Case Report of Pulmonary Alveolar Microlithiasis: A Family Issue

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Abstracts

Pulmonary alveolar microlithiasis (PAM) is a super rare autosomal recessive disorder characterized by deposition of calcium-phosphate Microliths inside the alveoli. Usually the presentation is not specific. Here we report a case of a 20-year-old female presenting with progressive dyspnea and cough through years whose diagnosis of PAM was confirmed via high-resolution computed tomography (HRCT) and a family history. This case highlightes the clinical and radiological diagnosis of PAM, and reviews the available possible therapies.

Keywords: Pulmonary alveolar microlithiasis, lung transplant, SLC34A2 gene.

1. Introduction

PAM is a super rare genetic lung disease caused by mutations in the SLC34A2 gene, encoding a sodium-dependent phosphate co-transporter responsible for alveolar phosphate homeostasis. PAM was first described by MALPIGHI [1] in 1686 and was named by PUHR [2] in 1933. Only around 1000 cases have been reported worldwide until 2015 [3]. PAM remains a diagnostic dilema due to its nonspecific symptoms and rarity. This case report discusses a typical presentation, the diagnostic pathway, and current management approaches.

2. Case Presentation

Patient Background:

A 20-year-old female, non-smoker, with no significant past medical or surgical history, presented to the Emergency department with history of a two-year of progressive exertional dyspnea and intermittent dry cough. There was no history of chest pain, hemoptysis, or wheez.

Also no systemic symptoms such as fever, anorexia, night steating or weight loss.

There was no history of recurrent chest infection, hospitalization or emergency department visits.

The patient was a student with neither working nor exposure history

Family History :

The patient brother was diagnosed with PAM five years ago in different hospital before our patient started to seek medical attention.

Clinical Examination:

Upon physical examination her vitals revealed : SpO2 : 70% on room air requiring high flow face mask with reservoir to keep SpO2: 85-88%, Blood pressure : 119/82, Pulse: 140, Tempreture: 37.1 C. Upon chest auscultation: diffuse bilateral coarse crackles with also finger clubbing. Pulmonary function testing could not be done due to patient clinical situation.

Laboratory studies:

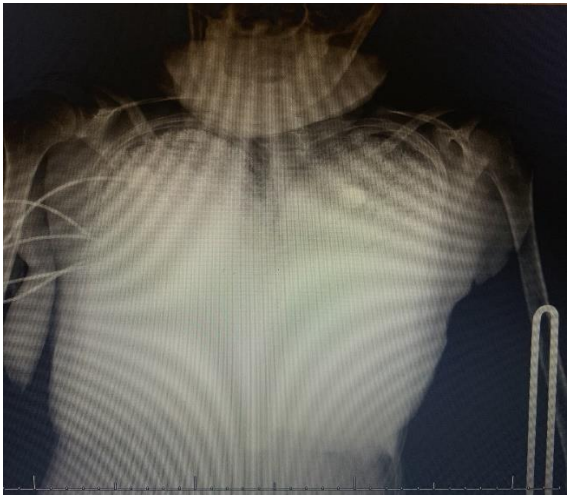
WBC:12, Neutrophils:10, HGB:10.8, PLT: 265, CREATININE: 34, INR: 1.09, Liver Function Test: within normal range, Electrolytes: within normal range

PH: 7.36, pCO2: 60, pO2: 50, HCO3: 32

Genetic testing for the SLC34A2 gene was not available.

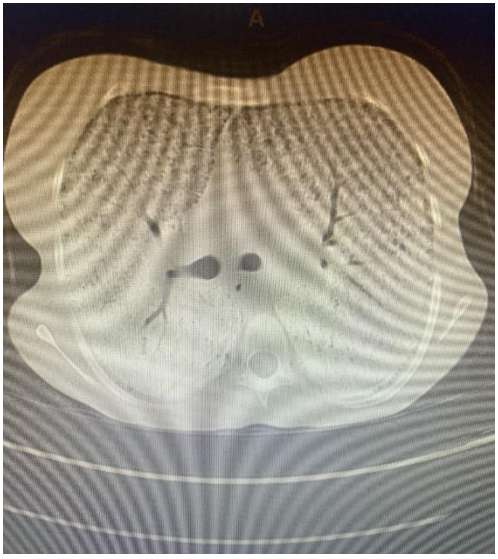
Imaging Studies:

• Chest X-Ray: Diffuse, bilateral sand-like calcifications all over lung fields. The typical presentation of PAM on a chest X-ray is usually discribed as “sandstorm” appearance. (Figure 1)

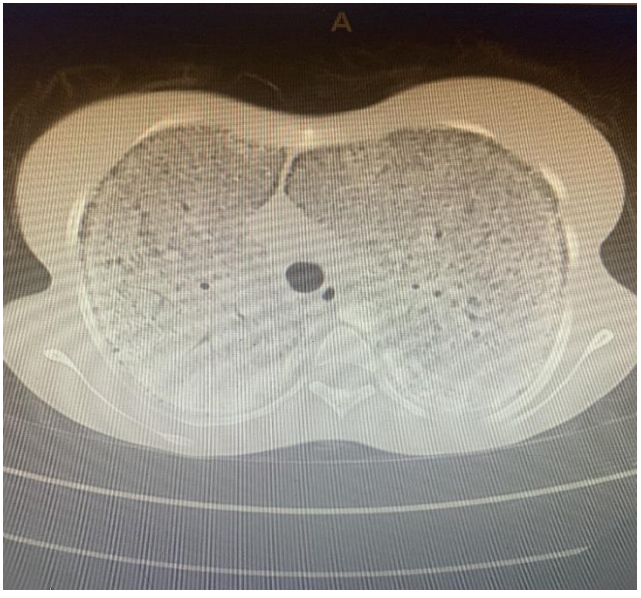


(Figure 1)

• High-Resolution CT (HRCT): Revealed “crazy-paving” patterns and extensive micronodular calcifications, pathognomonic for PAM. (Figure 2), (Figure 3)



(Figure 2)



(Figure 3)

Hospital Course:

The patient was admitted to the ICU due to deterioration of her work of breathing. During the admission we had to keep the patient on BiPAP alternating with HFNC to keep her SpO2 between 88-92%. Dispite presciping brochodilators, antibiotics and systemic steroids, the patient did not improve, so we have had transferred the patient to a transplant center in order to evaluate and prepair her for lung transplant.

3. Discussion:

PAM is considered to be a genetic disease due to the inactivating mutations within the SLC34A2 gene identified in patients. This gene is located on chromosome 4p15 and consists of 13 exons (4). Genetic analysis aids in confirming the diagnosis and understanding familial implications.

PAM is typically asymptomatic in early stages, with symptoms appearing in the second to fourth decade of life. Finger clubbing (also known as secondary hypertrophic pulmonary osteoarthropathy) is typically present in advanced stages of PAM, seen in 7% of the worldwide 1022 cases reviewed (3). Imaging modalities, particularly HRCT, play a crucial role in diagnosis by demonstrating characteristic calcifications. Upon macroscopic examination, lungs affected by PAM are enlarged, heavy and nonbouyant. Sectioning of the lungs often reveals a diffusely calcified, gritty, pleural surface with a studded, fine and granular appearance (4). In our presented case, the patient did not undergo a lung biopsy; however, the typical radiological finding and the previous dignosis of the patient's brother was consistent with the diagnosis of PAM. Routine blood tests, including serum phosphate and calcium, are usually normal in patients with PAM (5). Serum monocyte chemotactic protein-1 (6), surfactant protein (SP)-A and SP-D (7) have been revealed to be elevated in certain patients with PAM. To the best of our knowledge, still no guidelines for the treatment of PAM. Systemic steroids, calcium-chelating agents and bronchopulmonary lavage have demonstrated an ineffectiveness at reducing disease progression in previous studies (3,8).

Therapeutic Options:

Symptomatic management includes supplemental oxygen, systemic steroid and management of complications is usually attempted. Whole lung lavage has been attempted by a few investigators but without improvement in radiographic findings or clinical symptoms [9],[10]. Lung transplantation remains the only curative option in advanced stages. The first bilateral lung transplant in a patient with PAM was described in 1992 in France [11], Single transplants were reported in 1996 in Saudi Arabia [12], The longest survival for PAM treated by transplantation is 15 years without recurrence [13]. Emerging therapies targeting phosphate metabolism still under investigation.

Prognosis:

The disease is lethal but usually progresses slowly but it can lead to pulmonary fibrosis, respiratory failure, and cor pulmonale. Regular follow up and multidisciplinary care and referral to lung transplant center are essential for optimizing outcomes.

4. Conclusion:

This case highlights the importance of considering PAM in the differential diagnosis of diffuse pulmonary calcifications. Dealing with such cases is challenging due to the rarity of the disease worldwide and the fact that lung transplant is the only available treatment for this disease. Early recognition through imaging and genetic testing is crucial, as timely interventions and referral to lung transplant center may improve survival and quality of life.

Conflict of interest:

Nothing to disclose.

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