

# Multislice computed tomography and virtual bronchoscopy diagnosis of interbronchial fistula

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## ABSTRACT

Although tuberculosis is a rather common disease in the Indian subcontinent, tracheobronchial involvement in tuberculosis is still rare. Fistula formation between bronchi is very rare considering that only four cases have been published in the English literature. We present a case of multislice computed tomography (CT) and virtual bronchoscopy diagnosis of interbronchial fistula in a patient with tuberculosis along with a review of literature of the same. This happens to be the smallest of the interbronchial fistula identified on imaging so far and the first case from the Indian subcontinent. This is also the first instance where the diagnosis appears to have been made using only multislice CT generated virtual bronchoscopy without the aid of fiber optic bronchoscopy.

**KEY WORDS:** Fistula, interbronchial, tuberculosis, virtual bronchoscopy

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## INTRODUCTION

Although tuberculosis, one of the most common causes of morbidity and mortality in the Indian subcontinent, commonly involves the lung, fistula formation between the bronchi is quite rare. Interbronchial or broncho-bronchial fistula occurs either due to direct bronchial wall involvement by the tuberculosis infection or more commonly as a sequel to nodal disease eroding into the bronchial tree. This usually presents with a cough with or without expectoration. These fistulae can be noninvasively diagnosed using multislice computed tomography (CT) scans which also give information about the cause of the fistula as well as other associated findings and complications. Here we report a young male who incidentally showed a small inter bronchial fistula during a CT examination done for work up of cough of 4 weeks duration.

## CASE LETTER

A 30-year-old male patient presented to our Radiology Department for the CT chest examination with complaints of fever, cough, and abdominal pain for a period of 4 weeks. Blood tests were normal except for elevated erythrocyte sedimentation rate. Mantoux test was positive for the patient. He was seronegative for HIV. Sputum for acid-fast bacilli was positive. Chest radiograph was normal. CT chest showed a small thin air filled communication between the right and left main bronchi ~6–7 mm below the carina level [Figure 1a-c and Video 1]. Multiple nodes were seen in prevascular, pretracheal, preaortic, precarinal and subcarinal region, largest measuring ~ 17 mm in short axis in subcarinal region [Figure 1d]. Multiple small nodules with tree-in-bud appearance were seen in the superior segment of left lower lobe [Figure 1e]. Moderate right pleural effusion with passive atelectasis of posterior basal segment of right lower lobe was seen. Minimal left

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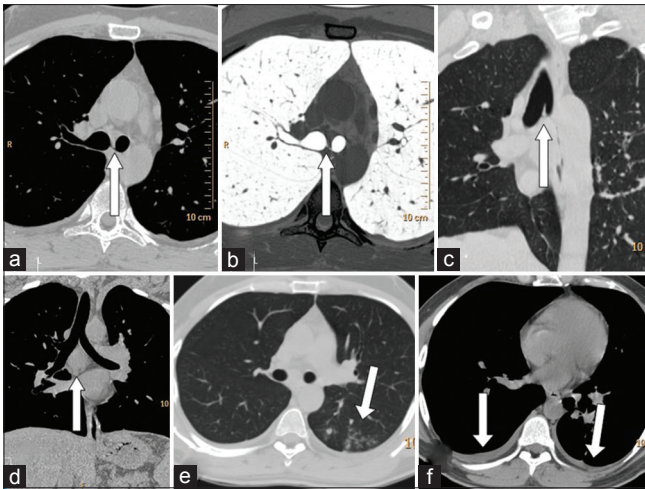
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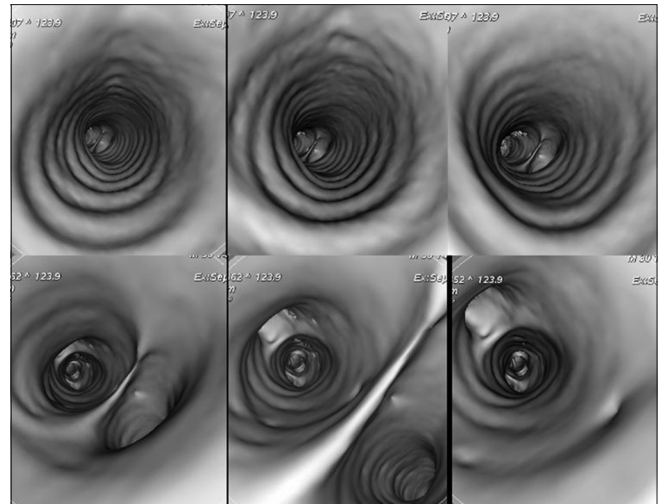
**Figure 1:** (a-c) Axial and curved coronal reformat shows thin small thin air filled communication between the right and left main bronchi ~6-7 mm below the carina level. (d) Coronal reformat computed tomography shows a large node in the subcarinal region. (e) Axial computed tomography in lung window shows multiple small nodules with tree-in-bud appearance in the superior segment of left lower lobe. (f) Axial computed tomography shows bilateral pleural effusion

pleural thickening and bilateral pleural effusion were seen [Figure 1f]. Virtual bronchoscopy showed small openings in the medial wall of a proximal portion of bilateral major bronchi [Figures 2 and 3 and Video 2]. Bronchoscopy was not done as the fistula was very small. At present patient is on anti-tuberculous treatment and he reported significant improvement of symptoms at 3 months, though the tiny fistulous tract still persists on follow-up imaging.

## DISCUSSION

Tuberculosis is one of the leading causes of morbidity and mortality in the Indian subcontinent. Tuberculosis affects most parts of the body with chest being the most common site. Thoracic tuberculosis can present as parenchymal, airway, pleural, mediastinal, vascular, and chest wall complications.<sup>[1]</sup> Patients with pulmonary tuberculosis present with various symptoms of fever, fatigue, weight loss, night sweats, and cough with or without hemoptysis. Fistulas are known to occur with tuberculosis of the chest in the form of bronchopleural fistula, bronchopleurocutaneous fistula,<sup>[2]</sup> bronchoesophageal fistula,<sup>[3]</sup> and interbronchial fistula<sup>[4]</sup> with bronchopleural fistulas being the most common.

Endobronchial tuberculosis in patients with active tuberculosis has a prevalence of about 10–40% with the most common complication being bronchial stenosis.<sup>[4]</sup> Interbronchial fistula due to endobronchial tuberculosis is very rare. The distal trachea and carina are the commonly affected regions of the tracheobronchial tree. Tracheobronchial involvement is usually accompanied by lymphadenopathy and parenchymal tuberculosis. Tracheobronchial involvement may occur due to lymphatic spread of the infection from parenchymal lesions or due to



**Figure 2:** Virtual bronchoscopy images show small openings in the medial wall of proximal right and left main bronchi

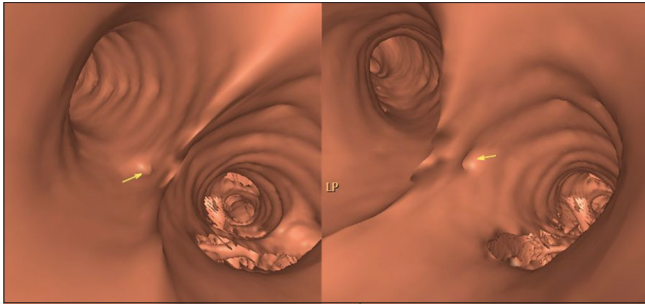
direct invasion of the trachea or bronchi by the enlarged lymph nodes. Granulomatous reaction with destruction of the wall forms the basis of tracheobronchial stenosis/fistula.<sup>[5]</sup>

Of the four cases identified during the literature search all of them were females.<sup>[4-7]</sup> All the patients were more than 50 years of age. Site of involvement was subcarinal region with fistula between the right and left main bronchi. None of the patients were of known immunocompromised status. All the patients recovered following or during the course of anti-tubercular therapy [Table 1].

The patient described here happens to be the first male patient apart from being the youngest to be described with relevance to tuberculous interbronchial fistula. This patient also happens to be immunocompetent with similar subcarinal region involvement between the right and left main bronchi. However, the size of the fistulous tract depicted here appears to be the smallest. This patient also showed significant improvement with anti-tubercular therapy, as has been the case with the other patients.

This is also the first instance where the diagnosis appears to have been made using only multislice CT generated virtual bronchoscopy without the aid of fiber optic bronchoscopy. Multislice CT generated virtual bronchoscopy allows excellent noninvasive visualization of the lumen and wall of the trachea and proximal part of the bronchial tree with dynamic/fly through images resembling the fiber optic bronchoscopy images. Applications of virtual bronchoscopy include evaluation of bronchial stenosis due to intra/extraluminal lesions, assessment of tracheobronchial tree abnormalities including fistulas and guidance of transbronchial biopsy.<sup>[8]</sup>

Interbronchial fistula in tuberculosis may occur either due to direct tracheobronchial wall involvement or secondary to lympho bronchial/bronchonodal fistula. Subcarinal location appears to be the most common location. Multislice



**Figure 3:** Close up image of virtual bronchoscopy images show small openings in the medial wall of proximal right and left main bronchi

**Table 1: Review of literature for interbronchial fistula**

	Age (years)	Gender	Immune status	Site	Clinical course
Yilmaz <i>et al.</i>	76	Female	Not known	Subcarinal	Recovered
Nemati <i>et al.</i>	53	Female	Immunocompetent	Subcarinal	Recovered
Fox and Patel	63	Female	Immunocompetent	Subcarinal	Recovered
Lee <i>et al.</i>	80	Female	Immunocompetent	Subcarinal	Recovered

CT due to the availability of multiplanar reformation and virtual bronchoscopy is extremely useful in the detection of broncho – bronchial and bronchoesophageal fistulas of any etiology. Anti-tubercular therapy appears to be the appropriate and adequate treatment.

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**Conflicts of interest**

There are no conflicts of interest.

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