SARCOIDOSIS VASCULITIS AND DIFFUSE LUNG DISEASES 2025; 42 (2): 16126 DOI: 10.36141/svdld.v42i2.16126

Pulmonary sarcoidosis with dendriform ossification: Diagnostic and pathological insights

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Case presentation

A 77-year-old man presented for evaluation of progressive generalized weakness, dyspnea, and chest discomfort worse with inspiration. His past medical history is significant for sarcoidosis, hypertension, coronary artery disease, and hypothyroidism. Chest computed tomography (CT) showed bilateral pleural effusions left greater than right, a stable mass in the upper anterior mediastinum previously diagnosed as fibrosing mediastinitis, and numerous small, calcified densities in the lower lungs bilaterally (Figure 1).

His sarcoidosis was diagnosed 40 years prior to this presentation via lung biopsy demonstrating noncaseating granulomas with negative tissue stains for fungal and mycobacterial organisms. His course was complicated by fibrosing mediastinitis requiring superior vena cava (SVC) stent. He was last seen by our institution 6 years prior to current presentation and his sarcoidosis was determined to not be active at that time due to stability of pulmonary function testing and negative inflammatory markers. Four months prior to this most recent presentation he was admitted to an outside hospital for hypoxemia and recurrent syncope. He was found to have bilateral pleural effusions and a pericardial effusion, the etiology of which was unclear. That hospital stay was complicated by cardiac arrest thought to be secondary to trifascicular block requiring transvenous pacing with ultimate dual chamber pacemaker placement after resuscitation. He underwent robotic video-assisted thoracopic surgery (VATS). On histology, there was nonnecrotizing granuloma as well as dendriform ossification. Tissue stains for fungal and mycobacterial organisms, urine and serum serological testing for fungal infections, and testing for tuberculosis (serum TB quantiferon and bronchoalveolar lavage fluid acid fast culture) were negative.

The posterior inferior right chest wall lymph node and the anterior pulmonary lymph node were negative for malignancy or granuloma. He was referred to our facility for further evaluation and management of his intrathoracic process. By the time of evaluation at our facility, the patient's dyspnea on exertion had continued to worsen. A thoracentesis demonstrated lymphocytic pleural fluid, with negative cytology and flow cytology. A transthoracic echocardiogram showed a depressed left ventricular ejection fraction of 30-35%. A subsequent cardiac fluorodeoxyglucose Positron Emission Tomography (FDG-PET) scan showed patchy metabolic activity in septum and basal lateral wall. This, in the setting of LV dysfunction and history of pulmonary sarcoidosis met Japanese Circulation Society Guideline

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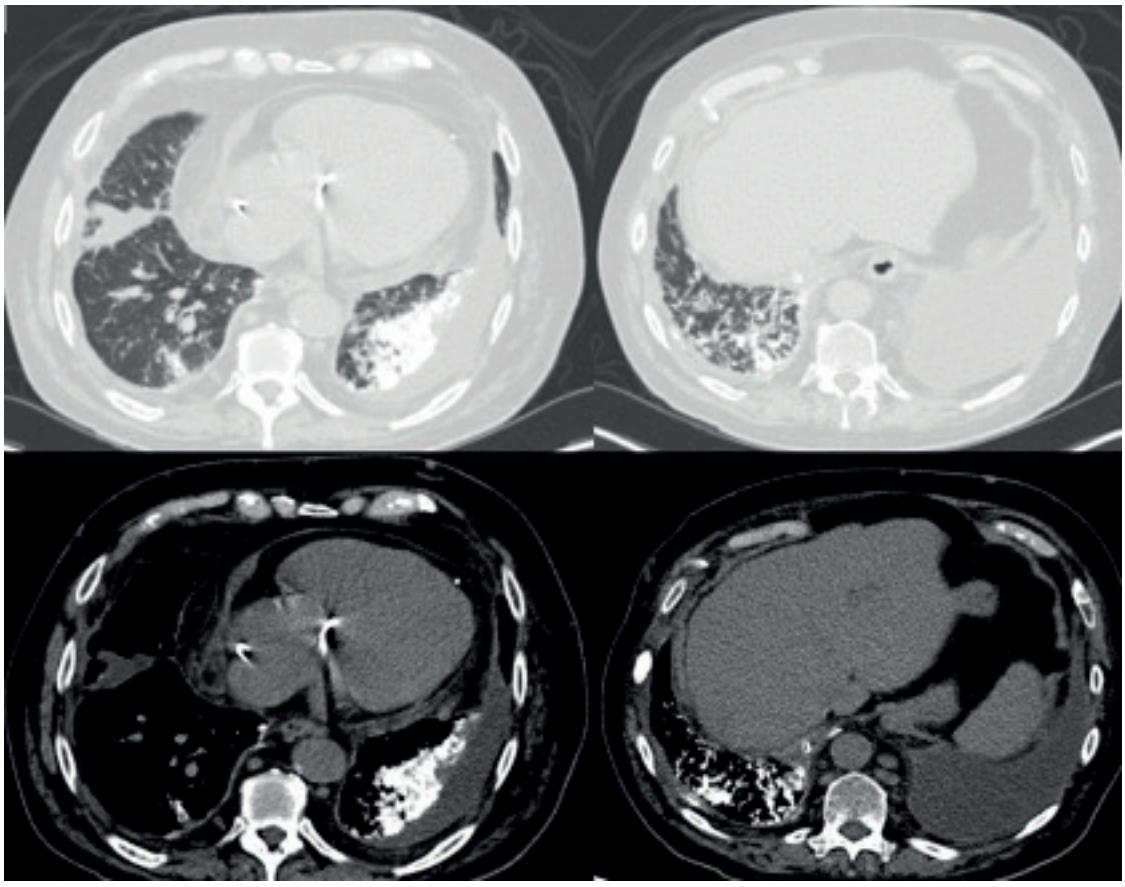

Figure 1. CT chest with bibasilar calcified densities.

of Cardiac Sarcoidosis (1). The final diagnosis was relapse of sarcoidosis in the heart along with progressive dendriform pulmonary ossification. The patient was started on corticosteroids with improvement in symptoms and later transitioned to a steroid-sparing agent.

Discussion

Pulmonary ossification is the histological finding of mature bone with or without marrow elements within pulmonary tissue. The mechanism of formation is incompletely understood but thought to include metaplastic transformation of fibroblasts to osteoblasts secondary to some form of chronic insult. Inflammation, acidosis, sheer forces, and various cell signaling molecules have been proposed as mechanisms by which fibroblasts convert to osteoblasts, however, there remains a paucity of research surrounding this mechanism (2). Pulmonary ossification has features of both experimentally induced bone formation and embryonic bone development (3). Serum calcium, phosphorous, and alkaline phosphatase levels are typically within normal limits (2). There are two distinct histological patterns of pulmonary ossification: nodular and dendriform (4). The nodular subtype is typically seen secondary to underlying left-sided cardiac disorders and thought to be a byproduct of chronic pulmonary venous congestion. This pattern consists of circumscribed lamellar deposits of calcified osteoid material within alveolar spaces without marrow elements. In contrast, dendriform pulmonary ossification appears as an interstitial process with branching spicules of bone and marrow elements that can involve the alveoli by extension (2). Dendriform pulmonary ossification has been described secondary to acute respiratory distress syndrome (3), chronic obstructive

pulmonary disease (4), idiopathic pulmonary fibrosis (5), organizing pneumonia (6), asbestosis (6), rare earth pneumoconiosis (7), heavy metal exposure (8), pulmonary tuberculosis (9), sickle cell disease (10), as well as COVID-19 pneumonia (11). Within the literature, there is also the described phenomenon of diffuse pulmonary ossification (frequently shortened to DPO) by which the dendriform ossification is widespread throughout the lung. Prior to more advanced imaging techniques, DPO was mostly noted on postmortem autopsy (2), although now with high resolution CT scan can be diagnosed using the osteoporosis window setting (12). DPO has typically been thought to affect older men, however there are reported cases in younger adults and women (2). There is limited information about management for DPO, but corticosteroids, calcium-binding drugs, and low calcium diets have no discernible benefit, and bisphosphonates have not been studied (2). When no underlying cause is found, it can also be called idiopathic pulmonary ossification (IPO), although the nomenclature seems to vary throughout the literature. For dendriform pulmonary ossification secondary to an underlying process, as is suspected in our patient, management is typically aimed at underlying pulmonary processes. Information regarding prognostic implications of secondary pulmonary ossification remains limited. Sarcoidosis is a reported (1) though exceedingly rare cause of diffuse pulmonary ossification, and this is only the second reported case of pulmonary ossification associated with sarcoidosis (13).

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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