

# LUNG HERNIA RELATED WITH A ROPE BULLFIGHT: CASE REPORT

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## Abstract

Lung herniation is an uncommon entity which was fully classified in 1845 after the study of several case reports. Acquired lung hernia, especially traumatic, is the most common etiology. In the absence of clear guidelines, management of lung hernia is made in a case-by-case basis. We present an asymptomatic middle lobe hernia perceptible on physical examination, but diagnosed initially by imaging studies. Patient medical history included a blunt bull trauma fourteen years before.

## INTRODUCTION

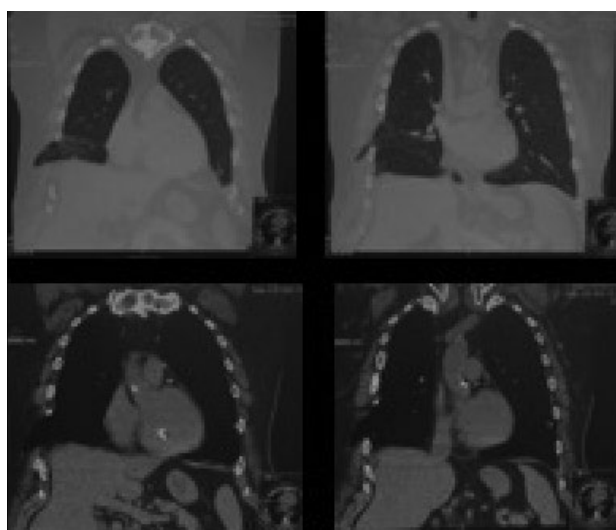
Roland was the first to describe lung hernia (LH) in 1499, a rare condition defined as a protrusion of lung tissue through one of its bounding structures [1-10]. Despite being usually asymptomatic,<sup>8,11</sup> the diagnosis of LH is most frequently clinical<sup>1,2,4,7,9</sup> but it should be confirmed by imaging.<sup>1,5</sup> We present a case of an asymptomatic middle lobe hernia possibly after a blunt trauma.

## CASE REPORT

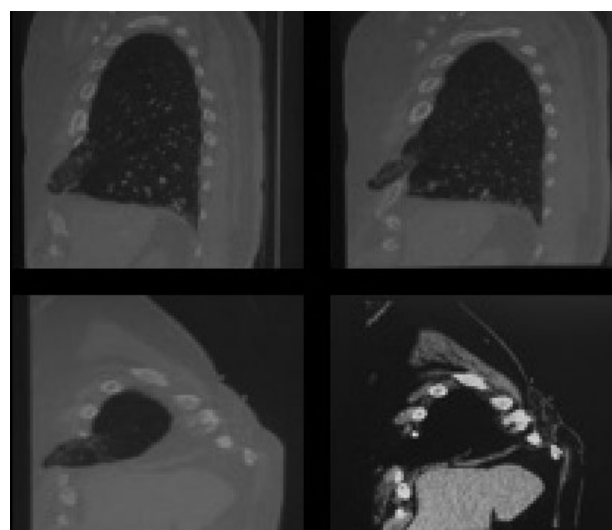
A 73-year-old male was admitted to an intensive

care unit for non-invasive ventilation with an exacerbation of COPD (chronic obstructive pulmonary disease). The thoracic computed-tomography (CT) showed herniation of the lateral segment of the middle lobe through the 6<sup>th</sup> intercostal space, with no signs of incarceration (Figures 1-3). The patient had a previous thoracic CT that confirmed the hernia presence for at least 3 years, although it was not perceptible in previous Chest x-Rays (CxR) (Figure 4).

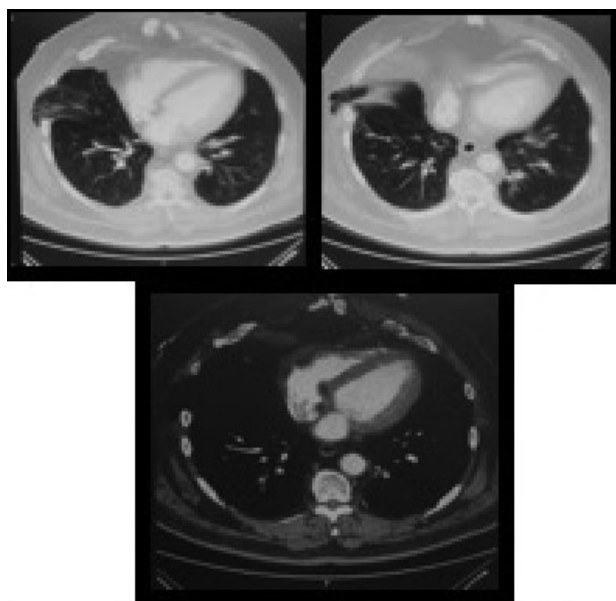
When inquired, the patient recalled getting hit and stepped on during a rope bullfight fourteen years before, resulting in multiple rib fractures. His medical history included severe obesity, obstructive sleep apnea, hypertension, diabetes, myocardial revascularization (3



**Figure 1** Coronary CT views of middle lobe hernia.



**Figure 2** Sagittal CT views of middle lobe hernia.



**Figure 3** Axial CT views of middle lobe hernia.

years before) and ischemic heart failure (class II NYHA). The patient was on steroids for clinical exacerbations of COPD.

The patient noticed a mass on his right chest wall some years after the trauma, not perceptible with normal breathing. He denied hemoptysis, chest pain, subcutaneous emphysema, fever or any other symptoms. On physical examination there was a soft subcutaneous mass, which varied in size with breathing, bulging with cough and Valsalva maneuvers (Figure 5).

The medical-surgical team agreed that being totally asymptomatic there was no indication for surgical treatment. The patient was discharged after resolution of the COPD's exacerbation.



**Figure 5** Subcutaneous mass while performing Valsalva maneuvers.



**Figure 4** Chest x-Ray on admission.

## DISCUSSION

In 1845, Morel-Lavallee classified LH etiologically and anatomically.<sup>1-4,6, 8-9,12</sup> Anatomically, it can be divided into cervical, intercostal, diaphragmatic or mediastinal.<sup>2,3</sup> Intercostal LH are the most common ones.<sup>5,6,9,10</sup> Lung herniation most frequently occurs anteriorly near the sternum or posteriorly near the vertebrae where there is only a single layer of intercostal muscles.<sup>1,3,10,11</sup> According to a database review on all patients who underwent pulmonary herniorrhaphy between 1991 and 2011, Seder et al. concluded that LH most frequently occur on the right side, fifth intercostal space, and is chronic in nature.<sup>9</sup>

Etiologically, LH is classified as congenital or acquired. Congenital hernias account for approximately 20% of the cases and are related to costal or cartilage malformations such as rib or intercostal hypoplasia or agenesis, or simply to an attenuation of the endothoracic fascia.<sup>1,4,8,10,11</sup> They usually occur at the thoracic inlet or intercostal space, because of the absence of intercostal muscles and weakness of the fascia and can present only in adult life.<sup>2,3</sup> The supraclavicular region is the most frequent location of congenital LH.<sup>5</sup>

Acquired LH is the most common cause (80%).<sup>1,2,4, 6,7,8-11</sup> It can be classified as spontaneous, pathological, traumatic or post-surgical.<sup>2-4,11</sup> Predisposing factors are environmental and operative trauma, neoplastic or inflammatory processes, COPD and chronic steroid use.<sup>3,4,9,10</sup> Male sex, obesity and smoking are also described as risk factors.<sup>9,10</sup> Positive pressure ventilation and diabetes mellitus were also considered as potential risk factors.<sup>8,9</sup>

The mechanism of spontaneous LH involves an intercostal defect associated with increased intrathoracic pressure (intense or persistent coughing, sneezing, playing wind musical instrument, heavy weight lifting), in the presence of the risk factors previously described.<sup>2-4,10</sup> Castro et al. reported that spontaneous LH are mainly caused by Valsalva maneuvers.<sup>6</sup> They are typically more frequent in patients with COPD.<sup>1</sup>

Traumatic Lung Hernia (TLH) is an uncommon condition which may be benign or constitute an emergency.<sup>4,6,11</sup> It may appear immediately after the insult or be delayed for months or years.<sup>1,2-4,6,8</sup> They Usually occur on the anterior thoracic wall, where external intercostal muscles are absent and muscles are weaker.<sup>1,4</sup> Most of the times, TLH is due to the disruption of intercostal muscles or rib fractures, after trauma or after cardiopulmonary resuscitation; they can also occur after thoracic surgery.<sup>3-7</sup> Interestingly, postoperative LH is more common after minimally invasive procedures due to a less meticulous closure of the chest wall through the smaller skin incision.<sup>2,3,5-7,8</sup> Incidence of TLH is increasing related to an increment of high velocity penetrating weaponry.<sup>14</sup>

Pathological lung hernias are the least common variety.<sup>1,3</sup> They can be due to breast or chest wall pathology (malignant tumors, empyema necessitans, abscess, osteomyelitis or even tuberculosis), but its incidence decreased due to an early detection and treatment of these conditions.<sup>1,3,6,11</sup>

According to the Morel-Lavallee classification, the case reported corresponds to an acquired thoracic pulmonary hernia with a traumatic origin. Nonetheless, it could also have been enforced by an exacerbation of the COPD. The patient also had other risk factors: poor tissue quality and healing capacity resulting from diabetes, obesity, smoking history and oral steroid use.

Physical findings are usually similar to the present case. Often, when there is no palpable mass it can be necessary to perform Valsalva maneuvers in order to detect the disorder.<sup>1-4,11</sup> Other presentation symptoms can be chest pain, dyspnea, subcutaneous emphysema, hemoptysis, bone crepitation, ecchymosis or chest wall instability.<sup>1,3,4,6</sup> In rare circumstances, diagnosis results from an accidental finding in imaging studies. A CxR especially during a Valsalva maneuver, can establish the diagnosis, but in the case of intercostal LH it could go undetected as in our case.<sup>1-4,8-11</sup> CT can confirm a herniated lung, the hernia sac and orifice in the chest wall as well as their anatomic relation with chest wall muscles.<sup>3,4,8,9</sup> It can also exclude complications such as incarceration.<sup>3,8,10</sup>

When it comes to treatment, a multidisciplinary team constituted by thoracic, general and sometimes a plastic surgeon, is recommended for decision making.<sup>12</sup> Classification is outdated, not guiding operative approaches or repair strategies in the modern era. Kuckelman et al. reinforce the idea that there is scant literature guiding managing of TLH with no evidence-based consensus.<sup>14</sup> It depends on the clinical condition of the patient but literature is ambivalent.<sup>1,3,4,7,8,10</sup> In most cases, LH needs no immediate repair or, if asymptomatic, any repair at all.<sup>2,7,9,11</sup> It is reasonable to wait for spontaneous regression before intervention, because complications are rare.<sup>3,8,11</sup> Some authors advocate conservative treatment like compression with pads and corsets, treating the underlying cause and promoting weight loss.<sup>1,7</sup> The majority of literature agree that large LH (or those with progressive increase in size) should be treated surgically, just like the incarcerated,

strangulated or symptomatic ones, according to the patient conditions and surgical risk.<sup>1-5,7,8-10,12</sup> Associated lesions like rib fractures and chest wall defects should also be treated on a case-by-case basis.<sup>6</sup>

Repair techniques vary, ranging from primary closure to implantation of a mesh or muscle flaps.<sup>7,9</sup> In the majority of cases, primary closure of the defect produces good results, mainly for smaller defects.<sup>1,7</sup> Some authors advocate the use of prosthetic mesh when the thoracic wall defect is large.<sup>7,8</sup> According to others, muscle flaps are usually preferable in this situation.<sup>6</sup> More recently Kuckelman et al. advocated the primary suture closure for defects less than 2 cm and a prosthetic mesh, if larger than 2 cm.<sup>12</sup>

In the presented case, LH was asymptomatic and without incarceration signs. So we've decided for a conservative approach, with a regular clinical and radiographic follow-up, which is mandatory.<sup>8,9</sup>

## CONCLUSION

It is important to recognize LH as a benign disorder in most of the cases. Highly sensitive imaging such as CT, the increased prevalence of high-velocity blunt trauma and the increment of VATS (video-assisted thoracic surgery) worldwide, had increased the number of case reports.<sup>9,12</sup> There must be a meticulous technique when closing primary thoracotomies, mainly in COPD, obese, smoker, diabetic and chronic oral steroid user patients.

LH can be challenging to the thoracic surgeon. The classification system provides few orientations to clinical decision and operative repair and there is controversy regarding concomitant intraoperative decisions such as rib fixation and chest wall reconstruction.<sup>6</sup> Management depends on symptoms, location and size.<sup>2,7</sup> Indications for surgery are increasing size, pain or any signs of impending incarceration.<sup>1,2,5,9,10</sup> Repair for cosmetic reasons can be justified.<sup>1,2,4,9,10</sup> Approach must provide an optimal outcome in terms of recurrence, post-operative pain, hernia reduction and repair.

Because it is rare and variable, there are insufficient evidence-based studies to recommend a standard management of LH.

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