

Case 10304

Role of computed tomography and virtual tracheo-bronchoscopy in endobronchial tuberculosis

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Section: Chest Imaging

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Patient: 45 year(s), male

Authors' Institution

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Clinical History

A-45-year-old male patient was admitted to our hospital with low back pain and difficulty in walking for several months. Clinical history was not suggestive of respiratory disease. Physical examination was unremarkable. Routine laboratory studies including hemoglobin, white blood cells count, erythrocyte sedimentation rate and C-reactive protein were within normal range.

Imaging Findings

Chest radiograph showed an air-space consolidation in left middle lung zone without associated pleural effusion (figure 1).

Chest computed tomography (CT) confirmed parenchymal consolidation with branching linear structures in the superior segment of the left lower lobe and segmental bronchus wall thickening (figure 2). Multiplanar reconstruction (MPR) integrated with virtual tracheo-bronchoscopy (VTB) (figure 3) demonstrated extended concentric stenosis in the superior branch of the left lower lobe (B6) without extrinsic bronchial compression or obstructive endoluminal mass.

Flexible bronchoscopy confirmed narrowing of the lumen of the superior branch of the left lower lobe with swollen mucosa covered diffusely with whitish cheese-like substance (figure 3).

Discussion

Endobronchial tuberculosis represents the most common cause of inflammatory stricture of the bronchi. Airways involvement in tuberculosis has been reported in 10-20% of all patients with pulmonary tuberculosis [1].

The airways can be secondarily involved by the spread of organism within the airway lumen or along peribronchial lymphatic channels from an area of cavitations or localised tuberculous pneumonia. They can also be involved by extension from adjacent parenchymal infection, lymph node erosion or haematogenous spread [1].

In the presented case the radiographic findings were consistent with pulmonary consolidation. The CT integrated with virtual tracheo-bronchoscopy (VTB), showed bronchial stenosis with peribronchial cuff of soft tissue and concentric wall thickening with adenopathy probably secondary to neoplastic stenosis, further indicating a fiberoptic bronchoscopy (FBS).

In patients with chronic granulomatous disease, smooth narrowing of airways resistant to medical treatment with minimal wall thickening has been observed [1]. The lung parenchyma distal to the bronchial lesion may be involved with segmental atelectasis or consolidation, parenchymal cavities, or round area of low attenuation, suggesting mucoid impaction [1]. Peribronchial lymphnode calcification that either erodes into or cause major distortion of an adjacent bronchus is defined as broncholithiasis. "Bronchiectasis" most often consists of traction bronchiectasis together with peribronchial fibrosis.

In case of active airways disease, circumferential and predominantly irregular luminal narrowing with wall thickening and contrast enhancement have been described.

VTB offers three-dimensional with high-resolution endoluminal images, reveals inaccessible areas, evaluates bronchial stenosis and obstruction caused by both endoluminal pathology (tumour, mucus, foreign bodies) and extraluminal airways compression (anatomical structures, tumour, lymph nodes). VTB helps guiding biopsy and endobronchial treatment planning [2].

VTB cannot clearly depict the mucosal surface and distinguish between infiltrating and vegetative lesions because mucus, bronchial secretion and flaked bronchial epithelium may mimic neoplastic lesions [2].

Recent studies have also demonstrated the role of the chest CT scan for detecting the abnormalities of small- and medium-sized bronchus in patients with active tuberculosis, including wall thickening, bronchial impaction, dilatation, amputated appearance of air column, peribronchial cuff of soft tissue and bronchocavitary fistula [3].

VTB plays an important role in detecting endobronchial tuberculous involvement.

Final Diagnosis

Endobronchial tuberculosis (EBTB).

Differential Diagnosis List

Primary endobronchial lung cancer, Secondary endobronchial metastases, Endobronchial carcinoid

Figures

Figure 1 Posteroanterior chest radiograph

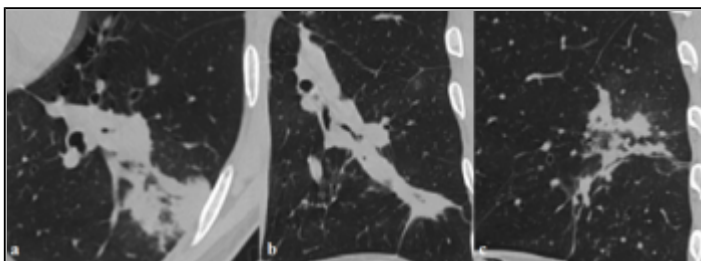


Chest radiograph showing air-space consolidation in left middle lung zone.

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Area of Interest: Lung;
Imaging Technique: Conventional radiography;
Procedure: Screening;
Special Focus: Infection;

Figure 2 Thin section CT examination with multiplanar reconstruction

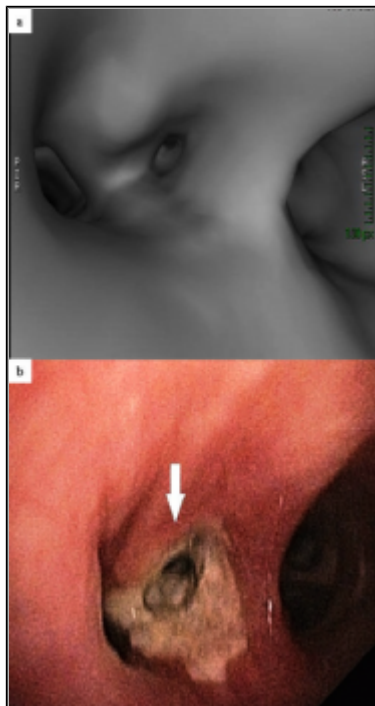


CT examination showing segmental consolidation in the left lower lobe (a); with peri-bronchial cuff of soft tissue (b); atelectasis due to segmental bronchus obstruction (c).

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Area of Interest: Lung;
Imaging Technique: CT;
Procedure: Computer Applications-General;
Special Focus: Infection;

Figure 3 Bronchoscopy and virtual endoscopy images



(a) Bronchoscopy shows reduction of stenotic bronchus (superior branch of left lower lobe - B6), with its mucosa swollen and covered diffusely with whitish cheeselike substance (arrow) (b). Note correlation with virtual endoscopy images.

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Area of Interest: Lung;
Imaging Technique: CT;
Procedure: Comparative studies;
Special Focus: Infection;

MeSH

Respiratory Tract Infections [C01.539.739]

Mycobacterium tuberculosis [B03.510.024.049.525.500.702]

A species of gram-positive, aerobic bacteria that produces tuberculosis in man, other primates, dogs, and some animals which have contact with man. Growth tends to be in serpentine, cordlike masses in which the bacilli show a parallel orientation.

Respiratory System [A04]

The tubular and cavernous organs and structures, by means of which pulmonary ventilation and gas exchange between ambient air and the blood are brought about.

Bronchial Diseases [C08.127]

References

[1] Beigelman C, Sellami D, Brauner M. (2000) CT of parenchymal and bronchial tuberculosis Eur Radiol. 10 (5): 699-709.

[2] Polverosi R, Vigo M, Baron S et al. (2001) Evaluation of tracheobronchial lesions with spiral CT: comparison between virtual endoscopy and bronchoscopy. Radiol Med. Nov-Dec; 102 (5-6): 313-319

[3] Oh JK, Ahn MI, Jung JI, Kim YK, Oh EJ, Park YJ, Han DH. (2011) MDCT abnormalities of small- and medium-sized bronchus in active tuberculosis: a new angle on an old disease. Acta Radiol. Mar 1;52(2):167-72.

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