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Case Report

A rare case of left sided trans-mediastinal herniation of right lung, its management and review of literature

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ABSTRACT

Mediastinal herniation can occur either due to traction as in the case of lung shrinkage in tuberculosis and chronic bronchostenosis or pulsion as a result of hydropneumothorax, empyema necessitans, and chronic infective etiology. We are reporting a case of left sided trans-mediastinal herniation of right lung in a patient with underlying right pulmonary tuberculosis, presenting with empyema thoracis. Empyema thoracis in pulmonary tuberculosis may either be a cause of trans-mediastinal herniation of lung or be a co-existent condition when the herniation occurs due to hydropneumothorax. Due to the presence of infection in pleural space, a prosthesis cannot be used. Due to the proximity of hernia sac to heart and major vessels, its plication is better avoided. Hence, treatment of such a case can be done by applying negative pressure for a few post-operative days till the dead space has been obliterated. Trans-mediastinal herniation of lung with underlying empyema thoracis requiring decortication can be successfully treated with the application of intermittent strong negative pressure (after completing decortication) in the pleaural cavity near mediastinum to gradually deliver the herniated lung to its normal position followed by application of negative pressure in the post op period through one of the ICDTs (intercostal drainage tubes) to avoid unnecessary post-operative complications or reherniation.

Keywords: ICDT, Transmediastinal, Herniation of lung, Suction

INTRODUCTION

Thoracic hernias are defined as protrusion of lung contents beyond the anatomic confines of the thorax or abdominal content extension into the thorax.[1]

They can occur at three levels: thoracic inlet, chest wall, and diaphragm. Mediastinal hernias can be due to either excessive pressure or under pressure i.e. pulsion due to excessive pressure and traction due to diminished pressure (the difference in pressure gives rise to distortion of healthy lobe with herniation into the diseased side).[2]

Mediastinal hernias caused by traction are usually due to shrinking process of the lung (TB, bronchiectasis), chronic bronchostenosis (tumor, foreign body), lobectomy or pleural shrinking following abandonment of pneumothorax, and pulmonary aplasia.[2,3]

Mediastinal hernias caused by pulsion are usually due to chronic infective etiology, hydropneumothorax, pneumothorax, empyema thoracis, empyema necessitans, malignant tumors, and bullous disease of lungs (chronic obstructive pulmonary disease, tobacco smoking, alpha-1 antitrypsin deficiency).[4-6]

Trans-mediastinal herniation occurs more commonly at three places - upper anterior mediastinum at the level of 1-3 costochondral junctions, lower posterior mediastinum at the level of 5-11 thoracic vertebrae, and between oesophagus and vertebrae at the level of 3-5 thoracic vertebrae.[7,8]

Defect in thoracic wall may be caused by repeated thoracotomies.[9] Here in we present a rare case of trans mediastinal herniation of lung most probably due to chronic infective etiology resulting in hydropneumo-thorax and empyema thoracis.

CASE REPORT

A 22 years old male patient presented with the complaints of breathlessness and vague right sided chest pain for the past 30 days and was admitted in district hospital February 2019 where he was diagnosed with pulmonary tuberculosis (TB) and was started on anti-Koch therapy (AKT) for the same. Patient was discharged on AKT which he discontinued after 15 days.

Patient then presented with the same complaints along with cough and right sided chest pain for 10 days and went to the same hospital in December 2019 where he was diagnosed with right sided hydropneumothorax. Patient's computed tomography (CT) scan was done (Figure 1).

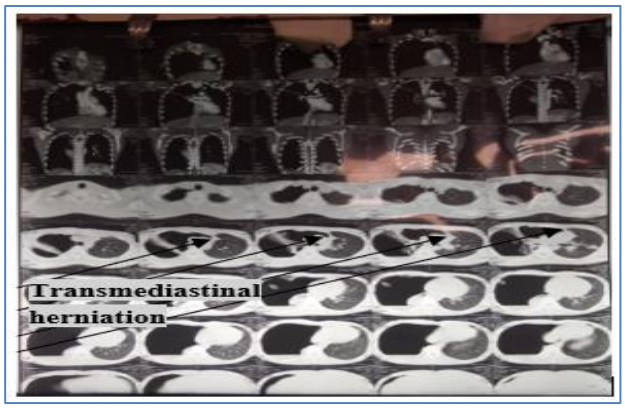

Figure 1: CT scan of the patient.

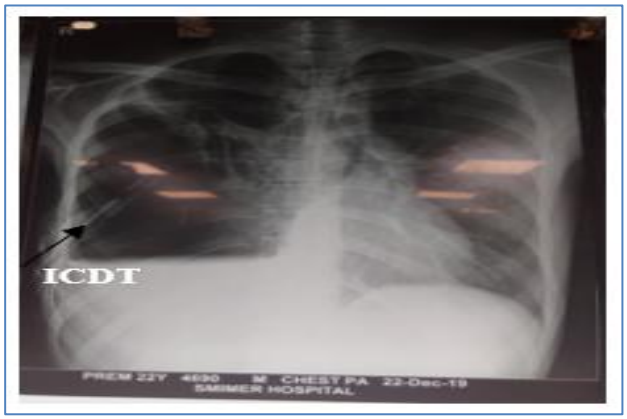

Figure 2: Chest X-ray showing intercostal drainage tube with hydropneumothorax.

The patient was referred to a higher center then he came to SMIMER Medical College and Research Institute on 17th December 2019 and got admitted in TBCD (tuberculosis and chest department). Patient was again started on AKT under defaulter category and intercostal drainage tube (ICDT) was inserted in his right chest in emergency department on the same day of admission. Patient's general condition was stable and respiratory rate was 22/minutes with an ICD output of 20 cc stat (purulent) with a (4-5) cm of column movement. Chest X-ray of the patient was repeated after inserting ICD (Figure 2).

On seeing the ICD output for two days being purulent the patient was referred to the surgical department where all investigations of the patient were reviewed along with his CT scan thorax. On careful examination and after consulting with the radiologist, patient's CT scan report showed left sided transmediastinal herniation of right lung which was appreciable in his chest X-ray as anterior margin displacement towards left (Figure 3).

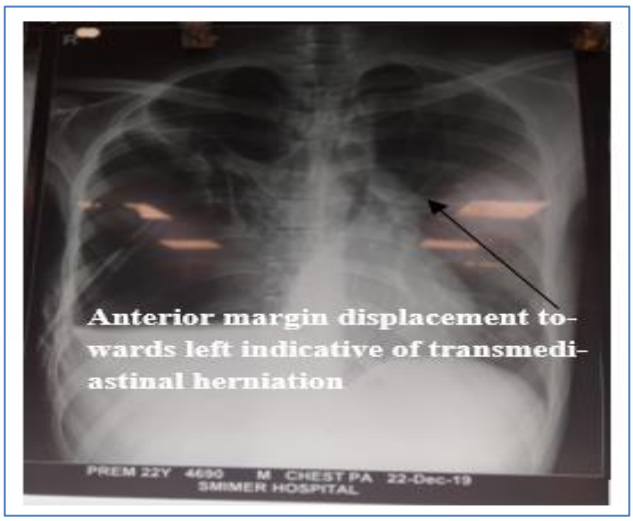

Figure 3: Chest X-ray comparative with CT scan.

Physical examination of the patient revealed an ICD inserted in the 5th intercostal space in the anterior axillary line, along with circumferential excoriation of skin of 3 cm diameter, with daily output of 10 cc pus in the ICD bag. Patient was henceforth diagnosed with empyema thoracis along with left sided transmediastinal herniation of right lung with underlying pulmonary tuberculosis.

Patient was posted for video assisted thoracoscopy on 4th January 2020. As ICDT was already inserted in the anterior axillary line of 5th ICS, 11 mm trochar was inserted through the same tract and additional two ports (one of 11 mm and one of 5 mm) were placed. On videoscopic examination, the right-side thoracic cavity was filled with pus and soft thick pyogenic membrane with a small bulge near hilum. After thorough decortication of right cavity, no appreciable lung tissue was visible. We applied strong suction through the 10mm cannula resulting in gradual delivery of the herniated right lung through the defect in the mediastinum (Figure 4).

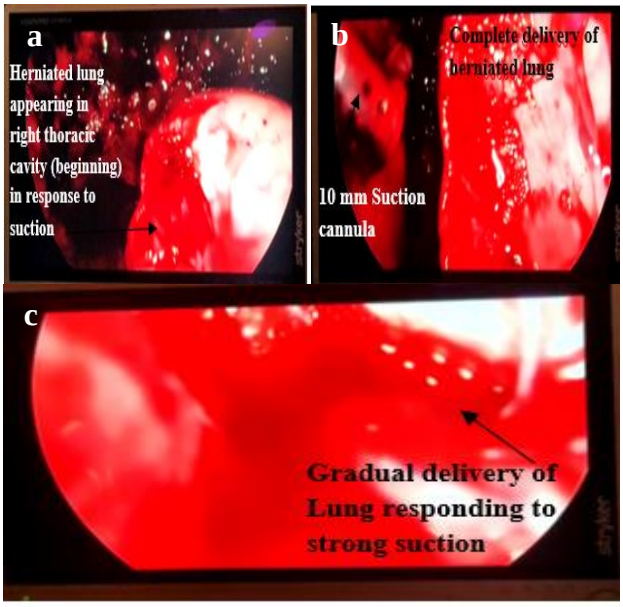

Figure 4 (a and b): Intra-operative application of negative suction.

Gradually the herniated lung responded to intermittent strong suction and gradually the entire right lung was delivered as depicted in the series of pictures. As we anticipated re-herniation of lung, so an intra-operative decision was made to keep negative pressure for initial post-operative period (5 days) with the help of Romovac drain (Romsons, India) attached to the lower ICDT inserted in the patient. The tip of lower ICDT was kept in the mediastinal hernia sac while that of upper ICDT was kept near apex of lung (Figure 5).

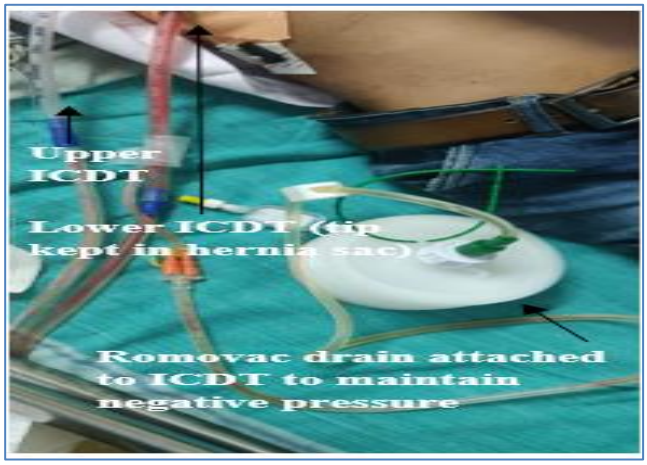

Figure 5: Post-operative drains in patient.

The patient remained admitted in the hospital for 5 days. Upper ICDT was removed on the third post-operative day. Lower ICDT with negative suction was withdrawn at the rate of 2 cm per day and finally removed entirely on 10th post-operative day after discontinuing negative suction for the last two days with serial X-rays showing complete expansion of lung (Figure 6).

Figure 6: Complete resolution after 14 days post-operative.

On close follow up for three months, clinically and radiologically patient has complete correction of empyema thoracis and the herniation defect.

DISCUSSION

Occasional increase in pressure on one side of the thoracic cavity causes herniation of the ipsilateral lung towards the opposite side. In this case report, we have presented a similar situation in which a patient suffering from pulmonary TB for a period of 11 months (since February 2019) being a defaulter presenting with the complaints of breathlessness and chest pain was ultimately diagnosed with right empyema thoracis which led to transmediastinal herniation of right lung towards left.

Pulmonary TB was the cause of empyema thoracis (pulsion) which together with underlying tubercular mediastinal lymph node (traction) led to herniation of lung. Apart from this, it may be possible that the resultant hydropneumothorax as a complication of right pulmonary TB might have caused collapse of right lung with herniation of the same lung through the mediastinum on the opposite side, empyema thoracis being an associated complication only.

The patient was not predisposed to any kind of addiction and did not have history of persistent cough which might have been an added cause of herniation.

Radiology plays an important role in the diagnosis of this condition. Presence of anterior line displacement in the chest X-ray of this patient may have provided a clue to the presence of transmediastinal herniation of the lung however it was missed in the peripheral center where he presented first.

The anterior margin in a normal chest X-ray is suggestive of the vessel marking which is radio opaque. But in this case as shown in the picture, the displaced anterior margin is radiolucent suggestive of transmediastinal

herniation. The diagnosis is confirmed with the help of CT scan.

The diagnostic signs in CT are upper border of hernia and blood vessels crossing from healthy hemithorax into the pouch of hernia.

Management may be conservative if the patient has no symptoms. However, in this case surgical intervention was indicated as the patient had dyspnoea and empyema thoracis large enough to cause herniation.

Herniation in the chest requires freeing of the hernia sac and then excising a sufficient amount of the sac so that following its plication a smooth, flat, non-protruding base or floor is created. Munnell suggested the use of autologous material to close the defect.[10] Synthetic material may be used in case of poor quality of local tissue.

Very few cases have been reported in the literature till now of transmediastinal herniation of lung being treated by negative pressure therapy. As in this case, the patient has right sided empyema thoracis requiring a thorough decortication. Any attempt at (plication) of sac would have resulted into disastrous complications as hernia sac was in close proximity with heart and major vessels.

As discussed with the radiologist, the hernia boundaries were: n major vessels laterally (left), left ventricle and left atrium at its base and its cavity on the right.

As it was an infected case one cannot think of any prosthesis. Hence an innovative way was planned to place tip of lower ICDT into hernia sac with Romovac attached for creating and maintaining negative pressure to keep hernia sac reduced and collapsed helping in prevention of reherniation.

CONCLUSION

Transmediastinal herniation of the lung can result due to pressure changes in hemithorax resulting in either pulsion or traction of the consequent lung. A careful look at the chest radiology may reveal signs that provide clue to the same. Trans-mediastinal herniation of lung with underlying empyema thoracis requiring decortication can be successfully treated with the application of intermittent strong negative pressure (after completing decortication) in the pleural cavity near mediastinum to gradually deliver the herniated lung to its normal position followed by application of negative pressure in the post-operative period through one of the ICDTs to avoid unnecessary post-operative complications or reherniation.

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