

Image Diagnosis: Bronchial Anthracofibrosis— A Bronchoscopic Diagnosis

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CASE PRESENTATION

A 65-year-old, HIV-negative woman from a rural region of India presented with 5 years of productive cough and breathlessness. Although a never-smoker, she had a significant history of exposure to biomass fuel smoke for 6 to 7 h/d for 40 years while cooking in a poorly ventilated kitchen. She had quit cooking on wood fires 5 years before presentation. Chest radiograph (Figure 1A) revealed an opacity in the left upper zone of her lung with the left hemidiaphragm at the same level as the right, suggestive of left upper lobe (LUL) collapse. A high-resolution computed tomography (HRCT) of her thorax (Figure 1B) confirmed collapse of the apicoposterior segment of the LUL, along with multifocal narrowing of the associated bronchus (Figure 1C), a feature characteristic of bronchial anthracofibrosis (BAF). Sputum stains and cultures were negative for *Mycobacterium tuberculosis*. On spirometry, an

obstructive pattern without significant bronchodilator response was observed. Fiberoptic bronchoscopy, performed to evaluate the LUL collapse, visualized dark bluish-black hyperpigmentation of the mucosa with narrowing and distortion of the right middle lobe (Figure 2) and LUL bronchi, which confirmed BAF. Stains and cultures of the bronchial aspirate were negative for *M tuberculosis* as well as for other aerobic organisms. The aspirate was also negative on GeneXpert testing (Cepheid, Sunnyvale, CA). Treatment was initiated for associated chronic obstructive pulmonary disease.

The diagnosis of BAF was based on 1) long-standing history of biomass fuel smoke exposure, 2) multifocal narrowing of the LUL bronchus on HRCT, and 3) bronchoscopy showing bluish-black mucosal hyperpigmentation of the right middle lobe and LUL bronchi, along with narrowing and distortion of associated bronchi.

DISCUSSION

Endobronchial pigmentation along with narrowing of the airways was first documented in 1951 by Abraham Cohen.¹ He described narrowing of the middle lobe because of perforated tuberculous lymph nodes in 8 female patients in New York of whom 6 had anthracotic pigmentation. This is most probably the first-ever description of “bronchial anthracofibrosis,” a term coined by Chung et al² in 1998, when they described this entity in 28 never-smokers in Korea with significant history of wood smoke exposure. Since then, BAF is increasingly being recognized as a distinct clinical entity among nonsmoking elderly women from developing countries who have long-standing histories of exposure to biomass fuel smoke while cooking in poorly ventilated kitchens.³

BAF was first documented in India in a 65-year-old woman with a lifelong history of biomass fuel smoke exposure who presented with middle lobe syndrome.⁴



Figure 1A. Chest radiograph showing an opacity in the left upper zone of the lung with the left hemidiaphragm at the same level as the right, suggestive of left upper lobe collapse.

Figure 1B. High-resolution computed tomography scan of the thorax showing collapse of the apicoposterior segment of the left upper lobe with narrowing of the left upper lobe bronchus.

Figure 1C. High-resolution computed tomography of the thorax. The black arrows indicate multifocal narrowing of the left upper lobe bronchus.

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Figure 2. Fiberoptic bronchoscopy image showing dark bluish-black hyperpigmentation of the mucosa with narrowing and distortion of the right middle lobe.

HRCT revealed multifocal stenosis of the right middle lobe bronchus. Fiberoptic bronchoscopy performed for evaluation of middle lobe syndrome visualized anthracotic pigmentation of the middle lobe bronchus and narrowing of the associated bronchus. Bronchial aspirate cultured *M tuberculosis*.⁴

Tuberculosis was once thought to be the causative agent of BAF. However, current evidence suggests that it is an associated condition documented in nearly a third of patients with BAF.^{3,5} The radiologic presentation of BAF is similar to that of pulmonary tuberculosis. Collapse, consolidation,

and fibrotic parenchymal bands can also be seen.³ Multifocal narrowing, when present on HRCT, is a characteristic imaging feature of BAF.^{3,6}

In developed countries, BAF is usually seen in immigrant populations in which elderly women patients would have had long-standing exposure to biomass fuel smoke. In a study from Canada, Hwang et al⁷ documented the occurrence of BAF in ten patients from Asia. Subsequent to its 1951 description,¹ BAF because of exposure to industrial dust was documented in a “USA-born African American male patient.”⁸

Considering that exposure to biomass fuel smoke is a risk factor inherent to chronic obstructive pulmonary disease and BAF, most patients are often diagnosed with chronic obstructive pulmonary disease without undergoing further workup to exclude BAF.³ There is a need to develop noninvasive modalities to establish an early diagnosis for this clinical entity. A standardized treatment protocol for BAF does not yet exist. Therefore, it is imperative to emphasize the need for preventive measures and to highlight the menace of biomass fuel smoke exposure. ❖

Disclosure Statement

The authors have no conflicts of interest to disclose.

How to Cite this Article

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References

1. Cohen AG. Atelectasis of the right middle lobe resulting from perforation of tuberculous lymph nodes into bronchi in adults. *Ann Intern Med* 1951 Oct;35(4):820-35. DOI: <https://doi.org/10.7326/0003-4819-35-4-820>.
2. Chung MP, Lee KS, Han J, et al. Bronchial stenosis due to anthracofibrosis. *Chest* 1998 Feb;113(2):344-50. DOI: <https://doi.org/10.1378/chest.113.2.344>.
3. Gupta A, Shah A. Bronchial anthracofibrosis: An emerging pulmonary disease due to biomass fuel exposure. *Int J Tuberc Lung Dis* 2011 May;15(5):602-12. DOI: <https://doi.org/10.5588/ijtld.10.0308>.
4. Kala J, Sahay S, Shah A. Bronchial anthracofibrosis and tuberculosis presenting as a middle lobe syndrome. *Prim Care Respir J* 2008 Mar;17(1):51-5. DOI: <https://doi.org/10.3132/pcrj.2008.00003>.
5. Shah A. Bronchial anthracofibrosis: A perilous consequence of exposure to biomass fuel smoke. *Indian J Chest Dis Allied Sci* 2015 Jul-Sep;57(3):151-3.
6. Kunal S, Piliyani V, Shah A. Bronchial anthracofibrosis with interstitial lung disease: An association yet to be highlighted. *BMJ Case Rep* 2016 Jan 11;2016. DOI: <https://doi.org/10.1136/bcr-2015-213940>.
7. Hwang J, Puttagunta L, Green F, Shimanovsky A, Barrie J, Long R. Bronchial anthracofibrosis and tuberculosis in immigrants to Canada from the Indian subcontinent. *Int J Tuberc Lung Dis* 2010 Feb;14(2):231-7.
8. Rangelov K, Sethi S. The first described case of occupational anthracofibrosis in the USA. *Case Rep Pulmonol* 2014;2014:460594. DOI: <https://doi.org/10.1155/2014/460594>.