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Pulmonary Micro-Embolism of Foreign Material Causing Acute Right Ventricular Failure and Cardiac Arrest

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Introduction

Pulmonary granulomatosis from foreign body micro-embolism has been described in literature since the 1950s under different terminologies like talc granulomatosis, excipient lung disease, pulmonary foreign body angiogranulomatosis, etc.
It is seen when crushed oral tablets are used intravenously. Tablets contain excipients like talc, cellulose, etc., which are insoluble inert particulate filler.
Administered intravenously, these particles lodge in the pulmonary arterioles and capillaries triggering a foreign body response which may vary from a granulomatous reaction resulting in slowly progressive fibrosis and pulmonary hypertension to an acutely fatal reaction leading to small vessel thrombosis and occlusion leading to acute right sided heart failure and cardiac arrest.

Case Description

Hospital Course

A 32-year old incarcerated man with a history of intravenous drug abuse presented to the ER with fever and knee pain.
He recently had surgical debridement of a left tibial abscess and was discharged with a central venous catheter for antibiotic administration.
Emergent surgical exploration of the left knee showed uninfected tissue.
On day 2, he developed chest tightness, shortness of breath (SOB), and was found to be hypoxemic.
ECG, echocardiogram, computed tomography of chest, infectious workup, and MRI of left knee were unrevealing.
He continued to have fevers despite broad spectrum antibiotics. On day 7, chest tightness and SOB acutely worsened. ECG showed sinus tachycardia and diffuse up-sloping ST segment elevations. Arterial pO_2 was 50mm Hg.
Echocardiogram showed severe right ventricular dilatation and dysfunction.
He was emergently transferred to the ICU after which he turned cyanotic and unresponsive with pulseless electrical activity. Despite aggressive resuscitative efforts, return of spontaneous circulation was not achieved. Tissue plasminogen activator was administered during resuscitation.

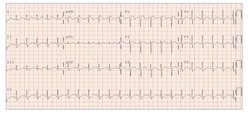

Fig 1. EKG showing sinus tachycardia with diffuse up-sloping ST elevations

Fig 2. Autopsy – gross knee findings

Autopsy Findings

Left lower leg: between outer elastic wrap and inner white wrap is an empty normal saline syringe.
No evidence of infection.
Heart: No significant atherosclerosis, left anterior descending artery tunnels into the myocardium 0.1cm to 0.2cm
Lung: Parenchyma markedly congested with edema, with patent arteries at the hilum. Within the pulmonary arteriole there was presence of polarizable foreign material with cellular response.
Microbiology and Toxicology : Autopsy blood cultures growing peptinophilus asaccharolyticus, other cultures negative. Blood positive for oxycodone, acetaminophen, fluoxetine, mirtazapine and gabapentin, urine positive for oxycodone. Gastric contents negative for opioids.
Cause of Death: Pulmonary micro-embolism of foreign material. It was retrospectively concluded that he had been injecting crushed medications through his central line.

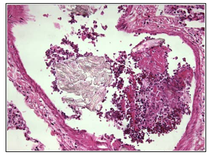

Fig 3. Artery within the lung demonstrating foreign material

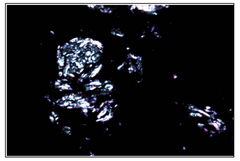

Fig 4. Polarizable Foreign Material

Discussion

With the current epidemic of intravenous drug abuse, we believe that pulmonary granulomatosis from foreign body micro-embolism is appreciably prevalent.
A high level of suspicion is needed to diagnose this potentially fatal disease.
Diagnosis is attained by a lung biopsy.
Systemic and inhaled steroids have shown to decrease symptom severity.
The only way to prevent the progression of disease is to stop intravenous drug use, with lung transplantation being the only definitive treatment.
There needs to be more research to assess diagnostic and treatment modalities.
Whether ventilation/perfusion imaging would be a more sensitive study to demonstrate the perfusion defect in the pulmonary arterioles, and whether this disease can be considered a subset of chronic thromboembolic pulmonary hypertension and symptomatically be treated with pulmonary arterial vasodilators is still to be assessed.

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