Case Report

The Rare Imitator : Pulmonary Nocardiosis Mimics Tuberculosis Reactivation

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Pulmonary Nocardiosis is a rare bacterial infection of lungs, caused by a filamentous bacterium. Immuno-compromised people are known to be at danger, but there are other new emerging risk factors to consider. The presentation and clinical course in such patients differ from the previous. Here the present case is aimed to underline the presentation and diagnosis in non-risk individual.

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Key words **: Nocardiosis, Filamentous Fungus, Immunocompromised, TMP-SMX.**

When Global economic expansion began in the 18th century, the Western World was still in its infancy and contagious diseases were rife among the populace. Koch and Pastuer, two of the greatest figures and Fathers of Microbiology, devised the germ theory of diseases, which paved the path for the discovery of disease-causing microbes. Edmond Nocard, a French Veterinarian and Microbiologist, was an assistant to Koch's adversary and Father of Bacteriology Louis Pasteur at the time when Koch discovered Tubercle Bacilli. He was fascinated by diseases that were passed from people to animals. His most significant contribution to medicine was isolating a filamentous fungus, that caused bovine farcy in economically important animals. The novel microbe was named Nocardia after him. He discovered that Nocardia can cause Nocardiosis in humans, which primarily affects the Central Nervous System (CNS) or immuno-compromised individuals. Nocard was also interested in the relation of tuberculosis in animals with that of humans, he published literature on bovine tuberculosis, tuberculin test in cattles, bovine pleuro pneumonia agent[14].

The finding of this bacteria by Edmond, who was working so closely with tuberculosis, couldn't have happened by mere chance.It has structural similarities to tubercule bacilli, is acid-fast, is a persistent illness comparable to tuberculosis, thus can occasionally be mistaken for tuberculosis. Nocardia genus is now classified under bacteria Actinomycetes and belong specifically to the family Mycobacteriaceae[15]. This account of Nocardia's discovery reveals a lot about the clinical acuity required for diagnosing Nocardia.

Editor's Comment :

- Nocardia can cause infection in both immunocompetent and immunocompromised hosts.
- Pulmonary Nocardiosis may mimic relapse of tuberculosis.
- Nocardiosis should always be thought as differential organism in patients with old treated Tuberculosis lung.

Nocardia species are gram-positive, filamentous bacilli belonging to the actinomycetes genus that are non-motile, catalase-positive, weakly acid-fast, aerobic and do not form spores[1,2,4]. These organisms are frequently found in the soil and also as saprophytes in fresh and salt water[8].

Tlymphocyte mediated immune response is significant in preventing Nocardia infection. Therefore, clinically, it manifests as a cutaneous, systemic, or disseminated infection mostly inimmuno-compromised hosts with autoimmune diseases, human immuno-deficiency virus, organ transplant recipients or patients on long-term steroid therapy[3,4,6-8].

The most common manifestation is pulmonary nocardiosis[3,5,8]. It may occur in patients suffering from chronic obstructive airway disease, asthma, bronchiectasis or chronic sarcoidosis[6,8]. Extra-pulmonary disease may involve the Skin, Brain, Kidneys and other Organs[1,3,5].

Because of being ubiquitous organisms, laboratory contamination or colonization without infection must

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be ruled out[8]. Clinical presentation is also important along with the laboratory diagnosis. The patient may present with cough, thick purulent sputum, fever, weight loss or malaise and with a sign for pre-existing medical condition[6,8].

We present a case of pulmonary nocardiosis in a patient who is a known case of old pulmonary tuberculosis, chronic obstructive airway disease and bronchiectasis.

Case Report

A 66-year-old male presented to the Emergency Department of our Hospital with difficulty in breathing for three weeks, cough with sputum for one week, localized left-sided chest pain three weeks back that lasted for three days and on and off fever for one week.

The patient was a known case of old Pulmonary Tuberculosis with Chronic Obstructive airway disease (COPD) with bronchiectasis with recent onset of bilateral pneumonia. The patient was not diabetic and had not received systemic steroid therapy.

He experienced weight loss in the past three months and also complained of loss of appetite.

He has a history of Pulmonary Tuberculosis 45 years back for which he took an extended course anti-tubercular treatment for three years.

He was on an anticholinergic inhaler and long-acting bronchodilator and corticosteroid inhaler medication for COPD for eight years.

Patient had a history of smoking 1 pack bidi per day for 11 years but left in the past 40 years. In the past, he worked in a factory that exposed him to cotton fibers for 24 years.

He was diagnosed with bilateral pneumonia elsewhere and was on treatment for the same. He was managed by Sulbactam-Cefoperazone and Clarithromycin for pneumonia.

On examination, his axillary temperature was 97.2 Fahrenheit, Blood Pressure 134/84mmHg, Pulse rate 100/min, oxygen saturation 92% on room air. The patient was dyspneic and general physical examination was within normal limits. Left eye aphakia and right eye pseudophakia present.

On Auscultation S1S2 heard. Bilateral air entry equal with bilateral crepitations and coarse crepitations in left infrascapular and scapular area.

Vital parameters, blood sugar and electrolytes were monitored and required corrections given. Patient was started on antibiotics, bronchodilators, and oxygen therapy.

HRCT chest was suggestive of multifocal patchy are as of consolidation in bilateral lungs.

Partial collapse with cystic bronchiectatic change and fibrotic parenchymal calcification was seen in the right upper lobe -sequel to old etiology (Figs 1&2).

RTPCR for COVID was negative.

Bronchoscopy showed bilateral infective secretions. Bilateral Bronchoalveolar Lavage (BAL) sample was collected and sent for investigations.

No fungal elements were seen on 10% KOH mount. Gram's stain and Ziehl–Neelsen modified stain of the BAL showed Gram positive bacilli and acid fast branching filaments, respectively (Fig 1). No atypical cells were seen on cytological evaluation.

Acid-fast filamentous branching bacilli resembling Nocardia were seen in bronchoalveolar lavage specimen on Modified Ziehl-Neelson stain (1000 x Magnification).

Culture grew colonies with a chalky white appearance after 48 hours of incubation on Blood agar. The isolate was identified as *N Otitidiscaviarum* by MALDIT-OF.

After microbiological confirmation, the patient was started on empirical triple therapy with Injectable Imipenem, Amikacin and Cotrimoxazole for suspected disseminated Nocardiosis. After CEMRI of brain showed normal study, the treatment was de-escalated to oral cotrimoxazole therapy and patient was discharged on the same. The patient showed significant symptomatic improvement in 1 week. A

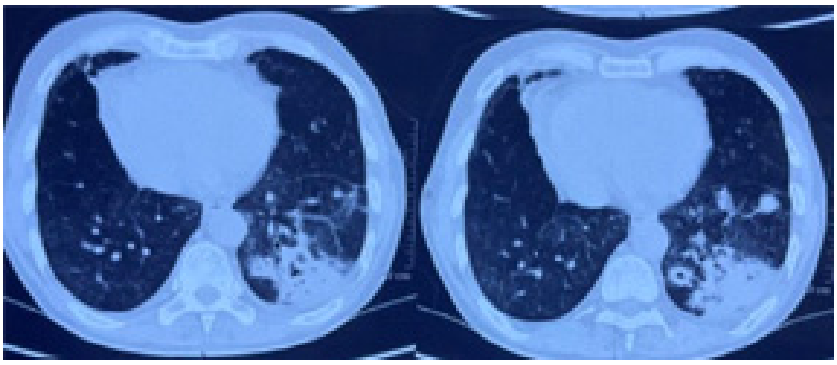

Fig 1 — CT chest

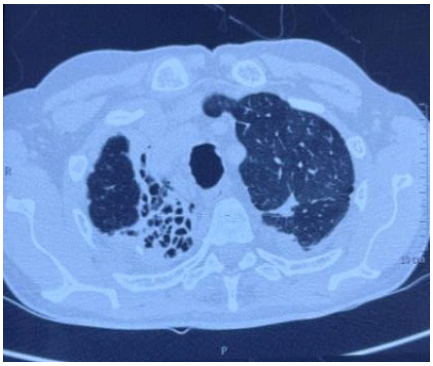

Fig 2 — CT chest

regular follow up and repeat chest X-ray after 2 months showed partial regression of pulmonary lesions.

Cardiac evaluation suggestive of trivial tricuspid regurgitation. The pulmonary function test revealed moderate obstructive with restrictive pattern (Figs 3&4).

Discussion

Nocardiosis, a tropical disease; primarily affects immuno-compromised people, but its diagnosis in an immunocompetent host is not an inconceivable entity. Despite the fact that it is a disseminated disease, it is shown to be confined in immunocompetent hosts[9], with pulmonary involvement being the most common.

As seen in the current report, such cases have been more frequently reported in patients with bronchiectasis or old tuberculosis, emphasising the need of considering this differential when traditional treatment options fail to relieve symptoms.Inhaled corticosteroid medication induced changes in local microbial flora and damage to airway and fibrosis-induced alteration in airway architecture may all be variables that pre-dispose to localised opportunistic infection and explain its incidence in these patients[10-12].

Treatment usually involves trimethoprim-sulfamethoxazole therapy, expect in instances of sulfa-drug allergy where minocycline has proven to be an effective alternative, while other would-be inhaled aminoglycosides, cephalosporins, carbapenems. Pulmonary Nocardiosis responds well on monotherapy

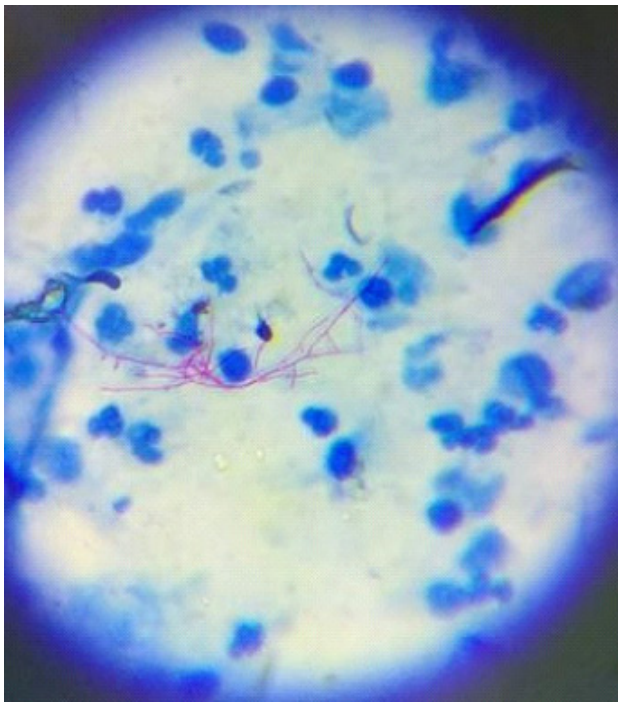

Fig 3 — Acid Fast filamentous bacteria in BAL specimen on Modified ZN Stain (1000x magnification)

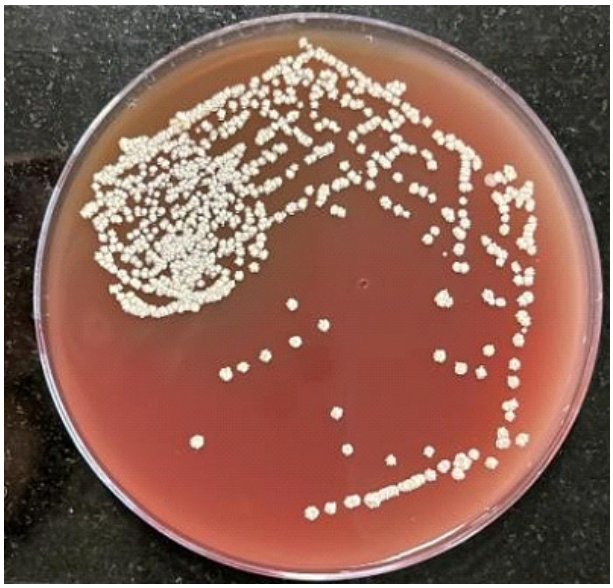

Fig 4 — Chalky white colonies of Nocardia on Blood agar

of 3 to 12 months[13]. Disseminated disease is treated with multi-drug therapy and partial treatment is associated with high mortality. Hence it is important to rule out brain or meningeal involvement by imaging or CSF studies in all cases and search for symptoms of dissemination other organs.

This report highlights the importance of differentiating such instances which are usually misdiagnosed as tuberculosis in an endemic zone like India. Doing a fungal culture more routinely in these newly defined high risk cases can help finding more such cases. Despite the relative rarity of these conditions, an awareness of the disease manifestations caused by these organisms is important because of their debilitating nature. In addition, outcomes are more favourable if they are diagnosed early and effective treatment is initiated in good time.

Nocardia, although rare in Indian scenario can present with unusual pulmonary lesion mimicking lung malignancy. Pulmonary infections due to *N Otitidiscaviarum* have been reported previously[16]. Species identification is important in deciding the clinical management and management of patients with nocardial disease. According to literature, isolates of *N Otitidiscaviarum* complex are usually resistant to betalactams, including most broad spectrum cephalosporins, ampicillin, amoxicillin clavulanic acid and imipenem but are usually susceptible to amikacin, the fluoroquinolones and sulphonamides[17]. However, sensitive isolates have also been reported[18].

Nocardiosis can present as acute or chronic disease. In acute presentation, it can lead to fatal disease when undiagnosed and untreated, especially

in TMP-SMX resistant cases. In chronic form it can get disseminate to other areas like Brain, Pleural, Abdomen[19].

Conclusion

Pulmonary Nocardiosis should always be kept in mind while treating old tuberculosis patients or COPD patients for exacerbation or recurrent infection. It responds well to treatment and significantly improves the outcome. Thorough microbiological investigations help in establishing the diagnosis and significantly improve the outcome.

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