The Egyptian Journal of Bronchology

CASE REPORT Open Access

# Lung herniation post-removal of thoracostomy tube

Megha Priyadarshi[1,2], Ved Prakash Meena[1] and Animesh Ray[3*]

**Abstract**

A 30-year-old gentleman presented with complaints of fever, productive cough, and shortness of breath for 10 days. On presentation, he had a right intercostal drainage tube (ICD) in situ in view of chest radiograph findings where hydropneumothorax was suspected. He had a past history of pulmonary tuberculosis 3 years back for which he self-discontinued anti-tubercular therapy after 3 months. He was also diagnosed 2 years back with right pulmonary aspergilloma for which he was receiving anti-fungal therapy. Contrast-enhanced computed tomography (CECT) of the chest suggested right destroyed lung with multiple cavitations, ICD inserted in the right-sided lung cavity, and intracavitatory aspergilloma in the left lung. Hence, it was confirmed that the patient had a lung abscess with pus in a large cavity in the right lung which on chest radiograph had mimicked hydropneumothorax. The patient was subsequently diagnosed with a case of chronic cavitatory pulmonary aspergillosis, and the thoracostomy tube was removed. Post-tube removal, the patient developed lung herniation from the suture site which was confirmed on a CT scan for which the patient was successfully managed conservatively. Follow-up at 3 months did not reveal any evidence of lung herniation.

**Keywords:** Lung herniation, Chronic pulmonary aspergillosis, Thoracostomy

## Background

Extra thoracic lung herniation is a rare entity defined as a protrusion of the pulmonary tissue and pleural membranes beyond the confines of the thoracic cavity through an abnormal opening in the chest wall, diaphragm, or mediastinum.

It can be classified based on anatomical location (cervical, thoracic, and diaphragmatic) or based on etiology (congenital, traumatic, or spontaneous). Thoracic lung hernias are most common with a predominant etiology being traumatic.

We report a case of intercostal lung hernia post-thoracostomy tube removal. Additionally, we also review the literature on the management of lung hernias.

## Case presentation

A 30-year-old gentleman presented to our hospital with complaints of fever, productive cough, and shortness of breath for 10 days. The shortness of breath was insidious in onset, gradually progressive, and occurred even on rest. There was no history of worsening of dyspnea on lying down or association with chest pain and palpitations. The patient was received with a right intercostal drainage tube in situ (inserted from outside the hospital) on the basis of a chest radiograph where hydropneumothorax was suspected (Fig. 1).

Three years before this admission, the patient was diagnosed with pulmonary tuberculosis and initiated category 1 anti-tubercular therapy (ATT), which the patient took 3 months and then self-discontinued and was lost to follow-up. Six months post-discontinuation of ATT, the patient presented with increased shortness of breath where he was diagnosed to have post-tuberculosis sequelae with evidence of aspergilloma in the right lung confirmed with the presence of thickened cavitation on

*Correspondence: doctoranimeshray@gmail.com
[3] All India Institute of Medical Sciences, Medicine Office, 3rd floor, Teaching Block, AIIMS, New Delhi 110029, India
Full list of author information is available at the end of the article

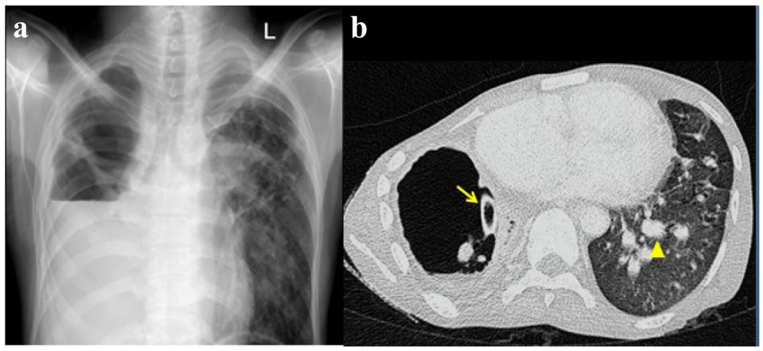


**Fig. 1** **a** Chest radiograph (A-P) view showing volume loss on the right side with demarcated air fluid level, loss of broncho-vascular markings above the fluid, and collapsed underlying lung. There is silhouetting of right hilar shadow. Left lung field fibrotic opacities with cavitatory changes. **b** Contrast-enhanced computed tomography (CECT) chest shows the cicatricial collapse of the right lung with intercostal drainage inside right-sided cavitation with the presence of aspergilloma in the left apical region

computed tomography (CT) chest and positive serum antibody specific for *Aspergillus*. The patient was then started on antifungal therapy, oral itraconazole (200 mg twice daily), since then and was not compliant with the medications.

On examination, the patient appeared to be tachypneic with a respiratory rate of 24 breaths per minute, maintaining saturation of 87% on room air with right ICD in situ and air leakage in the form of bubbles seen in the ICD tube along with significant pus drainage, jugular venous pressure was raised, with a parasternal heave grade III and bilateral pitting pedal edema. Chest expansion was decreased on the right side, with fine crepts heard at the right mammary, axillary, and infra-axillary region.

## Investigations

In view of suspicion of broncho-pleural fistula and persistent oxygen requirement, the patient underwent a contrast-enhanced computed tomography which suggested right destroyed lung with multiple cavitations, ICD inserted in the right-sided lung cavity, and intracavitatory aspergilloma in the left lung (Fig. 2). The pus culture from intercostal tube grew *Pseudomonas aeruginosa*. Sputum and mini-bronchoalveolar lavage (BAL) samples were also sent for bacterial and fungal culture, which came sterile. With decreased output, and clinical improvement in the form of decreasing tachypnea and improving saturation, the tube was removed, 1 week later. Post-removal, a tender swelling was seen over the lower ribs in the right midaxillary line (Fig. 2a). The swelling became prominent on coughing, sneezing, and performing Valsalva's maneuver. The swelling gradually disappeared over the next 1 month.

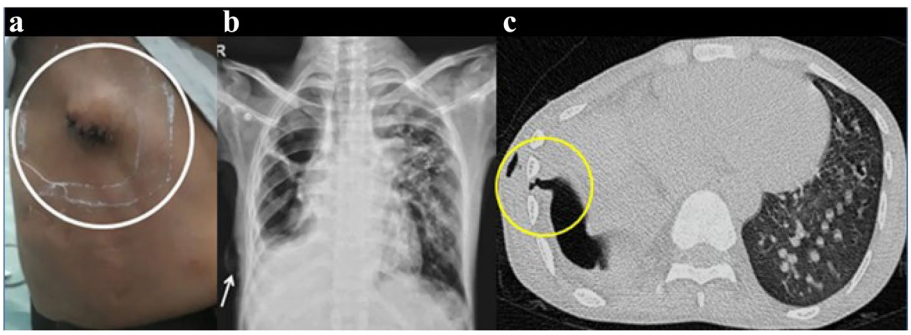


**Fig. 2** **a** A soft reducible mass, prominent on coughing, valselva noted at the site of previous intercostals drainage with overlying sutures. **b** Chest radiograph (A-P) view showing the presence of a tongue of herniated lung tissue at the right base overlying the herniated tissue. **c** CT chest showing the cicatricial collapse of the right lung, tractional bronchiectatic changes in the left lung with cavities in bilateral lungs, and presence of aspergilloma in the left apical region with features of pulmonary arterial hypertension. Pleural dehiscence with lung herniation is seen in the right lung

A repeat chest radiograph revealed a collection of air in the overlying soft tissues of the chest wall in the area of the bulge (Fig. 2b). Computed tomography of the chest suggested features of large cavitation with surrounding atellectasis of the right lung and fibrobronchiectatic changes with a fungal ball in the left apical lung and herniation in the right lung (Fig. 2c). The patient was diagnosed with a case of chronic cavitatory pulmonary aspergillosis based on the characteristic radiological picture and increased IgG-specific for *Aspergillus*. Echocardiography suggested features of severe right ventricular dysfunction with severe pulmonary hypertension.

Surgery was consulted and advised compressive bandaging with no surgical intervention. Repeated bandaging and monitoring for the infection at the ICD site were undertaken.

## Treatment and outcome

In view of lung abscess with culture growing *Pseudomonas aeruginosa*, the patient received intraneous antibiotics for 4 weeks. He was also started on itraconazole for the treatment of chronic pulmonary aspergillosis along with diuretics for systemic congestion due to the right ventricular dysfunction. Since there were no features of increasing size or pain over the site of lung herniation, it was conservatively managed with compressive bandaging. There was a reduction in the size of the swelling, and on follow-up after 3 months, there was no recurrence or pain at the previous herniation site.

## Discussion

This case is unusual as the patient developed herniation of lung post-thoracostomy tube removal which has been rarely reported in the literature. Since the defect in the chest wall was small, the patient was successfully managed conservatively.

Lung herniation, also called pneumocele, was first described in 1499 by Roland. The most accepted classification is of Morel-Lavallee which dates back to 1847 [1]. It has been classified based on the etiology into congenital or acquired forms, on the basis of location as cervical, thoracic, or diaphragmatic hernias and on the basis of the occurrence as spontaneous, post-trauma (penetrating or blunt), or from preceding operative procedure with inadequate closure of the chest wall. According to Hiscoe et al., congenital lung hernias account for 18% of all cases, whereas among the acquired causes, traumatic are most common accounting for 52% of the cases [2].

Lung hernias have been mostly reported anteriorly in the lower intercostal spaces. This is due to the inherent weakness anteriorly, near the sternum, medial to the costochondral junction due to the presence of only a single layer of intercostal muscle in comparison to the lateral chest wall which is covered by the serratus anterior, lattismus dorsi, and intercostals, and the posterior chest wall where the paraspinal muscles provide adequate resistance [3].

The pathogenesis of acquired lung hernia can be attributed to abnormally high intrathoracic pressure or with decreased thoracic wall resistance in patients with developmental or acquired defects of the chest wall. Spontaneous hernias usually develop as a consequence of increased intrathoracic pressure during coughing, sneezing, blowing into a musical instrument, or heavy lifting resulting in rib or cartilage fracture. Predisposing factors for acquired lung hernias include post-operative trauma, chronic obstructive pulmonary disease, morbid obesity, poor healing from malnutrition, and chronic steroid use.

Lung hernia does not usually pose a serious threat unless it undergoes incarceration or strangulation resulting in clinical symptoms of increasing pain at the site of herniation and hemoptysis. An uncomplicated hernia presents as a soft crepitant bulge that enlarges during coughing, deep inspiration, or on performing the valsalva maneuver [4]. Routine chest radiography is unable to detect the herniation unless the hernia is at a true tangent to the X-ray beam. Computed tomography is recommended as it determines the exact location and the dimensions of the hernia and gives valuable information on the associated pleural and parenchymal abnormalities [5].

Controversies still exist regarding the role of conservative management and the indications for surgical intervention in such cases. According to Brock and Heitmiller, if the patient is asymptomatic and has a supraclavicular hernia, no intervention is necessary. However, in a patient with increasing pain, increasing size, and signs of incarceration, with difficulty in reduction of the hernia, surgical management should be undertaken [6]. Among the surgical procedures, pericostal fixation of adjacent ribs has been considered sufficient for the closure of smaller defects while reconstructive procedures hold importance for larger defects. Munnell et al. recommend the use of autologous tissues such as muscle or fascia [7], but various absorbable and non-absorbable materials such as Vicryl, PTFE, Dacron, Marlex, and Gorotex mesh have been tried.

In a retrospective review published in 2008 of 16 patients with lung hernia post-minimally invasive cardiac surgery, the major complaint was pain in 75% of cases, and the diagnosis was confirmed by CT scan in all cases. All patients underwent chest wall reconstruction using Vicryl or Goretex mesh. There were no recurrences reported in follow-up at 3 months and 2 years [8].

An important aspect of this case was the misidentification of the cavity as pneumothorax. Cases of chronic

cavitatory pulmonary aspergillosis (CCPA) may form expanding cavities due to the destructive nature of the disease and may sometimes involve the entire lung [9]. In such a case hyperdense content in the cavity may mimic hydropneumothorax on chest radiograph necessitation use of CT scan to differentiate the two entities.

Among the pulmonary diseases associated with *Aspergillus* species, spontaneous pneumothorax can occur as a common complication with allergic bronchopulmonary aspergillosis (ABPA) but hydropneumothorax is rare [10]. Literature review revealed three such reports of pneumothorax secondary to pulmonary aspergilloma and only one recently published case report of spontaneous pneumothorax in an immunocompromised patient with CCPA has been reported [11].

It is also important to rule out active tuberculosis infection in such conditions as tuberculosis not only is a risk factor for *Aspergillus* colonization but co-infection leads to increased non-responsiveness to the therapy and adds to the morbidity associated with the illness [12].

## Learning points/take-home messages

1. Previous thoracostomy site may prove as a weak point for lung herniation, especially in case of underlying destroyed or cavitatory lung.
2. Uncomplicated hernias can be managed conservatively.
3. Hernia with persistent pain and features of entrapment or strangulation should be managed surgically.

Close monitoring of patients with lung herniation managed conservatively is necessary to rule out features of entrapment or strangulation of lung tissue.

**Acknowledgements**
No acknowledgments

**Authors' contributions**
The patient was managed by MP, VM, and AR. The manuscript was conceptualized by AR, and drafted by MP. MP edited the final manuscript which was approved by VM and AR. The authors read and approved the final manuscript.

**Funding**
There was no funding required for the case report.

**Availability of data and materials**
Not applicable

## Declarations

**Ethics approval and consent to participate**
There was no requirement of ethics approval for the case reports though consent to participate from the patient was taken.

**Consent for publication**
It was taken from the patient.

**Competing interests**
The authors declare that they have no competing interests.

**Author details**
[1]Department of Medicine, All India Institute of Medical Sciences, New Delhi, India. [2]Department of Infectious Disease Medicine, All India Institute of Medical Sciences, New Delhi, India. [3]All India Institute of Medical Sciences, Medicine Office, 3rd floor, Teaching Block, AIIMS, New Delhi 110029, India.

Received: 28 January 2022 Accepted: 10 April 2022
Published online: 25 April 2022

**References**

1. Montgomery JG, Lutz H (1925 Aug) Hernia of lung. Ann Surg 82(2):220–231
2. Pazooki D, Granhed H, Zeratiaan S, Haghighikian M, Hosseini M, Mousavie S, et al (2018) Traumatic extra thoracic lung herniation: a case series and a review of the literature. Int J Dev Res 08.
3. Athanassiadi K, Bagaev E, Simon A, Haverich A (2008) Lung herniation: a rare complication in minimally invasive cardiothoracic surgery. Eur J Cardio-Thorac Surg Off J Eur Assoc Cardio-Thorac Surg 33(5):774–776
4. Scullion DA, Negus R, al-Kutoubi A. (1994) Case report: extrathoracic herniation of the lung with a review of the literature. Br J Radiol 67(793):94–96
5. Brock MV, Heitmiller RF (2000) Spontaneous anterior thoracic lung hernias. J Thorac Cardiovasc Surg 119(5):1046–1047
6. Munnell ER (1968) Herniation of the lung. Ann Thorac Surg 5(3):204–212
7. Temes RT, Talbot WA, Green DP, Wernly JA (2001) Herniation of the lung after video-assisted thoracic surgery. Ann Thorac Surg 72(2):606–607
8. S Kumar S, Ray A, Vikram NK et al (2021) Unusual case of chronic cavitary pulmonary aspergillosis presenting as spontaneous pneumothorax in an immunocompromised man. BMJ Case Rep CP 14:e241655
9. Cavitating lung disease due to concomitant drug resistant tuberculosis and invasive pulmonary Aspergillosis in a post-partum patient: a case report - ScienceDirect [Internet]. [cited 2021 Oct 23]. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0019570715000010
10. Suri T, Makkar N, Ray A, Sood R (2019) A unique case of hydropneumothorax in allergic bronchopulmonary aspergillosis. Med Mycol Case Rep 25:29–31
11. S Kumar S, Ray A, Vikram NK, et al (2021) Unusual case of chronic cavitary pulmonary aspergillosis presenting as spontaneous pneumothorax in an immunocompromised man BMJ Case Reports CP 14:e241655
12. Cavitating lung disease due to concomitant drug resistant tuberculosis and invasive pulmonary Aspergillosis in a post-partum patient: A case report - ScienceDirect [Internet]. [cited 2021 Oct 23]. Available from: https://www.sciencedirect.com/science/article/abs/pii/S0019570715000010

## Publisher's Note