CASE REPORT

Mixed dust pneumoconiosis occurring in an unusual setting

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SUMMARY

Mixed dust pneumoconiosis secondary to domestic wood smoke exposure is a cause of pneumoconiosis in women from developing countries, but is rarely seen in the USA. An elderly female non-smoker, who immigrated to the USA from Pakistan 10 years previously, presented with a worsening non-productive cough and dyspnoea on exertion. She did not have any occupational or environmental exposures other than utilising firewood for cooking while living in Pakistan. Radiographs revealed multiple bilateral pulmonary nodules associated with hilar and mediastinal adenopathy. A video-assisted thoracoscopic biopsy revealed ill-defined nodules in a perivascular subpleural deposition, carbon pigment deposition around the terminal bronchioles, dust macules and negatively birefringent needles on polarised light microscopy with mixed dust nodules outnumbering the silicotic nodules consistent with mixed dust pneumoconiosis. This case illustrates the need for awareness of this condition among physicians caring for women who lived in areas where biomass exposure is common.

BACKGROUND

The pneumoconioses are a group of interstitial lung diseases caused by inhalation of certain dusts and the lung tissue's reaction to them. They are usually associated with work place exposure in certain occupations like mining and sand blasting. Absence of a history of occupational exposure can make the diagnosis challenging as its clinical and radiographic features are non-specific and definitive diagnosis can only be made by a lung biopsy.

We describe a case of mixed dust pneumoconiosis in an elderly woman who immigrated to the USA several years ago from Pakistan; she did not have a history of occupational exposure to any dusts.

CASE PRESENTATION

A 68-year-old female non-smoker presented with acute on chronic dyspnoea on exertion associated with a non-productive cough for 8 years. The cough worsened on exposure to cold and at night and was not relieved by albuterol. She denied chest pain, wheezing, leg swelling, myalgias, arthralgias, eye symptoms, skin rash and weight loss. She immigrated to the USA 10 years previously. She denied occupational or environmental exposures, but she used firewood for cooking for 30 years. She could not recollect any industrial pollution in the areas that she resided. Her chest X-ray and chest CT scan showed multiple bilateral pulmonary nodules in a perilymphatic distribution associated with hilar and mediastinal lymphadenopathy (figure 1A, B). A bronchoscopy revealed extensive anthracotic pigmentation of the tracheobronchial mucosa. The transbronchial biopsy was inconclusive. A video-assisted thoracoscopic biopsy revealed ill-defined nodules in a perivascular subpleural deposition, carbon pigment deposition around the terminal bronchioles, dust macules and negatively birefringent needles on polarised light microscopy consistent with mixed dust pneumoconiosis (figure 2A, B).

DISCUSSION

The pneumoconioses are a group of interstitial lung diseases usually associated with certain

Figure 1 (A) CT of the chest soft tissue windows showing mediastinal and hilar lymph node enlargement; (B) CT of the chest lung windows showing multiple nodules, most of them peripheral in location close to the pleura.

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Figure 2 (A) H&E stain of lung biopsy showing anthracotic pigment and collagen deposits indicating fibrosis; (B) polarised light microscopy of lung biopsy demonstrating negatively birefringent needles.

occupations. Domestic wood smoke exposure has been linked to pneumoconiosis in women from developing nations, but it is a rare occurrence in the USA. Our case highlights the need for awareness of this condition among physicians caring for women from rural areas in developing countries where indoor biomass smoke exposure is common.

In the industrial setting, it is common to be exposed to multiple dusts that can lead to lung disease; it is for this reason that the term ‘mixed dust pneumoconiosis’ was coined in 1946. It is the exposure of silica dust in combination with other dust that leads to lung disease. Mixed dust pneumoconiosis was first recognised among women using biomass fuels for cooking in Africa and the term ‘Transkei Lung’ was coined by early researchers who found this condition was prevalent in the Transkei region of Africa. Others coined the expression ‘Hut lung’ reflecting the usual environment in which this condition occurs.¹

Biomass combustion releases smoke that contains particulate matter, CO, nitrogen oxides, formaldehyde and polyaromatic hydrocarbons that are irritating to the lungs.² Epidemiological evidence links biomass smoke exposure to airway inflammation resulting in chronic bronchitis.³

The clinical manifestations are non-specific and range from asymptomatic in early disease to dyspnoea, cough, cyanosis and inspiratory crackles later on.⁴ This suggests that early disease can be masked by the lack of, or the non-specific nature, of symptoms and that the severity of the disease correlates with the duration of exposure.

Radiological findings are non-specific and include reticulo-nodular opacities, mediastinal and hilar lymphadenopathy as was seen in our case. Characteristic findings reported on bronchoscopy and bronchoalveolar lavage include anthracotic pigmentation of the bronchi and carbon laden macrophages in the bronchoalveolar lavage fluid.^{1 4}

Histopathology of the lung obtained by either transbronchial or open lung biopsy is the gold standard for the diagnosis of hut lung. This case demonstrated the classic histopathological

findings of fibrotic nodules with carbon pigment deposition around the terminal bronchioles and negatively birefringent needles on polarised light microscopy, suggestive of the presence of silica with mixed dust nodules outnumbering silicotic nodules.

Learning points

- ▶ The pneumoconioses are a group of interstitial lung diseases caused by chronic exposure to dust.
- ▶ Mixed dust pneumoconiosis is seen in women who use biomass fuels for cooking in poorly ventilated homes.
- ▶ Mixed dust pneumoconiosis should be considered when evaluating women who present with non-specific pulmonary symptoms and who emigrated from rural areas of developing countries where biomass fuels are utilised for cooking.

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Competing interests None.

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