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Endobronchial Tuberculosis Presenting as a Post-obstructive Pneumonia, Para-hilar Mass Lesion in Chest Radiograph and 'Tumorous' Endobronchial Lesion during Bronchoscopy: A Case Report

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Abstract Tuberculosis (TB) remains a major health problem in India, and accounts for nearly 20-30% of the global TB burden. Prevalence of tuberculosis infection in India is 40%, with pulmonary tuberculosis accounts for 80% cases, and Endobronchial tuberculosis (EBTB) is present in 10-40% of patients with active pulmonary tuberculosis. EBTB has diverse clinical and radiological presentation and overall scenario is confusing. Normal chest radiograph is present in 10-20% cases in EBTB, and is the common reason for delay in diagnosis. In this case report, a 25 year male presenting as febrile respiratory illness with post-obstructive pneumonia & para-hilar mass in chest radiograph and having tumorous Endobronchial growth during bronchoscopy. We confirm finally as Endobronchial tuberculosis after histopathological evaluation. Gene Xpert is rapid and sensitive test to diagnose EBTB. He is treated with antituberculosis drugs for six months and recovered clinically and radiologically completely. Bronchoscopy is must in all the cases of high index of suspicion of EBTB.

Keywords: *Endobronchial Tuberculosis (EBTB), Mass Lesion over chest Radiograph, Bronchoscopy, Gene Xpert*

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1. Introduction

Tuberculosis (TB) remains a major health problem in India, and accounts for nearly 20-30% of the global TB burden. Tuberculosis (TB) is the seventh leading cause of death among infectious diseases. Sputum smear microscopy has remained the corner stone of TB diagnosis in the global strategy to control the disease [1].

EBTB is defined as tuberculous infection of the tracheobronchial tree with microbial and histopathological evidence. [2] EBTB develops as a common complication of active tuberculosis, but the exact pathogenesis is not yet completely understood. EBTB is present in 10-40 % of patients with active tuberculosis and causes some degree of bronchial stenosis in more than 90 % of the patients [3].

In this case report, we observed post-obstructive pneumonia on right side of thorax with pleural effusion on same side as clinical presentation, bronchoscopically as exophytic endobronchial polypoidal type growth and finally diagnosed as Endobronchial tuberculosis. He has been started on Antituberculosis treatment and short course oral corticosteroids. Treatment outcome was excellent with no residual endobronchial growth or any residual bronchial Stenosis.

2. Case Summary

25 year male, nonsmoker, nonalcoholic, came with shortness of breath which was progressed from grade 1 to grade 4 over duration of 1 month, dry cough since 2 months and low grade fever since 3 months which was progressed to high grade continuous fever since 7 days. Additionally he was having chest pain mainly on right side of lower chest wall which was dull aching initially and progressed to sharp type and unbearable since 2 days. After clinical evaluation, we observed local tenderness over right lower chest wall intercostal tenderness with raised local temperature and, impaired to stony dull note on percussion from lower axillary to midaxillary region and decreased to absent breath sounds on auscultation from mammary and midaxillary to lower axillary region.

Complete hemogram- Hemoglobin 11 gm%, Total white blood cell count 28000/cubic mm, polymorphs predominantly 90%, band forms 30%, and shift to left in peripheral smear, platelets normal.

Retroviral status was assessed and confirmed to be negative for HIV 1 and HIV 2 both.

3. Chest x-ray Postero-anterior View - (Day of Admission)

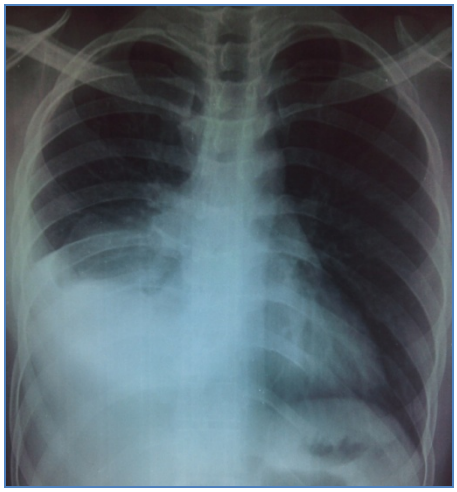

Image 1.

chest x-ray PA (first)- Showing collapse consolidation with pleural effusion on right side, also note enlarged right hilum with shift of horizontal fissure downwards towards diseased lower lobe i.e. collapse.

Sputum examination for acid fast bacilli was negative, and gram stain yields few gram positive cocci in chains and clusters.

Ultrasound examination of right thorax was showing fluid collection in right thoracic cavity with underlying collapse and consolidation, and performed ultrasound guided aspiration of pleural fluid in 6^{th} intercostal space in posterior axillary line.

Pleural fluid analysis- 450 ml of turbid, yellowish green colored pleural fluid was aspirated from right pleural cavity and sent for routine evaluation.

Appearance- turbid, mucin clot observed

Proteins- 5.3 gm%, albumin 3.0 gm%, sugar- 78mg/dl

Total cells–700/mm^3, 70% polymorphs, 25% lymphocytes and 5% mesothelial cells

Gram stain- no organisms seen

Zeihl nelson stain- no acid fast bacilli detected

ADA (adenosine deaminase level) level in pleural fluid was 25 units/liter, inconclusive for tuberculosis

No malignant cells were documented after cytological evaluation of pleural fluid

Final conclusion from pleural fluid analysis was suggestive of exudative pleural effusion.

4. Chest x-ray Postero-anterior View-

Chest x-ray 2 showing right hilar opacity (mass) with consolidation-collapse and pleural effusion on right side.

Chest x-ray 3 showing complete resolution of consolidation, re-expansion of collapsed lung and prominent right para-hilar mass with lobulated shape and irregular margins.

During treatment, we observed clinical and radiological recovery, but important clinical clue towards endobronchial mass was “localized monophonic wheeze” documented in right infrascapular area. Parahilar mass like opacity and localized monophonic wheeze was the indication for bronchoscopy.

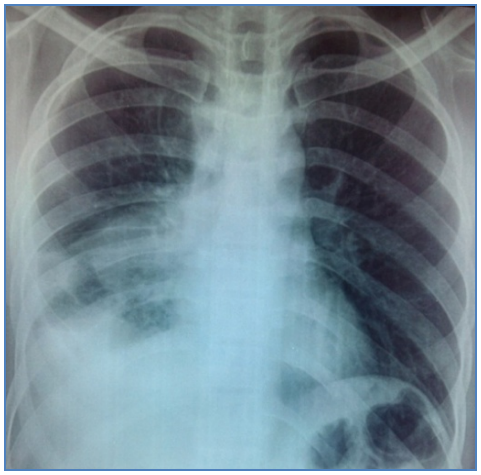

Image 2. Chest x-ray PA- 2 (post-aspiration)

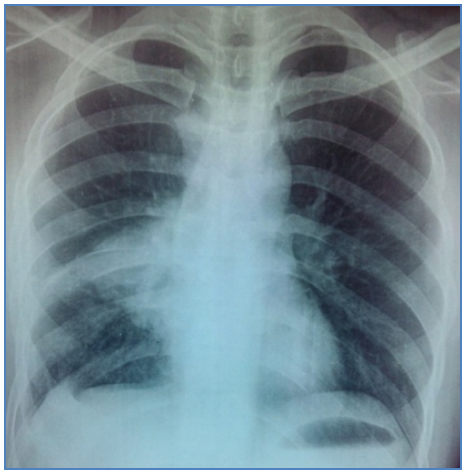

Image 3. Chest x-ray PA-3 (post treatment)

We have performed bronchoscopy at the time of discharge, because of parahilar mass lesion and classical presentation of post-obstructive pneumonia, at our bronchoscopy suite by Olympus 260 BPH video-bronchoscope under topical anesthesia.

Bronchoscopy Images-

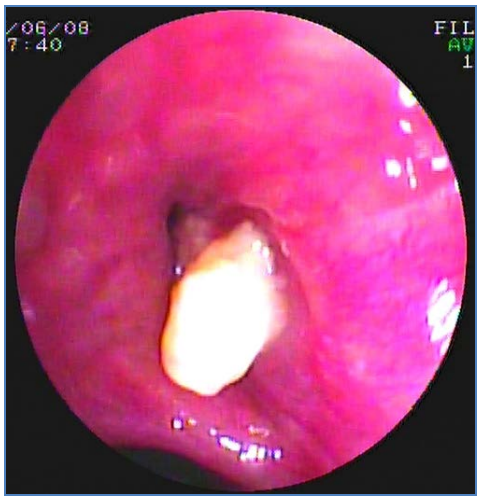

Image 4. Bronchoscopy image 1

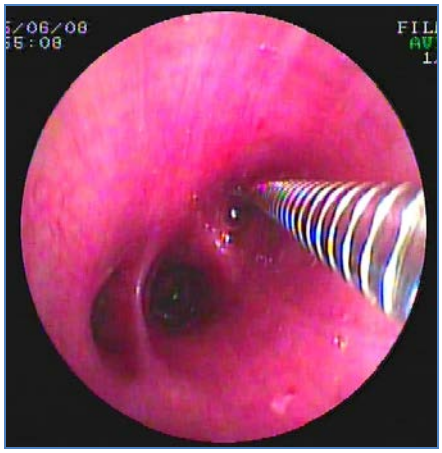

Image 5. Bronchoscopy image 2

Bronchoscopy image 1 is showing classical exophytic, polypoidal Endobronchial growth with yellowish necrotic slough overlying it arising from superior segment of right lower lobe bronchus leading to near total occlusion of segmental opening leaving behind pinhole opening. Bronchoscope could not be negotiated distal to it and is the reason for recurrent post obstructive pneumonia.

Bronchoscopy image 2 is showing conventional bronchoscopic technique Forcep biopsy taking biopsy sample from superior segment of right lower lobe bronchus. We have collected six biopsy specimens for better diagnostic yield and sent for histopathology evaluation. Additionally we have also performed bronchial wash, and two samples were collected. One bronchial wash specimen was sent for routine gram and AFB stain and second bronchial wash specimen was sent for nucleic acid amplification test i.e. Gene Expert MTB/RIF resistance analysis.

Bronchial wash specimen-15 ml bronchial wash sample was sent for evaluation and smears prepared showing low cellularity smear comprising benign squamous and disrupted respiratory mucosal cells on background of scanty mucin. Alveolar macrophages are sparsely distributed, no significant inflammation is seen. No granuloma or atypical cells noted. Zeihl Neelson stain does not reveal acid fast bacilli, and gram stain was showing scanty gram negative rods.

5. Histopathology Analysis-

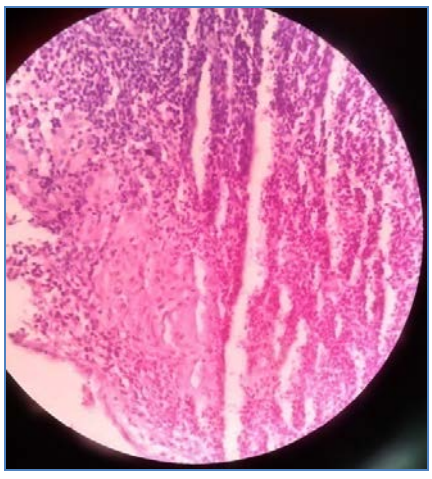

Image 6. HPE 1- Epitheloid granuloma with giant cell

Histopathology sections of bronchoscopic Forcep biopsy specimen shows bronchial mucosa along with separate fragments of caseous necrosis and intense lymphocytic infiltrate and well formed epitheloid granuloma with occasional giant cell. Increased plasma cells are also observed, lung parenchyma is not seen. Overall analysis was suggestive of tuberculosis as the causative agent for exophytic growth.

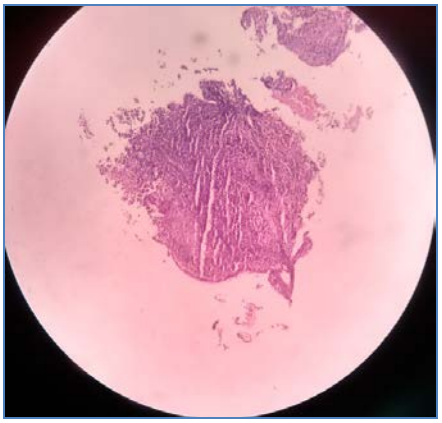

Image 7. HPE 2- Bronchial mucosa with granuloma

Bronchial wash sample for Gene Xpert MTB/ RIF resistance analysis-

Mycobacterium tuberculosis- detected

Rifampicin resistance- not detected.

6. Discussion-

EBTB was relatively common before the advent of effective treatment. The incidence of EBTB among postmortem specimens from people with tuberculosis was as high as 40% prior to the introduction of antituberculosis chemotherapy, but with modern treatment the incidence of EBTB has declined to 10% of cases of pulmonary tuberculosis. [4] Currently, its incidence may be underestimated since diagnostic bronchoscopy is not performed on every patient with tuberculosis.

Five potential mechanisms have been suggested for the development of endobronchial infection due to M. tuberculosis: (1) direct extension from adjacent parenchymal focus; (2) implantation of organisms from the infected sputum; (3) hematogenous dissemination; (4) lymph node erosion into the bronchus; and (5) through lymphatic drainage from parenchyma to the peribronchial region [5].

The clinical presentation of EBTB is variable. The clinical features depend on the site and the extent of involvement. The disease may occur in the absence of recognized symptoms. It may have an insidious onset, simulating lung carcinoma, or an acute onset mimicking asthma, foreign body aspiration or pneumonia. [6] Fever is observed in 50-87%, night sweats in 55% and weight loss in 71% of patients. Dyspnoea is often associated with atelectasis. Constitutional symptoms including anorexia, weight loss and night sweats may occur. [6] Physical examination may reveal no abnormalities in one third of the patients. Examination of the respiratory system may detect rales, decreased breath sounds, a localized monophasic wheeze, rhonchi and bronchial breathing. Persistent unilateral wheeze is indicative of EBTB.

Yield of sputum smear for AFB is not as high as in parenchymal involvement even in an optimal laboratory setup with meticulous sputum examination. In recent studies, sputum positivity in EBTB has been demonstrated from 16 to 53.3 percent. However, EBTB with ulceration and mucosal involvement has higher sputum positivity and yield is even greater with sputum culture when compared to smear (73.6 *vs* 53.3%) [7].

Ten to 20 percent patients with EBTB may have a normal chest radiograph. [6] Thus, a clear chest radiograph does not exclude the diagnosis of endobronchial TB. Bronchial stenosis occurs in 10-40 percent of patients with active pulmonary tuberculosis. [8] Radiologic manifestations of tuberculous bronchostenosis include persistent segmental or lobar collapse, lobar hyperinflation, obstructive pneumonia and mucoid impaction. [8] Characteristic HRCT findings of EBTB are patchy asymmetric centrilobular nodules and branching lines that may have unilateral or bilateral distribution. Multiple branching linear structures of similar caliber originate from a single stalk (the 'tree-in-bud' appearance). [9] The stalk is thought to represent a lesion that affects the last order bronchus within the secondary pulmonary lobule and the bud is thought to represent a lesion that is in the bronchioles and alveolar ducts [9].

Bronchoscopy with bronchoscopic sampling has been the key to diagnosis, producing a yield of greater than 90% on both smear and culture. [7] The experience of the bronchoscopist is of great importance for eliciting the bronchoscopic findings that contribute to diagnosis. Chung and Lee have classified EBTB into seven subtypes according to the bronchoscopic findings: actively caseating, oedematous-hyperaemic, fibrostenotic, tumorous, granular, ulcerative and the nonspecific bronchitic type. [7] This new classification is valuable for predicting the outcome because it is closely related to the extent of disease progression and is widely accepted for defining EBTB by bronchoscopy [7].

Early bronchoscopic findings consist of erythema, mucosal granularity including discrete submucosal tubercles and shallow mucosal ulcers. White, gelatinous granulation tissue may also be present. In more advanced cases, deep ulcers, tumour-like granulation tissue, hyperplastic inflammatory polyps and finally bronchostenosis occur. These lesions may simulate lung cancer on gross appearance [7,10].

A bronchoscopic biopsy is the most reliable method for the diagnosis of EBTB. Needle aspiration may provide only a cytological diagnosis. Bronchial biopsy is positive 30-84 % of patients. Bronchial brushing has provided a high yield of 84.88% in a study from China 21. Similarly, bronchial washings have also yielded variable results ranging from 10% to 37.5 percent [11].

Gene Xpert® MTB/RIF, which was recently endorsed by the World Health Organization (WHO), has the potential to lead a revolution in the diagnosis of active TB disease and multidrug-resistant (MDR) TB. Gene Xpert test can be performed on sputum or bronchial washing samples. Results become available in less than 2 hours. [12] The rapid detection of Mycobacterium tuberculosis and its resistance to Rifampicin (RIF's) allows the physician to make critical decisions in the management of patient regarding therapy during the same visit. We performed Gene Xpert on Bronchial wash specimen and found to be drug sensitive tuberculosis.

We started four drug Antituberculosis regimen (ATT) containing Isoniazid, Rifampicin, Ethambutol and Pyrazinamide given daily for 2 months followed by two drugs Isoniazid and Rifampicin continued for four months to complete 6 months standardized chemotherapy. We had started Prednisolone 15 mg daily for 2 weeks, 10 mg daily for one week and 5 mg daily for one week to complete 4 weeks steroid with ATT backup to avoid residual fibrosis, bronchostenosis and stricture. Clinical response in form of decreased cough, fever and shortness of breath was observed in 4 weeks; radiological response was delayed and took 5 months for near total response. Complete radiological response was documented in 7 months of start of therapy. Bronchoscopy was repeated at the end of ATT, and observed complete response without any residual fibrosis or stricture.

7. Conclusion

Although Tuberculosis is endemic disease in India, Endobronchial tuberculosis is missed due to variable clinical and radiological presentation. Exudative pleural effusion in India is mostly due to tuberculosis, although overall laboratory and radiological assessment is must before empirical treatment. Delay in diagnosis, due to lack of expertise in chest radiology or clinical suspicion is most common cause for poor outcome in TB.

Mass lesion in chest radiograph with effusion mandates bronchoscopy. Bronchoscopy is less invasive, rapid and sensitive technique to diagnose such cases. Although role of bronchoscopy in sputum negative pulmonary tuberculosis is well documented, still it is less utilized in India. EBTB can present like tumorous, mass like, ulcerative lesion during bronchoscopy. Histopathology expertise is crucial in diagnosing tumorous lesions.

Gene Xpert is rapid, sensitive and specific not only for mycobacterium tuberculosis (MTB) detection but also for rifampicin (RIF) resistance. It is alternative to conventional tests as it is reliable and can be performed on all bronchoscopic samples like Bronchial wash and lavage. Gene Expert should be used in all sputum negative pulmonary tuberculosis cases where conventional diagnostic tests are less sensitive and more time consuming.

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