Human Pathology (2016) **50**, 176–182

ELSEVIER

Human PATHOLOGY

www.elsevier.com/locate/humpath

Original contribution

Giant cell interstitial pneumonia in patients without hard metal exposure: analysis of 3 cases and review of the literature☆,☆☆

Andras Khoor MD, PhD[a,*], Anja C. Roden MD[b], Thomas V. Colby MD[c], Victor L. Roggli MD[d], Mohamed Elrefaei MD, PhD[a], Francisco Alvarez MD[e], David B. Erasmus MD[e], Jorge M. Mallea MD[e], David L. Murray MD, PhD[b], Cesar A. Keller MD[e]

[a]*Department of Laboratory Medicine and Pathology, Mayo Clinic, Jacksonville, FL 32224*
[b]*Department of Laboratory Medicine and Pathology, Mayo Clinic, Rochester, MN 55905*
[c]*Department of Laboratory Medicine and Pathology, Mayo Clinic, Scottsdale, AZ 85259*
[d]*Department of Pathology, Duke University Medical Center, Durham, NC 27710*
[e]*Lung Transplant Department, Mayo Clinic, Jacksonville, FL 32224*

Received 16 September 2015; revised 23 November 2015; accepted 3 December 2015

Keywords:
Giant cell interstitial pneumonia;
Cobalt;
Hard metal exposure;
Lung transplant;
Haplotype

Summary Giant cell interstitial pneumonia is a rare lung disease and is considered pathognomonic for hard metal lung disease, although some cases with no apparent hard metal (tungsten carbide cobalt) exposure have been reported. We aimed to explore the association between giant cell interstitial pneumonia and hard metal exposure. Surgical pathology files from 2001 to 2004 were searched for explanted lungs with the histopathologic diagnosis of giant cell interstitial pneumonia, and we reviewed the associated clinical histories. Mass spectrometry, energy-dispersive x-ray analysis, and human leukocyte antigen typing data were evaluated. Of the 455 lung transplants, 3 met the histologic criteria for giant cell interstitial pneumonia. Patient 1 was a 36-year-old firefighter, patient 2 was a 58-year-old welder, and patient 3 was a 45-year-old environmental inspector. None reported exposure to hard metal or cobalt dust. Patients 1 and 2 received double lung transplants; patient 3 received a left single-lung transplant. Histologically, giant cell interstitial pneumonia presented as chronic interstitial pneumonia with fibrosis, alveolar macrophage accumulation, and multinucleated giant cells of both alveolar macrophage and type 2 cell origin. Energy-dispersive x-ray analysis revealed no cobalt or tungsten particles in samples from the explanted lungs. None of the samples had detectable tungsten levels, and only patient 2 had elevated cobalt levels. The lack of appropriate inhalation history and negative analytical findings in the tissue from 2 of the 3 patients suggests that giant cell interstitial pneumonia is not limited to individuals with hard metal exposure, and other environmental factors may elicit the same histologic reaction.
© 2015 Elsevier Inc. All rights reserved.

☆ Disclosures: N/A.
☆☆ Presentations: Portions of this manuscript were presented at the United States and Canadian Academy of Pathology 104th Annual Meeting (March 23, 2015, Boston, MA) and are available here: http://www.nature.com/modpathol/journal/v28/n2s/full/modpathol201528a.html.
* Corresponding author at: Department of Laboratory Medicine and Pathology, Mayo Clinic, 4500 San Pablo Road South, Jacksonville, FL 32224. Tel.: +1 904 956 3318.
E-mail address: khoor.andras@mayo.edu (A. Khoor).

http://dx.doi.org/10.1016/j.humpath.2015.12.004
0046-8177/© 2015 Elsevier Inc. All rights reserved.

1. Introduction

Liebow first described giant cell interstitial pneumonia (GIP) as a distinctive idiopathic interstitial pneumonia in 1968:

> We have also seen two instances of a remarkable interstitial pneumonia with a predominantly lymphocytic interstitial infiltrate, but with numerous bizarre giant cells in the alveoli. The appearance is quite distinctive, and to our knowledge no previous accounts exist of precisely this lesion, although it somewhat resembles measles virus pneumonia... The giant cells are even larger than those of measles and are so actively phagocytic that they may be considered cannibalistic... At present, the etiology is completely unknown [1].

Hard metal, also known as cemented carbide or tungsten carbide cobalt, is a metal matrix composite in which tungsten carbide particles are dispersed into a cobalt matrix. Hard metal is used in various industries because of its stiffness and resistance to high temperatures.

The association between hard metal exposure and GIP was first reported by Abraham and Spragg in 1979 [2]. They described the case of a 40-year-old woman working in the hard metal tool industry. She developed interstitial lung disease and underwent a diagnostic open lung biopsy. The histologic features were those of GIP. Scanning electron microscopy and energy-dispersive x-ray analysis (EDXA) of the biopsy tissue revealed innumerable submicron particles containing combinations of tungsten, tantalum, and titanium. Samples of workplace materials showed identical particulates and a moderate amount of cobalt.

In 1984, Demedts et al [3] reported a series of GIP cases in diamond polishers, who had been exposed to cobalt through the use of high-speed grinding tools that had polishing surfaces cemented in a cobalt matrix. Mineralogical analysis of tissue, lavage fluid, and environmental atmosphere identified cobalt as the only toxic agent [3]. Since then, there has been general agreement that cobalt causes GIP in not only diamond polishers but also hard metal workers [4].

GIP has rarely been reported in individuals unaffiliated with the hard metal or diamond polishing industry, especially in the English literature. Magee at al and Hargett et al reported that GIP was an unusual manifestation of nitrofurantoin toxicity, and Reddy et al, Kakugawa et al, and Menon et al published cases of unknown etiology [5-9]. Nevertheless, with the exception of diamond polishers, GIP is generally considered pathognomonic for hard metal lung disease [4].

The aim of this study was to further investigate the relationship between GIP and cobalt exposure.

2. Materials and methods

This study was approved by our institutional review board. Surgical pathology records at our institution were searched for explanted lungs with a histopathologic diagnosis of GIP. The diagnosis was confirmed by 2 of the authors. The clinical histories were reviewed, histologic and immunohistochemical analyses were performed, and mass spectrometry and EDXA data were obtained and analyzed. Because immunologically mediated lung diseases may show association with certain human leukocyte antigen (HLA) haplotypes, HLA typing data were also studied [10].

2.1. Histology and immunohistochemistry

Histologic features of the selected cases were studied extensively and compared to cases of GIP of known etiology, which included 2 cases of hard metal lung disease and 1 case of nitrofurantoin toxicity from the personal files of 1 of the authors. The number of multinucleated giant cells per high-power field was counted in 5 hot spots per case. In addition, immunoperoxidase studies were performed for CD68 (clone PG-M1; Dako, Carpinteria, CA) and thyroid transcription factor 1 (TTF-1) (clone 8G7G3/1; Dako) in selected paraffin sections for each case to identify giant cells of histiocytic and type 2 cell origin, respectively. These

Table 1 Clinical information for patients with GIP of unknown etiology

	Patient 1	Patient 2	Patient 3
Age at transplantation	36 y	58 y	45 y
Race	White	White	White
Sex	Male	Male	Male
Chief complaint at presentation	Dyspnea	Dyspnea	Dyspnea
Smoking history	Former smoker (12 pack-years)	Former smoker (45 pack-years)	Never smoker
Occupational history	Firefighter	Welder	Environmental inspector
Pretransplant diagnosis	Unclassified interstitial lung disease	COPD and idiopathic pulmonary fibrosis	Pulmonary fibrosis, etiology undetermined
Type of transplant	Double lung	Double lung	Left single lung
Posttransplant follow-up	39 months	37 months	9 months
Current status	Alive with recurrent disease	Alive with no evidence of recurrent disease	Alive with no evidence of recurrent disease

Abbreviations: GIP, giant cell interstitial pneumonia; COPD, chronic obstructive pulmonary disease.

Download English Version:

https://daneshyari.com/en/article/6215563

Download Persian Version:

https://daneshyari.com/article/6215563

Daneshyari.com