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Case Report

Chronic cough causing unexpected diaphragmatic hernia and chest wall rupture

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ABSTRACT

Cough is a defense mechanism for airway protection and is associated with multiple systemic complications such as ribs fracture. Diaphragmatic rupture is commonly caused by blunt or penetrating trauma. We presented a case of a 72-year-old female with a 1-year history of chronic cough, not responding to medical management. Imaging showing abdominal herniation into the thoracic cavity and rib fracture due to diaphragmatic and chest wall rupture. Abdominal herniation and diaphragmatic rupture were repaired through surgery allowing resolution of symptoms. This is a life-threatening condition with a high-mortality rate in which early diagnosis and repair are desirable. Therefore, awareness of this uncommon complication of cough should be acknowledged.

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Introduction

Cough is a physiologic defense mechanism to protect airways from foreign material and secretions. It is one of the most common symptoms responsible for outpatient clinic eval-

uation with approximately 30 million visits annually in the United States. It is classified according to the duration as acute (less than 3 weeks), subacute (3–8 weeks), and chronic (more than 8 weeks). Sustained cough can be associated with multiple complications including cardiovascular, gastrointestinal, genitourinary, musculoskeletal, neurologic, ophthalmologic,

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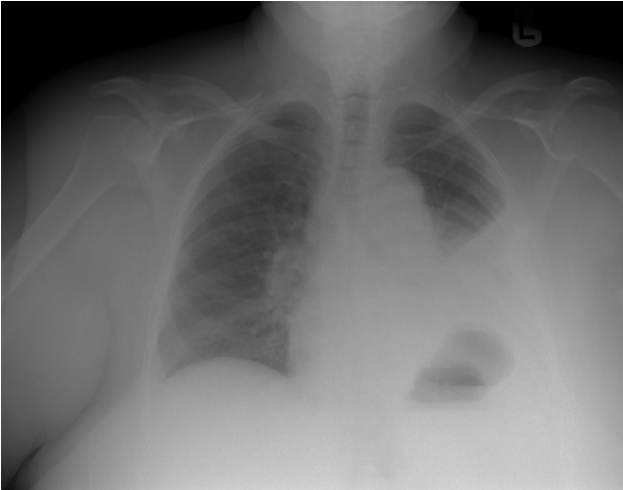


Fig. 1 – Initial chest x-ray demonstrates left-sided diaphragmatic hernia secondary to diaphragmatic rupture.

psychosocial, respiratory, and skin complications [1]. We reported a case with cough-related diaphragmatic rupture which incidence is unknown since condition is rare and many cases likely go undiagnosed.

Case history

A 72-year-old woman G3P3A0 with a medical history of morbid obesity, hypertension, fibromyalgia, diabetes mellitus type 2, and controlled sleep apnea with no toxic habits.

She came to the emergency department with a chief complaint of dry cough and progressive shortness of breath of approximately 1 year of evolution. She mentioned multiple visits to her primary physician as well as to the emergency room without improvement of symptoms during that year. Her treatment included nasal and inhaled steroids, proton pump inhibitors, antibiotics, and expectorants. As she continued with a prolonged forceful cough not responsive to medical management and developed upper chest pain and a tearing abdominal pain radiated to the back. Chest ecchymosis was present alongside with worsening dyspnea, early satiety upon eating, and left breast pain. She denied fever, sputum production, or recent trauma. Within that year, the patient never got a chest x-ray. Initial chest x-ray (Fig. 1) taken 1 year after the beginning of symptoms showed left-sided diaphragmatic hernia secondary to diaphragmatic and chest wall rupture. Subsequent chest CT scan axial view (Fig. 2), coronal view (Fig. 3), sagittal view (Fig. 4), and reconstruction (Figs. 5 and 6) demonstrated evidence of rib fracture, chest wall, and diaphragmatic rupture with a displacement of small and large bowel into the left side thoracic cavity causing left pulmonary collapse. Surgical findings consisted of a chronic large left anterior diaphragmatic hernia with bowel and omentum protruding to the pleura cavity plus subcutaneous detachment of left subcostal cartilage from the sternum as the causative of lung collapse. Afterward, thoracotomy was performed with repair of diaphragmatic rupture, reinforcement with a proline mesh, and chest tube placement for pneumothorax. A 1-week postsurgical follow-up with chest x-ray showing resolved herniation (Fig. 7) and discharge without complications.

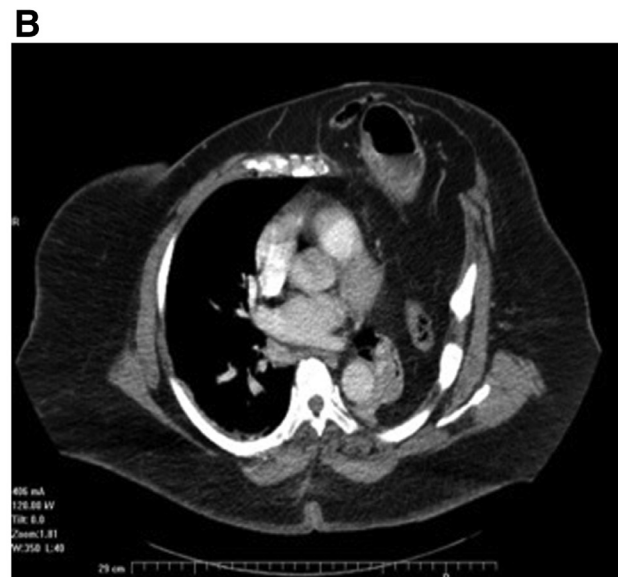
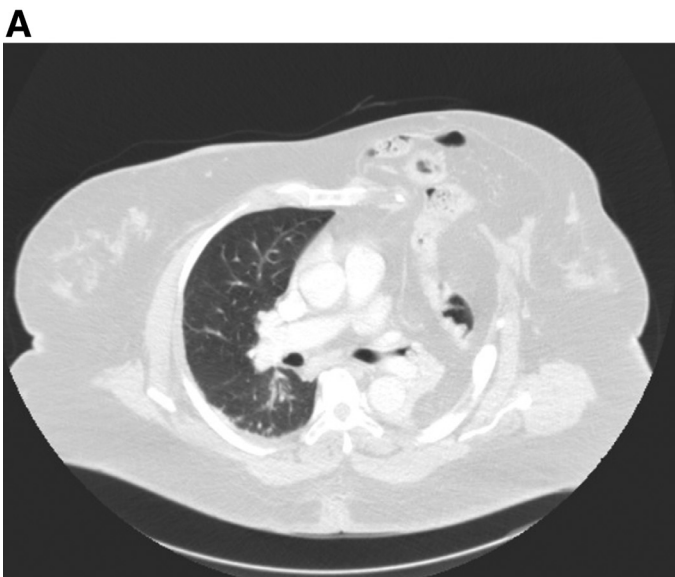


Fig. 2 – Chest CT with evidence of intra-abdominal content in the left hemithorax. (A) Lung window and (B) abdominal window.

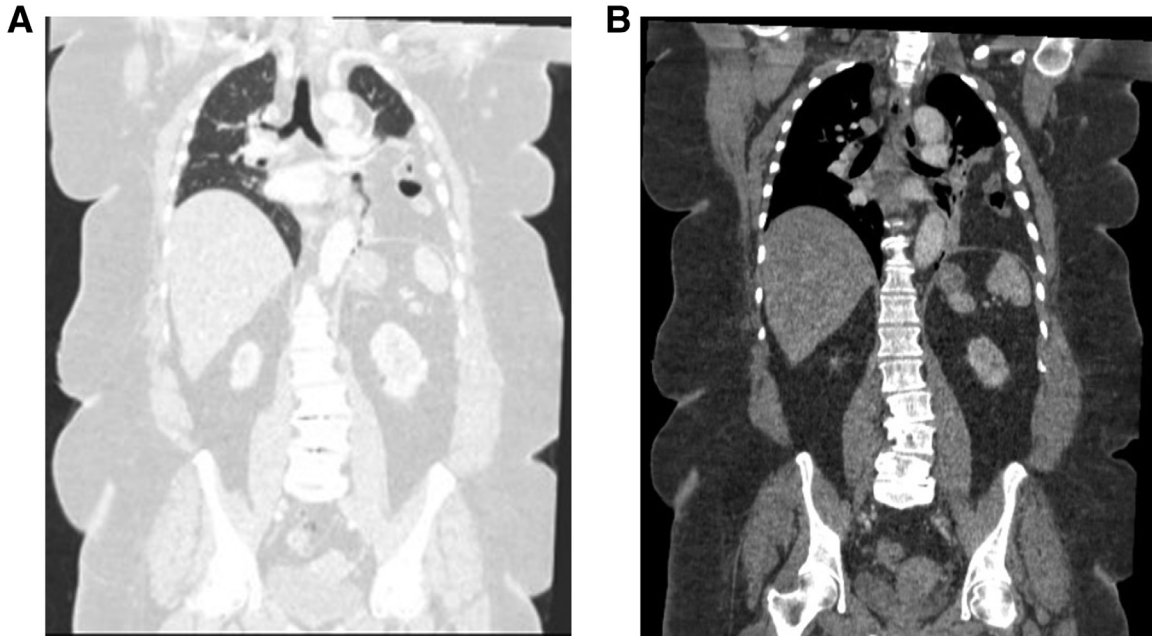


Fig. 3 – Coronal view of intra-abdominal content in the left-sided hemithorax. (A) Lung window and (B) abdominal window.

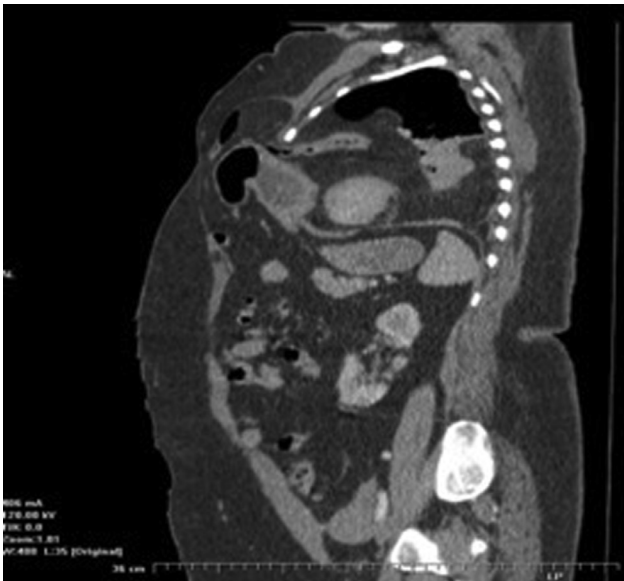


Fig. 4 – Sagittal view with anterior diaphragmatic and chest wall rupture with intra-abdominal content. (Abdominal window.)

Discussion

Diaphragmatic rupture is most commonly caused by penetrating injury or blunt abdominal trauma in 63% and 37% of the cases, respectively [2]. The diaphragm is a dome-shaped muscle, which contracts during the inspiratory phase. Cough valsalva maneuver causes lack of coordination of different muscles of expiration, the muscle of the abdominal wall contract

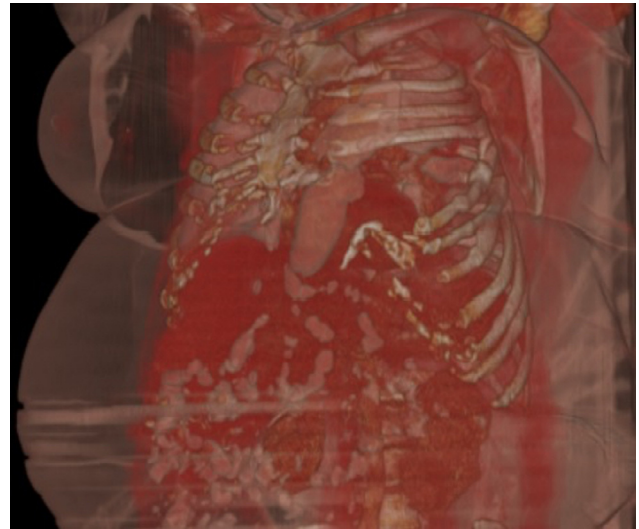


Fig. 5 – Chest CT reconstruction with evidence of a diaphragmatic hernia, rib fractures, and intra-abdominal content of left breast.

pushing the diaphragm upward, whereas the ribs are pushed inward and downward leading to a diaphragmatic rupture [3]. Herniation of bowel loops into the chest can be a consequence of diaphragmatic rupture, which impairs ventilation and oxygen delivery. The true incidence of abdominal organ herniation due to diaphragmatic rupture is unknown since many cases likely go undiagnosed or usually appear delayed.

Diaphragmatic injuries are usually diagnostic challenges. Chest radiographs are the initial and most common imaging study to evaluate the diaphragm. When the results are inconclusive, CT is the next study of choice since it can assess the

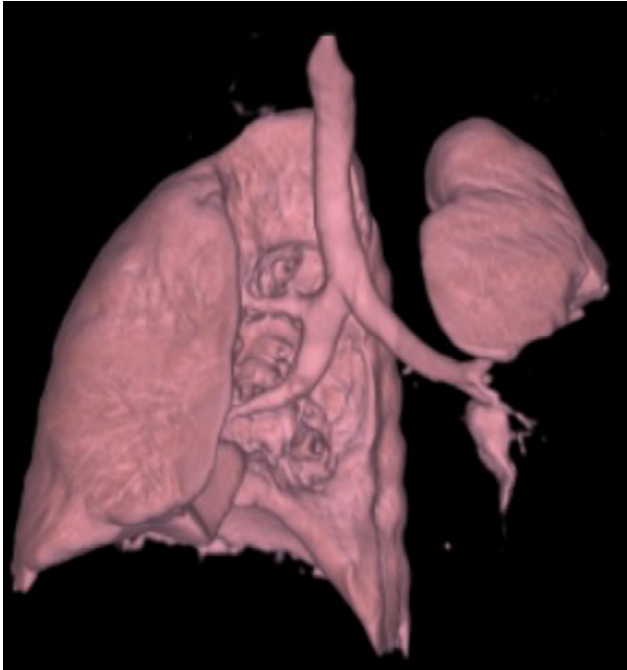


Fig. 6 – Chest CT reconstruction of the lung, remarkable for the left lower lobe collapse.



Fig. 7 – Chest x-ray postanterior diaphragmatic hernia and chest wall abnormality repair.

extent and anatomical sites of coexisting thoracoabdominal injuries [4].

The rate of missed diaphragmatic rupture on chest radiographs ranges from 12% to 66% with the potential risk of a late

visceral herniation through the diaphragmatic defect [5]. The sum of physician unawareness about the diagnosis, and the subtle and nonspecific findings of chest radiography alongside the technical limitations such as supine positioning, use of portable radiography, and limited patient cooperation make the diagnosis difficult through chest radiography alone. However, it remains a valuable imaging option in the acute phase for the detection of diaphragmatic rupture and when CT is not available or cannot be performed [6,7].

Diaphragmatic rupture has an overall mortality rate of 25% as reported by the National Trauma Data Bank. Due to an increased rate of herniation and strangulation of abdominal organs secondary to diaphragmatic rupture, which can be life threatening, early diagnosis and repair are desirable [8–10]. Therefore, physicians should be aware of this uncommon complication of cough.

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