Endobronchial Tuberculosis in Anthracotic Bronchitis

Tuberculoza endobronșică în bronșita antracotică

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Abstract

Background: *Endobronchial tuberculosis (EBTB) is a serious form of pulmonary tuberculosis. In EBTB, mycobacterium tuberculosis involves trachea, large airways and bronchial trees .Combustion of biomass fuels causes anthracotic bronchitis that is characterized by black pigmentation in bronchial tissue. The majority of anthracotic bronchitis are in aged patients, particularly rural women, that use biomass fuel for cooking or traditional bakery .The aim of this study was to evaluate the endobronchial tuberculosis in anthracotic bronchitis.*
Material and Methods: *In total, 483 EBTB patients who underwent flexible bronchoscopy (FB), for various indications, were included. Tuberculosis was confirmed by microbiological analysis of bronchoalveolar (smear and culture for Koch's bacillus) and histopathological methods. EBTB patients were divided in two groups: subjects with anthracotic bronchitis (group 1) and without anthracosis (group 2). Demographic data and important clinical , radiological and bronchoscopic findings were recorded. Chi-squre test and Spss 11.5 software were used for statistical analysis.*
Results: *483 out of 1824 patients who underwent FB had EBTB. 73.7% patients had EBTB and anthracotic bronchitis (versus 27.3% EBTB without anthracosis). The mean age was significantly higher in EBTB and anthracotic bronchitis (68.45±16.31 versus 49.08±14.7). Female/male ratio was 1.4:4 in EBTB and anthracotic group versus 1:1 in non anthracotic patients. Dyspnea, cough, hemoptysis and wheezing were higher in group 1. History of biomass fuel was more significant in EBTB and anthracotic bronchitis. Mass, diffuse infiltration in lower lobes were revealed higher in radiography of group 1. Bronchoscopy showed the higher frequency of bronchial stenosis in EBTB with anthracosis (P value <0.05).*
Conclusion: *This study suggested significant association between EBTB and anthracotic bronchitis. Unusual findings in radiological and bronchoscopic features were seen in EBTB with anthracosis.*
Keywords *: endobronchial tuberculosis, anthracotic bronchitis, biomass*

Rezumat

Introducere: *Tuberculoza endobronșică (TBEB) reprezintă o formă severă de tuberculoză pulmonară. Boala se localizează la nivelul traheei, căilor respiratorii mari si arborelui traheobronșic. Arderea de biomasă cauzează bronșită antracotică ce se caracterizează prin prezența de pigmenți negri în țesutul bronșic. Majoritatea bronșitelor antracotice apar la pacienții vârstnici, în special femeile din mediul rural, ce folosesc biomasa drept combustibil pentru gătitul și pentru patiseria tradițională. Scopul acestui studiu este să evalueze prezența tuberculozei endonbronșice la pacienții cu bronșită antracotică.*
Material și metodă: *în total au fost incluși 483 de pacienți cu TBEB diagnosticați prin bronhoscopie flexibila. Confirmarea bacteriologică a tuberculozei s-a făcut fie prin analiza lavajului bronsic (microscopie și cultură), fie prin efectuarea examenului histopatologic. Pacienții cu TBFB au fost împărțiți în două grupuri: pacienți cu bronșită antracotică (grupul 1) și pacienți fără bronșită antracotică (grupul 2). S-au notat datele demografice, precum și caracteristicile clinice, radiologice și bronhoscopice cele mai importante. Pentru analiza statistică s-a utilizat testul qui pătrat și softul SPSS 11.5.*
Rezultate: *483 din 1824 de pacienți cărora li s-a efectuat bronhoscopie, pentru orice indicație, au avut TBEB. 73.7 % din pacienti au avut atât TBEB cât și bronșită antracotică (vs 27.3% care au avut doar TBEB fără antracoză). Vârsta medie a fost semnificativ mai mare în grupul cu TBEB și bronșită antracotică (68.45±16.31 versus 49.08±14.7). Raportul femei/bărbați a fost 1.4:4 în grupul TBEB și bronșită antracotică vs 1:1, în grupul fără antracoză. Dispneea, tusea, hemoptizia și wheezing-ul au fost mai frecvente în primul grup. Utilizarea de biomasă drept combustibil a fost semnificativă în grupul cu TBEB și antracoză. Mase pulmonare, infiltrații difuze în lobii inferior au fost mai frecevente în primul grup. Bronhoscopia a arătat o frecvență mai mare a stenozei bronșice în TBEB cu antracoză (p < 0.05).*
Concluzie: *acest studiu sugerează o asociere între TBEB și bronșita antracotică. Caracteristice radiologice și bronhoscopice neobișnuite au fost întâlnite la TBEB cu antracoză.*
Cuvinte-cheie: ***tuberculoză endobronșică, bronșită antracotică, biomasă***

Introduction

Mycobacterium tuberculosis in trachea and bronchial tree causes a serious type of highly contagious infection named endobronchial tuberculosis (EBTB)[1]. Irreversible bronchostenosis is an important delayed complication of EBTB[2,3]. Anthracotic bronchitis is a bronchopathy characterized by anthracotic pigmentation in mucosa and submucosa of the bronchial tree[4]. It is caused by inhalation of smoke made by incomplete biomass combustion or exposure to wood fire[5]. Therefore, it is frequent in rural areas where women, in particular, make bread or food in traditional ovens[6]. Anthracotic depositions induce inflammation, narrowing, stenosis and cicatricle reactions in the bronchial lumen or anthracofibrosis[7,8,9]. Bronchostenosis is a predisposing factor for pulmonary infection, atelectasis and bronchiectasis, which can contribute to intractable and resistant tuberculosis infection[10-13].According to high frequency of tuberculosis worldwide, coincidence of the endobronchial tuberculosis and anthracotic bronchitis and greater endobronchial complications are possible[14]. The aim of present study is to evaluate the endobronchial tuberculosis in anthracotic bronchitis.

Table 1 Demographic characteristics and clinical findings in patients with endobronchial tuberculosis with and without anthracotic bronchitis

Variable	ETBT with Anthracotic bronchitis	ETBT without Anthracotic bronchitis	P value
Mean age	68.45± 3.81	49.08± 4.7	0.03
Female /male	4/1	1/1	0.001
Bakery or cooking with biomass or wood fire	82%	8%	0.000
Dyspnea	92.5%	34.2%	0.002
Cough	89.2%	63.6%	0.01
Hemoptysis	36.8%	13.2%	0.003
Fever	73.4%	79.7%	Not significant
Night sweats	43.3%	45.6%	Not significant
Wheezing	68.7%	3.1%	0.000
Decreased breath sound	34.3%	31.8%	Not significant
Crackle	68.2%	71.9%	Not significant

Material and Methods

This cross-sectional study enrolled all patients who underwent a diagnostic flexible video bronchoscopy for various indications during 2011-2013. The patients were divided in two groups: group 1 included endobronchial tuberculosis and anthracotic bronchitis, group 2 was endobronchial tuberculosis without anthracotic bronchitis. Demographic characteristic, history of exposure to biomass fuel and wood consumption, bakery, clinical finding, chest radiographic, and bronchoscopic findings were recorded. Bronchial washing for acid-fast bacilli (AFB), cytology, mycobacterium tuberculosis culture and bronchial biopsy, if bronchial lesion was present, were performed. Positive smear, culture in bronchial lavage and histopathologic consistent with caseating granuloma were definitive diagnosis for ETBT.

Statistical Methods

Values are expressed as Mean ± SD. Chi square test (X2), 95% confidence limit (95% CI) and Spss11.5 software were used to perform statistical analysis. P value <0.05 was accepted. This study was approved by ethical Committee of Mashhad University of Medical Science. Written Consent was obtained from all patients.

Results

Out of 1824 patients who underwent flexible video bronchoscopy for any indications, 483 (27.67 %) had ETBT. Amongst patients with endobronchial tuberculosis 356 (73.7%) cases had ETBT with anthracotic bronchitis (group1). 23.7% had ETBT without anthracotic bronchitis (group 2). The differences between the two groups were important (P value=0.01, 95% CI od OR=2.49-6.74). The mean age ± sd in group1 (ETBT with anthracotic bronchitis) and group 2 (ETBT without anthracotic bronchitis) was 68.45±16.31 and 49.08±14.7 respectively. As a result the difference was significant (P value<0.05). Female to male ratio in group 1 and 2 were 1.4:1 and 1:1 respectively. In the group with ETBT and anthracotic bronchitis was significantly more women than in the group without anthracotic bronchitis (P value=0.004.odd ratio= 4.7). Bread baker in rustic household oven and history of biomass smoke was significantly more frequent in the anthracotic group (group1) 82% than in non-anthracotic bronchitis 8% (group2)(P value=0.001). The most frequent clinical manifestations are shown in Table 1. Dyspnea, cough, hemoptysis and wheezing were significantly higher in the group of EBTB and anthracotic bronchitis) (p<0.05). The difference of other symptoms was not significant. Chest X-ray in group 1: Total or partial collapse of lobes with volume loss were presented in 49.2% (P value = not significant), mass in 13.8%, extensive diffuse with lower lobes involvement in 68.2%. (P value<0.05) (Table 2). In group 2: Total or partial collapse of lobes with volume loss were presented in 44.8% (P value = not significant), mass in 2.1% ,extensive diffuse with lower lobes involvement in11.8% (P value<0.05) (Table 2). Mass, diffuse infiltration of lower lobes in chest radiography were seen more frequent in the group that had anthracothic bronchitis (p value<0.05). Flexible video bronchoscopy findings: black discoloration of bronchial lumen was outstanding picture in group1 with anthracotic patients (100% in group1 and none in group 2) (Figure 1-5). Despite black pigmentation, stricture, irregularity and inflammation were higher in group 1 than group 2 (p value =0.003) (Table 2); (Figure2-4). The reddened and swollen mucosa were not significant (Table 2).

Discussion:

This current study showed that endobronchial tuberculosis was more frequent in anthracotic bronchitis patients (73.7%). Dyspnea, cough, hemoptysis and wheeze were significantly higher in EBTB and anthracotic bronchitis group. These findings were usually related and exaggerated with anthracosis. The patients in the EBTB and anthracotic bronchitis group were significantly older than those in EBTB with non anthracotic bronchitis and had a significantly higher frequency of biomass smoke exposure history .The EBTB and anthracotic bronchitis group had more women from rural,

Table 2 Comparison of radiological and bronchoscopical findings between ETBT with and without anthracotic bronchitis

Variable	ETBT with anthracotic bronchitis(%)	ETBT without anthracotic bronchitis(%)	P value
Diffuse infiltration on Chest x ray	68.2	11.8	0.000
Lower lobe involvement on Chest X-ray	43.8	9.1	0.001
Volume loss on chest x ray	49.2	44.8	Not significant
Mass on chest x ray	13.8	2.1	0.000
Stricture in flexible video bronchoscopy	58.9	24.9	0.002
Black pigmentation in flexible video bronchoscopy	100	0	0.0000
Irregularity in flexible video bronchoscopy	78..9	48.7	0.003
Redness and swollen in flexible video bronchoscopy	74.8	68.4	Not significant

that make bread and food in the traditional ovens. Chung and colleagues described for the first time anthracotic bronchopathy[9]. Anthracotic bronchitis is a result of inhalation of smoke from incomplete biomass combustion or exposure to wood fire[4,5,15]. Bronchoscopy is the main diagnostic tool for detecting black anthracotic patches in bronchial tree[16,3,6]. The majority of anthracotic patients live in countries using wood or other biomass for heating, cooking and or baking[17,4]. Amoli showed anthracotic bronchopathy in housewives chronically exposed to indoor wood smoke[6]. Unfortunately anthracotic bronchitis is an ancient disease for which there is still no effective treatment[7,8]. Tuberculosis is a major public health problem. Despite the improvements of health status in general population and prevention programs, the incidence of pulmonary tuberculosis remains still high[18]. Moreover, endobronchial tuberculosis has minimally three important outcomes. First, EBTB is highly infectious and contagious disease. Second, clinical and radiological feature are not specific, they are unusual and misleading causing the delay of definitive diagnosis. Third, are the complications of the disease such as important airway stenosis[2,3,19]. The golden standard for diagnosis is flexible bronchoscopy with bronchoscopic samplings (including bronchial washing for smear and culture with tissue biopsy)[19]. Previous studies have showed higher rates of pulmonary tuberculosis in lung anthracosis with fibrosis. Chung et al., reported the frequency as high as 60% of pulmonary tuberculosis in lung anthracofibrosis[11,12,13]. Kim et al., represented the higher rates of EBTB in bronchial anthracofibrosis[14]. We should take in consideration that EBTB and anthracotic bronchitis were more common in older women, results similar to those shown by Kim et al. Unusual radiologic characteristic such as mass, diffuse infiltration in lower lobes were significantly higher in EBTB and anthracotic patients. Anthracose deposition involve large and small airways and lung parenchymal that appears as a mass, volume loss, fibrotic consolidation and diffuse infiltrations in chest imaging[20,3]. Occasionally these findings are misdiagnosed as lung cancer[21]. In this regard lung anthracosis patients are very vulnerable to pulmonary tuberculosis especially EBTB. It seems that the coexistence of EBTB and anthracotic bronchitis aggravates the bronchial stenosis and the bronchoconstriction.

Conclusion

Significant association between EBTB and anthracotic bronchitis was shown in this study. Further studies should be conducted to find proper preventive program against these two disorders. ■

Acknowledgment: Many thanks to the vice chancellor of Mashhad University of Medical Sciences for support.

The authors declare no conflict of interest.

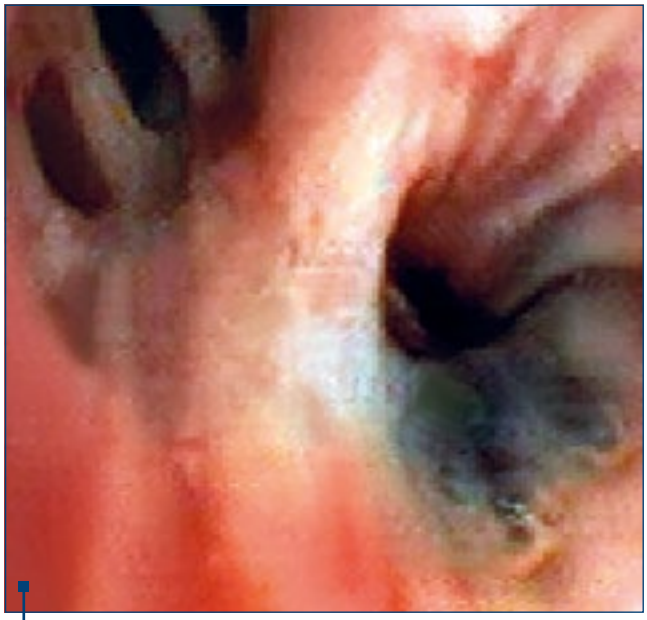

Figure 1. *Black anthracotic deposition with oedema, inflammation , stenosis in the right Lower lobe*

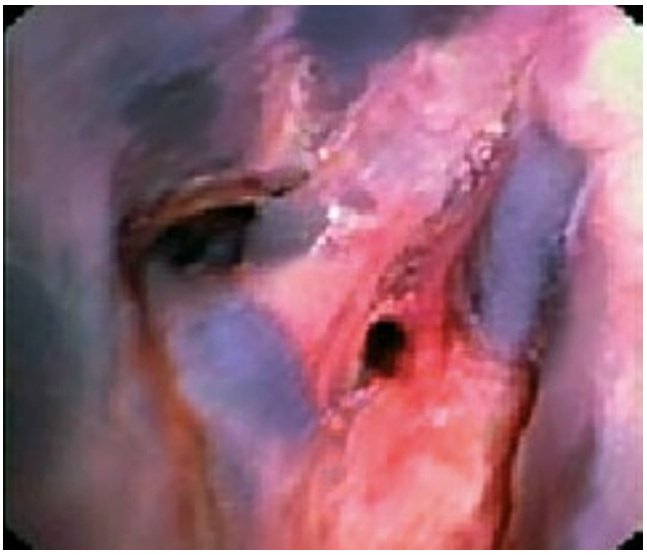

Figure 2. *Diffuse black anthracosis with stenosis , deformities and inflammation in the right upper lobe lumen*

Figure 3. *Diffuse anthracotic bronchitis with inflammation, oedema and stenosis in the Left upper, lingual and left lower lobe*

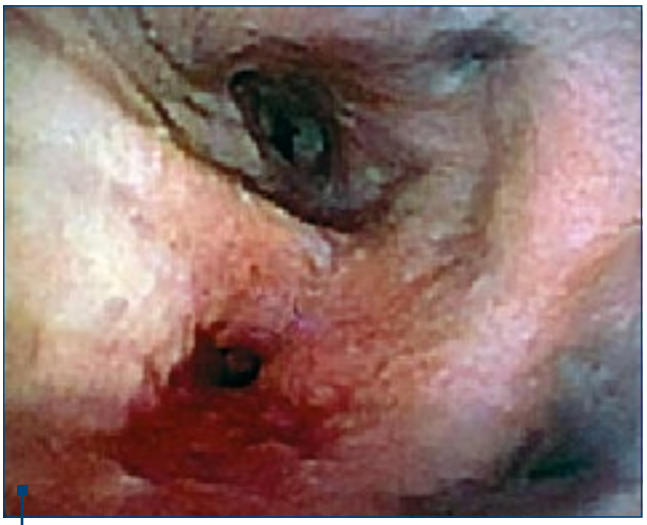

Figure 4 *. Deformities, edema, stenosis and scar in the right main bronchus and right airways*

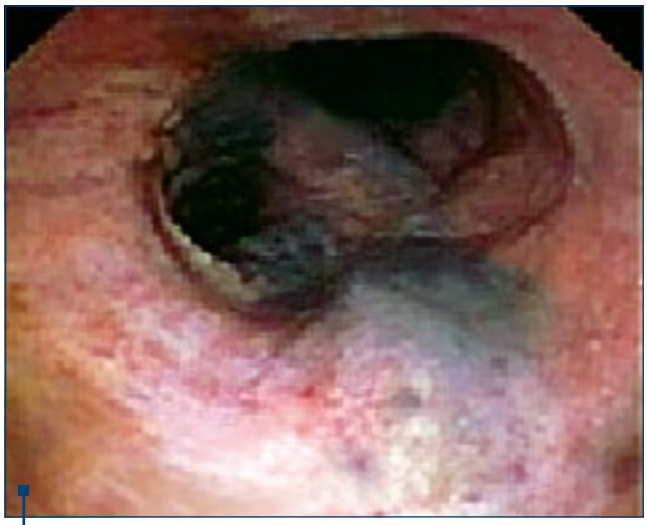

Figure 5. *Black pigmentation in Left main bronchus and orifices of the Left upper and lower lobes*

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