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Detecting Nontuberculous Mycobacteria (NTM) Infection – Sh. Nilica Devi

The nontuberculous mycobacteria (NTM) are a grouping of all Mycobacterium species other than ***Mycobacterium tuberculosis*** (which causes tuberculosis) and ***Mycobacterium leprae*** (which causes leprosy). Also referred to as "mycobacteria other than tuberculosis" (MOTT), atypical mycobacteria, and/or environmental bacteria, NTM are typically environmental organisms residing in soil and natural as well as treated water. They are protected by their waxy lipid-rich cell wall which makes these mycobacteria resistant to common disinfectants and water treatment measures. Although generally of low pathogenicity to humans, some NTM species are associated with opportunistic infections in humans and animals while some have caused sporadic outbreaks.

EPIDEMIOLOGY

NTM diseases are seen worldwide. The incidence rate among industrialised nations is 1 to 2 cases per 1,00,000 persons. However, surveillance data are limited and NTM infections are non-communicable and therefore, not reportable. Regardless, NTM infections have increased by 8% to 9% per year. Clinical disease is more common among those who are immunocompromised.

HOW ARE NTM ACQUIRED?

NTM are acquired through environmental exposure to water, aerosols, soil and dust – through inhalation, ingestion, and through breaks in the skin due to injuries, surgical procedures, or IV catheters. They are usually not passed from person to person. NTM can cause lung infections, bronchiectasis, lymph node infections, bone infections, abscesses, and skin and soft tissue infections, which may be localised or disseminated throughout the body. Most NTM reproduce slowly, which allows the infection to emerge weeks, months, or even years after the initial exposure.

COMMON SPECIES

Some common NTM species are ***M. avium, M. kansasii, M. abscessus, M. fortuitum, M. scrofulaceum, M. marinum, M. ulcerans,*** etc.

NTM DISEASES IN HUMANS

Pulmonary manifestations account for 94% of all NTM cases. However, infections involving the skin, bones and lymph nodes do occur. Disseminated disease may occur and, without treatment, is frequently fatal.

Chronic pulmonary disease is the most common clinical manifestation of NTM. The risk for infection increases in immunosuppressed patients or those with structural lung disease, particularly, chronic obstructive pulmonary disease (COPD) and bronchiectasis.

NTM lung disease is always associated with symptoms such as chronic or recurring cough with sputum production. Constitutional symptoms such as fever, fatigue, malaise, night sweats, and weight loss may occur. Hemoptysis, although uncommon, can occur. Clinically, NTM may be similar to active pulmonary tuberculosis.

There are two main pulmonary manifestations of NTM: fibronodular disease and nodular bronchiectatic lung disease, each with a unique epidemiology and clinical course.

CLINICAL DIAGNOSIS OF NTM DISEASE

The diagnosis of NTM diseases poses challenges to the clinician. As NTM are found everywhere in the environment, they may represent contamination rather than actual isolates. Additionally, NTM may colonise the airways of individuals with structural lung abnormalities. Recovery of these

organisms may represent airways colonisation rather than true infection. The diagnosis must be based on a high clinical suspicion that is compatible with symptoms and features found on x-ray.

DIAGNOSTIC TESTS

The goal of testing are to detect NTM infections and to distinguish between mycobacteria species. It is almost impossible to distinguish between TB and NTM infections without testing.

LABORATORY TESTS

AFB smears and cultures: AFB cultures are performed on samples that have been treated to liquefy mucous and reduce contaminating bacteria. From the culture, the detection, differentiation and identification of the mycobacteria are done.

Susceptibility testing: They may be performed to determine which antimicrobial drugs will be most effective in treating the infection.

Molecular tests: Other more rapid methods, such as the molecular detection of the organism's genetic material (DNA/RNA) may be performed on the primary specimen and also as a means to identify the species of mycobacteria once the bacteria are grown in culture.

RADIOLOGICAL INVESTIGATIONS

X-rays may be ordered to look for changes caused by a mycobacteria infection. NTM infections (and TB infections) can cause a number of characteristic findings on x-rays, including cavities and calcification in organs such as the lungs and kidneys. Chest CT imaging may be ordered and has been found to have greater sensitivity for detecting bronchiectasis and cavities than chest x-ray. Further evaluation can include bronchoscopy.

CHALLENGES

The diagnosis of NTM infections can pose challenges to the clinician because isolation of these organisms is often difficult. In addition, both active diseases and airway colonisation occur in individuals with structural defects, adding further confusion for clinicians. The treatment of NTM infection is as difficult as establishing a correct diagnosis because therapy is often prolonged and difficult to tolerate.

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