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Original Article

Imaging Findings of Isolated Bronchial Anthracofibrosis: A Computed Tomography Analysis of Patients With Bronchoscopic and Histologic Confirmation☆

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ABSTRACT

Background: To evaluate the chest computed tomography (CT) findings of patients with isolated bronchial anthracofibrosis confirmed by bronchoscopy and histopathology.
Methodology: Fifty-eight patients with isolated bronchial anthracofibrosis (29 females; mean age, 70 years) were enrolled in this study. The diagnosis of bronchial anthracofibrosis was made based on both bronchoscopy and pathology findings in all patients. The various chest CT images were retrospectively reviewed by two chest radiologists who reached decisions in consensus.
Results: Central peribronchial soft tissue thickening (n=37, 63.8%) causing bronchial narrowing (n=37, 63.8%) or obstruction (n=11, 19%) was identified as an important finding on imaging. Multiple bronchial stenoses with concurrent involvement of 2, 3, and 5 bronchi were seen in 12 (21%), 9 (15%), and 2 (3.4%) patients, respectively. Segmental atelectasis and lobar or multilobar collapse were detected. These findings mostly occurred in the right lung, predominantly in the right middle lobe. Mosaic attenuation patterns, scattered parenchymal nodules, nodular patterns, and calcified or non-calcified lymph nodes were also observed.
Conclusions: On chest CT, isolated bronchial anthracofibrosis appeared as peribronchial soft tissue thickening, bronchial narrowing or obstruction, segmental atelectasis, and lobar or multilobar collapse. The findings were more common in the right side, with simultaneous involvement of multiple bronchi in some patients.

Diagnóstico por la imagen de la antracofibrosis bronquial aislada: un análisis de tomografía computarizada de pacientes con confirmación broncoscópica e histológica

Palabras clave:
Antracosis
Atelectasia pulmonar
Bronquios
Ganglios linfáticos
Tomografía computarizada

RESUMEN

Antecedentes: Evaluar los resultados de la tomografía computarizada (TC) de tórax en pacientes con antracofibrosis bronquial aislada demostrada broncoscópica y anatomopatológicamente.
Metodología: Se incluyó en el estudio a un total de 58 pacientes con antracofibrosis bronquial aislada (29 mujeres; media de edad, 70 años). El diagnóstico de antracofibrosis bronquial se estableció en función de las observaciones broncoscópicas y anatomopatológicas en todos los pacientes. Los diversos aspectos observados en la TC torácica fueron revisados retrospectivamente por 2 radiólogos torácicos, que tomaron las decisiones por consenso.

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Resultados: Resaltamos el engrosamiento del tejido blando peribronquial central (n=37, 63,8%) como un hallazgo importante en las exploraciones de imagen, que causa estenosis (n=37, 63,8%) u obstrucción bronquial (n=11, 19%). Se observaron múltiples estenosis bronquiales con afectación simultánea de 2, 3 y 5 bronquios en 12 (21%), 9 (15%) y 2 (3,4%) pacientes, respectivamente. Se detectaron atelectasias segmentarias y colapsos lobulares y multilobulares. Estas observaciones se realizaron sobre todo en el pulmón derecho, con un predominio del lóbulo medio derecho. Se observaron también patrones de atenuación en mosaico, nódulos parenquimatosos diseminados, patrones nodulares y ganglios linfáticos calcificados o no calcificados.

Conclusiones: En la TC de tórax, la antracofibrosis bronquial aislada se observa en forma de engrosamiento de tejido blando peribronquial, estenosis u obstrucción bronquiales, atelectasia segmentaria o colapso lobular o multilobular. Estas observaciones fueron más frecuentes en el lado derecho, con múltiples bronquios afectados de manera simultánea en algunos pacientes.

Introduction

Anthracosis has been regarded as black pigmentation in bronchial mucosa visible at bronchoscopy or based on histological findings, and is characteristically related to the presence of pneumoconiosis or heavy exposure to atmospheric carbon or soot particles. Chung et al. described the term "anthracofibrosis" as dark pigmentation in mucosal layer of bronchi, leading to bronchial narrowing or stenosis.[1]

Given the prevalence of anthracofibrosis in elderly patients and some similarities in imaging features to those of lung cancer, differentiation may be difficult. Furthermore, causative association between anthracofibrosis and tuberculosis is an issue of ongoing debate, and their imaging findings may interfere with each other.[1,2] Hence, familiarity with anthracofibrosis with no concomitant diseases may shed light on the imaging features of this little-known lung disease.

The authors used the term "isolated bronchial anthracofibrosis" to describe bronchial dark tattoos found at bronchoscopic assessment and black pigmentation within the macrophages of bronchial mucosa in patients whose pulmonary evaluation for tuberculosis, neoplasm, or any other apparent lung pathologies was negative. In this study, we attempted to determine and describe the imaging characteristics of bronchoscopically and pathologically proven "isolated bronchial anthracofibrosis" on computed tomography (CT).

Methodology

This retrospective study was approved by an institutional review board, and informed consent requirement was waived.

Study Subjects

We identified 111 consecutive patients with bronchial black pigmentation and bronchial stenosis or obstruction on bronchoscopic examination and bronchial anthracotic pigmentation findings in the histological examination of bronchial biopsy specimens (Fig. 1) from January 2007 to March 2013. Of these, 11 cases were excluded from the study; 7 patients with malignant neoplasm, based on transthoracic (n=2) or transbronchial (n=4) lung biopsy, or pleural biopsy (n=1), 3 with usual interstitial pneumonia, and 1 coal mine worker with a history of anthracosilicotuberculosis. In addition, patients with a medical history, pathologic findings of tuberculosis with or without attributable radiological findings of pulmonary tuberculosis, as well as those with positive sputum smear, culture, or nucleic acid amplification test results for *Mycobacterium tuberculosis* were excluded. Also, patients with a positive Mantoux test were excluded from the study. Consequently, 25 patients with coexistent active tuberculosis and 17 cases with a history of previous tuberculosis were also excluded from the study. Thereafter, we retrospectively reviewed the imaging findings of the remaining 58 patients; all of them had an available chest CT scan within 0–30 days (mean, 7 days) of bronchoscopic sample. Information about each patient's presenting symptoms and the history of smoking, biomass or dust exposure was obtained from reviewing the medical records.

Image Acquisition

All examinations were performed with a 4-detector row scanner (LightSpeed QX/I; GE Medical Systems, Milwaukee, USA), and non-contrast helical CT scans were obtained at 5-mm collimation with a helical pitch of 3, 5-mm image intervals, 120 kV and 160 mAs. All scans were performed from the lung apices to the lung bases, and all images were reviewed using window settings appropriate for mediastinum [window width, 300–450 Hounsfield units (HU); window level, 30–50 HU] and lung parenchyma (window width, 1000–1500 HU; window level, −600 to −700 HU).

Imaging Review

Imaging features were reviewed by two radiologists, each with more than 8 years' experience interpreting chest CT, in consensus.

Central peribronchial soft tissue thickening, intraparenchymal peribronchial cuffing, bronchial narrowing or obstruction, atelectasis, collapse, lymph node enlargement, consolidation, nodule, nodular pattern, mosaic attenuation pattern, parenchymal band, reticular pattern, pleural effusion or thickening, and any other

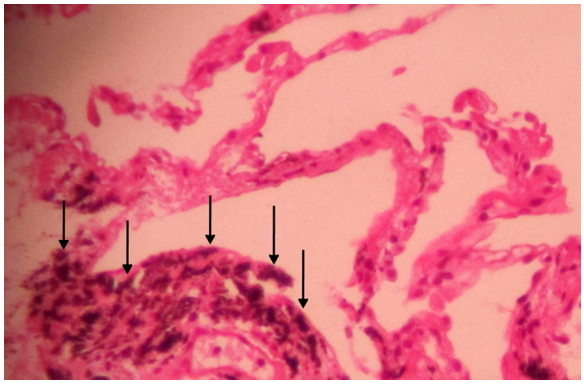

Fig. 1. Section from lung transbronchial biopsy reveals anthracotic deposits (*arrows*) in peribronchovascular bundles as well as interlobular septa with no evidence of fibrosis (hematoxylin and eosin staining, original magnification 400×).