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Asbestosis in a 32 year old - A rare presentation

Dr. Mani Tiwari[1], Dr. Samir Gami[2]
Department of Pulmonary Medicine
Unique Multispecialty Hospital and Research Institute, Surat
1-Corresponding Author

Abstract
Asbestosis is a serious lung condition which characterized by the scarring in the lungs. It is caused by prolonged exposure to asbestos.Several industrial sectors have been associated with asbestos exposure. When the asbestos dust is breathed in, the asbestos fibres enter the lungs and they gradually damage the lungs over time. But that would also need prolonged exposure to asbestos fibres, usually over several years, before the features of asbestosis develop. Here, we have a case of 32 year old male who had a relatively short duration of ship exposure diagnosed as asbestosis. This case reinforces the importance of occupational exposure to ships evenin the current era of asbestos free ships.

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I. Background

Exposure to asbestos has been proven to be a serious health hazard to the people working in several industrial sectors. Asbestos is white fibrous silicate mineral that is classified into two large groups: serpentines and amphiboles. Chrysotile is the only serpentine form of asbestos and accounts for the most commonly used form of the asbestos. Occupational exposure to asbestos dust occurs primarily in the occupations of asbestos mining and processing and in secondary occupations like construction, shipbuilding, textiles and the manufacture as well as repair of gaskets, brake linings and insulation material.(2) These asbestos dust particles are long up to 100 micron in length. The inhaled asbestos fibres penetrate the lungs and pleura causing a fibrogenic effect on the respiratory bronchioles, alveoli and pleura. Asbestos-related diseases include a wide range of diseases from the benign conditions affecting the pleura or the lung parenchyma to the malignant ones. The benign pleural diseases associated with asbestos exposure are pleural plaques, diffuse pleural thickening, effusion and calcification. The benign parenchymal diseases may present as asbestosis which is the parenchymal fibrosis caused by asbestos inhalation or as some other parenchymal conditions like rounded atelectasis, benign fibrotic masses or trans-pulmonary bands. Asbestos exposure may also lead to malignant conditions presenting as malignant mesothelioma or bronchogenic carcinoma.

Asbestosis, a form of pneumoconiosis due to prolonged exposure of asbestos, has long been recognized as a cause of ill health among people working in shipyards. Clinical manifestations typically do not appear until 20 years after initial exposure.(1,2)

Marine asbestos surveys are regularly conducted to eliminate any possibility of asbestos being present in any of the equipments or parts of naval vessels. Inspite of these regular surveys and use of asbestos free ships, asbestos related diseases are still found till date.

II. Case Report

A 32 year-old man presented to our outpatient unit with symptoms of cough, which was predominantly dry with increasing intensity over the past 4 months and progressive breathlessness for 6 months. He was a never smoker and did not have any history of fever, haemoptysis, joint pain or skin rashes. He was working in the Merchant Navy for last 8 years. On clinical examination, the patient had Modified Medical Research Council (MMRC) dyspnoea scale of 2, oxygen saturation of 95% at rest which reduced to 92% on six-minute walk test. On examination of the chest, there were vesicular breath sounds in both lung fields with scattered fine crackles. Chest radiograph showed bilateral reticular infiltrates, especially in the lung bases. The PFTs were suggestive of restrictive pattern withFEV1/FVC ratio of > 73% and TLC 66% predicted associated with a low DLCO/VA suggesting moderate restriction. Serological tests did not reveal any evidence of connective tissue disease.

High-resolution CT scan (mediastinal window) showed calcified pleural plaques on the right side with adjacent diffuse pleural thickening on both sides. High-resolution CT scan (lung window) showed a visceral pleural plaque in the right major fissure, thickened intra-lobular and interlobular lines, hazy patches of increased attenuation, bilateral curvilinear bands of sub-pleural reticular hyper-attenuating areas, bilateral small cysts,

traction bronchiectasis, and areas of ground-glass attenuation. Based on the clinical, physiological and radiological information a diagnosis of asbestosis was established.

III. Discussion

Workers who develop parenchymal fibrosis are the ones usually exposed to high asbestos dust concentrations for prolonged periods thus suggesting a definite dose-effect relationship. The disease usually manifests several years after the initial exposure, usually more than two decades. PFT abnormalities include progressive reduction of both the vital capacity and the diffusing capacity. Asbestos fibres tend to accumulate in the lower lobes adjacent to the visceral pleura. An intra-alveolar reaction begins in and around the respiratory bronchioles leading to Parenchymal fibrosis. This stage gradually progresses to diffuse interstitial fibrosis which eventually leads to complete destruction of the alveolar architecture and honeycombing appearance. Asbestos bodies are frequently observed microscopically in broncho-alveolar lavage fluid or tissue section.(2,3)

Radiologic changes include small, irregular opacities or hyper-attenuating areas in a linear pattern. These fine reticular shadows eventually progress to coarse linear pattern with honeycombing. It is usually more severe in the lower lung, dominating the posterior areas and in a sub-pleural location. The presence of pleural plaques lends support to the radiologic diagnosis of asbestosis.(2,3) CT-pathologic correlation leads to the conclusion that the confluence of sub-pleuralperi-bronchiolar fibrosis creates sub-pleural fibrosis.

High-resolution CT of the thorax including the prone scans is the most sensitive and reliable means of detecting the thoracic abnormalities in individuals exposed to asbestos. Prone scans allow basal structural abnormalities to be reliably distinguished from gravity-related physiologic phenomena.(4) Major CT findings in early asbestosis include thickened intralobular lines due to peri-bronchiolar fibrosis, thickened interlobular lines due to interlobular fibrotic or edematous thickening, sub-pleural curvilinear lines, pleura-based nodular opacities, patchy areas of ground-glassing, small cystic changes and small areas of hypoattenuation. Areas of ground-glass attenuation are the result of alveolar wall thickening due to fibrosis or edema.(5,6) Round atelectasis is a form of peripheral lobar collapse which usually presents in the subpleural, posterior or basal regions of lower lobes. Pleural thickening is present in almost all of the cases and it is greatest near the mass. The mass often has a curvilinear tail which is referred to as the "comet tail sign." This sign is produced by the crowding together of bronchi and blood vessels that extend from the lower border of the mass to the hilum, creating a whorled appearance of the bronchovascular bundle.(3,7) Volume loss of the affected lobe is the most common presentation with hyperlucency of the adjacent lung. Serial examination usually shows a stable appearance.(7,8) However, these findings are non-specific. Their occurrence, even in patients with CT evidence of pleural plaques, does not necessarily indicate the presence of asbestosis.(9) In the absence of pathologic proof, the diagnosis of asbestosis must be based on thorough evaluation of the likelihood of asbestosis using all available clinical, physiologic, and radiologic information.(10)

Operators and workers should be aware that there have been cases where asbestos related diseases have been found in ships with 'asbestos free' certificates. This may be due to the installation of some spare parts or repairs done after the issue of asbestos free certificate and hence vigilance is strongly recommended. This case with a shorter duration of exposure of ships and shipyards especially during the era of asbestos free ships raises question on the theory of dose-effect relationship and suggests that there is need of stronger vigilance.

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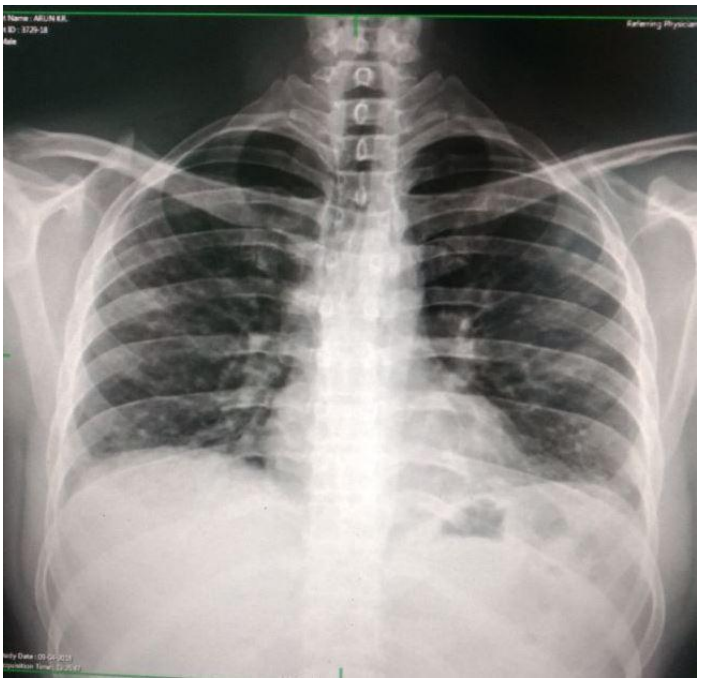

Fig 1 Chest radiograph shows bilateral reticular infiltrates, especially in the lung bases.

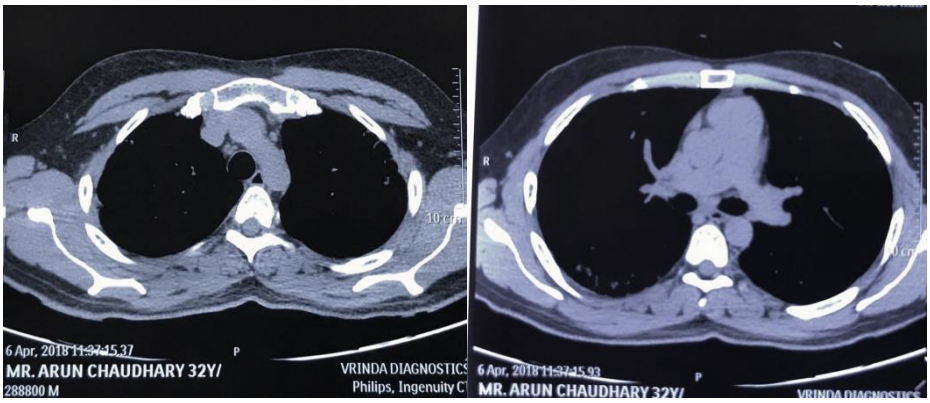

Fig 2 High-resolution CT scan (mediastinal window) shows calcified pleural plaques on the right side with adjacent diffuse pleural thickening on both sides.

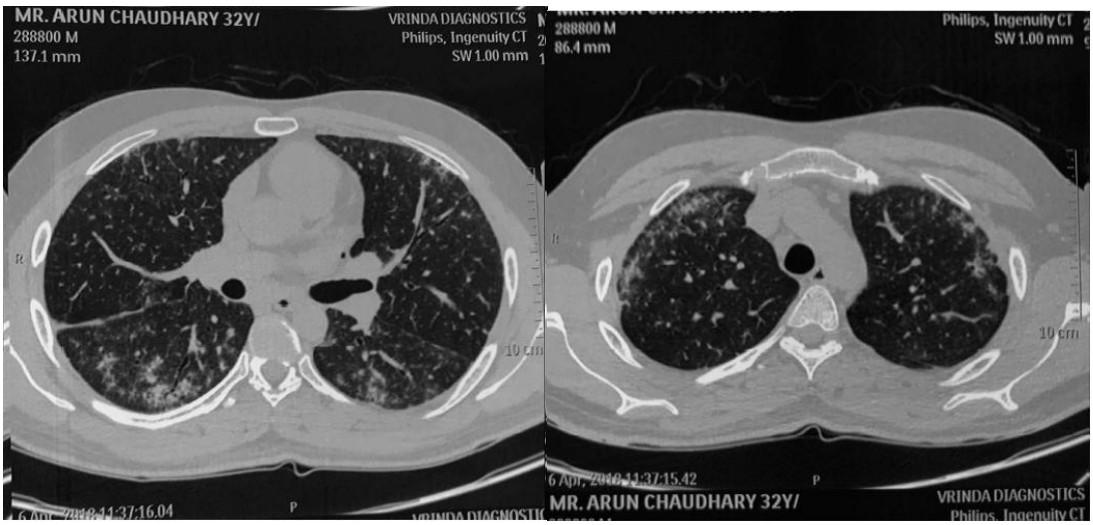

Fig 3 High-resolution CT scan (lung window) shows a visceral pleural plaque in the right major fissure,bilateral curvilinear bands of subpleural reticular hyper-attenuating areas

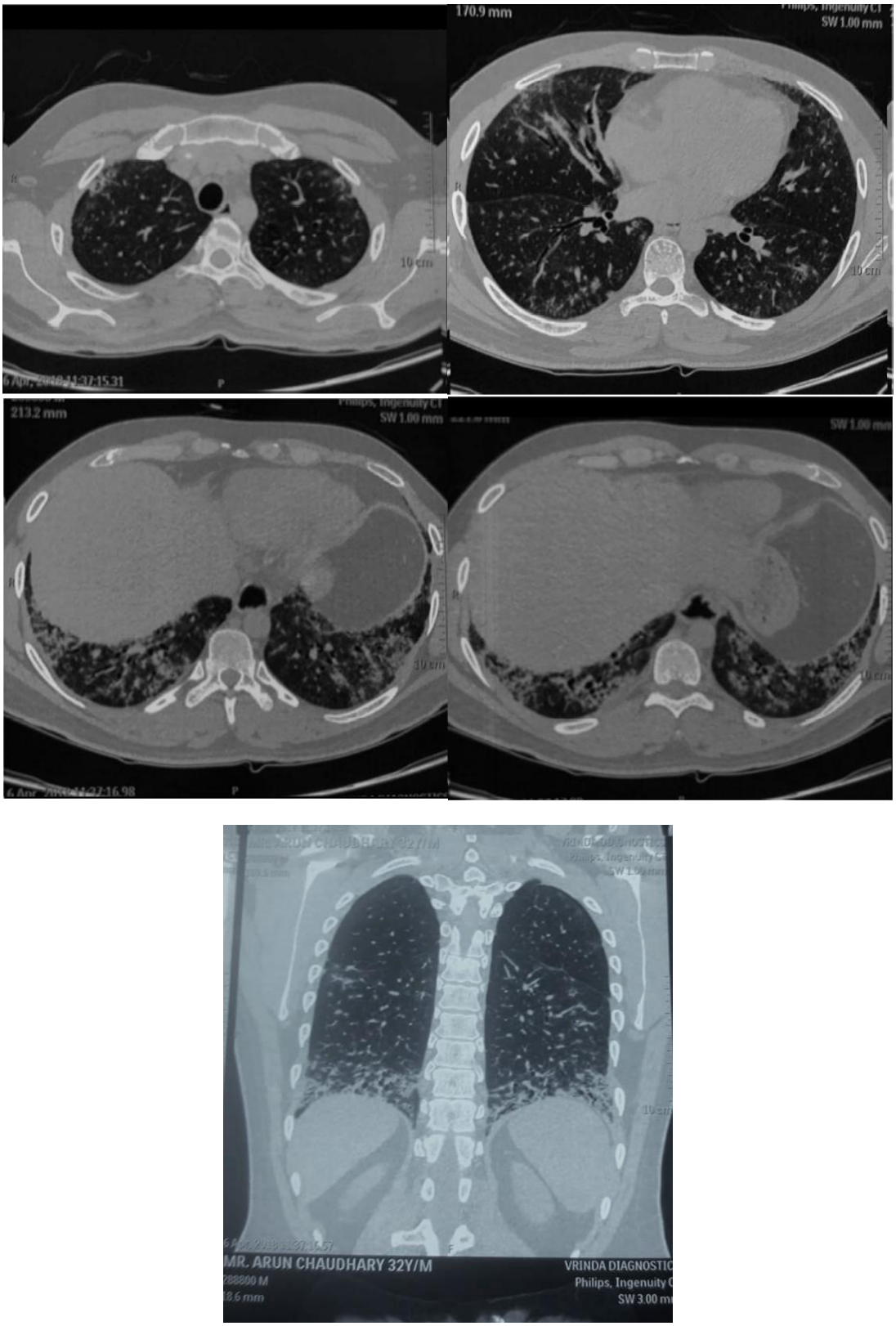

Fig 4 High-resolution CT scan (lung window) shows thickened intralobular and interlobular lines, hazy patches of increased attenuation, bilateral curvilinear bands of subpleural reticular hyper-attenuating areas, bilateral small cysts, traction bronchiectasis and areas of ground-glass attenuation.

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