

Benign Pneumoconiosis Due to Electrostatic Paint Exposure

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Abstract

Introduction: Pulmonary baritosis is secondary to inhalation of barium dust with extremely dense, discrete opacities on the chest radiograph. Baritosis has been classified as a benign pneumoconiosis. We present an unusual case of pulmonary baritosis secondary to exposure to electrostatic paints.

Case presentation: A 42 years old man was referred to the occupational medicine clinic with the respiratory symptoms of intermittent cough and exertional breathlessness. He had been spraying electrostatic and powder paint for 3 years. History and radiological features were consistent with the diagnosis of a pulmonary baritosis.

Conclusion: It is necessary to take a detailed occupational history in individuals with respiratory symptoms. Medical surveillance should be performed at regular intervals to determine the adverse effect of barium sulfate.

Keywords: Baritosis; Benign pneumoconiosis; Electrostatic paint

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Introduction

One of the major health hazards in painting industry was solvent exposure. This problem was resolved by the invention of the electrostatic method. To date, this method is considered safe, but results in increased exposure to hazardous substances such as lead, chromate and cadmium [1].

Electrostatic paint also contains non-toxic materials such as barium sulfate, a white pigment which is used as paint filler. Unfortunately, these pigments are considered safe; therefore exposure may be done without safety principles which can lead to deposition of these substances in the lungs and cause benign pneumoconiosis. Pulmonary baritosis is secondary to inhalation of barium dust with extremely dense, discrete opacities on the chest radiograph. Baritosis has been classified as a benign pneumoconiosis, because it is not associated with any respiratory symptom and sign or abnormal pulmonary function [1]. We present an unusual case of pulmonary baritosis secondary to exposure to electrostatic spraying.

Case Presentation

A 42 years old man was referred to the occupational medicine clinic with the pathological diagnosis of sarcoidosis and suspected silicosis. His respiratory complaints were intermittent cough and exertional breathlessness. He had worked as martial arts for 11 years but stopped from 3 years ago because of his symptoms. He was not smoker. He had worked in the manufacture of Teflon pans for 14 years, and then he had been spraying electrostatic and powder paint for 3 years.



Figure1

The onset of symptoms was from 3 years ago with progressive dyspnea and intermittent cough. Physical examinations except a slight reduction on chest auscultation were normal. CANCA (Cytoplasmic Anti-Neutrophil Cytoplasmic Antibodies) and PANCA (Perinuclear Anti-Neutrophil Cytoplasmic Antibodies) were negative. ACE (Angiotensin-converting enzyme) level was elevated (144µg/l, normal range: 40 µg/l). The result of 6 MWT (six minute walk test) and pulmonary function tests were in normal range: forced expiratory volume in 1 second (FEV1) 3.82L (87%);

forced vital capacity (FVC) 4.65L (84%); FEV1/FVC 88%. Chest X-ray revealed multiple dense opacities scattered on the lung [figure1]. High resolution computed tomography showed multiple nodules in both lungs which seems to spare sub-pleural regions, highly suggestive of silicosis [figure2].

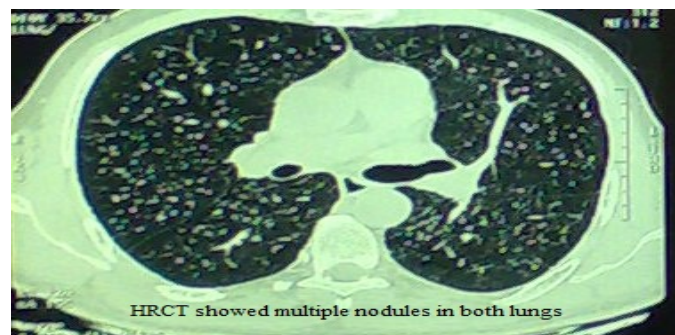


Figure2

Tran bronchial lung biopsy showed well defined chronic non-necrotizing granulomatous inflammation. He had a tuberculin skin test: 15mm in duration with negative sputum culture. Finally with the diagnosis of sarcoidosis and suspected mycobacterium tuberculosis he was treated with corticosteroid and anti TB drugs. Also he was referred to an occupational clinic for evaluation of silicosis.

On the walkthrough of the factory, there was no exposure prone procedure to silica dust. There were three hoods with the distance of half meters from each other in the electrostatic painting. Our patient with two workers who spraying the electrostatic paint work in front of these hoods. To improve ventilation each hood contains a local exhaust. Despite these engineering controls, some of the paint leaks out and it was seen on the sidewalls and roof of the hood. Workers wear simple masks and due to contamination sometimes had been changed 4 times daily. The color sedimentation was seen on the oral, nasal cavity and conjunctiva of these workers. Also they complain from a special taste during and after work. They had no upper and lower respiratory irritation. Duration of employment was 1 and 5 years for the other 2 workers respectively.

There were discrete opacities on the lungs of other workers with the priority in the lungs of workers with more work experience.

Due to these issues and improvement in engineering controls of this part and workers' chest radiographs in the 1 year follow up, the existence a benign pathology proposed. Therefore because of the existence of barium sulfate in electrostatic paints and this pattern, we suggest the diagnosis of baritosis.

Discussion

Inhalation of barium dusts due to heavy exposure to barium containing compounds can induce baritosis. The first case of baritosis was described by Fiori in 1926 [2]. As a result the inert nature of barium compounds led to the classification of "pulmonary baritosis" as a benign pneumoconiosis [3]. The greatest use of barium sulfate is in the manufacture of paint making.

However symptomatic disease with respiratory symptoms has been described in sarcoidosis, this benign pneumoconiosis dose not result in impairment of lung functions, although mild signs of bronchial irritation may occur. Also in the evaluation of his co-workers we found similar chest radiographic pattern that were symptom free.

Conclusion

Furthermore, it is necessary to take a detailed occupational history in individuals with respiratory symptoms. The best way for hazard identification and job analysis is walkthrough of that workplace. Lack of understanding about material safety data sheet should not lead to neglect of safety controls.

Medical surveillance should be performed at regular intervals to determine the adverse effect of barium sulfate. Additional evaluation may be done if a worker develops symptoms. There is no biological monitoring for barium sulfate [4].

The following recommendations should be considered while working with barium sulfate:

- contaminated cloths with barium sulfate should be removed.
- Workers should not eat, drink or smoke in working areas.
- Workers should use complete respiratory protection during work operations.
- Workers should worn protective cloths to prevent skin contact [5].

References

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