Complicated Silicosis in Teflon-Coated Utensil Making Industry

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A 33-year old man working in a Teflon coated utensil making factory presented with cough and progressive breathlessness for 10 years. His vital parameters were normal. Oxygen saturation by pulse oximetry (SpO₂) showed significant post exercise desaturation from 94%-85%. Systemic examination was unremarkable except for crackles on chest auscultation. Chest radiograph (Fig. 1) and High Resolution Computerised Tomography (HRCT) scan of the chest (Figs. 2a and b) showed multiple tiny discrete nodules randomly distributed throughout lung parenchyma with large fibrocalcific and fibrocystic masses in the upper lobes extending into the apical segments of the lower lobes. Two-dimensional echocardiography was normal. Spirometry showed restrictive abnormality FEV₁ / FVC – 73%, FVC – 1.89 (44% predicted) and FEV₁ – 1.38 (38% predicted). There was no change following bronchodilator administration.

The workplace has been a source of lung injury for centuries. Most occupational respiratory illnesses can be diagnosed on the basis of the history, physical examination, chest x-ray, and pulmonary function tests. Identifying a work-related disease can be difficult due to lack of awareness of the exact nature of exposure at workplace. An effective approach is first to determine the diagnosis and then to use the occupational history to identify possible causes. In this case a clinic-radiological diagnosis of complicated silicosis was made first. On detailed questioning it was found that before Teflon coating, silica sandblasting was performed to roughen the surface of utensils. Both sandblasting and Teflon coating were performed in the same premises without protective measure that led to silica exposure.

The process of Teflon coating requires abrasive blasting, which is done to roughen the utensil surface so that Teflon sticks. Abrasive blasting involves projecting a stream of abrasive particles forcefully onto the surface, with compressed air or steam. Historically, the material used for sandblasting was silica sand hence workers who perform abrasive blasting are often known as sandblasters. The sand is sieved to a uniform size and silica dust produced from this process causes silicosis. To prevent silicosis resulting from sandblasting, several countries now prohibit sandblasting using silica or regulate such that it may only be performed in a controlled environment using ventilation and protective clothing. Also other materials have been developed for abrasive blasting such as glass beads (bead blasting), steel shots (shot blasting), carborundum grit, copper slag, powdered slag, metal pellets, dry ice, powdered abrasives of various grades, and even ground coconut shells, corncobs, walnut shells, and baking soda (sodablasting).

The incidence of diseases caused by mineral dust has declined worldwide. However, unsafe working conditions exist in many sectors of the globalised economy. In unregulated Teflon coating units abrasive blasting is still performed using silica sand and primitive equipments and lack of protective materials for workers make silicosis unavoidable. Cases of silicosis have also been reported in jeans sandblasters where denim jeans undergo jet sandblasting to give them a “worn-in” appearance. Since association of sandblasting with these occupations is not well known; the diagnosis of silicosis in these workers is likely to be missed.

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References


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