

Bilateral Bronchiectasis in a 73 Year Old Man

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Clinical Summary

A 73yr old non-smoker man, retired school teacher, was referred for evaluation of breathlessness, cough with copious amount of sputum and intermittent fever of 2 years duration. There were no relevant systemic complaints or significant past history. On examination he had normal vital parameters and coarse crackles in the bilateral infra-scapular and infra-axillary region.

The laboratory results showed normal haemogram and serum biochemistry. Enzyme linked immunosorbent assay for human immunodeficiency virus (HIV) was negative. The chest roentgenogram did not show any significant abnormality. He was subjected to high resolution computed tomography (HRCT) of thorax shown in Figure 1. The sputum smear examination for acid fast bacilli was positive.

Diagnosis

1. What does HRCT thorax show? What are the differential diagnoses on HRCT thorax? What is the most likely diagnosis?
2. What is the classification of non tuberculous mycobacteria (NTM)?
3. What are the radiological manifestations pulmonary NTM?
4. What are tests required to confirm the diagnosis and what would be the final diagnosis if it is positive?

Answers

1. The HRCT thorax shows cystic lesions and nodular branching opacities prominently in the middle, lingular and lower lobes and a small cavity in the right lower lobe. The appearance of branching centrilobular nodules with bronchiectasis is highly suggestive of although not diagnostic of nodular bronchiectatic form of NTM [1]. It may also be seen in panbronchiolitis and bronchiectasis associated with non-specific bronchiolitis. If bronchiolitis with bronchiectasis is present in all the lobes or there is associated lobular consolidation or cavity, NTM pulmonary infection is the most likely diagnosis [1].
2. Runyon devised the first good scheme for grouping based on the growth rate and colony pigmentation [2]. Recently, a more appropriate grouping has been described based on the type of clinical disease they produce: disseminated disease, pulmonary disease, cutaneous disease, and others (eye, mastoid, sinus, breast, meninges, peritoneum, appendix, pericardium, kidney, prostate, bursa, joints, bones, lymph nodes) [3]. Disseminated disease usually occurs in immunocompromised host whereas localized disease i.e. pulmonary, cutaneous & others are reported in immunocompetent host [3].
3. The radiological manifestation of pulmonary NTM has three classic forms: nodular bronchiectasis, upper lobe cavity and hypersensitivity pneumonitis ("hot-tub lung") (Table 1) [4]. The nodular bronchiectatic form of pulmonary infection usually occurs in nonsmoker, middle-aged and elderly individuals without underlying lung disease. The typical HRCT findings

of nodular bronchiectatic form of NTM are multiple small centrilobular nodules (<5 mm) with "tree in bud" appearance combined with bronchiectasis in the same lobe of the lung which progress over time [5]. The lesions are observed predominantly in the right middle lobe and lingular segment of the left upper lobe [4]. In contrast to nodular bronchiectatic form, the cavitary form is typically seen in smokers and elderly men with underlying chronic lung disease, usually chronic obstructive pulmonary disease. Though, radiologically the upper lobe cavitary form is similar to post primary pulmonary tuberculosis, clinically it has more indolent course. The pulmonary form of hypersensitivity pneumonitis (HP) is caused by hot tub exposure and is clinically and radiologically similar to HP due to other organisms [6].

4. As per the American Thoracic Society (ATS) guidelines it requires clinical features, radiological characteristics and positive cultures on two different occasions to diagnose NTM [7]. The patient had two positive BACTEC cultures and both showed positive Nitro Acetyl amino hydroxyl propiophenone (NAP) test. Since the patient was a non-smoker without underlying lung disease with nodular bronchiectatic pattern on HRCT and two positive cultures he was diagnosed to have nodular bronchiectatic form of NTM. The nodular bronchiectatic form is treated only if the disease is progressive, thus he was kept under observation. In this case, since two sputum samples were sent for NTM culture soon after the patient presented, diagnosis was hastened.

Discussion

NTM exist free in nature and are well recognized causes of disease in humans and animals. An assortment of names has been employed to describe these mycobacteria like: anonymous mycobacteria, tuberculoid mycobacteria, atypical mycobacteria, opportunistic mycobacteria and mycobacteria other than tuberculosis. NTM commonly causing pulmonary infection are *Mycobacterium (M) avium-intercellulare complex* (MAC); *M. kansasii*; *M. abscessus*; *M. chelonae* and *M. fortuitum* of which MAC is the commonest pathogen [5]. The nodular bronchiectatic form is usually caused by MAC, however *M. abscessus*, *M. kansasii* and *M. fortuitum* are also known to cause the disease [7]. The progression of disease in nodular form is slow and treatment is indicated only if the disease is progressive. The cavitary form of disease is generally caused by MAC, *M. kansasii* and to a lesser extent by *M. xenopi*, *M. abscessus* and *M. malomense*. It is progressive in nature, and if left untreated can lead to extensive lung destruction and death. HP is commonly associated with MAC. The prognosis is good and prompt

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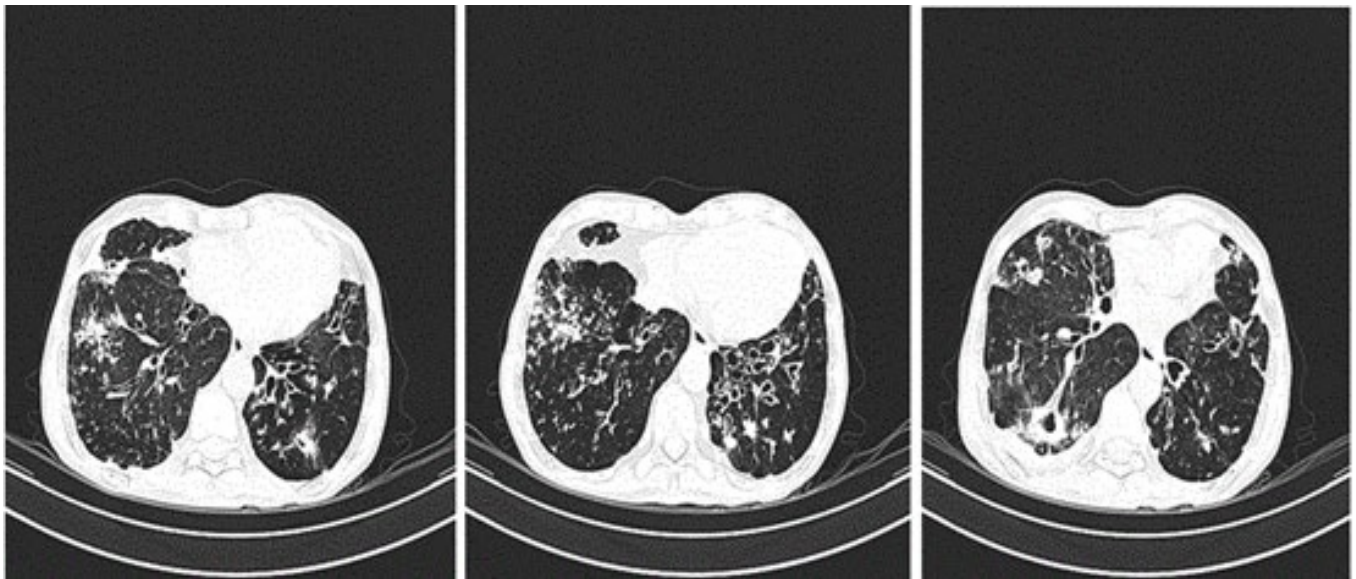


Figure 1: Transverse section of HRCT thorax

	Cavitary	Nodular bronchiectasis	Hypersensitivity pneumonitis
Age	Middle age	Middle age/ elderly	Any
Sex	Predominantly male	Predominantly female	Any
Underlying lung disease	Chronic obstructive pulmonary disease	No underlying disease	No underlying lung disease
Immunocompetency	Immunocompetent	Immunocompetent	Immunocompetent
Radiological pattern	Upper lobe, Cavity, Nodule, similar to classical pulmonary Tuberculosis	Middle/Lingular/lower lobe, bronchiectasis, 'tree in bud' appearance	Ill-defined, ground-glass centrilobular nodules, more diffuse ground-glass opacities, and air trapping on expiratory examination
Progression	Slowly progressive	Slowly progressive sometimes static	Rapidly progressive
Organism	MAC, <i>M. kansasii</i> and to a lesser extent by <i>M. xenopi</i> , <i>M. abscessus</i> and <i>M. malomense</i> .	<i>Mycobacterium (M) avium-intercellulare complex (MAC)</i> , however <i>M. abscessus</i> , <i>M. kansasii</i> and <i>M. fortuitum</i>	MAC
Indication of treatment	Treatment is required	Treatment is indicated only if the disease is progressive	Prompt treatment is required
Treatment	Daily therapy Azithromycin/Clarithromycin, Ethambutol, Rifampicin	Thrice in a week therapy Azithromycin/Clarithromycin, Ethambutol, Rifampicin	Cessation of exposure to hot water tubs, corticosteroids, antimycobacterial therapy

Table 1: Clinico-radiological manifestations of Non Tuberculous Mycobacteria.

resolution of symptoms is expected following treatment [8]. Medical therapy for NTM involves multiple agents to facilitate clearance of organisms and minimize the emergence of drug resistance. Though it is important to identify the species for treatment the cornerstone agents include macrolides, ethambutol, and rifampin. Patients with nodular bronchiectatic lung disease and those with less severe or indolent infections are effectively managed with a 3-times-weekly regimen that includes clarithromycin 1000 mg or azithromycin 500 mg plus ethambutol 25 mg/kg plus rifampin 10 mg/kg/day (maximum 600 mg/day) [7,9,10]. Intermittent drug therapy is not recommended for patients who have cavitary disease, patients who have been previously treated, or patients who have moderate or severe disease. The treatment is continued until culture is negative on therapy for 1 year. If the disease is progressive in spite of treatment and sufficiently localized and where lung function permits, surgical resection under chemotherapeutic cover is considered. In countries with high prevalence of tuberculosis, this entity needs to be remembered as it can lead to treatment failure [11]. To conclude, high index of suspicion is the key to the diagnosis of NTM infection. Patients with bronchiectasis and nodules on HRCT thorax should be advised a microbiological and culture examination of

their sputum for NTM organisms for early diagnosis and appropriate management [12].

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