
Posttraumatic pulmonary hernia

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Herniation of the lung through a traumatic chest wall defect is a rare occurrence. It may occur as a complication of severe blunt chest trauma.^{1,2} Herniation of the lung is possible through a chest wall defect caused by

multiple rib fractures or by a chondral-costal or clavicle-sternal dislocation.^{1,3} We present a case of right lung hernia caused by severe blunt chest trauma, in which surgical treatment was successful.

Clinical Summary

An overweight 77-year-old restrained driver was involved in a motor vehicle crash that was possibly caused by loss of consciousness. On admission, the patient had severe respiratory distress and was intubated and mechanically ventilated. Initial clinical evaluation revealed anterior thoracic ecchymosis caused by the safety belt and subcutaneous emphysema.

Standard chest radiography revealed only lateral fractures of 4 right ribs (ie, the third, fourth, fifth, and sixth ribs), together with a slender fog at the lower half of the right lung and enlarged cardiomeastinal image (Figure 1). A tangential view of the chest showed a lung herniation in the right parasternal area and a sternal

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Figure 1. Chest radiograph showing multiple rib fractures, pleural effusion, and lung contusion.



Figure 2. Tangential view of chest showing a lung herniation in the right parasternal area.

body fracture (Figure 2). The chest computed tomographic (CT) scan confirmed an anterior right subcutaneous lung herniation through a defect caused by the first, second, and third ribs; sternal dislocation associated with right-sided hemothorax; and a left lung contusion (Figure 3).

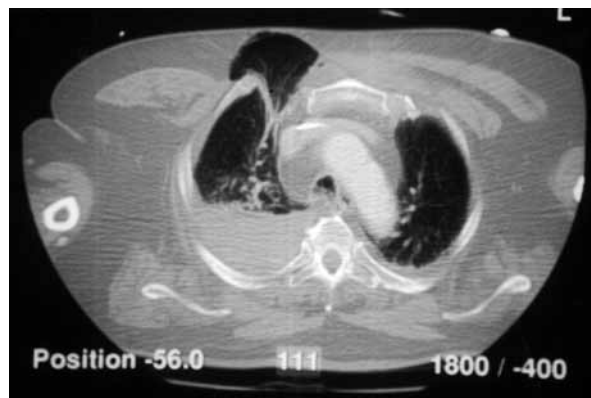


Figure 3. Computed thoracic scan confirming an anterior right subcutaneous lung herniation through a defect caused by first-, second-, and third-rib sternal dislocation associated with right-sided hemothorax and a left lung contusion.

Hemothorax was immediately treated with chest tube insertion, and then right anteroaxillary thoracotomy was performed (Figure 4). After reduction of the herniated lung, condrosynthesis of the third rib was performed with a Vycryl suture, and a double-sheet 8 × 5-cm Prolene patch was modeled and fixed. A compressive dressing was performed (Figure 5).

The chest CT scan performed on postoperative day 15 confirmed total reintegration of the herniated lung into the thoracic cavity but showed a 13 × 10-cm hypodensity parietal formation localized in the anterior right pectoral site. The mass was a seroma. A needle suction was performed with reduction of the mass, which disappeared 6 days later. The patient was extubated on day 26.

Discussion

Lung herniation is uncommon and has been defined as the protrusion of pulmonary tissue and pleural membranes through defects of the thoracic wall,¹ which may be congenital, spontaneous, or pathologic or may be the result of thoracic wall trauma.² The majority of acquired pulmonary hernias are of traumatic origin.^{1,4} Although the beneficial effects of safety belt use have been widely proved, specific thoracic injuries associated with 3-point restraints have been described.^{1,5,6} Hernias caused by blunt chest trauma more frequently arise anteriorly near the sternum or posteriorly, where there is only one intercostal muscle layer, and they usually protrude between rib spaces.^{3,7} Intercostal lung hernias usually protrude through thoracic wall defects caused by costal or sternal fractures or associated rib-chondral separation.^{1,7,8} Supraclavicular pulmonary herniations occur as a result of clavicle-sternal dislocation.¹

Most spontaneous lung hernias are associated with conditions of prolonged or excessive increase in intrathoracic pressure and have a predilection for areas of potential weakness in the chest wall.^{3,7} These areas occur anteriorly from the costochondral junction to the sternum because of the absence of external intercostal muscles.^{3,7,8} The anterior thorax is the site of predilection for both spontaneous and traumatic lung herniations, presumably because the anterior thorax lacks the muscular support afforded the posterior thoracic wall by the trapezius, latissimus dorsi, and rhomboid muscles.⁸

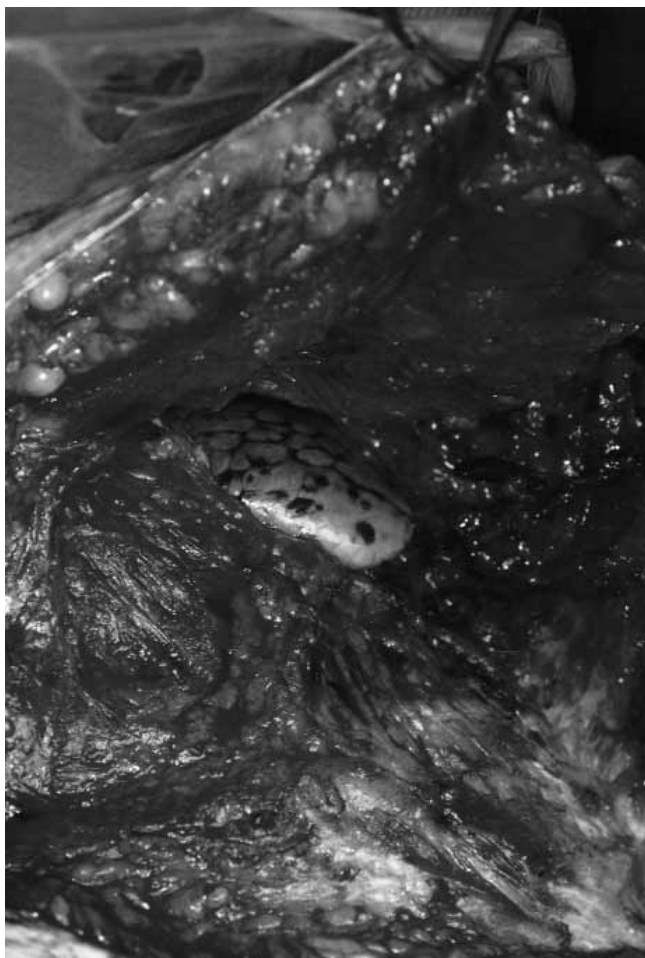


Figure 4. Intraoperative view of the upper right lung lobe herniated through a chest wall defect.

Most patients with lung hernias are asymptomatic. The usual sign is a bulging mass in the chest wall or neck associated with coughing, straining, or lifting. A soft, smooth, reducible mass that changes in size with respiration, protruding through a palpable defect in the chest wall, is usually evident on examination.^{3,7,8}

Posttraumatic lung herniation can be visualized on chest radiographs as a well-circumscribed area of subcutaneous air, although tangential views may be necessary in some patients, such as the one in this report.^{2,7} CT provides valuable information regarding the thoracic wall and pleural space and better defines the dimensions of the hernia. The more liberal use of CT may expand the number of diagnoses. Early surgical repair offers the best results with a low morbidity, and the long-term prognosis is excellent.^{2,9}

The true incidence of traumatic lung herniation is difficult to assess because it is likely that many hernias remain occult because of a low index of suspicion, subtle physical findings, and lack of symptoms.¹⁰

Incarceration is unusual, but if it happens, it is usually because of an entrapment of the lung on rib spicules at the site of rib fractures.¹

Lung herniations are unlikely to recover spontaneously. In the past, small hernias were managed by means of thoracic strapping.



Figure 5. Intraoperative view of the chest wall defect closed with a Prolene mesh.

However, primary surgical repair is better, and strapping has been abandoned because it impairs thoracic wall motion, reduces pulmonary compliance, and increases the incidence of atelectasis and infection.^{9,11} Pericostal fixation of adjacent ribs with absorbable sutures is usually enough to bridge the defect. In addition, the ribs can be divided and released from their pericostal envelopes before being shifted into place. Larger defects may require fascia lata grafts and muscle flaps to close the defect, and when the thoracic wall defect is too large to allow direct sutures, a prosthetic patch may be used, as in the patient in this report.^{1,12} Seroma is a possible complication. Exceptionally, resection of the incarcerated lung may be necessary before closing the thoracic wall defect.¹⁰

Early surgical management is recommended for best results with a low morbidity and for excellent long-term prognosis.¹⁰

References

1. Francois B, Desachy A, Cornu E, Ostyn E, Niquet L, Vignon P. Traumatic pulmonary hernia: surgical versus conservative management. *J Trauma*. 1998;44:217-9.
2. Tack D, Wattiez A, Schtickzelle JC, Delcours C. Spontaneous lung herniation after a single cough. *Eur Radiol*. 2000;10:500-2.
3. Fiane AE, Nordsrand K. Intercoastal pulmonary hernia after blunt thoracic injury. *Eur J Surg*. 1997;159:379-81.
4. Kyosola K, Reinikainen M, Siitonen P, Valli H. Lung hernia after blunt thoracic trauma. *Acta Chir Scand*. 1984;150:425-8.
5. Arajavi E, Santavirta S. Chest injuries sustained in severe traffic accidents by seatbelt wearers. *J Trauma*. 1989;29:37-41.
6. May AK, Chan B, Daniel TM, Young JS. Anterior lung herniation: another aspect of the seat belt Syndrome. *J Trauma*. 1995;38:5887-9.
7. Saw EC, Yokoyama T, Lee BC, Sargent EN. Intercoastal pulmonary hernia. *Arch Surg*. 1976;111:548-51.
8. Soreide O, Stedjeberg JO. Traumatic intercoastal pulmonary hernia. *Injury*. 1975;7:61-2.
9. Scullion DA, Negus R, Al-Kutoubi A. Case report: extrathoracic herniation of the lung with a review of the literature. *Br J Radiol*. 1994;67:94-6.
10. Allen GS, Fischer RP. Traumatic lung herniation. *Ann Thorac Surg*. 1997;63:1455-6.
11. Forty J, Wells C. Traumatic intercoastal pulmonary hernia. *Ann Thorac Surg*. 1990;49:670-1.
12. Cernilia J, Lin J, Ott R, Scannell G, Waxman K. A technique for repair of traumatic parasternal lung herniation: case report. *J Trauma*. 1995;38:935-6.