

Spontaneous posterior lung herniation: A case report and literature review

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ABSTRACT

Intercostal lung hernias are uncommon and usually a consequence of trauma or surgery. True spontaneous lung hernias are extremely rare, with only 51 cases identified over the past four-and-half decades. We report a case of nontraumatic chest wall ecchymosis secondary to spontaneous posterior-lateral lung herniation followed by a review of the literature. Interesting radiographic images are presented. The pathophysiology and therapeutic options of this condition are discussed. The case highlights that advanced chronic obstructive pulmonary disease (COPD) may be an etiological factor for the development of this rare entity, with cough being the precipitating event. Given the increasing prevalence of COPD, the authors believe further awareness of this pathology is needed.

KEY WORDS: Chronic obstructive pulmonary disease, cough, and smoking, spontaneous lung herniation

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INTRODUCTION

Lung herniation is defined as a protrusion of lung parenchyma outside of the thoracic cavity through a chest wall defect. This rare condition can be classified both anatomically and by etiology. As early as 1847, hernias were described as cervical, thoracic, or diaphragmatic and either congenital or acquired.^[1] Acquired hernias can be traumatic or pathologic, as a result of a neoplastic or inflammatory process. Lung herniation without antecedent injury is historically considered “spontaneous.” The latter usually is the result of an acute increase in intrathoracic pressure that accompanies coughing, sneezing, and heavy lifting or blowing, causing the lung parenchyma to herniate through an intercostal space. From 1968 to 2000, 16 spontaneous hernias were reported, all of which were described as anterior.^[2] A careful review of the literature

identified twenty more cases from 2000 until the time of this review. We report a case of a spontaneous posterior-lateral hernia presenting as chest wall ecchymosis and provide a review of the literature with associated risks.

CASE REPORT

A 71-year-old male with advanced chronic obstructive pulmonary disease (COPD), 100-pack-year smoking history, on long-term oxygen therapy presented to the hospital reporting 1 week of cough that was productive of yellowish sputum and pleuritic pain. He also had developed a small bruise on his right chest wall 1 day after he began coughing. On the day of admission, he awoke with an extensive bluish discoloration and swelling of his right chest. Cough and inspiration worsened his

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swelling. He denied fever, chills, sweats, weight change, or hemoptysis, noticing that, a week earlier, he received antibiotics and oral steroids for acute bronchitis. He was not anticoagulated, and cilostazol was the only relevant medication. He denied any easy bleeding, previous/current chest trauma, or surgical intervention. Chest examination revealed diffuse wheezing bilaterally and decreased breath sounds over the right lung base. A mildly tender hematoma extended from his right mid axilla to his iliac crest. A computed tomography (CT) scan of the chest demonstrated a right lower lobe lung herniation between the 8th and 9th rib into the posterior-lateral right chest wall with a large surrounding hematoma [Figure 1]. Following admission, he was observed for 24 h, and there was no worsening of the hematoma, with a stable hematocrit. The patient requested conservative watchful management. Over time, his hematoma/swelling resolved without recurrence.

DISCUSSION

Using Medline, we performed a literature search from January 1968 to April 2020. The search was limited to English using a combination of terms: lung AND herniation AND chest wall AND hernia. These are summarized in Table 1. We identified 52 cases of spontaneous chest herniation (including our case). Our identified patient population was male predominant (only two females), with a median age of 58 years. Thirty-three patients (63.4%) were documented as current or previous smokers with COPD assigned in 25 of 52 (48%) cases. Nineteen patients (36%) were described as obese. Cough was associated in 37 of 52 (71%) cases. While location was not described in all cases, herniation occurred on the left side in 26 of 49 (53%), posterior in 15 of 33 (45%) patients, and between the 8th and 9th intercostal space in 16 of 46 (34.7%) patients. The size of the herniation was >10 cm in most cases (15/20 [75%]) when size was reported. Previous chest surgery (three patients) and rib fracture (six patients) occurred in only a small number. One patient had Ehlers–Danlos disease. Of the 46 patients where treatment was described, 36 (78%) underwent primary surgical or patch repair.

Confirmation of lung herniation typically requires chest imaging. The diagnosis can be made with chest

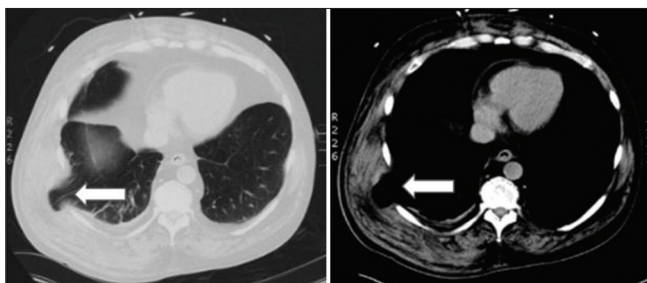


Figure 1: Noncontrast computed tomography of the chest demonstrating lung herniation through the intercostal space, with noted chest wall swelling due to bleeding within the muscle

radiographs, but thoracic CT can help better characterize the wall defect. Cardinal signs and symptoms include a bulge, less often ecchymosis (reported in 15 previous cases) and localized pain. While, in most cases, hernias were described as posterior or anterior, our review of the available images would more aptly classify them as anterolateral or posterolateral (which occurred in our patient).

Our review suggests that the presence of COPD or smoking is strongly associated with spontaneous lung herniation. The increased risk of lung herniation in patients with COPD may be attributed to both dynamic hyperinflation and respiratory muscle weakness. Dynamic hyperinflation produced by incomplete emptying of the lungs in expiration in patients with COPD results in increased spacing between the ribs. The flattening of the diaphragm that occurs with hyperinflation results in contractions that are inward instead of downward, thereby paradoxically pulling the inferior ribs inward with its movement. This paradoxical movement, known as “Hoover’s sign,” may explain the frequency of herniation occurring between the 8th and 9th ribs. In the studies cited above, the severity of COPD was not described; however, it may be reasonable to consider that those with a greater degree of hyperinflation may be at the greatest risk. In addition, respiratory muscle dysfunction is now recognized as an important aspect of COPD with important clinical consequences. While inspiratory muscle weakness is at least partially attributed to hyperinflation (placing the inspiratory muscles at a mechanical disadvantage), expiratory muscle weakness is a feature of the generalized myopathy observed in patients with COPD. A brief, but significant increase in intrathoracic pressure, such as occurs when coughing, can result in herniation of lung parenchyma in patients with advanced COPD.

Surgical repair of lung hernias may be necessary, particularly in those with refractory symptoms and in those with recurrent infections, hemoptysis, or other signs of impending incarceration. Repair can be by primary closure or through the placement of a prosthetic patch, muscle flap, or fascia lata used to close the defect, mainly when dealing with larger defects (which occurs in most cases).^[3,4] Palliative treatment (i.e., using compression bandages) can be considered when surgical repair is contraindicated or in less symptomatic patients. Those electing conservative management require close follow-up and a repeat chest CT when physical findings change because of the risk of hernia incarceration. In our patient, the hernia was small, and conservative management was sufficient.

CONCLUSION

Spontaneous lung hernias are rare and usually anterior or anterior-lateral. A bulge between the ribs is usually noted, and ecchymosis may or may not be present. Advanced COPD appears to be a predisposing condition. As COPD

Table 1: Reported spontaneous lung hernia - total 52 cases (including submitted case report)

Author (year)	Age	Gender	Smoker	COPD	Obese	Cause	ICS location	Anterior/lateral/posterior	Side	Size (largest dimension, cm)	Previous trauma or surgery	Associated rib fracture	Repair	Bruising	Picture
Periera (2010)	53	Male	NS	NS	NS	Heavy lifting	5 th and 6 th ICS	NS	Left	81	Yes	No	NS	NS	lateral
Mizea (2011)	65	Male	Yes	Yes	Yes	Cough	5 th , 6 th , and 7 th	Posterior lateral	Left	NS	No	Yes	Primary	Yes	Posterior lateral
Ryan (2008)	72	Male	NS	No	NS	Cough	8 th -9 th	Posterior lateral	Left	10	No	No	Observe	Yes	Posterior lateral
Shanker (2010)	63	Male	Yes	Yes	NS	Cough	4 th and 5 th	Anterior lateral	Left	NS	Yes (CABG)	No	Primary	NS	Lateral
Evans (2005)	49	Male	NS	NS	NS	Cough	Cervical	Thoracic inlet	Right	10	Ehlers-Danlos	No	Primary	NS	Lateral
Tack (2000)	62	Male	Yes	NS	Yes	Cough	NS	NS	Left	NS	No	No	Compress	Yes	Posterior lateral
Jastrow III (2009)	72	Male	Yes	NS	Yes	Cough	8 th -9 th	Posterior	Right	NS	Yes	No	Primary	Yes	Posterior lateral
Sulaiman (2006)	57	Male	Yes	Yes	Yes	Cough	8 th -9 th	Lateral	Left	10	No	Yes	Delayed primary	NS	Posterior lateral
Rubio (2020)	71	Male	Yes	Yes	No	Cough	8 th -9 th	Posterior lateral	Right	NS	No	No	Observe	Yes	Posterior lateral
Neilson	76	Male	NS	NS	NS	Cough	9 th -10 th		Left	30	No	No	Primary Patch		Anterior lateral
Donato (1973)	58	Male	NS	NS	Yes	Abn motion	7 th -8 th	Anterior lateral	Right	8	No	No			
Noyez	19	Male	Yes	NS	NS	Cough	7 th -8 th		Right	20			Primary		
Sheka (1984)	NS	Male	NS	NS	NS	Cough	8 th		Right	15	No	No	Primary		
Sloth-Neilson	70	Male	NS	NS	NS	Cough	7 th -8 th		Left	3			Primary		
Togashi	70	Male	NS	NS	No	Cough	8 th		Left	15			Patch		
Rob	54	Male	Yes	Yes	Yes	Cough	8 th -10 th		Left	15			Observe		
Seullion (1994)	60	Male	Yes	Yes	NS	Cough	9 th -10 th	Lateral	Right	NS	No	No	NS		Lateral
Sonnett	52	Male	Yes	NS	NS	Sneeze	7 th -8 th		Right	10			Primary		
Gaude	60	Male	Yes	Yes	Yes	Abn motion	6 th -7 th		Left	24			Observe		
Plandovskii	65	Male	NS	NS	NS	Cough	8 th -9 th		Left	20			Primary		
Floz (1998)	48	Male	Yes	Yes	NS	Cough	2 nd -3 rd	Anterior	Left	NS	No	No	NS		Anterior
Goverde	70	Male	Yes	NS	NS	Cough	8 th -9 th		Right	NS			Primary		
Brock (2000)	44	Male	NS	NS	Yes	Sneeze	8 th -9 th	Anterior	Right	12	No	No	Patch		NA
Brock (2000)	72	Male	Yes	Yes	Yes	Cough	8 th -9 th	Anterior	Left	20	No	No	Patch		NA
Bragga (1995)	50	Male	Yes	NS	No	Cough	3 rd -5 th	Anterior	Right	10	No	No	Observe	Yes	Anterior
Weissburg (2002)	42	Female	NS	Yes	NS	Cough	1 st -2 nd	Anterior	Left	3.5	No	No	Observe		NA
Rosi (2012)	78	Male	Yes	Yes	Yes	Cough			Right				Primary		
Zadori (2010)		Male	Yes	Yes	Yes	Cough							Primary		
Zadori (2010)		Male	Yes	Yes	Yes	Cough							Primary		
Vincez (2008)	47	Male	Yes	NS	Yes	Cough									
Habib (2010)	55	Male	Yes	NS	Yes	Cough	8 th -9 th	Lateral	Left	15	No	No	Primary Patch		Lateral
Ross (1999)		Male	NS	Yes	NS	Cough	7 th	Anterior lateral	Right	NS	No	No	Patch		Anterior lateral
Asenjo (2015)	67	Male	Yes	Yes	Yes	Cough		Lateral	Left		No	No	Surgery		Anterior lateral
Kara (2015)	72	Female	Yes	Yes	Yes	Cough	8 th	Posterior lateral	Left		No	Yes	Mesh		Posterior lateral

Contd...

Table 1: Contd...

Author (year)	Age	Gender	Smoker	COPD	Obese	Cause	ICS location	Anterior/lateral/posterior	Side	Size (largest dimension, cm)	Previous trauma or surgery	Associated rib fracture	Repair	Bruising	Picture
Dahlkemper (2019)	46	Male	Yes	Yes	Yes	Cough	7 th and 8 th	Posterior lateral	Left		No	No	Surgery	Yes	Posterior lateral
Mahony (2019)	65	Male		Asthma		Cough	8 th	Posterior lateral	Left		No	No	Observe		Posterior lateral
Hamid (2018)	65	Male	Yes	Yes	Yes	Abn motion Cough	7 th and 8 th	Lateral	Right		No	No	Blowhole incision		Anterior lateral
Cox (2018)	71	Male	Yes	Yes	Yes	Cough	8 th and 9 th	Posterior lateral	Right		No	No	Surgery	No	Posterior lateral
Mraidha (2017)	48	Male	Yes		Yes	Cough	Cervical 8 th and 9 th	Anterior	Right		No	No	Surgery	No	Anterior lateral
Cherian (2017)	61	Male	Yes	Yes	Yes	Cough	8 th and 9 th	Posterior lateral	Right		No	No	Surgery	Yes	Posterior lateral
Maeda (2017)	71	Male	Yes	Yes	Yes	Cough	8 th	Posterior lateral	Right		No	No	Surgery	Yes	Posterior lateral
Wani (2015)	65	Male	Yes			Cough	8 th and 9 th	Posterior lateral	Left		No	No	Observe	Yes	Posterior lateral
Gazitua (2015)	65	Male				Valsalva maneuver Cough	8 th and 9 th	Anterior lateral	Left		No	No	Surgery	Yes	Posterior lateral
Detorakis (2014)	40	Male				Cough	3 rd and 4 th	Anterior lateral	Left	5.45 cm axially×2 cm anteroposteriorly×4.7 cm craniocaudally	No	Yes	Surgery		Anterior lateral
Bhardwaj (2013)	63	Male	Yes			Sneezing	7 th and 8 th	Posterior lateral	Left		No	Yes	Observe		Posterior lateral
Lakshminarayana (2013)	61	Male	Yes	Yes	Yes	Cough	8 th and 9 th	Posterior lateral	Right		No	No	Surgery		Posterior lateral
Choe (2013)	61	Male	Yes	Yes	Yes	Cough	6 th and 7 th	Lateral	Right		No	Yes	Surgery	Yes	Lateral
Gomez (2013)	64	Male	Yes	Yes	Yes	Cough	6 th	Posterior lateral	Right		No	No	Surgery	Yes	Posterior lateral
Sanjuanelo (2017)	60	Male	Yes	Yes	Yes	Yes	8 th and 9 th	Posterior lateral	Right				Surgery	Yes	Posterior lateral
Sanjuanelo (2017)	56	Male	Yes	Yes	Yes	Yes	9 th and 10 th	Posterior lateral	Left				Surgery	Yes	Posterior lateral
Sanjuanelo (2017)	68	Male			Yes	Yes	9 th and 10 th		Left				Surgery	Yes	Posterior lateral
Sanjuanelo (2017)	60	Male		Asthma	Yes	Yes	8 th and 9 th		Right				Surgery	Yes	Posterior lateral

NS: Not significant, NA: Not available, CABG: Coronary artery bypass grafting, COPD: Chronic obstructive pulmonary disease, ICS: Intercostal space, Abn motion: Abnormal motion as the cause

has become increasingly prevalent worldwide, awareness of this condition is recommended.

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Dr. Rubio and Dr. Ie were involved in the evaluation of the pulled data, case presentation/analysis and contributed to the composition and editing of the manuscript.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Morel-Lavallée A. Hernies du poumon. Bull SocChir Paris 1845-1847;1:75-195.
2. Brock MV, Heitmiller RF. Spontaneous anterior thoracic lung hernias. J Thorac Cardiovasc Surg 2000;119:1046-7.
3. Jastrow KM 3rd, Chu D, Jaroszewski D, Huh J, Bakaeen F. Posterior lung herniation after a coughing spell: A case report. Cases J 2009;2:86.
4. Sloth-Nielsen J, Jurik AG. Spontaneous intercostal pulmonary hernia with subsegmental incarceration. Eur J Cardiothoracic Surg 1989;3:562-4.