Anthracofibrosis: A potential cause of airflow limitation

Shereen Khan,[1] Sanaullah Tareen,[1] Muhammad Farooq Oighor[1]

[1]Fatima Jinnah Chest hospital, Brewery road Quetta-Pakistan.

Address for correspondence
Shereen Khan
Fatima Jinnah Chest hospital, Brewery road Quetta-Pakistan.
Email: sherenqta@yahoo.com

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SH conceived idea, SH ST MFO drafted the study, ST collected data, ST did statistical analysis & interpretation of data, SH ST MFO critical reviewed manuscript, All approved final version to be published

Declaration of conflicting interests

The Authors declares that there is no conflict of interest.

Abstract

Background: The term "Anthracosis" was first used by Pearson while its association with airway narrowing was first described by Abraham cohen. In developed world anthracofibrosis has mainly been found to be associated with either Tuberculosis or coal dust exposure.

Objective: To define the clinical characteristics, bronchoscopic findings, histopathological and bacteriological results of patients with Anthracofibrosis.

Methodology: Total 62 patients diagnosed as Anthracofibrosis on bronchoscopy. Majority were female (71%), mean age at presentation was 51.4(41-65). The clinical features, bronchoscopic and histopathological findings along with bacteriological results of the Bronch-alveolar lavage (BAL) were assessed.

Results: Out of total, 07 patients were smoker, only 03 patients had significant history of smoking (>20 pack years, all male). 02(3.2%) of the patients had occupational exposure to coal dust; 56 patients (90.3%) had history of domestic fuel smoke exposure and 04 (6.5%) pts had no history of occupational or environmental exposure. Major symptoms were cough 46 (74%), dyspnea 44 (71%) and fever 10(16%).

Of 17 patients referred from internal medicine, 09 were reported bronchogenic carcinoma on CT chest, 05 with non- resolving pneumonia and 03 with lobar collapse.

Bronchoscopically RUL was the most frequent site involved (68%) followed by RML (57%). Multilobar involvement was found in 44 cases (71%) and rest 18(29%) had unilobar involvement. Histopathology revealed non specific acute and chronic inflammatory changes with black/brown pigments, 03 patients had granulomatous inflammation, and 02 patients were reported to have endobronchial neuromas with immunohistochemical staining positive for S-100. BAL smear/culture for AFB was positive in 05 (8%) patients (these were different from pts with histopathology of granulomatous inflammation).

Conclusion: Anthracofibrosis is mainly associated with tuberculosis and coal dust exposure in non Asian population where as it is associated with domestic smoke exposure in our region. Usual presentation is with cough, dyspnea and/or fever. The segmental collapse may mimic bronchogenic carcinoma.

Keywords: Anthracosis; Coal Workers; TB; Pakistan

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Introduction

The term "Anthracosis" usually describes coal and other black pigments which mainly constitutes carbon.[1]

In context to the airways the term Anthracosis is used when describing the effects of soot inhalation, which can cause black pigmentation of bronchial mucosa or lung parenchyma, or the histologic finding of anthracotic pigment in macrophages.[2] The term

Anthracofibrosis is used when the black pigmentation of the bronchial mucosa is associated with bronchial narrowing.[3] The term "Anthracosis" was first used by Pearson while its association with airway narrowing was first described by Abraham cohen.[3]

In developed world anthracofibrosis has mainly been found to be associated with either Tuberculosis or coal dust exposure.[2,4] In our observation we found it to be associated with domestic fuel smoke exposure.

Methodology

This cross sectional study was carried out in patients who underwent bronchoscopy in Fatima Jinnah chest hospital Quetta, Pakistan, during the period of March 2008 to December 2009. Patients having the bronchoscopic findings of Anthracofibrosis were included and patients with only anthracosis were excluded. Patients with anthracofibrosis who could not be followed either bacteriologically or histopathologically were also excluded. The clinical features, bronchoscopic and histopathological findings along with bacteriological results of the bronchoalveolar lavage (BAL) were assessed.

Results

Out of 258 total patients bronchoscopied during the study period. Out of these, 69 (26.7%) patients were diagnosed to have Anthracofibrosis on bronchoscopy. Seven (2.71%) patients could not be followed either bacteriolocaly (5 patients) or histopathologically (2 patients). Sixty two (24.03%) patients were included here and finally analyzed. Among the study cases, mean age was 51.4 (41-65) years and majority were female (71%). Out of 62, 7 (11%) patients were smoker; 2 females and 5 males. However, only 3 patients had significant history of smoking (>20 pack years, all male). Overall 2 (3.2%) of the patients had occupational exposure to coal dust and 56 patients (90.3%) had history of exposure to smoke of wood fire used as domestic fuel. The most common symptoms on presentation were cough 46 (74%), dyspnea 44 (71%) and fever 10 (16%). Nine patients were reported to have bronchogenic carcinoma on CT chest, 03 with lobar collapse while the others had nonresolving infiltrates on chest X-Ray.

Bronchoscopically RUL was the most frequent site involved (68%) followed by RML (57%). Multilobar involvement was found in 44 cases (71%) and rest 18 (29%) had single lobe involvement. Histopathology revealed non specific acute and chronic inflammatory changes with black/brown pigments, granulomatous inflammation and changes consistent with endobronchial neuromas with immunohistochemical staining positive for S-100 in 57 (92%), 3 (5%) and 2 (3%) cases respectively. BAL smear/culture for AFB was positive in 05 (8%) patients however these were not the patients having granulomatous inflammation on histopathology.

Discussion

For ethical and financial reasons, the estimate of anthracofibrosis prevalence is not practical however in different studies the frequencies ranges from 3.4-21%5-7, whereas in our study the frequency was 24%.

The Anthracofibrosis in former European studies has mainly been attributed to coal dust exposure or tuberculosis[8,9] whereas in our and few other Asian studies it was mainly secondary to domestic fuel smoke exposure.[10-12] These patients clinically behave like COPD presenting with cough and dyspnea but they differ radiologically by having infiltrates, mass like opacities secondary to segmental collapse and lobar collapse.[13,14] These opacities are usually reported as bronchogenic carcinoma on CT chest. As in other studies female were predominantly involved in our study as well. Chung et al[4] and Kim et al[13] found strong association between tuberculosis and anthracofibrosis but despite of a TB prevalent area this association was not found in our study population. On the other hand coal mining is also much common in our area but the association was not strong. This may be because we usually do not perform bronchoscopies in coal miners unless they have chronic fever not responding to empirical treatment or mass like opacity (Progressive massive fibrosis) on CXR to exclude tuberculosis and malignancy respectively.

Kim and colleagues5 in their study found that the middle lobe was most commonly involved where as right upper lobe was the commonest lobe involved in our study. Furthermore multilobar involvement in their study was found in 52% whereas it was 72% in our study.

Our findings suggest that anthracofibrosis is not an uncommon disease entity. Being more exposed to wood smoke it is predominant in females. Though tuberculosis has been found to be mainly responsible for anthracofibrosis in other studies, we could not find this association despite of living in a TB burden area. The only reliable and practical solution to the problem is to promote natural gas as domestic fuel.

Conclusion

Anthracofibrosis is mainly associated with tuberculosis and coal dust exposure in Non-Asian population where as it is associated with domestic smoke exposure in our region. Usual presentation is with cough, dyspnea and/or fever. The segmental collapse

may mimic bronchogenic carcinoma.

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