Case Presentation: Hard Metal Pneumoconiosis

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Edward is a 60-year-old man with a past medical history of hypertension who presented to the Simmons Center for Interstitial Lung Disease with dyspnea that began one and a half years prior. Working in construction, and amongst several exposures, he reports a history of welding tungsten more than 30 years ago. Edward first noticed dyspnea on exertion while painting with a silica-based compound. The dyspnea on exertion progressed over the course of a year, and at the time of referral, he reported shortness of breath at rest as well. He also described a dry cough, fatigue, and lightheadedness. Edward was first seen by a community pulmonologist who did a cardiac work-up which was negative. Edward then underwent computed tomography of the chest, which revealed bilateral upper lobe ground glass opacities and mild volume loss in the left upper lobe, without evidence of fibrosis. He was empirically started on a low dose of prednisone with great improvement in his symptoms. On the oral steroid, he was able to continue to perform his job doing manual labor.

Upon referral to the Simmons Center, his physical exam revealed stable vital signs and clear breath sounds; however, clubbing of his fingers was noted. Further pulmonary testing was completed as part of his initial visit. Pulmonary function tests revealed a moderate restrictive ventilatory defect and low diffusing capacity. A serologic screen for autoimmune disease was unremarkable. Because the diagnosis still remained unclear, he underwent transbronchial biopsies of his left upper lobe. The lung biopsies were reviewed by Samuel Yousem, MD, Director of the Division of Anatomic Pathology at UPMC. He found abundant airspace giant cells, as well as macrophages with "cellular cannibalism" (Figure 1). In the setting of Edward's remote exposure to tungsten, his improvement in symptoms with steroids, and his classic histopathology findings, he was diagnosed with **hard metal pneumoconiosis**, otherwise known as giant cell pneumonitis.

"Hard metal" is a synthetic compound made up of sintering tungsten carbide and cobalt, distinguishing it from other heavy metals [1]. When the lung is exposed to dust particles from these metals, hard metal lung disease (HMLD) may occur. HMLD presents as bronchitis, obstructive bronchiolitis, hypersensitivity pneumonitis, or fibrotic lung disease, otherwise known as hard metal pneumoconiosis [2]. Clinically, work-related subacute disease may occur, even at low levels of exposure, and eventually progress to interstitial lung disease. Radiographically, upper lobe ground glass opacities, reticular nodules, and traction bronchiectasis are most common, although in some cases, honeycombing fibrosis has been reported. For a definitive diagnosis, lung tissue must be obtained. The metals are soluble, and so they are not commonly seen on histopathology. However, alveolar macrophages and giant cells are commonly seen. As in Edward's case, the finding of smaller inflammatory cells within the giant cells, otherwise known as cellular cannibalism, is classic and can help distinguish hard metal pneumoconiosis from other occupational lung diseases and hypersensitivity pneumonitis [3].

With limited data in the literature to support directed therapy for giant cell pneumonitis, Edward was presented at the Simmons Center multidisciplinary team conference. Patients are typically dependent on chronic therapy with corticosteroids. There is only anecdotal evidence to support the use of disease-modifying agents such as azathioprine or mycophenolate mofetil. After discussion about Edward's case, the decision was made to begin him on mycophenolate, a steroid-sparing immunosuppressant agent, in the near future. Currently, he remains on a moderate dose of prednisone with most of his symptoms abated. He was counseled to avoid occupational exposures and to wear a respirator mask for lung protection if he continues to work in the exposed environment.

Diseases such as hard metal pneumonconiosis/giant cell pneumonitis are rare. Only case reports are available in the literature, and therefore diagnosis and treatment options can be challenging. Multidisciplinary academic centers such as the Simmons Center allows expert physicians in the field to serve patients like Edward and provide paramount clinical services, as well as efficient coordination of care.

For a list of references to this article, other articles in this issue, and the Division of PACCM's recent publications and suggested readings for this issue, visit UPMCPhysicianResources.com/Pulmonology.

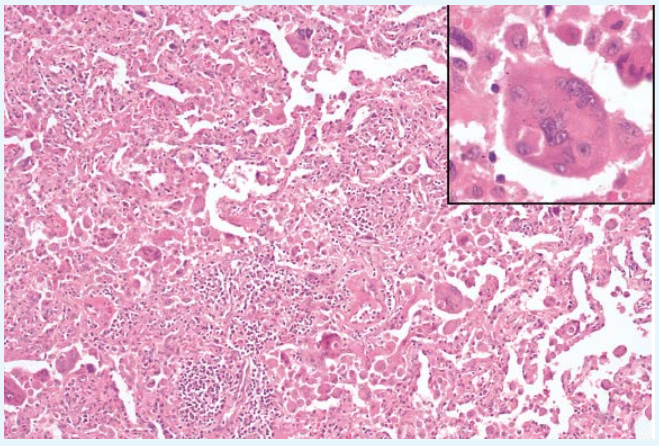

Figure 1. *The section demonstrates classic histologic features of hard metal pneumoconiosis/giant cell interstitial pneumonitis manifesting as airspace filling with numerous multinucleated giant cells and histiocytes. Many of the giant cells contain macrophages in their cytoplasm, which is commonly refer as "cell cannibalism" (see inset).*