

IMAGES IN PULMONARY, CRITICAL CARE, SLEEP MEDICINE AND THE SCIENCES

Respiratory failure due to rapidly progressive metastatic lung calcifications after heart transplantation in a six-year-old girl

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A six-year-old girl was admitted with acute cellular rejection 3 years after heart transplant for non-compaction cardiomyopathy, presenting with fatigue, tachycardia, tachypnea and loss of appetite. She underwent a second heart transplant, but died 4 months later due to respiratory failure after suffering multiple complications, including kidney failure warranting dialysis, cerebral infarctions, hemothorax, pneumothorax, pulmonary edema and bilateral pleural effusions (Figure 1A-C). Post-mortem examination revealed extensive bilateral metastatic pulmonary calcifications (MPC), attributable to kidney failure and dialysis, which were deemed responsible for her terminal respiratory failure (Figure 1D-H). Despite clinical suspicion in the month leading up to her demise, no pulmonary infection was detected.

Lung tissue calcifies in various patterns. Dystrophic calcification develops in abnormal lung and is usually associated with scars. By contrast, MPC represent calcium salt depositions in the alveolar septa and vessel walls of normal lung concurring with elevated calcium-phosphate levels and alkalosis (1). MPC occur most often in renal failure patients on dialysis (up to 75% in autopsy studies) and may resolve once normalization of calcium and phosphate homeostasis is reestablished following successful renal transplantation. Most patients with MPC are asymptomatic, but rapid progression can occur for reasons unknown to date, as demonstrated in this case (2). MPC is underdiagnosed, in part due to a lack of characteristic chest radiograph findings. High resolution computed tomography and radionuclide imaging with technetium-99m-methylene diphosphonate facilitate MPC diagnosis (3).

Figure 1. (A) Frontal radiograph shows extensive bilateral opacifications with air bronchograms and relative sparing of the lower lobes. Bilateral chest tubes were placed to drain pleural effusions, with a small left pneumothorax.

(B) Coronal and (C) sagittal images of an unenhanced computed tomography performed 3 months ante-mortem show extensive calcifications in the right upper lobe, subtle calcifications in the left upper lobe, scattered calcifications in both lower lobes, and bilateral pleural effusions. On functional magnetic resonance imaging (not shown) performed 2.5 months ante-mortem, ventilation was preserved in the right lower and middle lobe, with substantial consolidations of the right upper lobe and the left lung.

(D) Post mortem examination revealed bilateral interstitial lung changes, as depicted in the right lung. Images of histological sections from the upper lobe (asterisk) are provided in E, from the lower lobe (hashtag) in F-H. € Histological sections from the upper lobe show extensive calcifications following the alveolar walls, with advanced fibrosis. (F) Overview images of sections from the lower lobe show preserved lung architecture. On higher magnification (G) the non-fibrosed alveolar septa show significant interstitial calcifications, (H) which can be confirmed as calcium deposits by positive von Kossa staining (black).

(E-G, hematoxylin and eosin staining, H, von Kossa staining; D, scale bar 2cm; E-F, overall magnification 10x, scale bar 1000µm; G-H, overall magnification 200x, scale bar 50 µm).

References:

1. Chan ED, Morales DV, Welsh CH, McDermott MT, Schwarz MI. Calcium deposition with or without bone formation in the lung. *Am J Respir Crit Care Med* 2002; 165: 1654-1669.
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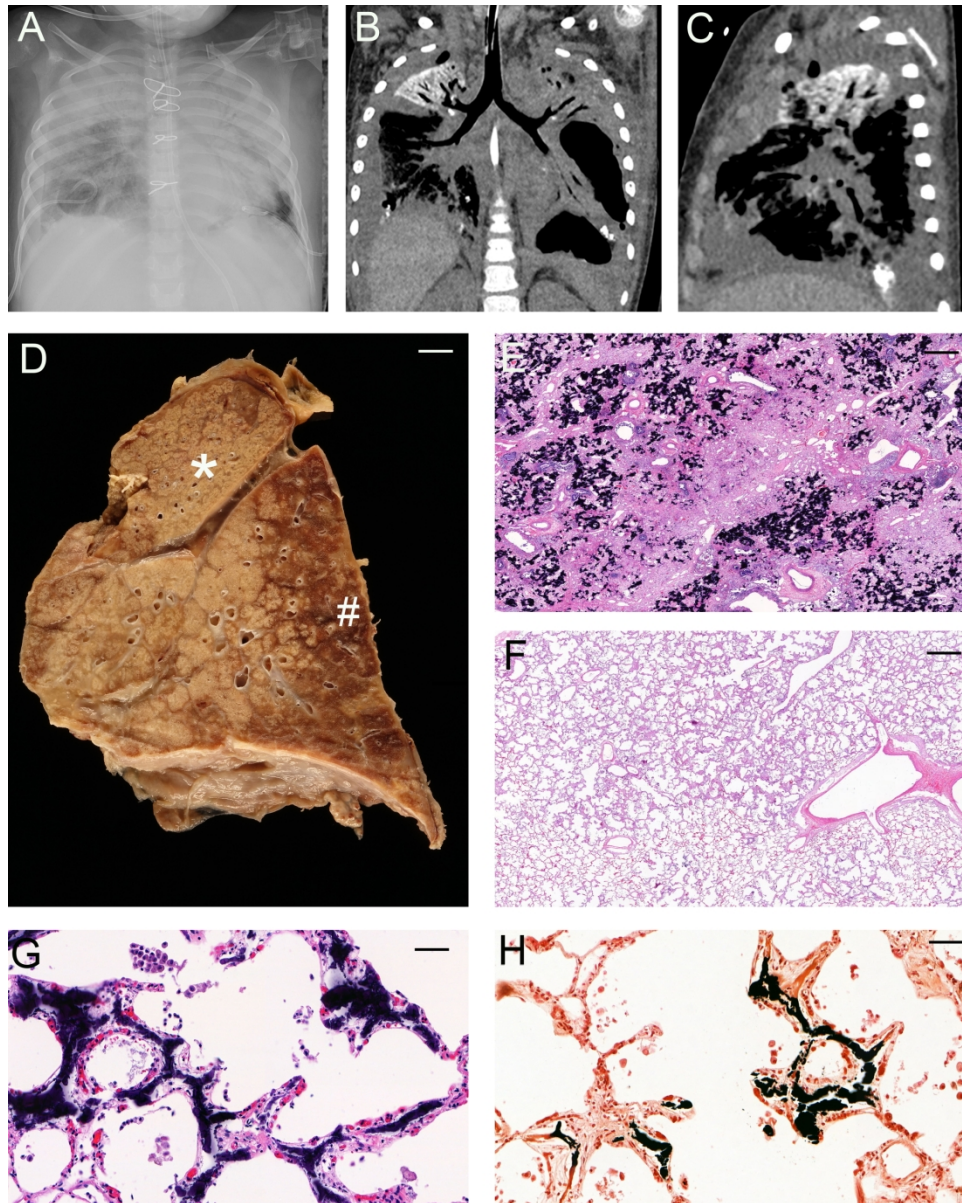


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