

Successful Surgical Management of A Large Ectatic Bronchial Artery Producing Hemoptysis

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How to citation this article: Dr. Priyanka Sarkar, Dr. Amarjyoti Rai Baruah, “Successful Surgical Management of A Large Ectatic Bronchial Artery Producing Hemoptysis”, IJMACR– August – 2026, Volume – 9, Issue –4, P. No. 804 – 808.

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Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Bronchial artery ectasia is a rare anomaly of the bronchial artery. It is a key cause of massive hemoptysis. Accurate diagnosis of the condition and intervention can be lifesaving. We report a case of a 51-year-old male who presented with massive hemoptysis on and off since one and half year, with breathlessness preceding the hemoptysis episodes.

There was no previous history of Bronchiectasis, pulmonary tuberculosis, chronic obstructive pulmonary disease. CT pulmonary angiography revealed ectatic left bronchial artery supplying left lower lobe. Intra operatively the findings were confirmed. Postero lateral thoracotomy, division and ligation of the ectatic bronchial artery was done. Postoperative course was uneventful. Ectatic bronchial artery is one of the rare conditions resulting in massive hemoptysis in the setting

where no underlying lung etiology is known and the diagnosis may be often missed without proper evaluation. Effective surgical management needs to be under taken in cases of hugely dilated ectatic bronchial artery.

Keywords: Ectatic Bronchial Artery, Massive Hemoptysis, Alveolar Haemorrhage, Ct Pulmonary Angiography, Surgical Management

Introduction

Bronchial artery ectasia is a rare anomaly of the bronchial artery¹. It can cause massive hemoptysis. The etiology of bronchial artery hypertrophy remains idiopathic in 3.4% of patients presenting with massive hemoptysis². Cases of bronchial artery ectasia with no underlying cause being subjected to surgical intervention is also very rare. Most cases may undergo interventional radiology procedures such as bronchial artery

embolization unless contraindicated. Surgery is done in failed embolization or recurrent cases ³. However, the prevalence of such cases and appropriate diagnosis remains the cornerstone for the prevention of mortality. Though the evidence in the literature explaining the bronchial artery ectasia in the setting of unknown etiology remains inadequate, the present case report provides an insight to this scenario.

The normal bronchial arteries are small vessels originating from the descending thoracic aorta usually at the T5-T6 vertebral plane, 1-2 cm above or below the carinal level. Right bronchial arteries arise from postero medial aortic wall and left bronchial arteries from the anterior or lateral aortic wall from descending thoracic aorta. The bronchial arteries may have ectopic origin from aortic arch, subclavian artery, thyrocervical trunk, internal mammary artery, coronary arteries. They supply the bronchi, visceral pleura, esophagus, vasa vasorum of pulmonary arteries. Normal diameter is less than 1.5 mm near the origin and less than 0.5 mm distally, as they ramify in the pulmonary hila. Bronchial artery enlargement can be recognized when its calibre exceeds 2 mm, increasing the risk of clinically significant hemoptysis. The four most prevalent patterns of bronchial artery anatomy (Caldwell patterns): Type 1 (41%) - 2 left, 1 right as inter costal bronchial trunk, Type 2 (21%) - 1 left, 1 right as inter costal bronchial trunk. Type 3 (21%) - 2 left, 2 right (one as inter costal bronchial trunk), Type 4 (10%) - 1 left, 2 right (one as inter costal bronchial trunk), Common bronchial trunk (unknown incidence) ^{4,5}

The lungs have a dual vascular supply- pulmonary and bronchial. The pulmonary arteries have a major role in gas exchange, delivering deoxygenated blood to the lung. The bronchial arteries have a supportive role, with

much thinner caliber than the pulmonary arteries and they carry oxygenated blood to the bronchial tree, large blood vessels, lymph nodes, esophagus and pleura. The bronchial arteries have distal micro vascular Anastomoses connecting to the pulmonary arterial system. Some diseases may lead to impairment of the pulmonary circulation. Bronchial arterial circulation usually supplies 1 % of the cardiac output to the lungs. In response to any pulmonary insult, bronchial arteries can enlarge significantly due to the property of plasticity possessed by the bronchial arteries. These enlarged bronchial arteries can supply around 30 % of the cardiac output to the lungs. Impairment in pulmonary circulation, may result in dilatation of distal bronchial to pulmonary artery anastomosis, resulting in risk of bronchial artery rupture with subsequent pulmonary haemorrhage ⁴.

Patients present with dyspnea; hemoptysis usually moderate to massive. Patient may have cough, fever if underlying infection/inflammation present, also may have signs of shock. Bronchoscopy is done at presentation. Diagnosis usually confirmed by CECT Thorax with CT pulmonary angiography, which is the gold standard.

It shows the lung parenchyma and pulmonary, bronchial vasculature.

Normal bronchial arteries are difficult to detect in CECT unless enlarged ^{1,4,5}. Bronchial artery embolization can be done for the bronchial artery ectasia which are enlarged >2 mm. [6] If contraindicated or recurrence or failed embolization, then surgical intervention is required. Surgical procedures commonly done are postero lateral thoracotomy, VATS (Video assisted thoracoscopic surgery), lobectomy depending on the respective patient scenario.

Case Presentation

A 51-year-old man presented with a 1.5 year history of progressive breathlessness accompanied by recurrent episodes of hemoptysis. Over the past six months, the frequency and severity of hemoptysis had increased, with the most recent 3-4 episodes classified as massive. Notably, there was no associated history of cough, chest pain, or fever during these episodes. There was no history of tuberculosis, pneumonia, Bronchiectasis, chronic obstructive pulmonary disease, or congenital heart disease.

The patient reported no history of weight loss or loss of appetite. Personal and family histories were unremarkable. General examination was normal-no histories of pallor, icterus, clubbing, lymphadenopathy, edema, vitals signs were within normal limits. Systemic examination revealed equal bilateral air entry without wheezes or rhonchi. Cardiovascular, neurological, and abdominal examinations were unremarkable.

Investigations were done pertaining to the case. Initially blood investigations especially complete blood count, coagulation profile were done which were within normal limits. Chest X ray was done which was normal. Flexible Bronchoscopy was done which revealed no impacted clots or abnormality in bronchial tree.

Computed Tomography (CECT) Scan with CT pulmonary angiography was done which revealed - Dilated and tortuous (ectatic) left bronchial artery measuring approx 13 mm in diameter arising from the left Antero lateral aspect of the descending thoracic aorta at the level of T9 vertebral body supplying the left lower lobe, patchy area of adjacent ground glass opacities were noted in basal segments of left lower lobe suggestive of diffuse alveolar haemorrhage, pulmonary vasculature was normally outlined without any dilatation, filling

defects or abrupt cut off, there was no evidence of thrombus, aneurysm or dissection noted in pulmonary artery or its branches, cardiac chambers were normally outlined with normal cardiothoracic ratio.

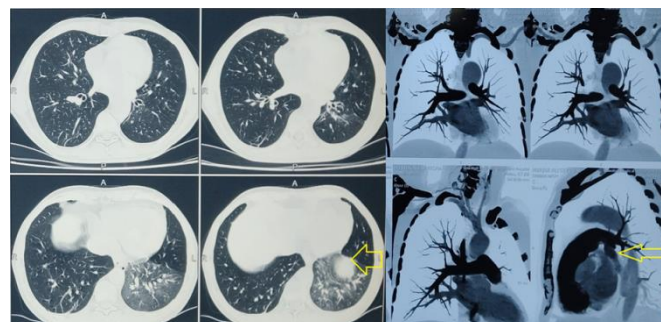


Figure 1: CECT Thorax and CT pulmonary angiography showing left lower lobe alveolar haemorrhage and left ectatic bronchial artery

Sputum for C/S, Pulmonary Function Test, and 2D Echocardiography was done and no abnormality could be detected.

Based on the clinical presentation, imaging findings, the patient was diagnosed having ectatic bronchial artery causing alveolar haemorrhage, but no other underlying cause could be detected. Intervention radiology opinion was taken but they referred back the patient to our department. The cause of the referral was the level of origin (T9) of the ectatic bronchial artery, because in some cases the anterior spinal artery receives part of its blood supply from the Medullary branch, artery of adamkiewicz which has variable origin from T5 - L1 but most commonly from T8 to L1 level. In 5 % of the population right inter costal bronchial artery contributes to artery of Adamkiewicz.

The left bronchial arteries rarely contribute the anterior spinal artery.⁷ Moreover these branches may be not evident in CT angiography.⁸ There could be failure of target vessel occlusion which could then lead to catastrophic consequences.

So we planned to go ahead for surgical intervention.

Surgical Approach and Intra operative Techniques.

Posterolateral Thoracotomy: Under general anesthesia, the patient was positioned in the right lateral decubitus position. Thorax was entered through left posterolateral thoracotomy.

The left lower lobe was inspected. Careful dissection identified an ectatic left bronchial artery arising from the descending thoracic aorta and supplying the left lower lobe. The vessel was dissected free from the adjacent pulmonary vein, and adequate proximal and distal control was obtained using silk 1-0 ligatures.

The artery was then divided using an Endoscopic Linear surgical stapler with a green cartridge. Hemostasis was secured, the lung re-expanded well, and a 28-F inter costal drain was placed. The thoracotomy was closed in layers. The postoperative course was uneventful, with follow-up chest radiographs obtained postoperatively and on day 3.

The inter costal drain was removed on postoperative day 8, sutures were removed on day 10, and the patient was discharged on day 11.

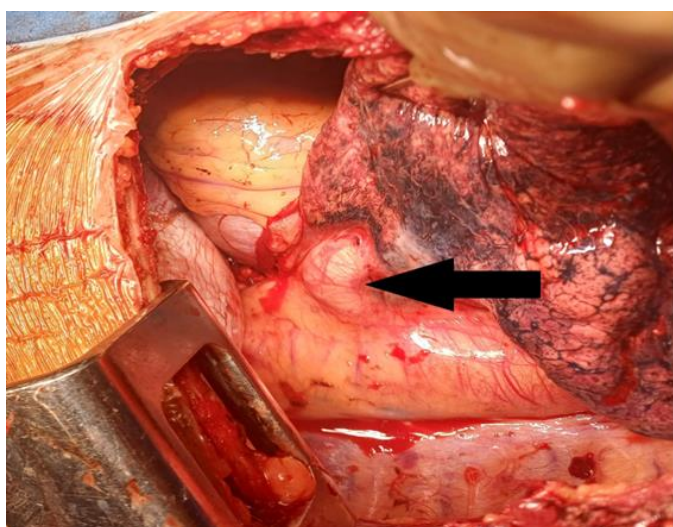


Figure 2: Intraoperative picture of left ectatic bronchial artery

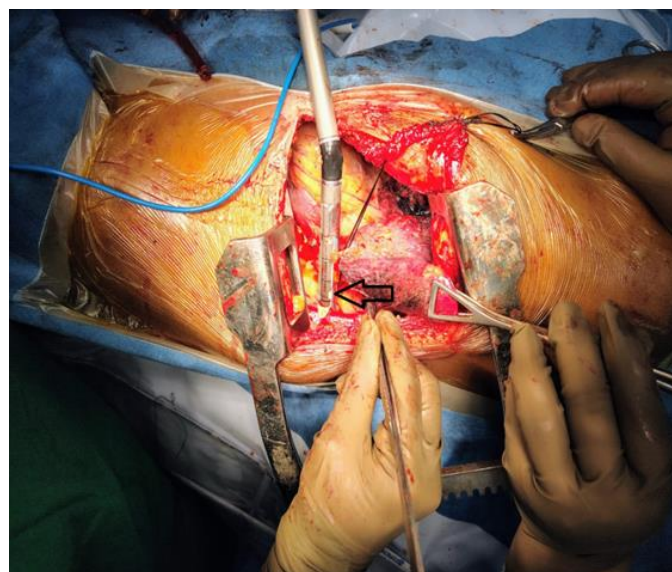


Figure 3: Endoscopic linear surgical stapler used for division of ectatic bronchial artery.

Discussion

The diagnosis of bronchial artery ectasia is essential and may be missed in the absence of any associated underlying lung condition at the time of presentation² or the absence of previous history of chronic lung pathology or symptoms. Imaging studies are crucial for diagnosis.

CT angiography identifies the bleeding source⁹. Surgical interruption of the hugely dilated ectatic bronchial artery is necessary to prevent further episodes and lifesaving for the patient.⁵. In our present case, patient was hemodynamic ally stable on presentation to our centre, bronchoscopy done, cect thorax with angiography done where ectatic bronchial artery with alveolar haemorrhage was seen with no other underlying lung etiology, so division and ligation of the ectatic bronchial artery supplying the left lower lobe was done by postero lateral thoracotomy. Postoperatively patient recovered well with no recurrence on short-term follow up after 1 month and at 3 months respectively. Thus surgical intervention prevents morbidity and mortality in the present case.

Conclusion

Ectatic bronchial arteries require to be diagnosed at the earliest and subjected to appropriate treatment, which could prevent the mortality. By preventing the blood supply from the ectatic bronchial artery to the corresponding lobe of lung, the further complications could be prevented. When no other therapeutic option is possible, surgical intervention for an ectatic bronchial artery may achieve favourable outcomes and reduced risk of recurrence during follow - up.

Consent

Written informed consent was obtained from the patient for publication of this case report. No ethical clearance required as stated by our institution for the case report.

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