

HRCT Chest Findings of Re-expansion Pulmonary Edema: A Case Report

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ABSTRACT

Re-expansion pulmonary edema occurs when the lung re-expands after an extended duration of collapse. It is rare with the reported incidence between 0% and 1%. We present a case of a 51-year male who presented with breathlessness, cough and right-sided chest pain. Chest radiograph showed right-sided pneumothorax. After 2 hours of chest tube insertion, the patient developed tachypnea and severe hypoxemia. HRCT chest revealed consolidation, ground glass opacity and smooth interlobular septal thickening in the right lung as well as a small patch of ground glass opacity in the contralateral lung. The serial radiograph showed resolution of consolidation and ground glass opacities.

Keywords: *Dyspnea; Hypoxia; Pneumothorax; Tachypnea*

INTRODUCTION

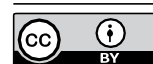
Re-expansion pulmonary edema (REPE) occurs when a collapsed lung rapidly re-expands after chest tube insertion to treat pneumothorax, pleural effusion, or hemothorax. REPE is rare with reported incidence following drainage of pleural effusion or pneumothorax between 0% and 1% in most studies. It is potentially lethal with a mortality rate as high as 25%.^{1,2}

CASE REPORT

A 51-year male presented to the emergency with shortness of breath and persistent cough for 6

months and right-sided chest pain for the last 2 days. On admission, his blood pressure was 130/70mm of Hg, pulse rate 90 per minute and respiratory rate 32 per minute. The SpO₂ was 82% on room air which increased to 90% with supplemental oxygen. The chest radiograph (Figure 1) showed hyperlucent right hemithorax with no bronchovascular marking along with tracheo-mediastinal shift towards the left side. Diagnosis of right-sided pneumothorax was made. He underwent intercostal tube drainage under local anaesthesia. Drainage was started without negative pressure suction with a 12 Fr chest

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Figure 1: Chest radiograph PA view showing right-sided pneumothorax

tube. After 2 hours following the chest tube placement, the patient developed severe dyspnea and cough with the production of pinkish sputum. The SpO₂ decreased to 80%. The pulse was 100 per minute and the blood pressure was 90/60 mm of Hg. On examination, crepitations were present in the right hemithorax. Chest radiograph showed consolidation, ground glass opacity and reticular opacities in the right lung. REPE was suspected and HRCT chest was done the following day. HRCT chest (figure 2a) showed consolidation, ground glass opacity and smooth interlobular septal thickening in the right lung. A small patchy area of ground glass opacity was also noted in the left lower lobe.

The patient received supplemental oxygen via a non-rebreathing face mask. Patient showed gradual clinical improvement. The vitals remained stable. The patient recovered completely without residual hypoxemia. Repeat chest radiograph (figure 2b) done at 4th day of admission showed resolution of consolidation with mild reticular opacities.

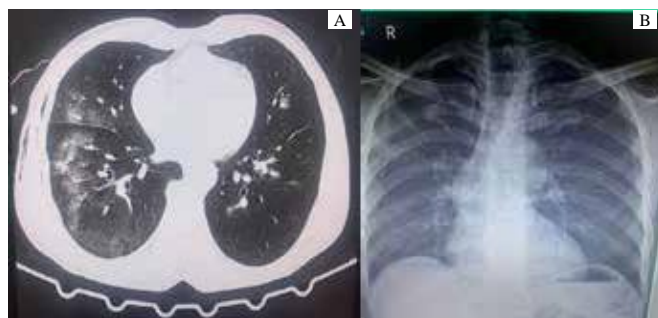


Figure 2: 2a); HRCT chest axial section shows ground glass opacity, consolidation, interlobular septal thickening in the right lung and a small patch of ground glass opacity in the left lung, 2b); Chest X-ray PA view shows resolution of consolidation with mild reticular opacities

DISCUSSION

Re-expansion pulmonary edema occurs when the lung is rapidly re-expanded by active evacuation of large amounts of air or fluid from the pleural space. Increased capillary permeability due to hypoxic injury, reperfusion injury with release of toxic oxygen free radicals, and surfactant depletion, are all thought to play a major role in the development of re-expansion pulmonary edema. Some research suggests that mechanisms such as increased pulmonary hydrostatic pressure caused by enhanced venous return, pressure-induced mechanical disruption of the alveolar capillaries, increased pressure across the capillary–alveolar membrane from bronchial obstruction and altered lymphatic clearance may also lead to re-expansion pulmonary edema in some patients.^{3,4,5}

The risk factors include duration of collapse greater than 72 hours, the application of high negative pressures during thoracic drainage (>20 cm H₂O), rapid lung expansion with drainage of large volumes of pleural fluid (>1.5 L), severe lung collapse and age between 20-39.^{5,6,7}

The clinical manifestations can vary considerably. In some cases, symptoms may be absent and pulmonary edema may be revealed only by typical radiological findings, or it may be associated

with severe cardiorespiratory insufficiency and circulatory shock.

The onset of symptoms is usually within 24 hours with 64% of patients having onset within 1-2 hours after lung re-expansion. Chest radiograph may show a unilateral alveolar filling pattern within 2-4 hours after reexpansion, which may progress over 48 hours and persist for 4-5 days. The edema resolves in 5-7 days without remaining radiographic abnormalities.^{5,8}

On HRCT scans most common finding is patchy areas of ground glass opacity. Other frequent findings include consolidation, interlobular septal thickening predominantly located in the anterior portion of the lung and intralobular interstitial thickening superimposed on ground glass opacity. Bronchovascular bundle thickening, ill-defined centrilobular ground glass nodules and small amount of pleural effusion are noted in some cases.⁹

REPE is mostly commonly involves the entire re-expanded lung and rarely involves a single lobe or segment. Bilateral or contralateral REPE have been reported rarely. However, as a small ground glass opacity might not be definitely identified on chest radiograph, the actual incidence of contralateral REPE could be higher than the reported numbers. A retrospective review by Glesson et al. of CT scan images of patients with REPE, contralateral abnormalities were seen in 8 cases and included ground-glass opacities in 6 patients, interlobular septal thickening in 3 patients and consolidation in 3 patients. In study by Baik et al. 9% of patients had contralateral REPE and each case presented as a relatively small area of ground glass opacity with intralobular interstitial thickening, which were similar to the CT findings of the ipsilateral REPE but to a lesser degree.^{9,10} Finding was similar to our case as there was small patch of ground glass opacity in lower lobe of contralateral left lung.

CONCLUSION

Re-expansion pulmonary edema should be considered if the patient's respiratory condition worsens after lung re-expansion. It is necessary to be

aware of risk factors and clinical features of REPE and be acquainted with its the HRCT features which will enable to make prompt diagnosis in appropriate clinical setting.

CONFLICT OF INTEREST

None

SOURCES OF FUNDING

None

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