



## Medical Imagery

# Hilar asymmetry in endobronchial tuberculosis patients: An often-overlooked clue



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## ABSTRACT

**Background:** Endobronchial tuberculosis (EBTB) is a challenging diagnosis because of its varied clinical and radiological manifestations. Hilar asymmetry on chest radiograph (CXR) may be found in patient with EBTB but is often overlooked, which may lead to delayed diagnosis.

**Case report:** We present five cases with EBTB. Clinicians failed to identify unilateral hilar abnormalities on CXR, and these patients were treated initially for pharyngitis, bronchitis, or pneumonia with no improvement. Subsequently, they visited the pulmonary clinic and bronchoscopy revealed endobronchial lesions and microbial/histopathological evidence of tuberculous infection consistent with EBTB. Anti-tuberculosis therapy resulted in complete clinical resolution in four of the five patients; one patient had persistent bronchial stenosis.

**Conclusion:** Hilar asymmetry on CXR may occur with EBTB and may suggest this diagnosis in the appropriate clinical setting. Bronchoscopy has an important role in establishing the final diagnosis.

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This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).**Introduction**

Pulmonary hila are composed of large bronchi, pulmonary vessels, and lymph nodes (Sarkar et al., 2013). Endobronchial tuberculosis (EBTB) is a tuberculous infection of the tracheobronchial tree in which endobronchial lesions can occur in large central bronchi with hilar abnormalities (widening or asymmetric density) on chest radiograph (CXR) (Sahin and Yildiz, 2013). However, identifying these abnormalities may be challenging for both radiologists and clinicians because the pulmonary hilar structures are poorly defined on CXR. Here, we reported five interesting cases of EBTB with hilar asymmetry on CXR are presented here.

**Case reports***Patient 1*

A 68-year-old male non-smoker patient presented with dry cough and mild fever of 3-week duration. His past medical history was unremarkable. A posteroanterior (PA) CXR showed left hilar enlargement with infiltration of the surrounding parenchyma (Figure 1A). He was diagnosed with pneumonia and treated with antibiotics for 1 week without response. Chest computed tomography (CT) undertaken at the pulmonary clinic revealed an endobronchial mass and surrounding consolidation in the left lung. Bronchoscopy demonstrated a tumor in the left main bronchus (Figure 1B) and the biopsy result was consistent with a tuberculous (TB) infection. The diagnosis of EBTB was established

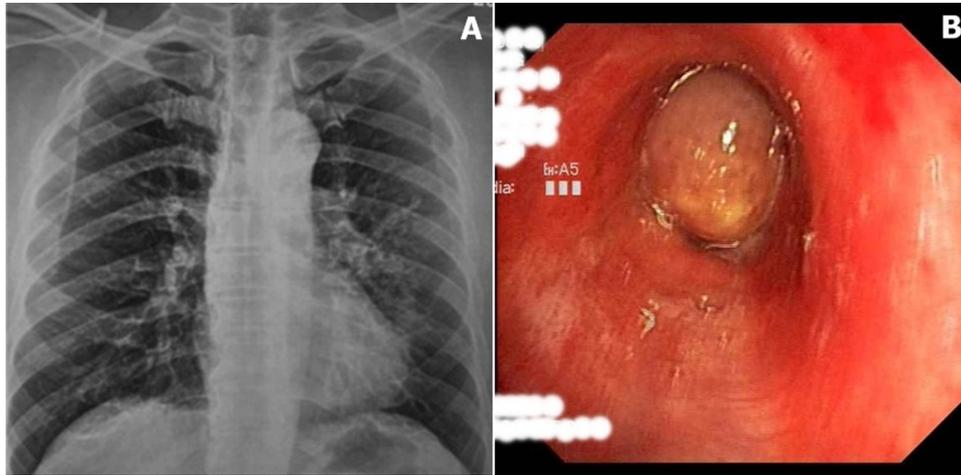
and 6-month anti-TB treatment resulted in complete resolution of the lesion on follow-up bronchoscopy.

*Patient 2*

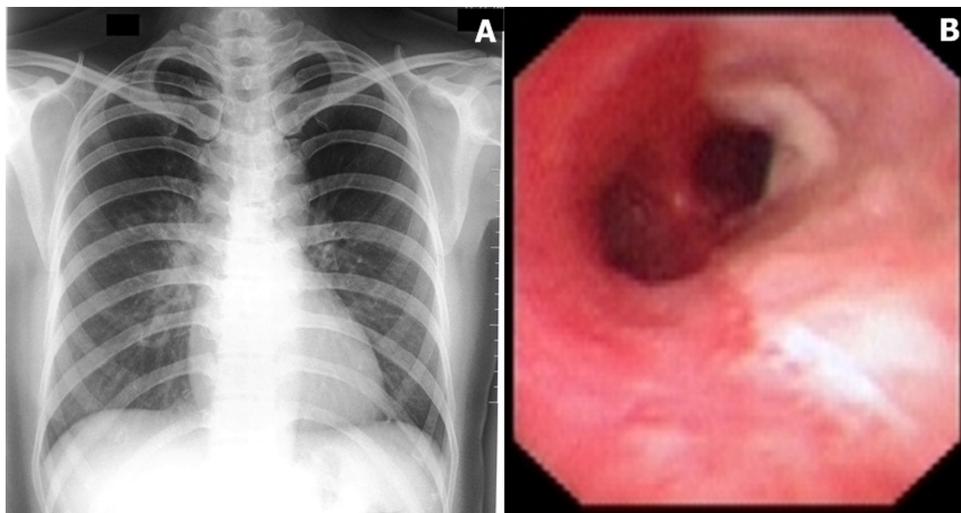
A 41-year-old female patient presented with a 4-week dry cough at the pulmonary clinic. She had had a CXR and been diagnosed with bronchitis before this visit, but antibiotic treatment had resulted in no improvement. Reevaluation of the PA CXR revealed enlargement and increased density of the right hilum accompanied by scattered infiltration (Figure 2A). Two sputum smears for acid-fast bacilli were negative. Bronchoscopy showed whitish cheese-like endobronchial material along the trachea and the right main bronchus causing the obstruction in the right upper lobe bronchus (Figure 2B), and the biopsy result was consistent with a TB infection. The diagnosis of EBTB with active caseous lesion was established and there was a good response to anti-TB treatment.

*Patient 3*

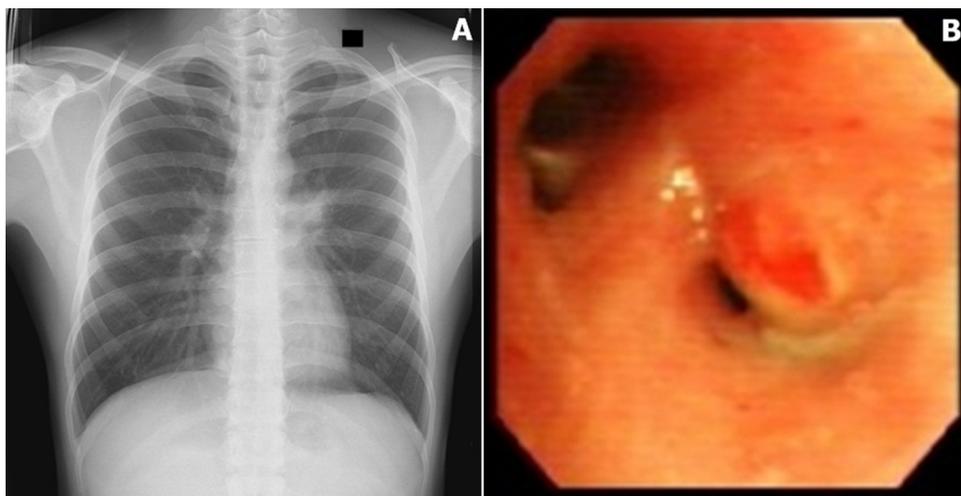
A 27-year-old male patient presented at an outpatient clinic because of a 3-week cough and fever. CXR was performed and he was treated for pharyngitis without improvement. Subsequently, he visited the pulmonary clinic and on review of the CXR, left hilar enlargement and increased density were found (Figure 3A). Bronchoscopy was performed, which revealed a mass lesion almost completely obstructing the lingular bronchus (Figure 3B).



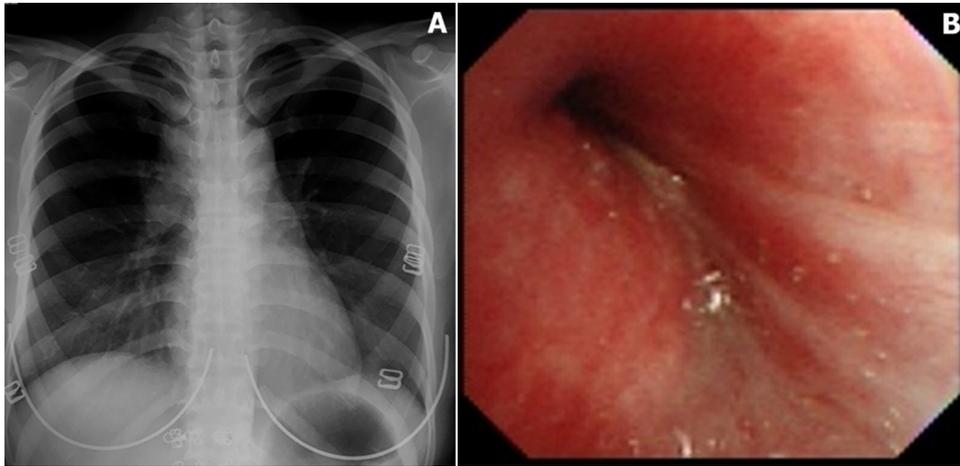
**Figure 1.** (A) Chest radiograph showing asymmetric left hilar enlargement; (B) bronchoscopic image showing a tumor in the left main bronchus.



**Figure 2.** (A) Chest radiograph showing right hilar enlargement; (B) bronchoscopic image showing whitish cheese-like material in the lower trachea.



**Figure 3.** (A) Chest radiograph showing left hilar enlargement; (B) bronchoscopic image showing a tumorous lesion in the lingular bronchus.



**Figure 4.** (A) Chest radiograph showing right hilar enlargement; (B) bronchoscopic image showing swelling of the mucosa in the right upper lobe bronchus.

The diagnosis of EBTB with a tumorous lesion was established with positive *Mycobacterium tuberculosis* culture of bronchial lavage, and the lesion resolved completely with anti-TB treatment.

#### Patient 4

A 28-year-old female patient presented with mild fever and a 4-week dry cough. Two weeks before this visit, a CXR had been performed and she had been diagnosed with pharyngitis and treated with antibiotics without improvement. Reevaluation of the PACXR at the pulmonary clinic showed right hilar enlargement (Figure 4A). Contrast-enhanced chest CT revealed many mediastinal lymph nodes located below the carina and in the right hilum. Bronchoscopy showed a swelling of the mucosa and narrowing of the right upper lobe bronchus. Biopsy results confirmed the diagnosis of EBTB with an edematous-hyperemic lesion (Figure 4B). Anti-TB treatment was followed by complete resolution.

#### Patient 5

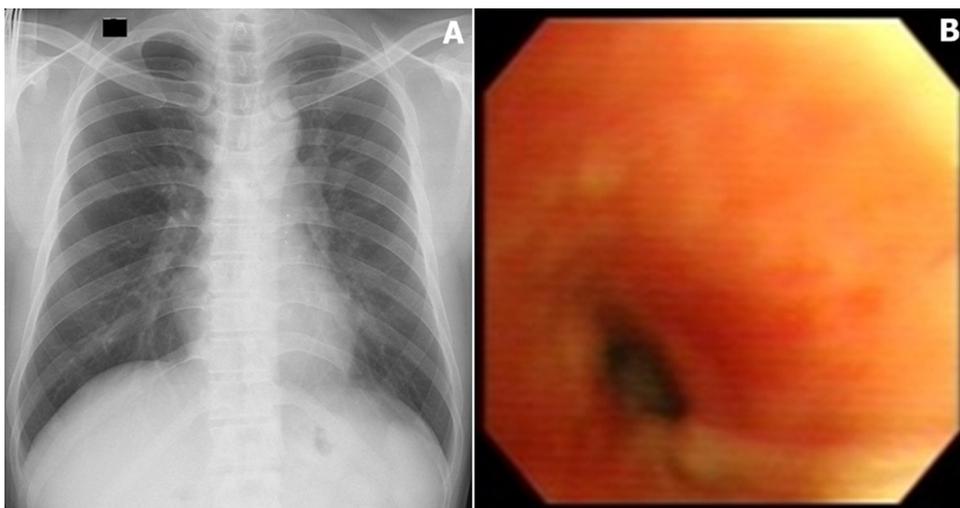
A 36-year-old male patient with no significant past history presented "because of an 8 week cough. A CXR had been performed and he had been diagnosed with community-acquired pneumonia at

an outpatient clinic; however, his condition had not improved with antibiotic treatment. Reexamination of the PA CXR at the pulmonary clinic showed an asymmetrically dense and enlarged left hilum (Figure 5A). Bronchoscopy revealed narrowing and ulceration of the left main bronchus (Figure 5B). Biopsy results confirmed the diagnosis of EBTB with a fibrostenotic lesion. Anti-TB treatment led to a clinical response with residual bronchial stenosis.

#### Discussion

The diagnosis of EBTB is challenging, with varied presentations on CXR including consolidation, nodular lesions, cavitary lesions, and hilar abnormalities (Casali and Crapa, 2012; Kashyap and Solanki, 2014). Asymmetric hilar enlargement and density are important clues and can be overlooked on the initial CXR assessment. In the case series presented here, this may have contributed to the initial failure to diagnose EBTB.

Most of the case patients exhibited hilar enlargement and/or asymmetric density with minimal parenchymal abnormality on CXR. This finding resulted from endobronchial lesions at the main bronchus or lingular bronchus, perihilar parenchymal abnormality, and enlarged hilar lymph nodes. *M. tuberculosis* can affect the pulmonary hilar structures (central bronchi and lymph nodes),



**Figure 5.** (A) Chest radiograph showing a dense left hilum; (B) bronchoscopic image showing narrowing and ulceration of the left main bronchus.

which can manifest as hilar abnormalities on CXR. Although hilar abnormalities can result from many different etiologies (Sarkar et al., 2013), EBTB should be considered in countries with a high prevalence of pulmonary TB. The low level of suspicion for EBTB in patients with hilar asymmetry on CXR may also have contributed to delayed diagnosis in the case patients.

Cough was present in all five cases, consistent with the prevalence of 70–80% reported for EBTB patients (Shahzad and Irfan, 2016). All five patients had a persistent cough (duration of cough  $\geq 3$  weeks) despite empiric treatment for common bacterial infections. In patients with a persistent cough that is unresponsive to the initial diagnosis and therapy, early bronchoscopy should be undertaken to rule out EBTB (Qingliang and Jianxin, 2010).

Bronchoscopy played an important role in diagnosing EBTB in these cases. Bronchoscopy is crucial not only to provide biological samples to identify the etiology, but also to evaluate endobronchial lesions (Mondoni et al., 2017). Using the bronchoscopic classification described by Chung and Lee (2000), airway lesions in this case series showed a similar diversity of endobronchial lesions, and included two cases of tumorous lesion, one case of active caseous lesion, one case of edematous-hyperemic lesion, and one case of fibrostenotic lesion. Early bronchoscopy should be considered in patients with hilar abnormalities.

In conclusion, EBTB is difficult to diagnose and often overlooked. The clinician should have a high index of suspicion when treating patients with persistent cough and hilar abnormalities, especially in TB endemic regions. Bronchoscopy plays an important role and should be considered early in the management.

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#### Informed consent

Written informed consent was obtained from all patients for publication.

#### Conflict of interest

There is no conflict of interest.

#### References

- Casali L, Crapa ME. Endobronchial Tuberculosis a peculiar feature of TB often underdiagnosed. *Multidiscip Respir Med* 2012;7:35.
- Chung HS, Lee JH. Bronchoscopic assessment of the evolution of endobronchial tuberculosis. *Chest* 2000;117:385–92.
- Kashyap S, Solanki A. Challenges in endobronchial tuberculosis: from diagnosis to management. *Pulm Med* 2014;2014:594806.
- Mondoni M, Reposi A, Carlucci P, Centanni S, Sotgiu G. Bronchoscopic techniques in the management of patients with tuberculosis. *Int J Infect Dis* 2017;64:27–37.
- Qingliang X, Jianxin W. Investigation of endobronchial tuberculosis diagnoses in 22 cases. *Eur J Med Res* 2010;15:309–13.
- Sahin F, Yıldız P. Characteristics of endobronchial tuberculosis patients with negative sputum acid-fast bacillus. *J Thorac Dis* 2013;5:764–70.
- Sarkar S, Jash D, Maji A, Patra A. Approach to unequal hilum on chest X-ray. *J Assoc Chest Phys* 2013;1:32–7.
- Shahzad T, Irfan M. Endobronchial tuberculosis—a review. *J Thorac Dis* 2016;8:3797–802.

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