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Case Report

A rare case of silicosis with hepatitis B infection

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ABSTRACT

Introduction: Silicosis is a type of diffuse interstitial lung disease caused by inhalation of crystalline silicon dioxide. The number of silicosis cases have been rapidly increasing over the years. Complete cure is not possible so early diagnosis and prevention is required.

Case presentation: Our patient came with chief complaints of productive cough, breathlessness progressing to MRC grade 4 and fever. He worked in a flour mill for 15 years and has been symptomatic for the past 4–5 years. Chest examination showed tracheal deviation to the right, bilateral decreased breath sounds and fine crepitations. Chest X ray showed multiple tiny nodular opacities in all lung zones. Pulmonary function test confirmed restrictive lung disease. On CT scan, miliary mottled densities were noted bilaterally along with fibrosis in upper lobes and ground glass appearance in lower lobes. Echocardiography revealed mild pericardial effusion and Abdominal Ultrasound revealed coarse liver texture, splenomegaly and right sided pleural effusion. Patient was also Hepatitis B positive.Patient was treated with Prednisolone, Entecavir, Moxaclav along with symptomatic management.

Discussion: Male gender, HIV infection, Smoking, Occupation, Age at first exposure, Duration of exposure and Concentration of inhaled silica dust are the risk factors of silicosis. Individuals with Silicosis are at high risk of developing Tuberculosis and Hepatitis B infection. Pulmonary function test, HRCT and Lung biopsies help in diagnosis of Silicosis. Serological markers and Liver Function Test helps in diagnosis of Hepatitis B infection. Early diagnosis and prevention is essential for better prognosis and Lung transplant is the only definitive management. Complications like progressive fibrosis, infections, cor pulmonale and pneumothorax may result due to Silicosis.

Conclusion: Silicosis is a rare chronic inflammatory condition which leads to an immunosuppressed state and may predispose individuals to opportunistic conditions like Hepatitis B. Therefore, early identification of risk factors and clinical features is required.

1. Introduction

Silicosis is common pneumoconiosis caused by inhalation of crystalline silica or silicon dioxide occurring commonly in sandblasters, miners, quarry workers, flour mill workers due to occupational exposure to silica dust particles [1]. It is a type of diffuse interstitial lung disease [2]. There are over 20,000 new cases per year with high incidence in regions of Asia, Africa and South America [2]. The number of pneumoconiosis cases have increased by 66% from 1990 to 2017 according to latest data from the global burden of disease study [3]. Cough, shortness of breath, chest tightness and sputum expectoration are some of the respiratory symptoms presented by the patient [3]. Complete cure of the disease is not available so prevention and early diagnosis of the disease is necessary [4]. This manuscript has been prepared in line with SCARE criteria [5] (see Figs. 1 and 2)

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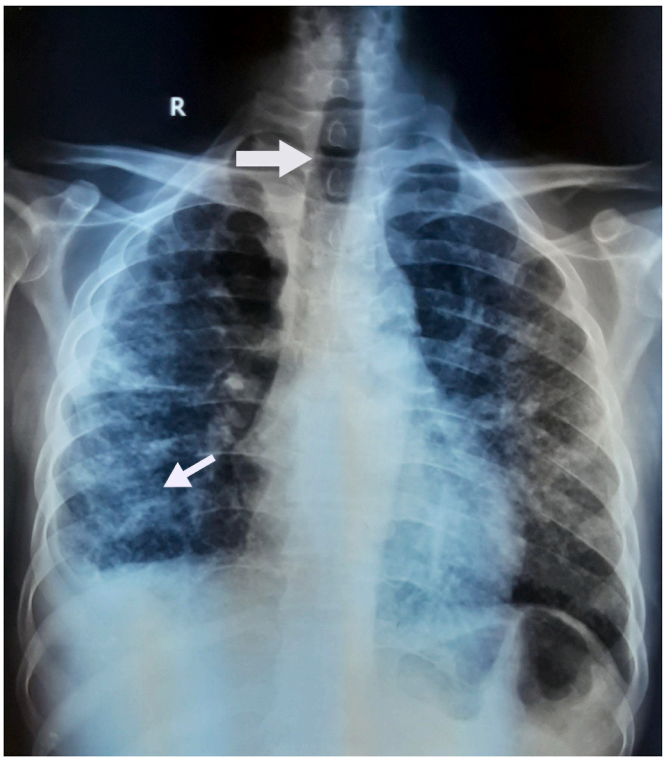

Fig. 1. Chest X Ray showing nodular opacity in the lower zone of Right Lung and tracheal deviation to Right side.

2. Case Presentation

A 35 years old, non-smoker, non-diabetic man, flour mill worker for the past 15 years presented with exaggeration of cough and mild fever. Cough present for about 10 years, increased progressively for the past six months and was associated with translucent white sputum and exertional dyspnoea. He was also diagnosed with chronic liver disease with Hepatitis B infection 8 months ago.

On examination, the patient was underweight, pale and icteric. A respiratory examination showed mild deviation of trachea to the right side, bilateral decreased breath sound and fine crepitations.

His Hb was 11.8 gm% and liver function test showed raised total bilirubin and raised aminotransferases. Serology also revealed Hep B surface antigen. A Plain chest radiograph showed multiple tiny nodular opacities on all zones of the lungs. MDCT showed extensive miliary mottled densities in both lungs with diffuse air space densification with streaky fibrosis and diffuse subpleural ground glass lesion in both upper lung and both lower lobes respectively.

USG abdomen showed coarse echotexture of liver indicating CLD, mild splenomegaly.

The patient was treated symptomatically with high flow oxygen, prednisolone, antipyretics and mucolytics. Moxaclav 625 mg OD for 5 day was started for prophylaxis against hospital acquired pneumonia. Concurrently, antiviral therapy was started with tablet entecavir (0.5mg, od for 9 days) for Hepatitis B.

Liver function returned to normal by the 9th day and he was discharged on the 10th day and with advice to continue entecavir for 3 months and to be followed up at 1 and 3 months.

3. Discussion

Silicosis is a chronic, irreversible and fibrotic lung disease caused by exposure to respirable silica dust (silicon dioxide) [3]. It is more prevalent in males and in those who are working in mining, sandblasting, construction and metal casting [6]. Concentration of silica dust inhaled and duration of exposure remain the primary risk factors for pathogenicity although age at first exposure(>30 years), Smoking, HIV infection, chronic obstructive pulmonary disease and migration also seem to play a role [7,8]. Our patient is a flour mill worker for the past 15 years showing increased duration of exposure. Incidence of Silicosis in a study by Athavale et al. on flour mill workers working with silica containing grinding stones was 30.4% [9]. Another study found it to be 4.51% among the 3190 excavation workers [10].

Based on chronicity of exposure, Silicosis can be categorized as acute, developed after an exposure to heavy amounts of silica over a few weeks to a few years or chronic that develops after exposure to low amounts of silica over an extended period of time usually after 2 decades. Accelerated Silicosis is similar to chronic silicosis in terms of exposure but differs in that there is faster progression to pulmonary fibrosis usually after a 5–10 year period [6,11].

Individuals with Silicosis have a higher likelihood of developing autoimmune disorders like Rheumatoid arthritis and SLE as well as Sarcoidosis, Hypertension, Chronic Kidney disease, Scleroderma, Pulmonary Tuberculosis, Pneumothorax and opportunistic infections like Aspergillosis [6,12]. Tuberculosis has a relative risk between 1.5 and 3 in patients with Silicosis and a risk of developing cavitating lesions are still present with any chronic exposure to silica dust even after the

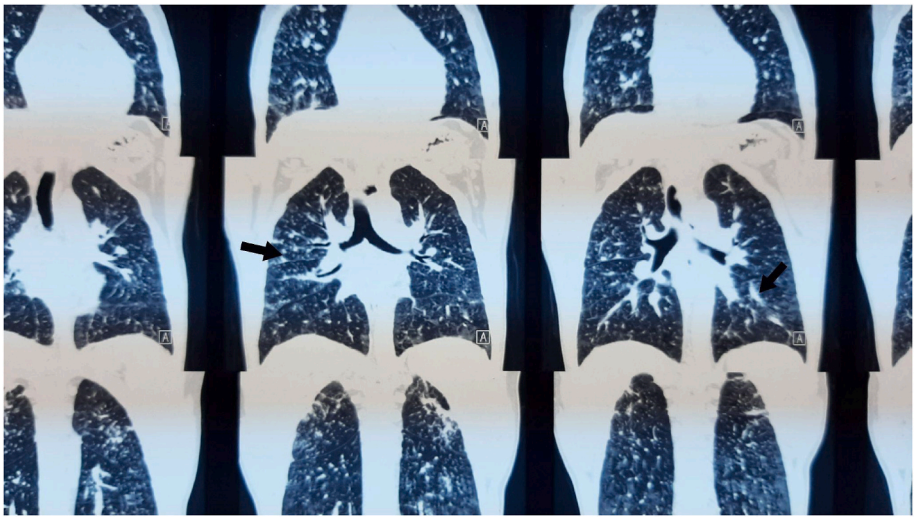

Fig. 2. HRCT showing miliary mottled densities in both the lungs.

exposure has stopped [6,13].

Our patient also had Hepatitis B infection which is similar to findings reported by Yanmei and Jie with an incidence of 5.56% among excavation workers with Silicosis.10 Silica induced chronic inflammation generates an immunosuppressive microenvironment due to higher expression of chemical mediators like TGF-β1, Lymphocyte-activation gene 3, Monocyte chemotactic protein 1 or FOXP3 [14]. Hepatitis B infection is more prevalent in immunosuppressed patients as immunosuppression enhances viral replication explaining the lower rate of spontaneous recovery in acute cases and the higher rate of chronic infection with a higher frequency of HBe positivity [15]. Immunosuppression results in rapid progression towards Cirrhosis and Hepatocellular Carcinoma showing higher risk of morbidity in the case of this patient as well [15].

Clinical history including history of exposure and findings typical of silicotic nodules such as HRCT showing small calcified nodules are important tools in diagnosis while definitive diagnosis of Silicosis can be made by lung biopsies [4,16]. Our patient underwent HRCT showing extensive miliary mottled densities in both lungs, streaky fibrosis and diffuse subpleural ground glass lesion in both the lobes. Pulmonary Function Test showing decreased value for FVC, FEV1, PaO2 & SpO2 can help in diagnosis [4]. Similarly, Acute Hepatitis B infection can be diagnosed by serological markers and high serum aminotransferases (deranged liver function). This patient had raised total bilirubin and raised aminotransferases.

Silicosis is an incurable, chronic and progressive disease. This can be prevented by maintaining dust levels within limits, early diagnosis and prevention of complications through regular assessment and investigations. If a person is diagnosed, further exposure to silica should be stopped. One study revealed that progression of disease was more likely to occur if exposure continued for more than 2 years after the earliest radiological abnormality was detected than in those where exposure was discontinued within 2 years of detection [17]. Lung transplant is the only definitive management of silicosis which is generally done in young patients [4].

Uncomplicated Silicosis does not decrease the life expectancy but complications like progressive massive fibrosis, infections, Cor Pulmonale, Pneumothorax may deteriorate the clinical condition [18]. Repeated lung injury and subsequent oxygen free radical release has been thought to be the cause of increased prevalence of lung cancer in patients with chronic silica exposure [6].

4. Conclusion

Silicosis is a long-term lung disease caused by inhaling large amounts of crystalline silica dust, usually over many years. The case report show an association with Hepatitis B an life-threatening liver infection caused by the hepatitis B virus (HBV), being a major global health problem. The case report demonstrated relevance due the association of those conditions at the same patient which could be potentially harmful as the patient may develop other conditions such as Cirrhosis and Hepatocellular Carcinoma. Early identification of risk factors and clinical features remains imperative for management and prevention of complications.

5. Declaration of patient consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Ethical approval

As the case series is compilation of information of retrospective period, we had obtained exempt for ethical approval from Institutional ethical committee.

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Since we are medical students under supervision and we have just started doing the research, we don't have any financial support for our research.

Author contribution

Abhigan Babu Shrestha; Patient care and clinical management.
Sneha Shrestha: Manuscript writing.
Suyesh Raj Shrestha: Manuscript writing.
Abhyuday Kumar Yadav: Manuscript writing.
Sajina Shrestha: Manuscript writing.
Hritik Raj Yadav: Manuscript writing.
Shumneva Shrestha: Manuscript writing.

Registration of research

1. Name of the registry:
2. Unique identifying number or registration ID:
3. Hyperlink to your specific registration (must be publicly accessible and will be checked):

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Declaration of competing interest

There are no conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.amsu.2022.104838.

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