Diagnostic Evaluation of NTM and Bronchiectasis

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NTM patient education program
November 9, 2016
Involves a combination of findings

- Symptoms
- Radiographic findings
- Microbiologic confirmation
- Evaluation of other possibilities
Pulmonary disease

3 presentations

1. Preexisting lung disease
Caucasian, middle aged-elderly men, often alcoholics, smokers with COPD.
Can often resemble tuberculous with cough, weight loss, upper lobe disease.

2. Without preexisting lung disease
Lady Windermere syndrome
Nonsmoking middle-aged females
Interstitial pattern, predominantly RML and lingula

3. Hypersensitivity reaction
Hot tub lung
Symptoms

- Cough
- Sputum
- Fatigue
- Hemoptysis
- Weight loss
- Associated conditions (GERD, LPR, scoliosis)
Prevalence of Gastroesophageal Reflux Disease in Patients With Nontuberculous Mycobacterial Lung Disease.

• GERD is reported to be associated with several respiratory diseases, including asthma, COPD, IPF, chronic cough.

• Aspiration into the tracheobronchial tree can be silent clinically and present as insidious-onset bronchiectasis.

• Many patients with GERD lack typical symptoms of heartburn or regurgitation.

Koh et al. CHEST 2007;131:1825-1830
Prevalence of Gastroesophageal Reflux Disease in Patients With Nontuberculous Mycobacterial Lung Disease.

- Prevalence of GERD with the nodular bronchiectatic form of NTM lung disease was 26%.
- Only 27% had typical GERD symptoms.
- Patients with GERD were more likely to have a sputum smear positive for AFB (80%) compared with patients without GERD (44%).
- Bronchiectasis and bronchiolitis were observed in more lobes in patients with GERD than in patients without (p=0.008, p=0.005, respectively).

Koh et al. CHEST 2007;131:1825-1830
Diagnostic evaluation

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<th>TABLE 2. DIAGNOSTIC EVALUATION OF THE PATIENT WITH BRONCHIECTASIS</th>
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*Definition of abbreviations:* aCCP = anti-cyclic citrullinated protein antibody; ANA = anti-nuclear antibody; CF = cystic fibrosis; CFTR = cystic fibrosis transmembrane conductance regulator; RF = rheumatoid factor; SSA, SSB = anti-Sjögren’s syndrome A and B antibodies, respectively.
Figure 3. Radiographic signs of bronchiectasis. A = Bronchus terminating in a cyst; B = lack of bronchial tapering as it travels to the periphery of the lung; C = signet ring sign (bronchus is larger than the accompanying vessel); D = mucus plug (mucus completely filling the airway lumen).

Am J Respir Crit Care Med, 2013

Published in: Pamela J. McShane; Edward T. Naureckas; Gregory Tino; Mary E. Strek; Am J Respir Crit Care Med 188, 647-656.
DOI: 10.1164/rccm.201303-0411CI
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Radiographic patterns

- Bronchiectasis
- Bronchiolitis
- Mucoid impaction
- Bronchial wall thickening
- Nodular/Reticulonodular infiltrates
- Cavitary disease
• At least 50 percent of patients with MAC lung disease have radiographic abnormalities characterized by nodules associated with bronchiectasis or nodular/bronchiectatic disease.

• The nodules and bronchiectasis are usually present within the same lobe and occur most frequently in the right middle lobe and lingula.

Computed Tomographic Diagnosis of *Mycobacterium avium-intracellulare* Complex in Patients With Bronchiectasis*

*Stephen J. Swensen, M.D., F.C.C.P.; Thomas E. Hartman, M.D.; and David E. Williams, M.D., F.C.C.P.*

- 100 patients with bronchiectasis
- 24 had multiple pulmonary nodules
- Among those where sputum were obtained, a positive culture for MAC was more common in those that had nodules that those without (53 vs 4 percent)

Microbiologic confirmation

• CT findings not specific for NTM, requires microbiologic confirmation

• Should consist of smear and culture of at least 3 separate expectorated sputums in the morning.

• If etiology unclear and symptoms, radiographic findings persist, bronchoscopy with lavage or biopsy may be helpful.
**Recommendations:**

1. The minimum evaluation of a patient suspected of NTM lung disease should include (1) chest radiograph or, in the absence of cavitation, chest HRCT scan; (2) three or more sputum specimens for AFB analysis; and (3) exclusion of other disorders such as TB and lung malignancy. In most patients, a diagnosis can be made without bronchoscopy or lung biopsy (A, II).

2. Disease caused by *M. tuberculosis* is often in the differential diagnosis for patients with NTM lung disease. Empiric therapy for TB, especially with positive AFB smears and results of nucleic acid amplification testing, may be necessary pending confirmation of the diagnosis of NTM lung disease (C, III).
### TABLE 3. CLINICAL AND MICROBIOLOGIC CRITERIA FOR DIAGNOSING NONTUBERCULOUS MYCOBACTERIAL LUNG DISEASE*

**Clinical (both required)**
1. Pulmonary symptoms, nodular or cavitary opacities on chest radiograph, or a high-resolution computed tomography scan that shows multifocal bronchiectasis with multiple small nodules (A, I)*

   and

2. Appropriate exclusion of other diagnostes (A, I)

**Microbiologic**
1. Positive culture results from at least two separate expectorated sputum samples (A, II). If the results from (1) are nondiagnostic, consider repeat sputum AFB smears and cultures (C, III).

   or

2. Positive culture result from at least one bronchial wash or lavage (C, III)

   or

3. Transbronchial or other lung biopsy with mycobacterial histopathologic features (granulomatous inflammation or AFB) and positive culture for NTM or biopsy showing mycobacterial histopathologic features (granulomatous inflammation or AFB) and one or more sputum or bronchial washings that are culture positive for NTM (A, II)

4. Expert consultation should be obtained when NTM are recovered that are either infrequently encountered or that usually represent environmental contamination (C, III)

5. Patients who are suspected of having NTM lung disease but do not meet the diagnostic criteria should be followed until the diagnosis is firmly established or excluded (C, III)

6. Making the diagnosis of NTM lung disease does not, per se, necessitate the institution of therapy, which is a decision based on potential risks and benefits of therapy for individual patients (C, III)

* For evidence quality, see Table 1.
Nucleic acid probes

• Highly accurate probes (Accuprobe, GenProbe, Inc) are available that can identify MAC isolates within one day after growth is evident.

• A similar probe is also available for identification of M. kansasii.
• 590 patients with MAC

• Compared to *M. avium*, *M. intracellulare* patients were more likely to be:

  - older
  - have a lower BMI
  - symptoms such as cough
  - history of previous TB treatment
  - have fibrocavitary form
  - smear-positive
  - be on antibiotic therapy
  - have an unfavorable microbiologic response after combination therapy.

References


Koh et al. Prevalence of Gastroesophageal Reflux Disease in Patients With Nontuberculous Mycobacterial Lung Disease, CHEST 2007;131:1825-1830


. McShane; Edward T. Naureckas; Gregory Tino; Mary E. Strek; Am J Respir Crit Care Med 188, 647-656.DOI: 10.1164/rccm.201303-0411CI


Uptodate.com, Diagnosis of non-tuberculous mycobacteria in the HIV-negative patient.