Symptomatic Pulmonary Siderosis in Scissors/Knife Sharpening Worker: A Case Report

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Abstract

Pulmonary siderosis is a rare occupational lung disease. Traditionally, it has been considered a “benign pneumoconiosis” because of the absence of associated clinical symptoms or pulmonary fibrosis. However, few authors have reported the evidence of pulmonary symptoms with lung fibrosis on high-resolution computed tomography and lung biopsy. Symptomatic pulmonary siderosis in scissors/knife sharpening worker has not been described in past literature. We report a case of biopsy proven symptomatic pulmonary siderosis in scissors/knife sharpening worker, who was unnecessarily treated with antitubercular therapy for 3 months.

Keywords: Occupation, sharpening, siderosis

INTRODUCTION

The term “Siderosis” was first applied by Zenker in 1866 for description for pathological condition of lung caused by long continued inhalation of the dust of iron or iron oxide.[1] Pulmonary siderosis is a rare occupational lung disease that occurs due to chronic inhalation of iron compounds. It had been believed to be a benign pneumoconiosis because of the absence of significant signs/symptoms or associated fibrosis.[2,3] Symptomatic disease even with interstitial fibrosis has been described with it.[2,4] The occupations that lead to the development of Pulmonary siderosis include mining, welding, steel manufacturing, iron oxide manufacturing, grinding wheel manufacturing and silver jewellery manufacturing.[2,4,5] The relationship between occupation of Scissors/knife sharpening and pulmonary siderosis has not been mentioned in past literature. We report a case of symptomatic pulmonary siderosis in scissors/knife sharpening occupation.

CASE

A 42-year-old man presented with the compliant of cough and breathlessness (modified medical research council grade-II) for the last 5 years with mild non-documented fever (on and off) for last 6 months. There is no significant past history. He was on antitubercular therapy (ATT) for last 3 months on basis of clinic-radiological diagnosis with no improvement in symptoms. He is a scissor/knife sharper by occupation with exposure for iron dust for the last 25 years. He is a non-smoker. On examination, general physical examination was normal. On respiratory examination, there was bilateral vesicular breath sound with bilateral fine crepitation. Routine haematological and biochemical investigation were normal. X ray of chest (postero-anterior view) showed bilateral nodular opacities in all zones [Figure 1]. Sputum for acid fast bacilli (AFB) direct smear was twice negative. Connective tissue serological profile (ANA, Rheumatoid factor, p-ANCA/c-ANCA, Scl-70) was negative. Serum angiotensin converting enzyme level was 118 U/l. His 6-min walk test (6MWT) was 320 m with desaturation of 9%. Pulmonary function test (PFT) showed FVC-2.63lts (73%), FEV1-1.31lts (44%), FEV1/FVC-50, TLC-5.06 (99%) and DLCO-23.56 (88%). HRCT chest showed numerous reticulonodular densities in bilateral lung fields and multiple nodular lesions in the lung fields.

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(sub-pleural aspect of the right lower lobe with fibrolinear densities in both upper lobes [Figure 2 a-d]. Bronchoscopy showed normal bronchial tree. Bronchoaveolar lavage (BAL) and Transbronchial lung biopsy (TBLB) were obtained from the right middle lobe. The AFB smear and geneXpert of BAL fluid were negative. The bacterial and fungal cultures from the BAL fluid were sterile. TBLB showed heavy deposition of dark to brown pigment in perivascular and peribrochiolar areas with mild chronic inflammation and focal interstitial fibrosis. Iron stain shows fine and coarse granules in macrophages on prussian blue. [Figure 3a and b] He was finally diagnosed as pulmonary siderosis, ATT was stop and advised to change occupation and use of protective gear while working.

Discussion
Pulmonary siderosis is most commonly seen in workers who are exposed to metal fumes containing iron during welding, mining, steel and silver polishing. In 1936, Doig and McLaughlin described the first case series of siderosis in welder. In their series of 16 cases, they followed 15 cases for 9 years. They showed that there were no respiratory symptoms or significant pulmonary functional impairment, irrespective of radiological progression or resolution.[4] In Meyer E. et al. study of four patients, who are exposed to iron oxide fumes, pathological examination did not show evidence of pulmonary fibrosis.[5] McLaughlin et al. described that exposure to iron-oxide produce X ray changes, but no fibrosis in lungs after 40 years of exposure.[6] So as a result, the apparently inert nature of iron compounds, pulmonary siderosis consider as benign pneumoconiosis.

However symptomatic disease with interstitial fibrosis has been described with siderosis. Buckell et al. studied siderosis in iron turner and grinders, and they suggested the possibility of lung fibrosis after >20 years of exposure.[7] Funahashi et al. in a study of ten symptomatic welders, the pathological examination showed some degree of parenchymal fibrosis was present in all, and in 50%, this fibrosis was considered moderate to pronounced.[8] Symptomatic pulmonary siderosis with interstitial fibrosis, even with progressive massive fibrosis, consolidation and usual interstitial pneumonia pattern, has been reported recently.[2,9,10] The detail of various published symptomatic/fibrotic pulmonary siderosis is summarised in Table 1.

Han D et al. in a study of the computed tomography (CT) of lung among Arc-Welders’ pneumoconiosis showed the findings were poorly defined centrilobular micronodules (55.6%), branching linear structure (33.3%) and ground-glass attenuation (11.1%).[11] An another study of CT features of uncommon pneumoconiosis showed centrilobular ill-defined micronodules most common radiological finding in 15/21 cases while only 3 cases showed honey-combing.[12] In the present study, the HRCT chest finding showed multiple nodular opacities with reticulation. However, above radiological findings are not confirmations of diagnosis. In view of not confirmative radiology with endemic of tuberculosis, the histopathological examination is important for the diagnosis of pulmonary siderosis in scissors/knife sharpner.

The histopathological diagnosis requires lung biopsy. The common methods for lung biopsy are transbronchial lung biopsy via bronchoscopy, imaging-guided lung biopsy or surgical lung biopsy. Akar E et al. in a study of seven cases diagnosed by video-assisted thoracic surgery (VATS) showed 100% diagnostic yield with no complication.[9] Transbronchial lung biopsy also showed good diagnostic yield without any complication in few reported cases.[2,13] Our case was also diagnosed with transbronchial lung biopsy without any complication.

The manual scissors/knife sharpening is one of the main occupations of particular population especially in developing countries. Majority of them are neither aware of occupational diseases associated with their occupation nor of using any protective gear. The occupational history is important for

Figure 1: Chest X ray (PA view) showing bilateral nodular opacities in all zones

Figure 2: 2a) HRCT chest: Bilateral numerous reticular with fibrolinear densities in both upper lobes. 2b) Bilateral lung showing multiple reticular densities. 2c) Multiple nodular lesions in sub-pleural aspect of the right lower lobe with reticular densities in both lower lobes. 2d) Coronal section of lung showing multiple bilateral reticular densities all lobes
Table 1: Summary of symptomatic/fibrotic pulmonary siderosis cases

| Author/year       | Age/ Sex | Occupation/years | Smoking/ pack year | PFT          | Symptoms/duration | HRCT chest                                                                 | Biopsy type |
|-------------------|----------|------------------|--------------------|--------------|-------------------|-----------------------------------------------------------------------------|-------------|
| McCormick et al.  | 66/male  | Welder/20 years  | Non smoker         | Obstructive | Breathlessness/2 years | Multiple small nodular opacities in bilateral predominantly in upper and middle lobes. | VATS biopsy |
| Cheng J et al.    | 45/male  | Welder/20 years  | Smoker/20          | Normal       | Chest pain and productive cough & hemoptysis/1 month                       | Bilateral diffuse centrilobular ground-glass nodular opacities and a mass in the left lower lobe | Resection lung biopsy |
| Gothi D et al.    | 62/male  | Lathe machinist/40 years | Smoker/45         | Mixed defect | Cough with minimum expectoration and breathlessness/3 years                | Septal thickening, groundglass opacities with evidence of honey-combing predominantly in upper lobe. | TBLB        |
| Arun Prasath et al. | 30/male | Welder/14 years | Non smoker         | Restrictive | Breathlessness/1 years                                                   | Bilateral diffuse centrilobular nodules in all lobes.                                   | TBLB        |
| Present study     | 42/male  | Sharpener/25 years | Non smoker         | Mixed defect | Cough & breathlessness/5 years                                            | Multiple reticulonodular densities in bilateral lung.                                   | TBLB        |

VATS: Video-assisted thoracic surgery, TBLB: Transbronchial lung biopsy, CT: Computed tomography

Figure 3: (a) Histopathology showed heavy deposition of coarse dark to brown pigment and mild chronic inflammation with focal interstitial fibrosis. (b) Iron stain with prussian blue shows fine and coarse granules in macrophages.

diagnosis of all occupational diseases, particularly those occupations which are not mentioned in literature. Like in our case, there is no published data of scissors/knife sharpening and pulmonary siderosis. This leads to unnecessary treatment with ATT particularly in TB endemic countries like India. Our case was also treated with ATT for 3 months before presented to us.

Conclusion

This case illustrates symptomatic pulmonary siderosis in scissors/knife sharpening worker. Obtaining a detailed occupational history in respiratory disease is important for diagnosis and preventing unnecessarily treat with anti-tubercular therapy. The use of protective gear for iron exposure even in scissors/knife sharpening is an important measure to prevent occupational disease. Pulmonary siderosis may not be considered as a benign pneumoconiosis any further because cases demonstrating that iron oxide could also cause fibrosis and symptomatic disease. Further larger studies may help to elucidate the relationship between iron oxide exposure and pulmonary fibrosis with symptomatic disease.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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