

Case Report

Multidisciplinary Management of Lung Destruction Presenting with Massive Hemoptysis and Asphyxia

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Abstract: Lung destruction with massive hemoptysis is a life-threatening condition associated with a poor prognosis in the absence of prompt management. Asphyxia due to the flooding of the airways rather than exsanguination is usually the cause of death, so the initial treatment is resuscitation and protecting the airway. Prompt identification of its causes and location is mandatory to do an adequate treatment and to avoid fatal complications. We describe the case of a patient who was an emergency admission with large volume hemoptysis and asphyxia. After lung destruction was confirmed the cause of massive hemoptysis by a chest computed tomography (CT). She underwent bronchial artery embolization (BAE) and controlled the bleeding. But due to recurrent bleeding two days later, she performed pneumonectomy and achieved hemostasis. BAE is now considered as first-line therapy or may be used as a tool to stabilize the patient before surgery. Emergency pneumonectomy is indicated for lung destruction with recurrent hemoptysis not controlled by embolization and is generally considered a last resort.

Keywords: Massive Hemoptysis, Destroyed Lung, Pneumonectomy, Surgery, Embolization

1. Introduction

Lung destruction is an uncommon condition, and results in irreversible changes in the lung parenchyma and gives rise to chronically morbid and sometimes acute complications such as massive hemoptysis. This complication is a life-threatening condition associated with a poor prognosis without prompt treatment. The initial management is resuscitation and protecting airway [1]. Prompt identification of its causes and location by CT and bronchoscopy is mandatory to do an adequate treatment and to avoid fatal complications [2]. BAE is the most effective and minimally invasive procedure for managing massive hemoptysis or may be used as a tool to stabilize the patient before surgery, so it is now considered as first-line therapy, but there is possibility of recurrent bleeding [3]. Emergency pneumonectomy is indicated for lung destruction with recurrent hemoptysis not controlled by embolization and is generally considered a last resort [4]. We

herein report a case of emergency management for left lung destruction with massive hemoptysis and asphyxia of a 48-year-old woman.

2. Case Report

2.1. Clinical Course of the Illness

A 48-year-old woman was presented to our emergency department an hour after abrupt onset of spitting a bowl of red blood. She had a sensation of choking and quickly developed into unconscious, dyspneic, restless and markedly cyanotic. She has a normal work and is a life long nonsmoker. She had a history of pulmonary tuberculosis (TB) 27 years ago. On ambulance she had hemoptysis about 300ml again and was severe dysphoric, with BP of 140/90 mm Hg, pulse of 126 beats/min, and respiration of 26 breaths /min and oxygen saturation of 22% on ambient air and underwent first aid treatment.

2.2. Presentation upon Admission

Upon Admission, the patient was cyanotic with respiratory distress. Physical examination revealed left deviation of the trachea and unclear auscultation of left lung field. Laboratory studies showed a hemoglobin value of 11.7g/dl, leukocyte of $11.9 \times 10^9/L$, platelet of $300.0 \times 10^9/L$. Prothrombin time was 14.3 seconds (9.7-12.8 seconds) with INR of 1.25 (0.85-1.10).

Arterial blood gas analysis revealed a pH of 7.15, $Paco_2$ of 75mm Hg, Pao_2 of 50 mm Hg on ambient air. She was immediately intubated to aspirate about 600ml bloody fluid and her condition obtained a little improvement. She performed a chest CT which showed entire consolidation of the left lung with residual cystic bronchiectasis and cavitory lesions (arrow), as well as herniation of the right lung toward the left hemithorax (arrow).

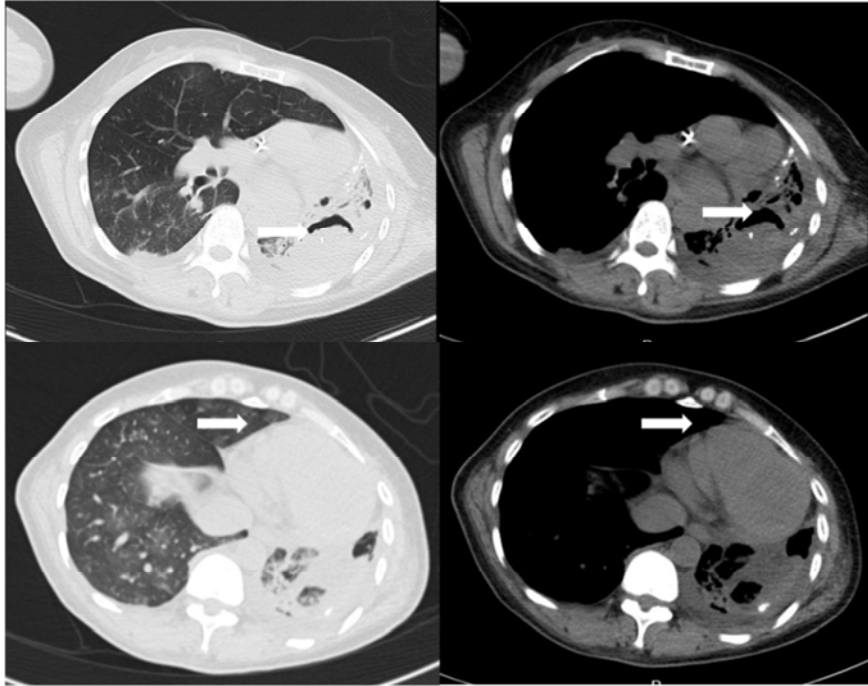


Figure 1. Preoperative chest CT scan.

Figure 1 Preoperative chest CT scan (axial view) showing entire consolidation of the left lung with residual cystic bronchiectasis and cavitory lesions (arrow), as well as herniation of the right lung toward the left hemithorax (arrow).

2.3. Clinical Course After Admission

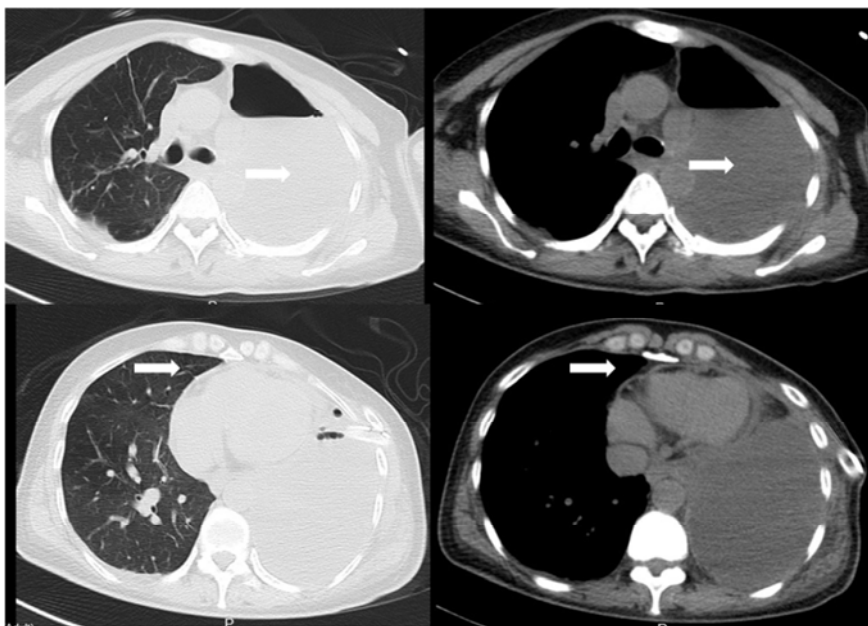


Figure 2. Postoperative chest CT scan.

Figure 2 Postoperative chest CT scan (axial view) showing left pleural effusion (arrow) secondary to pneumonectomy and relocation of the mediastinum (arrow) on postoperative day 9.

The patient underwent BAE when bronchial angiogram revealed two branches of an enlarged left bronchial artery and controlled the bleeding. Bed-side bronchoscopy revealed a mild bleeding in narrowing of left main bronchus. But two days later she suddenly expectorated about more than 400ml bloody fluid within endotracheal tube. Persistent hemoptysis despite appropriate embolization of the systemic arteries suggests a pulmonary arterial or other source of bleeding. So she underwent emergency pneumonectomy. During thoracotomy many collateral vessels were identified to ligate after dissection of pleural adhesions around cavity space and high fibrous thickening at the hilum. Her postoperative course has been uneventful without bleeding. Chest CT showed a left pleural effusion and relocation of the mediastinum on postoperativeday 9 (figure2). Histologic evaluation of the specimen showed lung destruction with cystic bronchiectasis and fungus ball and no positive finding of TB. She go back to work with best recovery at follow-up of 5 years.

3. Discussion

Lung destruction is an end-stage phenomenon prone to serious complications and irreversible changes in the parenchyma. The involved lung is nonfunctional, with demonstrable absent perfusion and ventilation and important sequela was always induced. The causes of destroyed lung include bronchiectasis, tuberculosis (TB), lung abscess, necrotic pneumonia, pulmonary infarction, fungal infection, bronchial stenosis, and congenital lung disease, of which the most common causes were bronchiectasis and TB [1, 5, 6].

The most common presenting symptom was recurrent cough, followed by repetitive hemoptysis or bloody sputum, purulent sputum, and dyspnea. Sometimes it gives rise to massive hemoptysis (16.8%), whose cumulated volume of blood is more than 200 ml per hour or more than 600 ml in 24 hours [2, 7, 8]. It has multiple causes usually categorized under parenchymal diseases, airway diseases, and vascular diseases. Bronchial arteries are the principal source of bleeding (90%) and pulmonary arterial origin of hemoptysis is possible (5%). In normal conditions the diameter of bronchial arteries is less than 1.5 mm at the origin and less than 0.5 mm more distally. They are usually considered hypertrophic and a potential source of hemoptysis when larger than 2 mm at the origin. Complex capillary anastomoses exist between the pulmonary arteries and the systemic bronchial arteries, while chronic inflammatory disorders, such as bronchiectasis, TB, lung abscess, as well as in neoplastic diseases, the release of angiogenic growth factors promote neovascularization and pulmonary vessel remodeling, with engagement of collateral systemic vessels. These new and collateral vessels are fragile and prone to rupture into the airways. Persistent hemoptysis despite appropriate embolization of the systemic arteries suggests a pulmonary arterial source of bleeding. Hemoptysis

may also arise from nonbronchial systemic arteries (5%). Otherwise bleeding can coexist, or cannot be determined in some patients [1, 2].

Lung destruction with massive hemoptysis is a life-threatening condition associated with a poor prognosis in the absence of prompt management. Asphyxia due to the flooding of the airways rather than exsanguination is usually the cause of death. The mortality rate from untreated one is more than 50%. So the initial management involves resuscitation and protecting the airway. Prompt identification of its causes and location is mandatory to do an adequate treatment and to avoid fatal complications [2, 4]. Bronchoscopy is helpful for identifying active bleeding and for checking the airways such as deformation, narrowing or blockage of main bronchus and the segmental bronchus and patients with positive bronchoscopic brushing mycobacterium TB. But severe bleeding can hinder the visualization of airways, while lavage or the use of endoscope itself may cause bronchial mucosa irritation and recurrent bleeding. The chest CT represents a noninvasive and highly useful imaging tool to reveal the degree of pulmonary destruction, narrowing of intercostal space, and translocation of the mediastinum to the affected side and allows a comprehensive evaluation of the lung parenchyma, airways, and thoracic vessels. Nevertheless, its limitation is in characterizing lesion such as endobronchial blood clots that may mimic a tumor. So chest CT combined with bronchoscopy is necessary in assessing patients with hemoptysis. Digital subtraction angiography (DSA) is now reserved for patients whose endovascular treatment has to be attempted [9, 10].

The application of definitive and specific treatments is to prevent massive or fatal recurrent bleeding. BAE reduces the pressure in the fragile hypertrophic arterial vessels supplying the pathological lung areas and decreases the risk of perioperative bleeding. Endovascular embolization is considered as first-line therapy and the most effective and minimally invasive procedure for managing these patients, with an immediate control of bleeding in 66% to 90% or it may be used as a tool to stabilize the patient before surgery. But recurrence rate of the bleeding reached from 5% to 20%, because nonbronchial systemic arteries may enter the pulmonary parenchyma through transpleural adhesions due to chronic inflammatory processes or through pulmonary ligaments and anastomose with the pulmonary arterial circulation [3, 11, 12].

The goal of operation in destroyed lung with massive hemoptysis is to resolve complications and to improve the patient's quality of life. But there is some controversy about pneumonectomy for these patients because surgery has been considered a high-risk procedure due to technical hazards and complications, with associated mortality rate ranging from 7% to 18%, which increases up to 40% in emergency. Firm pleural adhesions and high fibrous thickening around the hilum cause some intraoperative difficulties. In addition, the underlying cause of destroyed lung and the compromised clinical status of the patient make the postoperative period a critical time.

Pneumonectomy is indicated for lung destruction with recurrent hemoptysis not controlled by embolization and is generally considered a last option [7, 8, 11].

4. Conclusion

Lung destruction with massive hemoptysis is a life-threatening condition associated with a poor prognosis in the absence of prompt management. Asphyxia due to the flooding of the airways rather than exsanguination is usually the cause of death, so the initial treatment is resuscitation and protecting the airway. Prompt identification of its causes and location is mandatory to do an adequate treatment and to avoid fatal complications. The combined use of chest CT and bronchoscopy provide the best accuracy in evaluating these patients, by providing a comprehensive and accurate assessment of the lung parenchyma, airways, and thoracic vessels. BAE may be used as first-line therapy or a tool to stabilize the patient before surgery. Emergency pneumonectomy is indicated for recurrent hemoptysis not controlled by embolization and is generally considered a last resort.

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