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Cryptogenic Organizing Pneumonia Masquerading as Coal-Worker's Pneumoconiosis

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ABSTRACT

We report a case of cryptogenic organizing pneumonia in a coal worker that had been diagnosed clinically as coal worker's pneumoconiosis on the basis of imaging studies. This is the first report of this illness in a coal worker, and shows the ongoing role of the pathologist in the diagnosis of compensable pneumoconiosis.

Keywords: Bronchiolitis Obliterans Organizing Pneumonia, Coal, Coal Mining, Interstitial Lung Diseases, Occupational Medicine, Pneumoconiosis, Pulmonary Fibrosis

The Case

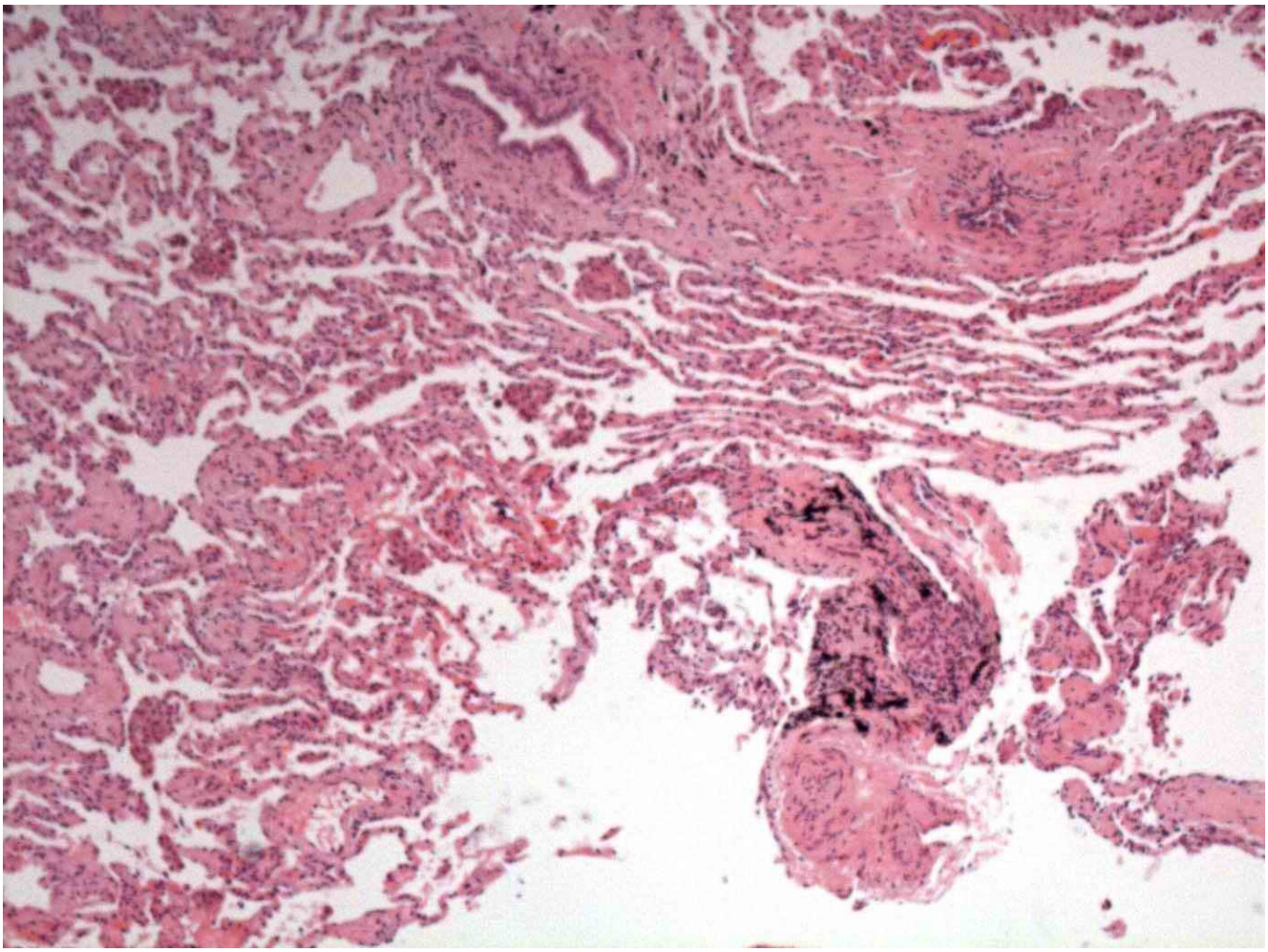


Figure 1. A classic, small coal macule. Black, coal-laden macrophages are contained within a delicate fibrous stroma. There is surrounding emphysema, consistent with the history of smoking.

A 60 year old male presented to his physician complaining of gradually decreasing exercise tolerance over the previous two years. He noted that he now became short of breath after walking half a mile. He had worked in the soft coal industry for 38 years, mostly as a general inside laborer. He had considerable exposure to coal dust, especially when working as a roof bolter and rock duster. At age 46, screening chest x-ray detected slight dust reticulation, and he was offered work in a less dusty area. However, he had left the industry at age 56, without any respiratory symptoms. He had approximately 30 pack years of smoking, but had quit ten years ago.

Chest x-ray was interpreted as consistent with dust reticulation having a profusion of 0/1. The reader noted that "inspection of the lung parenchyma demonstrates interstitial changes in the mid and lower lung zones bilaterally consisting of small irregular and rounded interstitial opacities", and added that these "parenchymal changes are consistent with coal worker's pneumoconiosis. A pulmonologist agreed, and a diagnosis of coal worker's pneumoconiosis was made.

Four months later, the patient presented with a 20 lb weight loss and dysphagia for solid food. An obstructing mass in the distal esophagus was seen on imaging studies and endoscopy, and adenocarcinoma of the distal esophagus arising in a metaplastic columnar (Barrett) epithelium was diagnosed by biopsy.

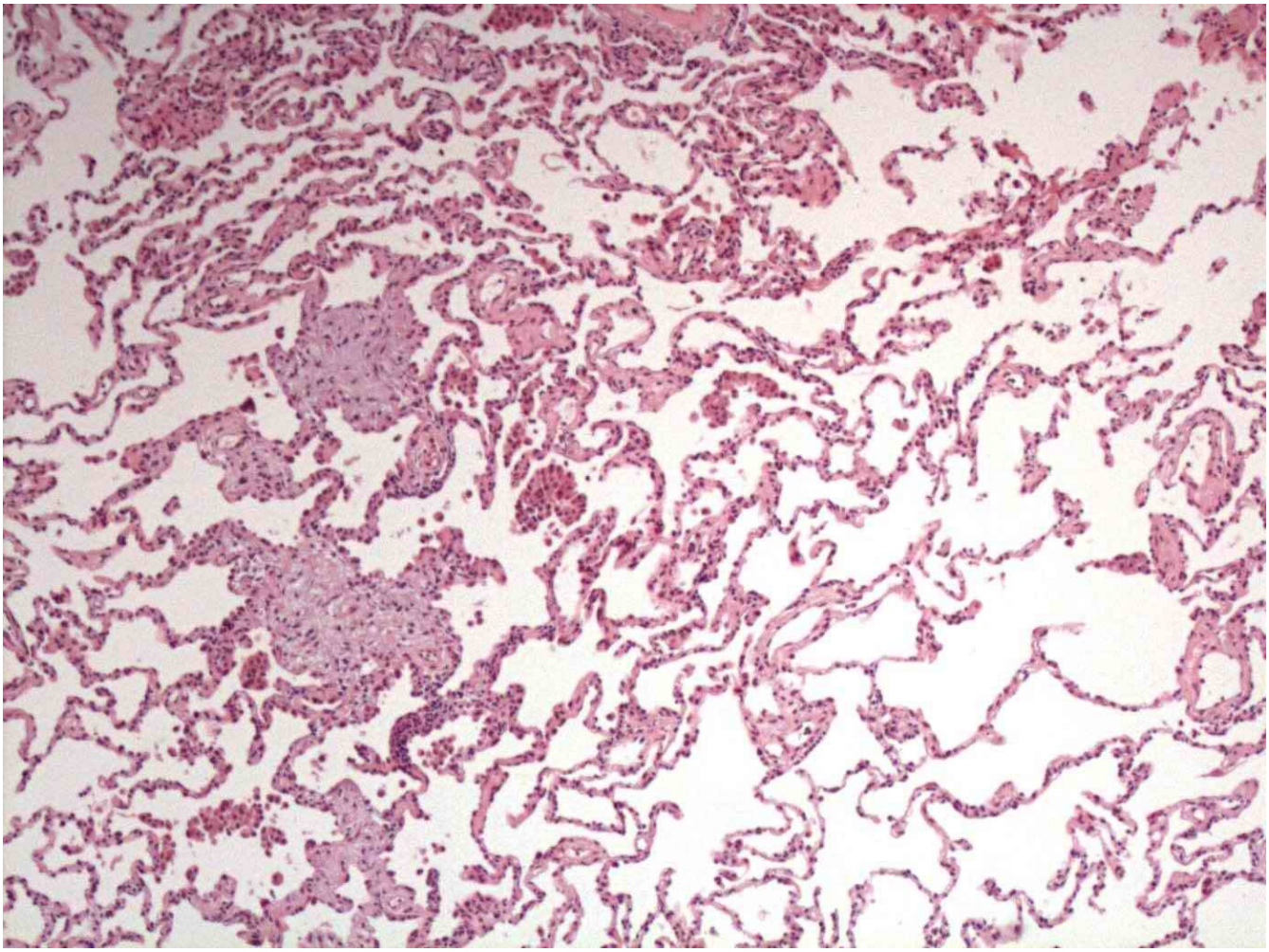


Figure 2. Small nodules of loose connective tissue within the lung parenchyma, but unrelated to coal.

For staging purposes, a wedge biopsy of the right lower lobe of the lung was performed.

Microscopic Evaluation

There was no malignancy, but the nodules and reticulation seen on x-ray were found to consist of a proliferation of loose fibrous tissue, with abundant ground substance imparting a bluish tinge to the involved areas on H&E stain. The process was patchy, and appeared both as thickening of septa, individual nodules 0.5-1mm in diameter, and areas in which the lung was entirely fibrotic. The biopsy also demonstrated both small coal macules with minimal amounts of refractile crystals, and some centrilobular emphysema. The fibrosing process was no more or less severe near carbon-laden macrophages. There was no malignancy.

The process was felt to be most consistent with cryptogenic organizing pneumonia, and in any case to represent an idiopathic fibrosing process that had mimicked coal worker's pneumoconiosis clinically.

Discussion

What is already known on this topic

Coal worker's pneumoconiosis may entitle a worker or the family to compensation if it contributed to death. However, other illnesses may produce nodular densities that mimic the illness during life. Tissue examination is the gold standard.

What This study adds

The author reports a case of nodular densities believed during life to represent coal macules, but which were shown by autopsy to be cryptogenic organizing pneumonia. Cryptogenic organizing pneumonia could not be distinguished from coal worker's pneumoconiosis clinically or radiographically without tissue diagnosis.

Suggestions for further development

The classic Morgantown (US) autopsy studies from the 1970's showed the pathology of coal worker's pneumoconiosis from an era when workers had little protection. Today, small nodules are the usual basis for claims for benefits for coal worker's pneumoconiosis in the US, and in some European countries are considered sufficient evidence. A large autopsy series of claimants, successful and unsuccessful, gathered from medico legal and hospital autopsies, would probably reveal other entities that mimic coal macules, and give some indication of how often the lesions seen on x-ray have some cause unrelated to dust exposure.

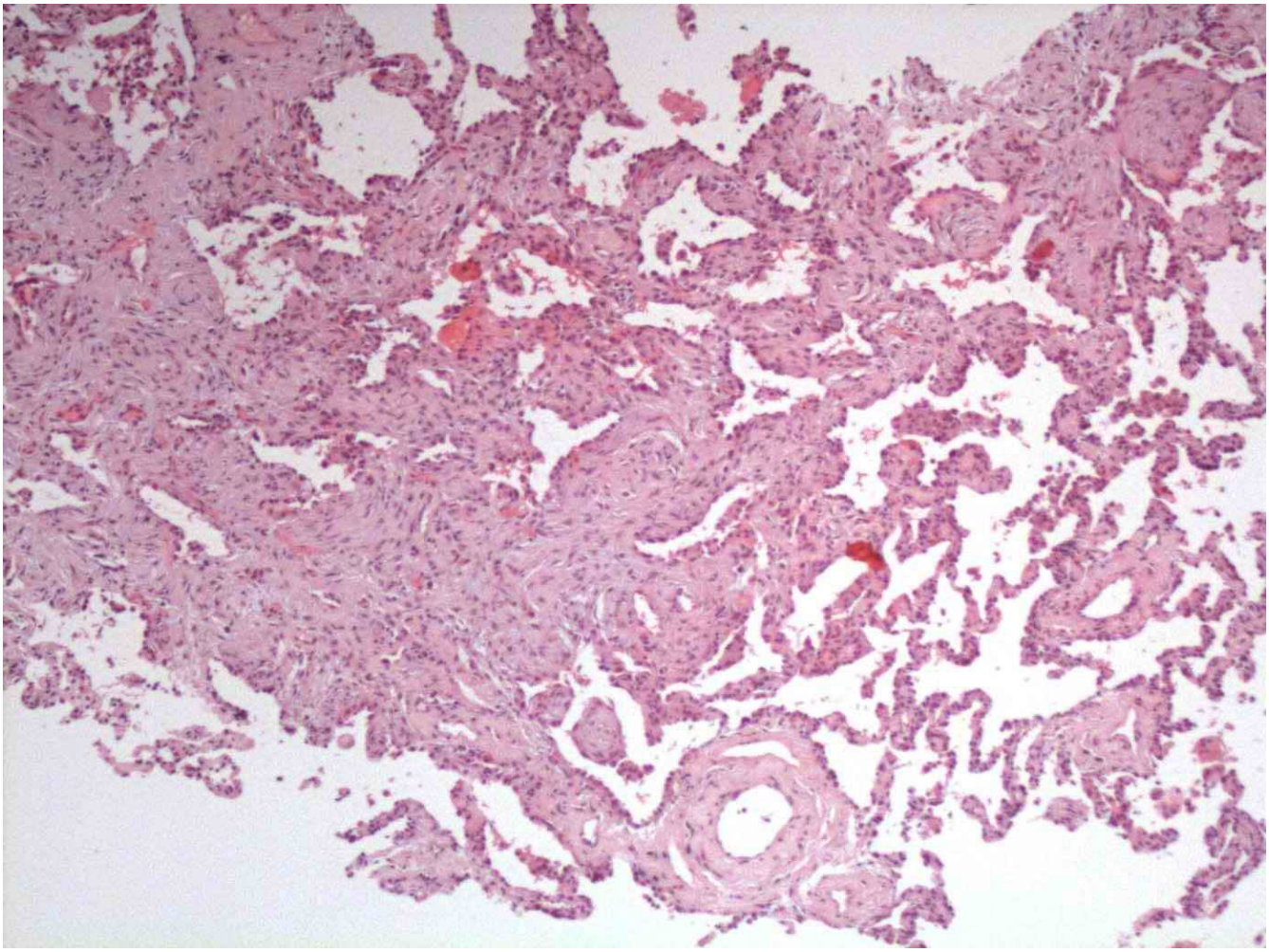


Figure 3. A more severely involved area, in which nodularity can still be appreciated, and the loose fibrosis extends along the alveolar septa.

Cryptogenic organizing pneumonia is a newer term for idiopathic "bronchiolitis obliterans organizing pneumonia".[1] The clinical appearance of this illness, including rapidity of development, is highly variable. The nodularity and looseness of the connective tissue is characteristic.[2] The radiographic appearance seen in this patient is consistent with cryptogenic organizing pneumonia.[3,4] The exact nomenclature of the fibrosing alveolar diseases is still being worked out, and these seem to be reaction patterns rather than discrete diseases.[5]

Coal worker's pneumoconiosis is unlikely to become more severe after dust exposure ceases, but shortness of breath may be exacerbated by additional illness. This patient left his work in the coal industry without respiratory difficulties. The deterioration in his exercise tolerance was evidently due to the fibrosing lung disease, which mimicked coal worker's pneumoconiosis radiologically. The esophageal cancer proved to be inoperable, and the patient died from it seven months after the diagnosis was made.

Pathologists have been leaders in defining the lesions that cause disability following coal dust exposure. The importance of coal-related lung disease in the United States led to the formation, in the early 1970's, of the National Coal Workers' Autopsy Study.[6] The severity of symptoms was correlated with lesions attributable to coal dust exposure, while controlling for confounding variables such as smoking. Radiographic appearances were correlated carefully with postmortem

findings.[7] In 1979, the College of American Pathologists published standards for pathologists to use in diagnosing the various coal-induced lesions seen in lungs of coal workers.[8]

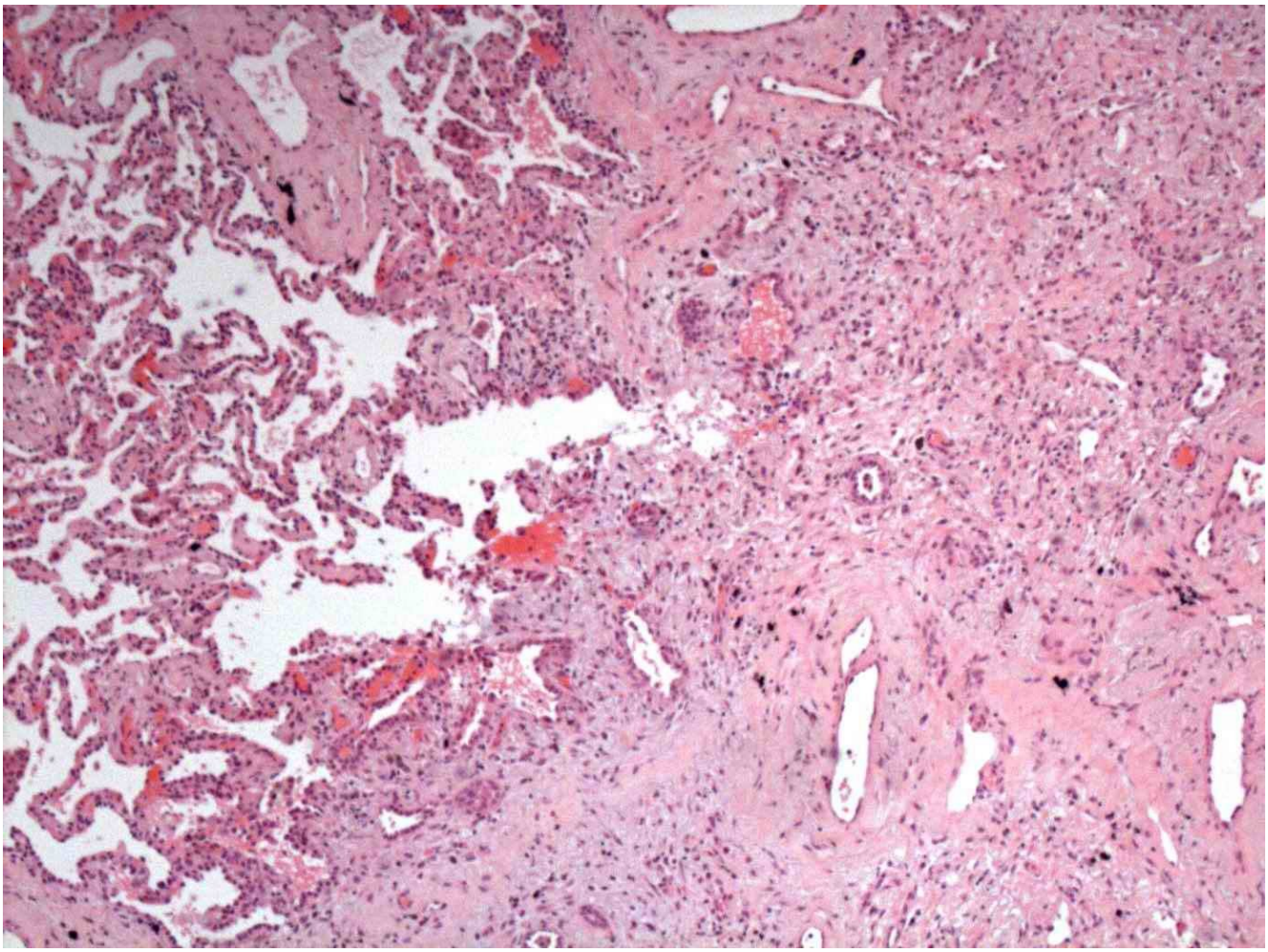


Figure 4. An area in which the process has obliterated the lung parenchyma. A few carbon-laden macrophages are trapped within the fibrosis, but most areas show no coal dust.

In many countries, coal workers are entitled to compensation if they can demonstrate that their illness resulted from their exposure to coal dust.[9] The radiologist who described the parenchymal changes is certified as a "B-reader" to perform examinations for the United States Department of Labor. A recent study from South Africa has shown generally good agreement between a miner's diagnosis in life, and findings at autopsy.[10]

Forensic pathologists who practice in areas where mining activities take place can expect to be called upon to help determine whether disease was present. In this case, the correct diagnosis was made by serendipity on surgical biopsy. However, the principle is the same. Pathologic examination remains the "gold standard" for the accurate diagnosis of coal worker's pneumoconiosis, as well as most other diseases.

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