Diseases Involving the Central Bronchi: Multidetector CT for Detection, Characterization, and Differential Diagnosis

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Abbreviations: ABPA = allergic bronchopulmonary aspergillosis, COPD = chronic obstructive pulmonary disease

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The bronchial tree can be challenging to evaluate with computed tomography (CT). The two main patterns of central endobronchial disease, focal endobronchial lesion and diffuse or multifocal bronchial wall thickening, are easily overlooked. Endobronchial disease can be difficult to recognize clinically. This online presentation provides a guide to the identification and differential diagnosis of central bronchial lesions, including wall thickening and endoluminal nodules. Diseases limited to the trachea or small airways and diseases characterized primarily by bronchiectasis are not included.

Ancillary CT findings such as postobstructive air trapping, consolidation, atelectasis, tree-in-bud nodularity, and bronchiectasis are often more easily identified than the endobronchial lesion itself (Figure). Whereas these CT findings are common and nonspecific, a central obstructing endobronchial lesion should be excluded when these findings are focal and/or persistent. The finger-in-glove sign is a classic sign of allergic bronchopulmonary aspergillosis (ABPA). When the finger-in-glove sign involves an isolated segment (unlike the bilateral multifocal pattern seen in ABPA), endobronchial tumor should be considered.

Transient endobronchial lesions are common and usually represent mucus plugs. The differential diagnosis for focal persistent endobronchial lesions includes foreign body, primary benign neoplasm, and malignant neoplasm. Most endobronchial neoplasms are malignant. The challenge for the radiologist is identification of the early small endobronchial lesion; regardless of the imaging features, bronchoscopy is usually indicated for tissue diagnosis and sometimes treatment.

Diffuse or multifocal bronchial wall thickening is an important multidetector CT finding. Normal wall thickness decreases as the caliber of the bronchus decreases. Main, lobar, and segmental bronchial walls measure about 1.2–1.4-mm thick, with wall thickness measuring about 20% of the internal bronchial luminal diameter. Bronchial wall thickening is common in smokers and usually reflects the chronic bronchitis form of chronic obstructive pulmonary disease (COPD). In never smokers or in younger patients, consider other causes of bronchial inflammation, including asthma.

TEACHING POINTS
- Bronchial lesions can be difficult to detect. Ancillary findings at CT such as postobstructive air trapping, consolidation, atelectasis, and bronchiectasis may be more easily identified than the endobronchial lesion itself.
- A focal persistent endobronchial nodule should raise concern for neoplasm.
- Ninety percent of endobronchial neoplasms are malignant.
- The differential diagnosis for diffuse bronchial processes is broad and can be narrowed by the presence and location of wall thickening, calcification, and nodularity, in addition to patient medical history and demographics.
Often hyperdense. Filling of dependent bronchi in a patient with acute respiratory decline suggests aspiration or poor clearance of secretions. In addition to the bronchial wall thickening that may be seen in lymphatic spread of malignancy, lymphoma is another malignant cause of central airway disease. Bronchial lymphoma may appear as nodularity or wall thickening but is rare and typically occurs in the setting of lymphoma elsewhere. Endobronchial metastases are rare. However, when a patient with a known primary malignancy demonstrates scattered multifocal endobronchial lesions, particularly when the underlying bronchus is dilated, endobronchial metastases should be considered.

Acknowledgments.—We thank Mathieu Castonguay, FRCPC, and Zhaolin Xu, MD, FRCPC, for providing correlative histologic images.

Suggested Readings

Other inflammatory processes such as amyloidosis and granulomatosis with polyangiitis, although more rare, are important considerations for central bronchial wall thickening and may result in severe luminal narrowing. Distinguishing CT features include the calcification often seen with amyloidosis and the subglottic involvement typical for granulomatosis with polyangiitis.

Nodularity of the cartilaginous tracheobronchial walls is the hallmark of tracheobronchopathia osteochondroplastica, an idiopathic process affecting middle-aged adults. Relapsing polychondritis, a rare autoimmune inflammatory disorder of cartilage throughout the body, manifests in the thorax as calcified thickening of airway wall cartilage. These two entities are more likely to affect the trachea than the central bronchi. Acquired tracheobronchomalacia is a characteristic finding in relapsing polychondritis but can also be seen in COPD, asthma, and advanced age.

Infectious bronchitis is typically diagnosed clinically. Fungal tracheobronchitis can be more difficult to diagnose clinically, and the radiologist should consider this when central airway wall thickening is seen in immunocompromised patients. ABPA, almost exclusively seen in patients with asthma or cystic fibrosis, manifests as bilateral segmental and subsegmental endobronchial plugs, often hyperdense. Filling of dependent bronchi in a patient with acute respiratory decline suggests aspiration or poor clearance of secretions.

In addition to the bronchial wall thickening that may be seen in lymphatic spread of malignancy, lymphoma is another malignant cause of central airway disease. Bronchial lymphoma may appear as nodularity or wall thickening but is rare and typically occurs in the setting of lymphoma elsewhere. Endobronchial metastases are rare. However, when a patient with a known primary malignancy demonstrates scattered multifocal endobronchial lesions, particularly when the underlying bronchus is dilated, endobronchial metastases should be considered.

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