombosis, or anticoagulant use. On examination, the patient was generally ill, conscious, oriented, with average body built, without pallor, not in respiratory distress. She was vitally stable as the blood pressure was 100/65 mmHg, the pulse was 90 beats per minute, respiratory rate was 21 per minute, and temperature was 38.2 C.. Chest examination

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revealed decreased breath sounds on the right lung, no added sounds and otherwise it was normal. The cardiovascular system examination, neurological examination, abdominal examination, lower limbs examination was normal. Complete blood count was done, and it revealed: hemoglobin level of 14.6 mg/dl, platelet 186.000 per microliter and white blood cells count of 4100 per microliter. Coagulation studies were slightly abnormal as the PT was 15 seconds, and the INR was 1.28.

The patient was admitted to female medical ward for observation and follow-up, few hours after the admission, the hemoptysis increased in amount to be massive about 100 ml per hour. On

examination, the patient looked more ill, but still conscious, oriented, vitally stable, in respiratory distress. Chest examination revealed decreased breath sounds on the right lungs, no added sounds and otherwise it was normal.

Computed Tomography angiography scan of the lungs showed a rounded vascular mass on the right lung which diagnosed as arterio-venous fistula, otherwise both lungs were normal, and no signs of pulmonary embolism in the pulmonary arteries, Figure 1. Ultrasound for both lower limb veins was done and it was normal. A bronchoscopy was done, and showed blood coming from the left main bronchus.



Figure 1 CT angiography for the chest showing a rounded vascular mass with a feeding artery.

The patient continued to deteriorate despite the medical management that was started at the admission which is both inhaled and IV tranexamic acid 500 mg every 8 hours, the hemoglobin level dropped to 9.5 mg/dl, platelets was 208000 per microliter, and the same coagulation profile. As a result, the was referred to the intensive care unit for more care and follow up and packed red blood cells transfusion. As a last resort, endovascular consultation was obtained, and the patient was referred to our department for endovascular embolization of the

right bronchial artery. Pre-procedure preparation with hydration was performed. A 6 French sheath was inserted into the right Femoral artery, and a 6 French right catheter was introduced and aortogram was done to look for the site of the right bronchial artery. After determining the origin of the right intercostal-bronchial artery, which divides into a bronchial branch and intercostal branch which gives a radicular branch to the spinal cord.

Then super selective cannulation of bronchial artery was done by A 2.4 French micro catheter

was advanced into the bronchial artery to escape from the radicular branch and showed the arteriovenous fistula clearly, following that, three (2mmx3cm) coils were used to totally

occlude the bronchial artery and control the bleeding. At the end of the procedure, control angiography showed totally occluded right bronchial artery and no more flow into the AVM.

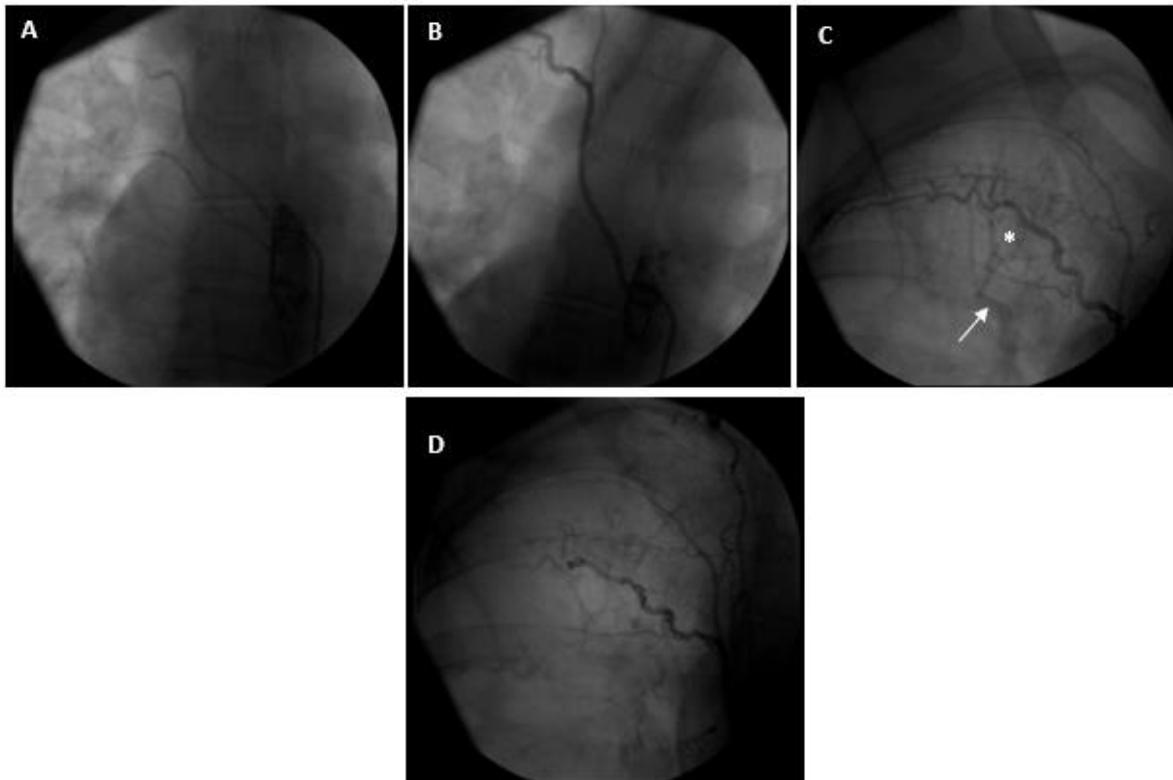


Figure 2 aortogram showing the anatomy of the bronchial arteries in A. B, & C the bleeding bronchial artery is identified, and the asterisk is on the vascular mass shown in the CT angiography, arrow shows the site of the fistula. D is control angiography shows that the bleeding has stopped after placement of 3 coils.

Discussion:

Hemoptysis is coughing up blood from the respiratory tree. The causes of hemoptysis are diverse, and can be classified according to body systems with the most common causes are from the respiratory system as follows: inflammation of the bronchi i.e acute bronchitis, chronic bronchitis, bronchiectasis, lung cancer, arteriovenous malformation in the lungs, hematological as bleeding diathesis, rheumatological causes as alveolar hemorrhage in systemic lupus erythematosus, or medication adverse effect as streptokinase, antiplatelets or others [1].

Hemoptysis can be classified as mild which is about 100ml of blood per day, and it is tolerated

by the patient and self-resolving as the case of acute bronchitis; or it could be major defined as more than 300ml in 24 hours period, or when hemoptysis lead to 1mg/dl drop in hemoglobin level [2], or exsanguinating, life-threatening hemoptysis when it is more than 1000cc per 24 hours [3].

The lungs are supplied by two separate circulations: the systemic circulation through the bronchial arteries, and the pulmonary circulation through the pulmonary artery. The bronchial arteries are branches of the aorta that arises at the level T3 to T8 thoracic vertebra, with 70% arising from the T5 to T6 level[4]. The bronchial circulation is a high-pressure circulation comparing to pulmonary circulation, as a result,

the bronchial arteries are responsible for about 90% of massive hemoptysis cases [3].

The bleeding from one of the bronchial arteries can be managed by minimally invasive trans-arterial embolization of the bleeding artery. This is to selectively cannulate the intercosto-bronchial trunk and to be sure that the spinal branch of that trunk is free and no embolized [4]. This procedure is a simple procedure and the technical success reaches 80-100%, unless the patient is uncooperative, or the patient has anatomic variants that are difficult to cannulate [2]. Although the long-term follow-up after bronchial artery embolization is excellent [5], there are many complications of the procedure with chest pain is the most common one about 90%, followed by dysphagia 12% and they resolve spontaneously, and subintimal dissection of the aorta or the bronchial artery during the procedure which is minor and asymptomatic [6]

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