

Cough induced rib fractures complicated by lung herniation

Olaguoque Akinwande, M.D. James Reed, M.D.

Departments of Diagnostic Radiology

University of Louisville School of Medicine

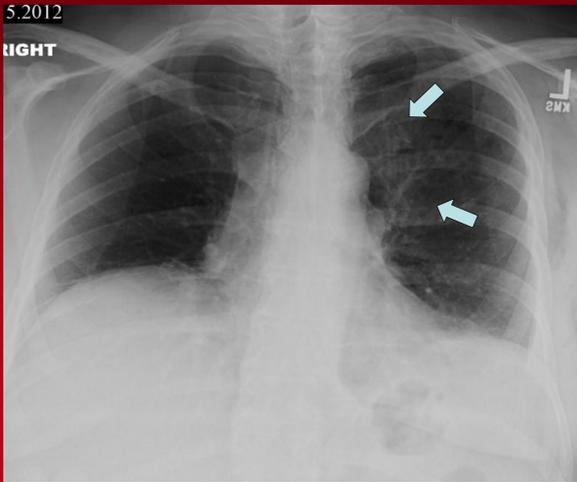
Purpose

This exhibit will present a case of cough induced rib fractures complicated by lung herniation. The goal is to familiarize the audience with the radiographic features as well as to raise the awareness of this condition. The radiographic and CT features will be discussed and a brief review of the literature will be presented.

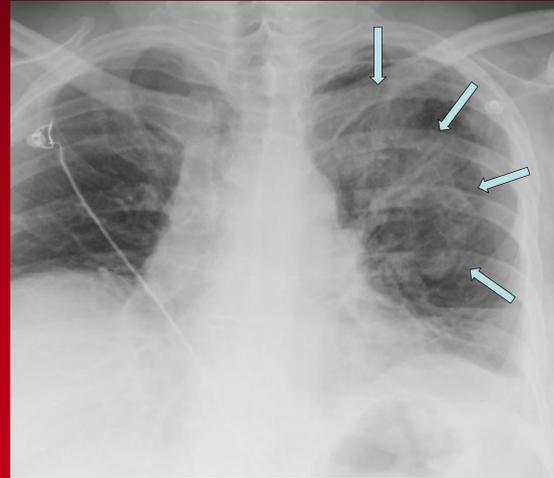
Case Report

Patient is a 51 year old male with a history of chronic cough and significant progression over the few days before presentation. On the day of admission, he felt a "pop" after a coughing spell along with associated chest pain. Initial radiographs from an outlying hospital only demonstrated mild bibasilar atelectasis. A CT scan was performed which demonstrated fractures of the left first and second anterior ribs with a small anterior lung herniation. The patient was then transferred to our institution where a subsequent CT showed the hernia to have significantly enlarged. A small hydropneumothorax and prominent subcutaneous emphysema was also visualized. The patient was taken to the operating room where the lung hernia was reduced via a left open thoracotomy approach. An Atrium C-QUR mesh was utilized to repair the chest wall defect which consisted of multiple comminuted rib fractures. The patient tolerated the procedure well and was discharged in a stable condition.

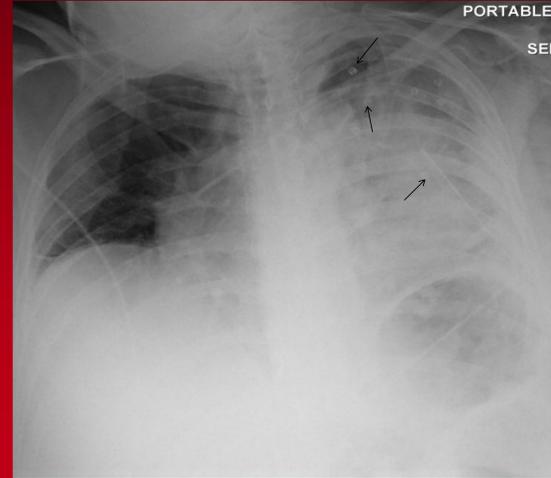
Results



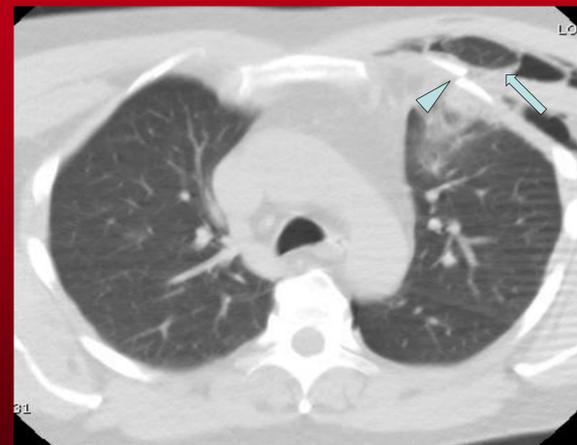
Images performed in the outside facility prior to the patient's transfer to our trauma emergency room. The chest radiograph demonstrates an ill-defined left upper lobe opacity (arrows).



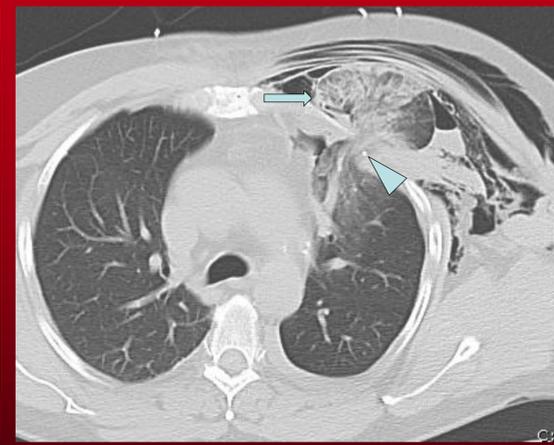
Imaging performed in our facility. Radiograph of the chest shows an enlarging opacity in the left lung (arrows).



Postoperative radiograph of the chest demonstrate small radioopaque structures in the left upper hemithorax from the chest wall mesh repair (black arrows). Opacification of the left lung is related to postoperative hematoma.



CT scan of the chest shows a fracture of the anterior second rib (arrow head). A small segment of lung parenchyma is seen outside the chest wall (arrow).



CT scan of the lung demonstrates an enlarging chest wall defect (arrow head) with increasing lung herniation (arrow) through the defect. There is extensive emphysema involving the left anterolateral chest wall



Postoperative CT scan of the chest again shows the mesh material (black arrows). There is a large amount of hematoma involving the left lung and left anterior chest wall.

Discussion

Lung herniation is defined as protrusion of pulmonary parenchyma with surrounding pleura through a chest wall defect. This in itself is a rare phenomenon, but even more so as a spontaneous event induced by cough. Most cases of lung herniation are traumatic, with spontaneous and pathological cases making up the remaining cases. It is more common in males and in particular, those with chronic lung disease.

Any condition that either causes increased intrathoracic pressure or weakens the integrity of the chest wall can predispose patients to this condition. Coughing increases intrathoracic pressure and chronicity leads to microtrauma which may weaken the chest wall, leading to rib fractures and intercostal muscle rupture. Valsalva maneuver has been reported to accentuate the size of the hernia.

Imaging characteristics on chest radiographs are nonspecific. The literature reports that diagnosis on chest radiographs is determined by visualizing a radiolucent shadow. Instead, our case demonstrated an opacity projecting over the right lung field which may be related to hemorrhage associated with the herniated lung. Computed tomography is more useful in not only confirming the diagnosis but also determining the size of the defect and the location to aid surgical intervention.

There is controversy as to the standard of treatment in these cases. Some advocate initial conservative management as some hernias do spontaneously resolve. However, surgery is the definitive management ensuring sustained reduction with closure of the defect. Surgery may be the primary management for those patients who demonstrate significant pain and increasing size of the hernia. Primary closure or mesh repair can be performed depending on the size of the chest wall defect.

Conclusion

Spontaneous lung herniation can occur in patients with chronic cough after a coughing spell. Morbidity and complexity of surgical repair increases if the hernia extends inferiorly to the abdominal cavity. It is important to be aware of the existence of this condition and how to recognize it.

References

1. Hanak V, Hartman TE, Ryu JH. Cough-induced rib fractures. *Mayo Clin Proc.* Jul 2005;80(7):879-882.
2. Jastrow KM, 3rd, Chu D, Jaroszewski D, Huh J, Bakaeen F. Posterior lung herniation after a coughing spell: a case report. *Cases J.* 2009;2(1):86.
3. Goverde P, Van Schil P, Van den Brande F, Vanmaele R. Chronic herniation of the lung in a patient with chronic obstructive pulmonary disease. Case report and review of the literature. *Thorac Cardiovasc Surg.* Jun 1998;46(3):164-166.
4. Brock MV, Heitmiller RF. Spontaneous anterior thoracic lung hernias. *J Thorac Cardiovasc Surg.* May 2000;119(5):1046-1047.
5. Tack D, Wattiez A, Schtickzelle JC, Delcour C. Spontaneous lung herniation after a single cough. *Eur Radiol.* 2000;10(3):500-502.