Clinical and Experimental Health Sciences

Giant Pulmonary Herniation: A Late and Rare Complication of Minimally Invasive Lung Biopsy for Interstitial Lung Disease

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ABSTRACT

Pulmonary herniation is the protrusion of the lung parenchyma beyond the normal limits of the thoracic cavity. It is a rare entity. In general, the defect in the chest wall is accompanied by increased intrathoracic pressures in the formation mechanism. Usually the cause is blunt-penetrating thoracic trauma, violent cough or previous thoracic surgery with insufficient closure of the chest wall. We report a case with giant pulmonary herniation that developed four years after biopsy in a patient diagnosed with usual interstitial pneumonia by VATS. Although this is a very rare condition in the literature, one of the late and rare complications of diagnostic pulmonary resections with awake VATS may be caused giant pulmonary herniation

Keywords: Pulmonary, diagnostic resection, pulmonary herniation

1. INTRODUCTION

Pulmonary Herniation (PH) is the protrusion of the lung parenchyma beyond the normal limits of the thoracic cavity. It is a rare entity. In general, the defect in the chest wall is accompanied by increased intrathoracic pressures in the formation mechanism. Usually the cause is blunt-penetrating thoracic trauma, violent cough or previous thoracic surgery with insufficient closure of the chest wall. Asymptomatic and minimal PHs can be approached conservatively. Parenchyma incarceration, which is the most feared complication in followed cases, should be considered. Symptomatic and major ones require surgical repair (1-3).

Here, we wanted to present a case with a PH developing four years after biopsy in an Idiopathic Pulmonary Fibrosis (IPF) patient diagnosed with awake VATS.

2. CASE PRESENTATION

A 60-year-old male patient evaluated to our clinic 4 years ago with complaints of shortness of breath and cough. In his history, he had hypertension for 15 years and schizo-affective disorder for 1 year. He was exsmoker for 15 years. When his exposures were questioned, it was learned that he worked in the glass factory for 23 years and retired for 12 years ago.

Chest CT image before the diagnostic surgery, showed peripheral ground glass areas with a peribronchovascular distribution, subpleural reticulation, traction bronchiectasis on the left lingular segment with a lower lobe predominance of the lesions, which was consistent with a probable UIP pattern and surgical lung biopsy was recommended with the decision of the multidisciplinary council (Figure 1A).

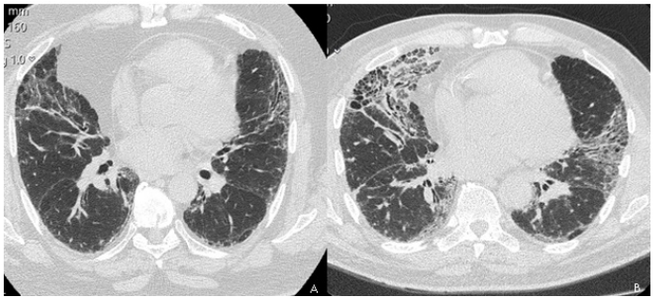

Figure 1. A: *Chest CT image before the diagnostic surgery, showed peripheral ground glass areas with a peribronchovascular distribution, subpleural reticulation, traction bronchiectasis on the left lingular segment with a lower lobe predominance of the lesions, which was consistent with a probable UIP pattern* ***B:*** *Chest CT image after four years from diagnostic surgery, shows remarkable progression in findings consistent with IPF.*

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The patient underwent awake non-intubated uniportal VATS with the help of TEA (Thoracic Epidural Analgesia) and sedation (propofol 1mgr/kg iv, remifentanil 1 mgr/kg iv). A total of two wedge resections were performed with the help of endoscopic GIA from the infiltrated and intact lung parenchyma areas detected in the posterior segment of the right upper lobe of the lung during VATS. The total operation time was 35 minutes. Chest drain was removed at the postoperative 24th hour. The day after he was discharged uneventfully. Awake VATS procedure was preferred to reduce the risks of general anesthesia and intubation and to provide rapid recovery. Pathology result was reported as diffuse focal interstitial pneumonia, lung parenchymal tissue showing heterogeneous fibrosis. No specific findings were demonstrated to suggest silicosis.

The patient was evaluated at the multidisciplinary council again and radiological and morphological findings were consistent with a probable UIP pattern. He was not eligible for lung transplantation due to his psychiatric condition and nintedanib treatment was started. During his treatment, the patient was followed up regularly every six months and remained stable for three years. At the end of the fourth year, although the clinical response of the patient was stable, progression was detected in his radiological findings (Figure 1B). Since his psychiatric disease was under control, the patient was asked again for the transplantation, but he refused again. Beside the progression of the disease, there was also pulmonary herniation at the same time. The patient presented with a complaint of pain and bulging mass on the right side of his chest in the old biopsy area. Bulging was observed on inspection, also bulging increased with breathing and coughing (Figure 2A). PH was detected on chest CT images, in the bulging area which increased when coughing (Figure 2B). Violent couhing period history may be the cause of pulmonary herniation

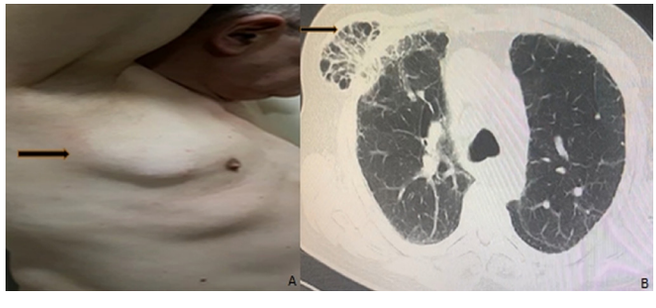

Figure 2. A: *Bulging on the antero-lateral chest wall localized in the old incision site is clearly seen in the 4th year after the operation, marked with arrow.* ***B:*** *Chest CT image of PH at the same period, marked with arrow.*

The patient was operated to repair PH. The operation was performed on the old incision scar with the help of sedo-analgesia (i.v. propofol 0,5 mgr/kg + dexmedetomidine 1 mikrogram/kg). Also, lidocaine 2 mgr/kg was used for local anesthesia. Under the subcutaneous tissue, the PH from the defect in the intercostal region was detected (Figure 3). The herniated lung tissue was pushed into the thoracic cavity and the defect in the intercostal region was primary separate repaired using the no 1 polyglactin. We used the intercostal and serratus anterior muscles as autologous tissue over the repaired defect. The patient was discharged uneventfully on the first postoperative day. After two years of the hernia operation, he passed away due to acute exacerbation of IPF with no recurrence for PH.

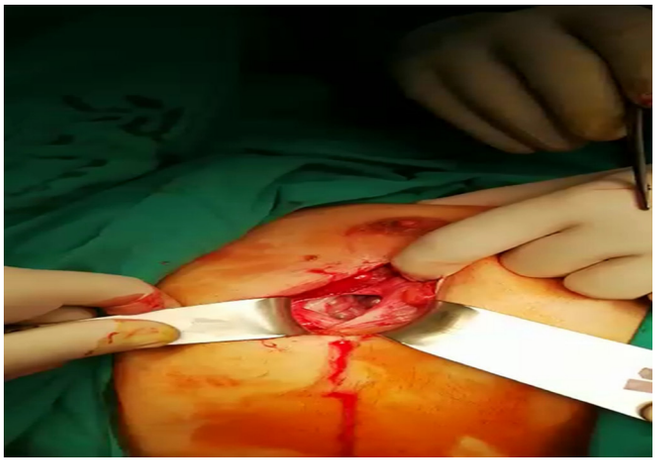

Figure 3. *Operation view of the intercostal defect which causes PH*

3. DISCUSSION

PH is a rare entity and is defined as the protrusion of the pulmonary tissue and pleural membranes beyond the chest cavity through an abnormal opening in the chest wall, diaphragm or mediastinum. PH first described in the 16th century by Morel-Lavallée (5). Although the exact frequency is not known, less than 400 cases of lung herniation have been reported in literature. PH can be congenital or acquired. Acquired hernias are etiologically classified as traumatic, spontaneous, and pathologic. PHs's anatomical locations are cervical, thoracic, diaphragmatic and mediastinal. The mechanism of acquired PHs includes intercostal muscle or thoracic wall weakness (after rib or cartilage fracture) with conditions that increase intrathoracic pressure, such as coughing, sneezing, musical instrument or glass blowing or heavy lifting. (5,6). Our case corresponds to an acquired lung herniation of an operative traumatic origin and violent coughing. This may have been caused by inadequate closure of the intercostal space used during VATS. Particularly in cases where a wound retractor is used, meticulous closure of the intercostal space may prevent the development of the such complication.

The most common clinical presentation of a PH is a soft, tender, subcutaneous mass that may protrude on deep breathing or coughing. Although chest X-ray and thorax USG can be used for diagnosis, chest CT to be taken after Valsalva maneuver is often needed for definitive diagnosis. In the differential diagnosis, subcutaneous emphysema, bronchopleural fistula, chest wall lipoma, chest wall or breast abscess, cutaneous metastasis, seroma, hematoma, pectoralis major tendon rupture should be considered (3-6).

Four years after diagnostic operation our case presented with a complaint of pain and bulging mass on the right side of his chest in the former biopsy area, In our case, the diagnosis was clearly established by chest CT.

The most common complications of VATS are pneumothorax, prolonged air leakage, pain and infections (4-6). PH is an uncommon complication after awake VATS .

PH was described in a few cases in the literature. PH was reported after minimally invasive cardiac surgery and VATS lobectomy (2-7). However, there is no case of PH due to awake lung biopsy for the diagnosis of ILD in the literature.

While conservative treatment can be tried in spontaneous and traumatic minor PH, surgical repair is required in major and symptomatic PH. Bed rest, analgesic, antitussives, antibiotics, chest orthosis and other basic treatment can be used in conservative treatment unless serious findings such as incarceration occur. The purpose of surgical treatment is returns the lung to its proper position and then stitches up the opening or reinforces the weakened area of the chest. Surgery, generally, is not the preferred treatment for lung hernias in the cervical region, no matter how severe. But surgery is routinely performed for lung hernias involving the thoracic wall and diaphragm. Usually, posterior chest wall defects under the scapula do not require surgical repair. Wire sutures, absorbable and non-absorbable materials (such as polytetrafluoroethylene patch, polyglactin, PTFE (PolyTetraFluoroEthylene), dacron, marlex and goretex mesh), autologous tissues, approximation of ribs with monofilament sutures can be used in surgical repair. Which surgical technique will be used depends on the location and size of the hernia and the experience of the surgeon (1,5-7). We successfully used the intercostal and serratus anterior muscles as autologous tissue and performed the approximation of ribs with monofilament separate sutures technique.

4. CONCLUSION

As in our case, we aimed to emphasize that PH, which is a rare complication of diagnostic VATS biopsy, can also be detected in the late period. Although there are other repair methods of the PH, primary closure with autologous tissue reinforcement technique which we also used can be used safely.

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