Pulmonary Talcosis with Intravenous Drug Abuse

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Introduction

Talc has been known to cause lung disease, either when exposed to inhalation form or intravenous form. A good history along with radiological correlation will often reveal the diagnosis. However, most intravenous drug abusers are reluctant to give a history of exposure and most diagnoses are made after lung biopsy. We present a case of acute respiratory failure that posed to be a diagnostic challenge and was only diagnosed after a biopsy.

Case presentation

A 34-year-old white male presented with dyspnea, fatigue and dry cough. A day prior he had reported a syncopal episode, and did not recollect the preceding events. On regaining consciousness, he thought he had a seizure, given a prior episode from benzodiazepine withdrawal a year earlier. He presented to his primary care physician where he was noted to be severely hypoxemic with pulse oximetry readings in the range of 60-65% and was transferred to the emergency room. He denied any chest pain, palpitations, fever, chills or night sweats.

His medical history was significant for depression for which he was on trazodone. He also took over the counter analgesics as needed for chronic back pain. He had worked as a waiter, for over 10 years. He had quit smoking and drinking alcohol six months earlier and denied any illicit drug use, sick contacts, animal exposure or travel history.

On physical examination, he was afebrile and hypoxemic. He had an unremarkable respiratory and cardiac examination. His laboratory values were significant for elevated CK, CK-MB and troponin at 9862 IU/L (49-397 IU/L), 38 ng/mL (0.2-5.0 ng/mL) and 1.28 ng/mL respectively. He was also noted to have elevated transaminases with AST and ALT at 931 IU/L (15-41 IU/L) and 2315 IU/L (5-45 IU/L) respectively. A urine drug screen for benzodiazepine, narcotics, cocaine and methamphetamines was
unremarkable. An electrocardiogram showed a normal sinus rhythm with no evidence of new or old ischemic changes.

A chest radiograph showed only bibasilar atelectasis, given his severe hypoxemia a computerized tomography (CT) scan of the chest for possible pulmonary embolism was performed which revealed bilateral diffuse areas of ground glass opacities. (Fig. 1) He was started on empiric antibiotic coverage for community acquired pneumonia.

A flexible bronchoscopy revealed inflamed airways and a bronchi alveolar lavage (BAL) and trans bronchial biopsies of the right lower lobe were performed. The BAL cultures were unrevealing and the biopsies showed evidence of multinucleated giant cell reaction with polarizable foreign material in perivascular distribution. (Fig 2)

The presence of talc in the giant cell reaction, prompted us to consider pulmonary talcosis secondary to IV drug abuse as the diagnosis. When confronted with the findings, the patient admitted to injecting himself with crushed oxycodone, he had acquired. He had associated rhabdomylosis from the loss of consciousness and prolonged immobility. He eventually was weaned off oxygen, and there was resolution of his laboratory abnormalities. He was discharged to home but did not followup with pulmonary clinic and we were unable to get any pulmonary function tests.

**Discussion**

Talc or magnesium silicate is a commonly used agent in industry and in daily life. Talc causes two broad categories of lung disease; one caused from talc inhalation and the other from intravenous (IV) administration. Talco-silicosis and Talco-asbestosis result from occupational exposures to talc dust with high content of silica or asbestos fiber respectively. Talcosis or talc pneumoconiosis has been reported as early as the nineteenth century, and is seen with industrial exposures in the mining, rubber, paint, ceramics, leather, and insecticide industry. Inhalation of pure talc such as cosmetic talc has also been reported to cause talcosis.\(^1\,^2\) Reports from literature have even described acute respiratory distress
syndrome from inhalation of cosmetic talc. The common form of pulmonary talcosis is caused by intravenous (IV) administration of talc. Talc is a frequent component of oral medications and serves the purpose of a bulking agent and a lubricant. In the population with intravenous drug use, talcosis has been reported with a variety of agents including methyphenidate, methadone, promethazine, cocaine, diazepam, acetaminophen, meperidine, pentazocine, oxymorphone and heroin among others. Talc is also a commonly instilled in intrapleural spaces as sclerosing agent for malignant pleural effusions. Lung manifestations from pleural instillation are not common, though cases of acute respiratory failure from systemic absorption of intrapleural talc have been reported.

Talc from crushed oral medications results in a suspension which is then injected intravenously. These particles then become entrapped in the pulmonary vasculature and can then translocate to the interstitium resulting in a granulomatous reaction. These granulomas with giant cells can be visualized as birefringent talc crystals with polarized light. The perivascular distribution of talc granulomas is distinct finding of IV drug abuser, unlike the inhaled form where the deposition is predominantly around respiratory bronchioles and alveolar ducts. Larger sized talc crystals are also suggestive of intravenous drug abuse as the source. Talcosis has also been identified by using scanning electron microscopy (SEM) with energy-dispersive x-ray analysis (EDXA) which identifies ratio of magnesium and silicone in the granuloma crystals. Talc granulomas have also been described in other organs in IV drug abusers, but a characteristic finding is presence of crystals in retinal vessels on fundoscopy.

Patients with talcosis can be asymptomatic or present as acute respiratory failure. Usually, symptoms are non-specific symptoms including dyspnea, and cough. Other reported symptoms, include fevers, night sweat, weight loss, or even spontaneous pneumothorax. The pulmonary function tests usually show evidence of mixed obstructive and restrictive physiology with a reduced diffusion capacity. As the disease progresses, there is usually conglomeration of micronodules into masses and development of emphysematous changes in the lung parenchyma. Later complications include chronic respiratory failure.
from emphysema, pulmonary hypertension from intravascular deposition of talc crystals, and right heart failure.\textsuperscript{12, 13}

The CT scan manifestations of acute talcosis consist of a fine micro nodular pattern usually 1mm or less in diameter, and areas of ground-glass attenuation present in all lung zones. Both centrilobular and panacinar emphysema pattern has been reported in IV drug users, with lower lobe panacinar pattern being the predominant finding.\textsuperscript{6, 14} These emphysematous changes can resemble presentation of bullous sarcoidosis and even alpha 1 antitrypsin deficiency. Progressive form of disease is seen as conglomerate masses in upper lobe with areas of high attenuation.\textsuperscript{15}

Our patient had crushed an oral formulation of oxycodone and injected himself and resulted in acute respiratory failure presenting with severe hypoxemia and manifesting on the CT scan as ground glass opacities and reticulonodular pattern. The granulomas from talc injection were discovered on biopsy and had helped in establishing the diagnosis of respiratory failure from IV drug abuse.

A good history, including detailed occupational or remote exposures, radiological correlation and a lung biopsy will help in establishing diagnosis. Acute talcosis is generally treated with supportive measures, though use of steroids has been sparsely reported in literature. Chronic talcosis resulting in severe emphysema, and has been subject to lung transplant.\textsuperscript{16} Pulmonary Hypertension from talcosis has been treated with vasodilator agents with some success.

**Teaching Points**

1. A good history and clinical suspicion along with a biopsy to help in establishing diagnosis of talcosis from IV drug abuse.

2. Presence of polarizable material in lung tissue is pathognomic of pulmonary talcosis.

3. For acute pulmonary talcosis, management is with supportive care only.

**Figure Legends**
Figure 1. Panel A. CT scan of the chest showing bilateral areas of micronodules and ground glass opacities. Panel B. Coronal Section of the CT chest showing areas of ground glass opacities in all lung fields.

Figure 2. Panel A. Granulomatous reaction with giant cells and foreign body (H&E stain, magnification ×10). Panel B. Presence of polarizable material in the granulomatous reaction under light microscopy.
