

# Pulmonary Nocardiosis in Immunocompetent Patients: A Report of Four Cases from a Tertiary Care Centre

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**Abstract-** Pulmonary nocardiosis (PN) is an infrequent and severe infection due to *Nocardia spp.* It is more common in immunosuppressed individual. The aim of this study was to evaluate the clinical features, evolution and prognosis of PN in immuno-competent hosts. The study group comprised 4 consecutive immuno-competent patients with pulmonary nocardiosis acquired in a community setting, diagnosed and followed in a tertiary care hospital.

Chronic obstructive pulmonary disease (COPD) and pulmonary tuberculosis were the underlying diseases. Two patients had received anti-tubercular treatment before isolation of *Nocardia spp.* Clinical course was chronic and diagnosis was delayed 2 weeks or more in two out of four patients. Lobar or multilobar condensation was the most frequent radiographic pattern. The disease remained localized in the lung in all the four cases, with a trend toward chronicity in one with bronchiectasis.

The following conclusions were reached : (1) In our geographical setting *Nocardia* presents as a subacute or chronic pulmonary infection, mainly outside the hospital. (2) Pulmonary nocardiosis is difficult to diagnose, diagnosis is frequently delayed and a high level of suspicion is, thus, required in patients with underlying diseases e.g. COPD, pulmonary tuberculosis. (3) Diagnosis requires a high clinical suspicion, and can be made on the basis of a microbiological investigation of sputum or bronchoalveolar lavage. (4) The treatment of choice for this infection includes cotrimoxazole but some *Nocardia spp.* may show resistance to this drug.

**Index Terms-** A *Nocardia spp.*, Immuno-competent, Pulmonary tuberculosis, COPD

## I. INTRODUCTION

Nocardiosis is a localised or disseminated infection caused by *Nocardia spp.* Common sites of dissemination include the lungs, skin, brain and musculoskeletal system.<sup>1</sup> *Nocardia spp.* are branching, beaded, filamentous aerobic gram-positive bacteria and are weakly acid fast. In humans, *N. asteroides* complex is the predominant pathogen, but there are several other species, including: *N. brasiliensis* and *N. otitidiscaviarum*. Pulmonary infection is usually produced by *N. asteroides* (85%), whereas *N. brasiliensis* causes cutaneous and subcutaneous abscesses<sup>2</sup>.

Pulmonary nocardiosis (PN) is an infrequent but severe infection that commonly presents as a subacute or chronic suppurative disease.<sup>3</sup> It is characterised by positive respiratory symptoms, radiographic infiltrates and positive cultures from respiratory samples.<sup>(6)</sup> Soil is a natural habitat of *Nocardia*,

Man acquires infection by inhalation of the bacteria from contaminated soil. Person-to-person transmission is rare<sup>5</sup>.

*Nocardia* infections are common in COPD or immunosuppressed patients.<sup>6</sup> Immunosuppressive conditions commonly associated are chronic steroid use, solid-organ transplantation, lymphoreticular malignancy, chronic granulomatous disease (CGD), or human immunodeficiency virus (HIV) infection.<sup>7</sup>

Cotrimoxazole alone is highly effective against majority of isolates of *Nocardia spp.* but sometimes combination antimicrobial therapy with amikacin, imipenam or ceftriaxone is required for critical patients therapy with Nocardial infection.<sup>8</sup>

## II. CASE REPORT

### Patients and methods

The study group comprised 4 patients with pulmonary nocardiosis acquired in a community setting, diagnosed and followed in a tertiary care hospital. The following data were collected: predisposing factors; clinical manifestations; radiographic findings; bacteriological reports; treatment; outcome of illness; duration of infection from the onset of symptoms to diagnosis.

### Characteristics and clinical features of the patients

Four patients (3 males, 1 female) were diagnosed with Nocardial infection with a mean age of 56 yrs. The clinical manifestations in the four patients were: cough, purulent expectoration, fever and dyspnoea. The following underlying diseases were present in the four patients: Chronic obstructive pulmonary disease (COPD) (2) and pulmonary tuberculosis (2). Two patients were on anti-tubercular treatment and diagnosis was delayed 2 weeks or more in those two patients.

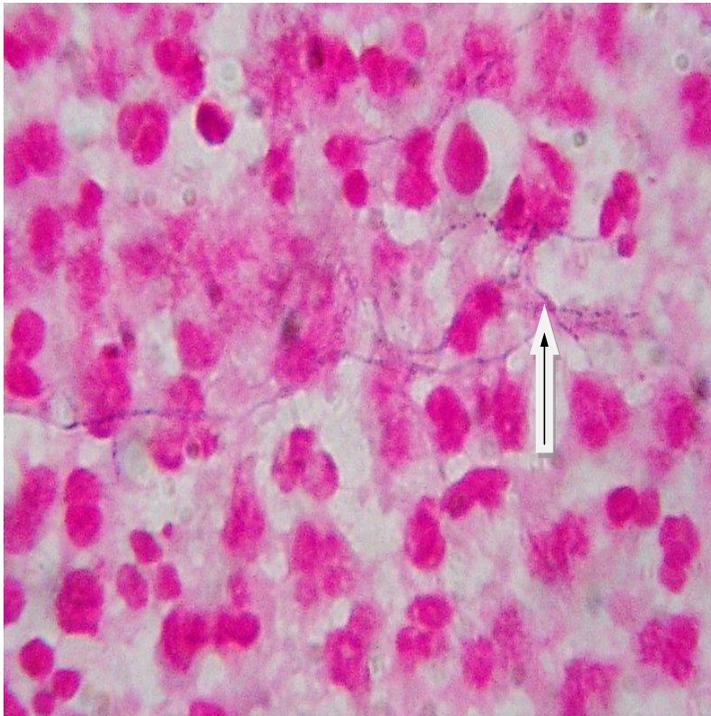
### Radiographic patterns

Lobar and multilobar condensation was seen in the above cases.

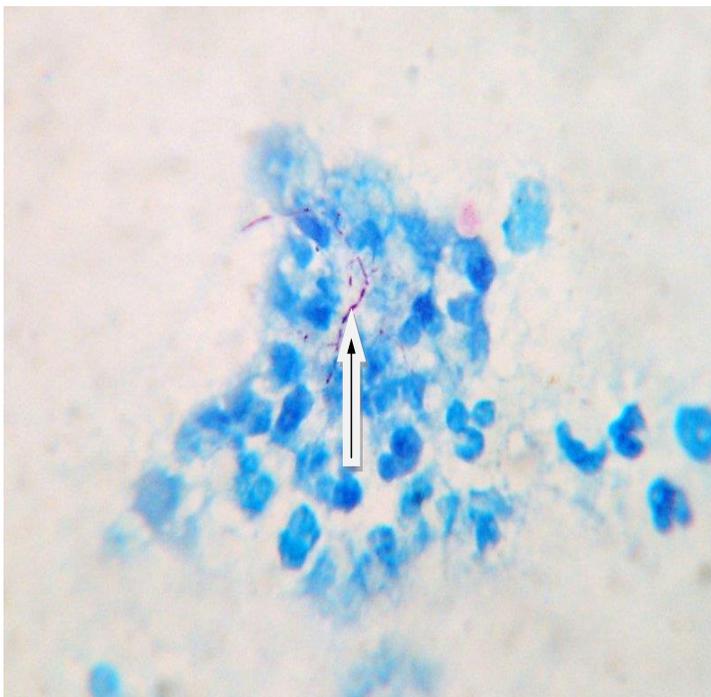
### Microbiological identification

In four patients, *Nocardia spp.* was also isolated in sputum. Microbiological identification was attained by direct microscopic observation of preparations with Gram and Kinyoun's acid fast staining. All specimens were cultured on blood agar and chocolate agar plates aerobically at 37°C. They were also cultured in duplicate slopes of Lowenstein - Jensen (LJ) medium. The slopes were incubated at 36°C for 3 weeks. Gram stained sputum smear revealed beaded and branched gram positive filaments (FIG-1). Smears stained for acid fast organisms using 1

% sulphuric acid as decolorizing agent revealed thin acid fast beaded and branched structures (FIG-2). Culture showed Colonies with features of *Nocardia* species after 48 hours in chocolate and blood agar. The growth on LJ medium appeared as moist and glabrous (FIG-3). The growth was confirmed by presence of gram positive and acid fast thin beaded and branching filaments.



**FIG1: Gram positive branching filamentous bacilli (Gram stain x100)**



**FIG2: Acid fast branching filamentous structure (Kinyoun's acid fast staining x 100)**



**FIG 3: Growth of *Nocardia* spp. in LJ medium.**

#### **Clinical outcome:**

Resolution of the disease was defined as eradication of *Nocardia* spp., together with clinical and radiological improvement. The disease remained localized in the lung in all the four cases, with a trend toward chronicity in one with bronchiectasis. All the patients showed symptomatic improvement within a week but complete radiological resolution took 1-3 months.

### **III. DISCUSSION**

Pulmonary nocardiosis is a sub-acute or chronic infection caused by aerobic actinomycetes of genus *Nocardia*. *Nocardia* infections are rare among normal population, most infections occur in immuno-compromised patients. They behave as an opportunist microorganism in an immune-compromised host.<sup>9,10</sup> Among the *Nocardia* spp. *Nocardia asteroides* is a saprophyte of skin and respiratory tract. Most of the time respiratory colonization occur when the individual has underlying obstructive pulmonary disease and treated with corticosteroid therapy. In the absence of corticosteroid therapy infection is very rare.<sup>11</sup> It can affect immunocompetent host by impairing bronchial defences by damaging ciliated epithelial cells especially in COPD and bronchiectasis patients.<sup>12</sup> In the present series it was found that underlying COPD were present in two patients. They were never prescribed oral or inhaled corticosteroid therapy. Similar to other studies, clinical findings were nonspecific.<sup>11</sup> As both clinically and radiologically it mimics and sometimes coexist with pulmonary tuberculosis.<sup>1</sup> In

the present study, 2 cases were diagnosed as tuberculosis before the isolation of *Nocardia spp.* and were started with anti-tubercular therapy (ATT). One among them developed chronic course later. With antimicrobial treatment disease remain localized in the lung and complete resolution occurred gradually in 3 patients within 1 month. But one patient developed chronicity (bronchiectasis) inspite of therapy. The reason could be the *Nocardia spp.* isolated in this patient was resistant to cotrimoxazole or may be diagnosis was delayed.

#### IV. CONCLUSIONS

1) The cases are unique as pulmonary Nocardiosis were seen in immunocompetent hosts acquired in a community setting. 2) Pulmonary nocardiosis is difficult to diagnose, diagnosis is frequently delayed and a high level of suspicion is, thus, required in patients with COPD or chronic tubercular therapy. Because most of the time *Nocardia* co-infection never suspected once pulmonary tuberculosis is diagnosed. High index of suspicion arise when patient fail to respond after completing anti-tubercular chemotherapy. 3) As it is difficult to diagnose clinically and radiologically, clinicians should take help from microbiologists to include specific stains and cultures to investigate the presence of *Nocardia spp.* 4) Though the treatment of choice for localised infection in immune-competent host is cotrimoxazole but some *Nocardia spp.* shows resistant to it, so antimicrobial susceptibility is required, which is not done in our study.

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