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## Herniation of a Pulmonary Emphysematous Bulla to Contralateral Hemithorax

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### ABSTRACT

*Herniation of an emphysematous bulla is extremely rare. A 55-year-old male patient presented with complains of shortness of breath and cough for the last 10 years which had exacerbated in the last two days. The patient was a diagnosed case of chronic obstructive pulmonary disease. Chest x-ray showed bilateral hyperinflated lung fields along with loss of lung markings in left upper lobe and a thin white line in right upper lobe suggestive of wall of bulla. High resolution computed tomography of the chest revealed anterior herniation of a pulmonary bulla from left to right side across midline. Patient was put on antibiotics, hydrocortisone and aminophylline by intravenous route and nebulization of steroid and bronchodilator. However, the patient expired after 5 days following admission. (Tanaffos2011; 10(3): 55-58)*

**Key words:** *Herniation, Pulmonary bulla, Emphysema*

### INTRODUCTION

Lung herniation is the abnormal protrusion of the pleura covering the lung through the thoracic wall. It can be congenital or acquired, due to injury or surgical intervention. Herniation of an emphysematous bulla is an extremely rare type of lung herniation and very few cases have been reported in the literature (1). Here, we report a case of herniation of left pulmonary bulla in which emphysematous bulla herniated to contralateral

hemithorax across the anterior mediastinum. To the best of our knowledge, only two cases of a pulmonary bulla herniating to contralateral hemithorax are reported in the literature (2, 3).

### CASE SUMMARIES

A 55-year-old male patient presented to us complaining of shortness of breath and cough for the last 10 years which had exacerbated in the last two days. There was no history of fever, chest pain or hemoptysis. The patient was a smoker for the last 30 years. The patient was a diagnosed case of chronic obstructive pulmonary disease and was on inhaled steroid and inhaled bronchodilator for the past 5 years. His vital signs were as follows: respiratory rate: 28/min, blood pressure: 130/80 mmHg and

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pulse rate: 94/min. There was no pallor, cyanosis or pedal edema. On respiratory system examination, air entry had been decreased and rhonchi were present bilaterally on auscultation. Examinations of cardiovascular and gastrointestinal system were normal. Complete blood count, renal function tests and liver function tests were within normal limits. Chest x-ray (postero-anterior view) showed bilateral hyperinflated lung fields along with loss of lung markings in left upper lobe and a thin white line in right upper lobe suggestive of wall of bulla (Figure 1). High resolution computed tomography of the chest revealed anterior herniation of a left pulmonary bulla from left to right side across midline causing volume loss and compression collapse of right upper lobe with resultant shifting of upper mediastinum slightly towards the right side (Figure 2). Electrocardiography revealed P pulmonale along with poor progression of R waves. Spirometry showed obstructive airway disease. The patient was put on antibiotics, hydrocortisone and aminophylline by intravenous route and nebulization of steroid and bronchodilator. But patient expired after 5 days following admission due to respiratory distress. Bullectomy surgery was planned once the patient's dyspnea settled, but the patient expired. The autopsy was not done since the consent for autopsy was not given by patient's attendants.



Figure 1. Chest x-ray (postero-anterior view) showed bilateral hyperinflated lung fields along with loss of lung markings in left upper lobe and a thin white line in right upper lobe suggestive of wall of bulla.

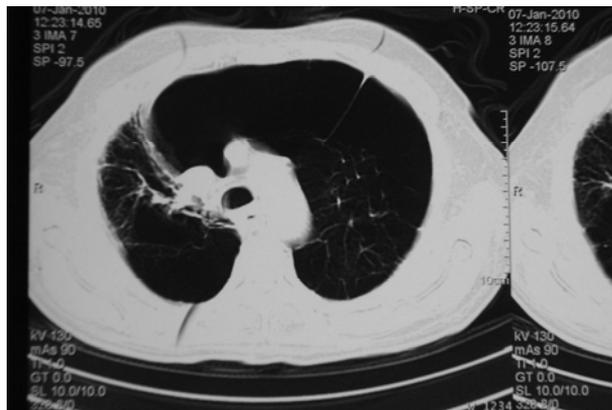


Figure 2. High resolution computed tomography of the chest revealed anterior herniation of a left pulmonary bulla from left to right side across midline causing volume loss and compression collapse of right upper lobe with resultant shifting of upper mediastinum slightly towards the right side.

## DISCUSSION

Pulmonary bullae are pathologically dilated thin walled air spaces distal to the terminal bronchiole measuring more than 1cm in diameter and accompanied by destruction of their walls(4). They are most commonly seen in the upper portions of the lungs, are relatively avascular, and do not participate in gas exchange. Pulmonary bulla can occur in normal lungs but generally occurs in association with generalized emphysema. Most patients with bulla have a significant history of cigarette smoking. Rarely cocaine smoking, pulmonary sarcoidosis,  $\alpha$ -1-antitrypsin deficiency, Marfan's syndrome and Ehlers-Danlos syndrome may be associated with emphysematous bulla (5,6). There are two theories regarding expansion of bulla. According to one theory partial obstruction of airways in an emphysematous lung creates a one way valve mechanism in which air enters the bulla during inspiration but is entrapped in it during expiration leading to gradual enlargement of bulla. However, relatively greater elastic recoil of the adjacent lung parenchyma results in the expansion of bulla. Bulla inflates during respiration due to greater compliance

while adjacent lung parenchyma retracts away from the bulla due to greater elastic recoil resulting in expansion of bulla (6). The bulla may cause compression of surrounding lung parenchyma, atelectasis, and even mediastinal shift. Gradual enlargement of bulla occurs commonly while rarely spontaneous regression may occur (7). Rupture of bulla may result in spontaneous pneumothorax. Herniation of emphysematous bullae is a very rare complication and very few cases are reported in the literature (1). To the best of our knowledge, only three cases of extrathoracic herniation of bulla occurring through a tube thoracostomy site are reported in the literature (1,8,9). Increased intrathoracic pressure generated during coughing bouts can cause herniation of the soft lung parenchyma through a weak site in the intercostal space and subcutaneous tissue. Pulmonary bulla can also herniate in the neck. Weakness of Sibson fascia and neck muscles may contribute to cervical herniation of pulmonary bulla (10). Two cases of mediastinal herniation of pulmonary bulla are also reported (11,12). Extrathoracic herniation of a bulla must be differentiated from a soft tissue neoplasm, a cyst, or an abscess of the chest wall because needle aspiration mostly performed for the diagnosis of these conditions can cause pneumothorax in patients with bulla herniation. An increase in size of the chest wall mass by performing Valsalva maneuver and a decrease in its size by the Muller maneuver can be helpful in diagnosing the bulla. In our patient pulmonary emphysematous bulla herniated to contralateral hemithorax without any obvious cause. Probably increased intrathoracic pressure due to repeated coughing may be the cause. To the best of our knowledge, only two cases have been reported in the literature in which pulmonary bulla herniated to contralateral hemithorax (2,3). Lung herniation to contralateral hemithorax can occur at three locations

which are anterior to ascending aorta, immediately behind the heart and under the ascending aorta (2). In our case, the emphysematous bulla had herniated to the opposite hemithorax anterior to the ascending aorta and under the arch of aorta. Herniation of bulla into the mediastinum or towards contralateral hemithorax can cause compression of trachea and esophagus resulting in dyspnea and dysphagia. In patients with severe emphysema, discrete emphysematous bullae can cause functional impairment of pulmonary mechanics resulting in diminished exercise capacity and even acute respiratory distress. Bullae are best diagnosed by computed tomography. A “double-wall sign” on chest CT, demonstrating air on both sides of the bulla wall, signifies an associated pneumothorax with the bulla (13). Surgical resection is advised if bulla is causing incapacitating dyspnea or giant bullae involving more than 30% of the hemithorax causing compression of healthy adjacent lung parenchyma (14). Resection is also indicated if bulla is infected or ruptures leading to pneumothorax (14).

### **Conflict of Interests**

The authors declare that they have no conflict of interests.

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