

Bronchial Disorders Due to Anthracosis

Until mid-twentieth century, the pathologists as well as pneumonologists believed that, the carbon dust, anthracosis, was an inert and harmless pigmented particle, one can see frequently in the lung parenchyma especially among adult persons and crowded city dwellers. They were not clinically and pathologically regarded as a subgroup of pulmonary pneumoconiosis.

Later, it became clear that this material also causes fibro-inflammatory process alone or in combination with other dust materials including silica which causes anthraco-silicosis. In the second half of twentieth century, the anthracotic pneumoconiosis and coal workers disease became a familiar entity in respiratory medicine (1).

Among these anthracotic lesions, domestically acquired particulate lung disease, bronchial anthracofibrosis as a clinical and pathological entity was described as a distinct disease, less than one or two decades ago. It is a new entity in this field (2). The disease is characterized by anthracotic pigmentation of the bronchial lumen, narrowing, and stenosis with or without lymphatic node involvement. The condition is generally seen in non smoking elderly persons with a long standing history of domestic housework (3).

In this issue of Tanaffos (*Respiration Journal*) Dr. Amoli reports 102 cases of anthracotic lung disease, in patients with long term indoor and outdoor smoke inhalation not related to cigarette smoking who were not coal workers. The majority of these patients used to live in country using wood or other biomass materials for heating or baking. Currently many inhabitants in rural areas in Iran depend on biomass for cooking and heating. In this report the patients were evaluated based on clinical and bronchoscopic findings for having anthracotic pigmentation in comparison to controls. The controls were similar number of contemporary patients without anthracotic lesions but with a variety of established pathologies. Those with bronchial anthracotic pigmentation were older, mainly middle aged or older than controls. Almost half the male and all the female anthracotic patients used to live in country. All women were full-time housewives. More than 40% of control women used to work in civil services.

Anthracotic bronchitis is a separate entity from anthracotic pneumoconiosis and has been reported variously as hut lung, anthraco-fibrosis, anthracotic inflammatory bronchial stenosis, and charcoal disease. Recently, many articles regarding this disease presented the special characters of the clinical features, imaging performances and histological findings. It is potentially the largest environmentally attributable hazard in the world, with an estimated 3 billion people at risk (4), particularly in developing countries where people use biomass fuel for their daily indoor requirements. The disease is caused by the inhalation of particles liberated from the combustion of biomass fuel and results in significant morbidity (5). Although the majority of patients are aged persons particularly rural women, it has been shown in children as well.

Najafzadeh et al. reported association of typical *Mycobacterium* and anthracotic bronchitis. These authors concluded that anthracotic bronchitis is actually an atypical presentation of tuberculosis infection (6). Chung and his coworkers also concluded that the anthracotic fibrotic response was caused by tuberculous fibrotic reaction (7). None of 102 patients of Dr. Amoli showed such combination.

In conclusion, anthracosis and its pulmonary complications are important and noticeable issues to be considered in our mind. Regarding prevalence, etiologic factors especially tuberculosis and other mycobacteria, clinical manifestations radiologic and bronchoscopic findings, therapeutic management of the disease, and patient's follow-up, it is recommended to perform more precise and extensive researches in different settings.

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What Is the Real Cause of Anthracofibrosis?

Mild deposition of carbonaceous materials in the lung is a common finding in healthy adults who are exposed to them. Overexposure to carbonaceous materials may occur in many occupations and a variety of industries such as coal mining which may result in a variety of pathological pulmonary responses in susceptible hosts. Coal worker pneumoconiosis is the most common coal related respiratory diseases, pathologically characterized by an excessive coal deposition, mainly within pulmonary parenchyma (1).

Initially recognized in 1998, Chung et al. introduced an uncommon form of pneumoconiosis, named as “Anthracofibrosis” or “anthracotic bronchitis”, that predominantly involved the bronchial wall (2). Bronchoscopic evaluation of these patients demonstrated deposition of carbonaceous materials in bronchial wall associated with the bronchial narrowing and obliteration. Subsequently, other investigators reported similar cases of anthracotic bronchitis and described its additional features. The reported patients were usually old men or women, suffering from symptoms mimicking chronic obstructive pulmonary disease and they were mostly from developing countries. Anthracotic bronchitis was manifested pathologically with multiple collapse consolidation in their different lung segments and multiple calcified lymph nodes in mediastinum. Additionally, in bronchoscopic evaluation of patients, large anthracotic patches with narrowing and distortion of the bronchial tree had been noticed.

While the histopathologic features of anthracotic bronchitis have been determined clearly, the pathogenesis of the disease still remains unclear.

Several studies have demonstrated an association between tuberculosis infection and development of anthracotic bronchitis (3-5), suggesting a causal role of tuberculosis for development of anthracotic bronchitis. Exposure to the biomass fuels and wood smoke has also been proposed as the cause of anthracotic bronchitis by some investigators [6]. Finally, occupational exposure to mixed dusts has been speculated as the main cause of anthracotic bronchitis in patients who had neither history of smoke exposure nor evidence of tuberculosis (7).

According to the published literatures, tuberculosis infection has been observed in 27 – 60% of patient with anthracotic bronchitis. Although supporting a causal relationship, other possible explanations should also take into account in interpreting the observed association. Chronic exposure to smoke might affect the mucociliary defense mechanism of the respiratory system and reduce the antibacterial activity of macrophages, cause the lungs susceptible to infection and even tuberculosis (8). Mishra et al. conducted a survey of 260,000 Indian adults, showing that tuberculosis was more frequent in people exposed to biomass fuel pollution than in people not so exposed (9). The authors concluded that the use of biomass fuels increases the risk of tuberculosis. Similarly, in a case-control study, Pérez-Padilla et al. observed that biomass fuels exposure was more frequent in cases who had active tuberculosis than in control cases (6,10). In 1988, Chang et al. noted the endobronchial involvement from intrathoracic tuberculous lymphadenopathy through bronchial erosion. They suggested that intrathoracic tuberculous lymphadenopathy may cause bronchial anthracosis through fistulization of the lymph node to the bronchial mucosa (11).

In conclusion, the pathogenesis of anthracotic bronchitis is still not fully understood. Although evidence on the association of anthracotic bronchitis with several factors is accumulating, the published data are not entirely consistent and do not permit the

investigators to place causal inferences on the observed association. Therefore, to explain the intriguing association that has been observed, further studies are required to replicate previous findings, and to strengthen the observed association.

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