Metastatic pulmonary calcification
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Section: Chest imaging  
Area of Interest: Lung  
Procedure: Computer Applications-Detection, diagnosis  
Imaging Technique: CT  
Imaging Technique: CT-High Resolution  
Imaging Technique: Teleradiology  
Special Focus: Calcifications / Calculi  
Case Type: Clinical Cases  
Authors: Zalazar R1, Fernandez-Plaza A2, Páramo M1, Viteri-Ramirez G 1, Slon-Robledo P 1, Bastarrika G1  
Patient: 29 years, female

Clinical History:

A 45-year-old female patient with polycystic kidney disease started with haemodialysis programme due to a chronic renal failure. A chest radiograph was performed and showed poorly-defined small nodules in the upper and middle lung zones.

Imaging Findings:

Chest radiograph shows poorly-defined small nodules in the upper and middle lung zones (Figure 1). High-resolution CT examination of right lung shows fluffy, poorly defined nodules in right upper lobe (Figure 2). Several nodules exhibited calcification (arrows) on mediastinal window (Figure 3, 4).

Discussion:

Metastatic pulmonary calcification (MPC) is a complication arising in patients with untreated renal failure, failed renal transplantation and during haemodialysis treatment. It is found in 60% to 75% of postmortem examinations of patients who received chronic haemodialysis [1, 2]. The clinical classification of pulmonary calcification includes metastatic calcification with deposits of a calcium magnesium phosphate complex accumulating in normal interstitial and bronchovascular tissue and dystrophic calcification, which occurs in previously injured lung [1, 2]. The mechanism is not entirely clear but is believed to be related to the secretion of free ions, this produces an alkaline medium in which calcium salts may precipitate [1]. The lung is one of the first sites of deposition of calcium being affected by 75% of cases. It affects with more frequency the apices because the pH is 7.5, compared to the bases, where it is 7.3. The deposit occurs primarily in the alveolar septa and bronchial walls and to a lesser extent in pulmonary and bronchial arterioles. Other organs susceptible to metastatic calcification are the stomach and kidneys [1, 3].

Several conditions can cause disbalance of the metabolism of calcium and phosphorous e.g. patients who are in haemodialysis programs, primary and secondary hyperparathyroidism or hypervitaminosis D. In the case of chronic renal failure with secondary hyperparathyroidism, a significant association has been found between lung calcium content, elevated phosphate level and the calcium-phosphate product [4]. Although most of the patients are asymptomatic, typical symptoms can include dyspnoea, chronic non productive cough and even fulminate respiratory failure or death [2, 4]. The chest radiograph can be normal or shows poorly defined nodules. Involvement of the lung can be unilateral or
bilateral typically in the upper lobes [4]. They may simulate airspace disease, such as pulmonary oedema or infection [4]. Chest CT examination is a more sensitive technique than radiography in detecting the nodules and make a correct diagnosis. Chest HRCT shows poorly defined small nodules of 2-12 mm diameter, some of them calcified. Other findings are ground-glass attenuation and patchy consolidation. Calcifications of the vessels of the chest wall are better seen on the mediastinal window [5]. Technetium-99m-MDP SPECT can help with the diagnosis. This technique has demonstrated radiotracer deposition in MPC in the absence of radiographic findings [4, 6]. The differential diagnosis includes primary and secondary hyperparathyroidism, hypervitaminosis D, dystrophic calcification (TBC) sarcoidosis, silicosis or idiopathic ones (alveolar microlithiasis) [7].

**Differential Diagnosis List:** Pulmonary metastatic calcification secondary to haemodialysis, Primary and secondary hyperparathyroidism, Tuberculosis, Sarcoidosis, Alveolar microlithiasis, Paraneoplastic syndrome

**Final Diagnosis:** Pulmonary metastatic calcification secondary to haemodialysis

**References:**


Figure 1

Description: Chest radiograph shows poorly-defined nodules in the upper and middle lobes. Origin: Zalazar R, Department of Radiology, Clinic University of Navarra, Spain.
**Description:** High-resolution CT examination shows poorly-defined nodules in the right upper lobe.

**Origin:** Zalazar R, Departament of Radiology, Clinic Universitary of Navarra, Pamplona, Spain.
**Description:** Several nodules were calcified (arrows) on mediastinal windows. **Origin:** Zalazar R, Departament of Radiology, Clinic Universitary of Navarra, Pamplona, Spain.
Description: Several nodules were calcified in the right upper and middle lobes on mediastinal windows. Origin: Zalazar R, Departament of Radiology, Clinic Universitary of Navarra, Pamplona, Spain.