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A unique case report of occupation associated recurrent loculated hydro-pneumothorax with interstitial lung disease

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Abstract---Hydro-pneumothorax is an abnormal collection of fluid and air in the pleural space. The knowledge of hydro-pneumothorax dates back to the days of ancient Greece when the Hippocratic succussion was used to be performed for the diagnosis. Generally, a patient with hydro-pneumothorax presents with heaviness of the chest with chest pain, shortness of breath, dry cough and early fatigue. The patient in this case report presented with the above complaints along with that he was having structural thoracic kyphosis and grade 3 gynecomastia. He was working in a diamond industry as a diamond polisher. This case explains the role of occupation and hormones on the presentation and prognosis of respiratory disease.

Keywords---diamond worker, gynecomastia, hydro-pneumothorax, occupational disease, thoracic kyphosis.

Introduction

Hydro-pneumothorax which is an abnormal collection of air and fluid in the pleural space. Normally, a patient with hydro-pneumothorax is investigated with an x-ray, thoracentesis with fluid cytology to confirm the diagnosis and source of fluid and air. After the confirmation of diagnosis, generally, intercostal drainage

tube (ICD) is inserted for the drainage of fluid and air, along with analgesics and antibiotics. Most of the times physiotherapy is also being prescribed for re-expansion of the collapsed lung. In cases of repeated collapsed lungs, the next step is a non-surgical repair of the leak. This can be done in several ways and is sometimes called pleurodesis which is a procedure for the obliteration of the pleural space to prevent recurrent accumulation of air, fluid or both. There have been tremendous advancements in the field of laboratory and radiological diagnosis and therapeutic management for pleural pathologies. However, not many national or international literature are documented regarding hydro-pneumothorax. The purpose of this case report is to throw light on the clinical presentation, association with occupation and etiological diagnosis of the patients with hydro-pneumothorax.

Patient information

A 51-year-old male presented to the respiratory medicine department with complaints of fever, cough, and breathlessness since 2 months. He also complained of loss of appetite and loss of weight. There was no history of hemoptysis. When taken history in details he also informed that there was a past history of complaints of fever and cough 2 months ago and for 2 weeks for which he was diagnosed with pneumonia and was treated for the same in another hospital. Few days after the discharge from that hospital, he started experiencing chest pain, cough with expectoration (whitish, mucoid, non-foul smelling and non-blood tinged) and breathlessness for which he again visited the same hospital and after investigations he was diagnosed with right middle lobe consolidation type of lesion with endobronchial right middle lobe lesion, suggesting a neoplastic etiology and Intercostal drainage tube was inserted for 3 days and was prescribed with medications for 1 month and sent back to home. Patient was on regular medications, but after a week he again experienced aggravation of same symptoms of cough and breathlessness so he again visited the same hospital where investigations were done in the form of bronchial biopsy and histopathology report and diagnosed with chronic bronchitis. As he was not satisfied with the treatment he decided to visit multispecialty hospital in Vadodara, Gujarat where upon admission he underwent USG thorax and HRCT. Along with the clinical examination and investigations, patient was diagnosed with right side loculated Hydropneumothorax causing atelectasis of right lung. Along with the medical treatment, physiotherapy reference was also given for expansion of the right lung and also for bronchial hygiene.

Patient is not having any other medical history including no history of tuberculosis, asthma or hypertension. But he was having frequent episodes of dry cough throughout the years since 1.5 to 2 year. Patient is not having any addiction of bidi, cigarette or alcohol. He never got moustache nor even scanty beard hair even after attaining adulthood. In terms of occupation, the patient is working in a diamond industry as a polisher. The patient since few years is having difficulty in viewing the nearly placed objects, which is common with aging. But despite of having difficulty, the patient continued his work with difficulty and did not consult any optometrist for the same. Because of this his work output was decreased and income also suffered.

Upon systemic examination, patient was found to have grade III gynecomastia along with widely spaced nipples, kyphosis and shallow breathing with some use of accessory muscles including sternocleidomastoid and scalene. Patient was also having high arched palate. Mediate percussion revealed dullness over right 2nd, 4th, and 5th intercostal spaces. Mediastinum was shifted towards the left side (positive trail sign). On auscultation, patient had reduced air entry over right inframamillary, supramamillary, upper and lower mid-axillary, infrascapular, interscapular regions, and reduced air entry over left inframamillary region, and there were no added sounds. On modified Medical Research Council (mMRC) scale, patient had grade II dyspnea. With regards to activities of daily living (ADLS), patient is independent in all his activities.

Table 1 - Timeline of events

Events	Date
First onset of symptoms	July 2019
Visited local physician	21/06/2021
Revisit to local physician	07/08/2021
Diagnosis of tubercular empyema thoracic by local physician	07/08/2021
Discharge by local physician with the diagnosis of right lung abscess	19/08/2021
Visit to the current physician	06/09/2021
USG thorax	06/09/2021
HRCT Thorax	07/09/2021
Chest x-ray & Pleural fluid tapping	07/09/2021
Pleural fluid AFB	07/09/2021
Bacteriological report	07/09/2021
Sputum examination for TB	07/09/2021
ICD insertion	07/09/2021
Pleural fluid cytology	08/09/2021
2D Echo	08/09/2021
USG Inguinoscrotal – Diagnosis of ectopic testes	08/09/2021
USG abdomen-pelvis	08/09/2021
Diagnosis of Hydro-pneumothorax under investigation	08/09/2021
Physiotherapy reference	13/09/2021

Image 1 - Serial x-rays of the patient (first three images are of before the insertion of ICD and fourth is after insertion of ICD)

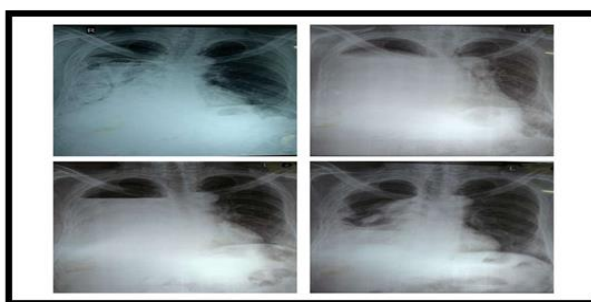


Table 2 – Finding in major laboratory investigations

Investigation	Findings
USG Thorax (06/09/2021)	Gross amount of free fluid is noted in right pleural cavity with few echoes within, with underlying collapse of lung. Right side gross pleural effusion. Left Hemithorax appears normal.
HRCT Scan Chest (07/08/2021)	Right middle lobe consolidation type of lesion with endo-bronchial right middle lobe lesion could suggest neoplastic etiology. Lung parenchyma shows centrilobular and para septal emphysematous changes with a large bulla in right upper lobe. This measures 8*8cm.
HRCT Chest (07/09/2021)	Large right sided loculated hydro-pneumothorax causing atelectasis of right lung. Calcified sub-carinal lymph nodes.
Bacteriology Report (07/09/2021)	Specimen - Pleural fluid Gram stain - Plenty of pus cells seen, no organism seen Z.N. stain - Acid fast bacilli not seen Culture report - No organism isolated
USG- Inguinoscrotal (8/9/21)	Penis appears small in size, B/L testes appears small in size and are located in supra-scrotal region suggestive of ectopic testes.

Discussion

Pleural effusion or pneumothorax is generally resolves with insertion of ICD along with antibiotics. Sometimes physiotherapy also plays part in terms of breathing exercises, thoracic expansion exercises along with spirometry. The patient was working as a diamond cutter for years and has a deformity of kyphosis. His work requires sitting in palathi posture for long period of time. In addition to it, the difficulty in looking at the objects placed nearby forces the patient to lean more in the forward direction. All these deviations may lead to the patient inhaling the diamond dust which is coming off while polishing the diamond. Generally, in diamond polishing industry, workers sit erect and occupation does not demand forward bending. But in this patient due to kyphosis and vision problem he used to bend forward with thoracic flexion at work. In terms of literature, to the surprise, there is scarcity of available literature regarding association of occupation and recurrent onset of current respiratory problem. There was one study done by Ben Nemery and Maurits G Demedts done in 1992, associated increased risk of cobalt exposure in diamond polishers. Even spirometry and ventilatory function of the workers showed significantly lower indices than control subjects. Similarly, in this case this might be the result for the repeated episodes of pleural effusion in patient. Also, Fairhall et al. noted an increased prevalence of bronchitis as one of the effects of cobalt exposure affecting respiratory system. (Fairhall et al. 1947). Thus, this is the distinctiveness of this case report, where there is a possible cause of the inhaled diamond dust or cobalt which is present in cobalt-containing polishing disks leading to the lung pathology. A Gyselen (1989) in his study also showed a significant correlation between exposure to cobalt and decrease in lung function in diamond cutters. He also concluded that the strikingly harmful effects of cobalt can be explained by the chronic exposure

to very small particles with markedly increased solubility. Z. K. Wahbi et al. in their case report stated that some types of interstitial lung disease are characteristically associated with an increased risk of spontaneous pneumothorax. Similarly, in this case, the association of hydropneumothorax that is seen in combination with interstitial lung disease is also because of the occupation. The pathogenesis of the broncho-pulmonary pathology may be attributed to the cytotoxic as well as to the sensitizing (i.e. allergic and/or idiosyncratic) actions of cobalt. The diagnostic findings in form of HRCT in this patient were supported by M. B. Gotway et al. (2002) who in their case report studied the High-Resolution Computed Tomography Appearance in Hard Metal Interstitial Lung Disease.

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