

Nocardia Pneumonia in a COPD Patient Following Dry Powder Steroid Treatment

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Received: September 29, 2018; **Published:** October 31, 2018

Abstract

Nocardia may cause a severe infection leading to a high morbidity and mortality that usually affects the immunocompromised hosts. Pulmonary nocardiosis has an increasing incidence with a high tendency for diagnostic underestimation. A 64 years old male was admitted for fever, purulent sputum and dyspnea of ten days. The patient used DPI of 500 mcg bd and Spiriva td for six years. Blood count, biochemistry and radiologic findings were compatible with pneumonia. The patient had severe exacerbations during the previous year. Sputum and BAL culture grew Nocardia asteroides complex. After trimethoprim-sulfamethoxazole and intravenous imipenem treatment complete resolution of clinical findings occurred. The patient did not have any exacerbations in the following twelve months.

We present this patient to notify the clinicians that Nocardia asteroides complex pneumonia may emerge following dry powder steroid treatment. The patient was immunocompetent and did not use any immunosuppressive drug other than the inhaled steroid. Pulmonary nocardiosis may emerge as a diagnostic challenge for the clinician as an unidentified occult etiologic agent by leading to frequent chronic obstructive pulmonary disease exacerbations.

Keywords: Nocardiosis; Nocardia Asteroides Complex; Pulmonary Nocardiosis; COPD; COPD Exacerbation

Introduction

Pulmonary nocardiosis is a rare infection that usually affects the immunocompromised patients leading to significant morbidity and mortality. Despite its traditional description as an opportunistic infection it has been reported in immunocompetent patients and up to one third of patients with nocardiosis are immunocompetent. Several risk factors have been identified such as immunosuppression, steroid treatment, chronic obstructive pulmonary disease cystic fibrosis, bronchiectasis [1-5]. Pulmonary nocardiosis is common in patients with chronic obstructive pulmonary disease in the setting of concurrent oral steroid treatment [6]. We describe a patient with chronic obstructive pulmonary disease and bronchiectasis who developed pulmonary nocardiosis while on dry powder steroid treatment. As far as we know this is the first pulmonary nocardiosis case occurring during inhaled steroid treatment. Clinicians should be aware of the possibility of nocardiosis infection in chronic obstructive disease patients since nocardiosis simulates an acute exacerbation caused by more frequently encountered agents in the obstructive lung disease setting while discrimination from other bacterial or viral agents may pose a great difficulty.

Case Report

A 64 years old male was admitted for fever (38.4°C), purulent sputum and increasing dyspnea in the last ten days. Smoking history was 40p-years. The patient had chronic obstructive pulmonary disease, hypertension, gastrointestinal bleeding, hernia operation and coronary artery disease while family history divulged pulmonary tuberculosis in the mother and Behçets' disease in the son. Dry powder fluticasone propionate 500 mcg bid and tiotropium bromide 18 mcg qd had been commenced for chronic obstructive pulmonary disease treatment five years ago. Blood pressure was 140/70 mm Hg. Physical examination revealed normal heart sounds, rales in both lower lung zones and fever (38.4°C). WBC: 12.7 X 10³/mm³, RBC: 4.9 X 10⁶/mm³, LYMP: 2.8 X 10³/mm³, Hgb: 13.6 mg/dl, Htc: 42.7 and PLT: 287 X 10³/mm³, creatinine: 0.72 mg/dl, AST: 18 IU/L, ALT: 24 IU/L, LDH: 142 IU/L, ECG showed sinus rhythm (89/minute). Arterial blood gas values on admission were: pO₂: 81.7 mm Hg, pCO₂: 38 mm Hg and pH: 7.49. Chest x-ray revealed emphysematous changes, bilateral acinar infiltrations in both lower lobes and pleural calcification on both sides (Figure 1). CT showed cystic lesions, consolidation areas, tree in bud pattern, bronchiectasis in the lower lobes and mediastinal lymph nodes measuring 16 mm in diameter (Figure 2). Sputum and BAL culture grew *Nocardia asteroides* complex. The WBC, LYMP count, serum immunoglobulins and complement levels were within normal limits. The patient was commenced on trimethoprim-sulfamethoxazole and intravenous imipenem. The inhaler dry powder steroid treatment was stopped. After six months of antibiotic treatment the patient had complete resolution of symptoms and clinical findings. The patient did not declare any chronic obstructive pulmonary disease exacerbation in the following eighteen months.

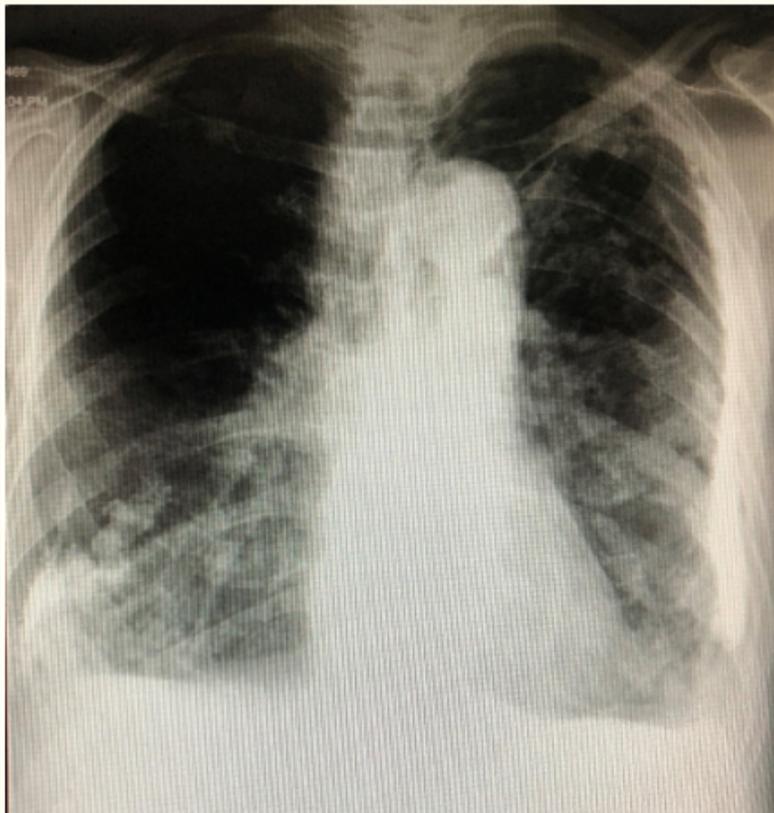


Figure 1: PA chest x-ray showing acinar infiltrations at both lung bases, bilateral pleural calcifications and bronchiectatic changes at the lower lobes.



Figure 2: CT of the lung revealing tree in bud pattern in both lungs, pleural calcification at the right, bronchiectatic and fibrotic changes at the lower lobes.

Discussion

Pulmonary nocardiosis is the most common manifestation of *Nocardia* infection and lungs are involved in 70% of all cases [2]. *Nocardia asteroides* complex may cause a severe pulmonary infection that leads to significant mortality and morbidity in the immunocompromised patients. The infection may present as an acute, subacute or chronic disease with ongoing remissions and exacerbations. Symptoms include fever, cough, breathlessness, hemoptysis and weight loss that are often attributed to tuberculosis or community-acquired pneumonia. Majority of the subjects have impaired cell-mediated immunity including patients underlying malignancies, HIV infection, solid organ or hematopoietic stem cell transplant recipients and those receiving medications that suppress cell-mediated immunity [3-10]. Preexisting pulmonary disorders such as COPD, bronchiectasis or MAC lung disease are additional risk factors for pulmonary nocardiosis [11-15]. However, it may be difficult to quantify the relative contribution of each factor in predisposing the disease.

Our patient had COPD and previously undiagnosed bronchiectasis that was identified by chest CT at admission. Pulmonary nocardia infection is very rare in an immunocompetent patient without previous lung disease. Use of immunosuppressive treatment is an additional risk factor for the development of pulmonary nocardiosis. In this patient, parenchymal lesions due to obstructive lung disease and bronchiectasis constitute a significant risk for pulmonary nocardiosis. The patient was not immunocompromised but used high doses of inhaled dry powder steroids for chronic obstructive pulmonary disease, which appears to be the second factor contributing to the development of nocardiosis. Bacterial, viral, or fungal lung infections have not been a problem in patients treated with inhaled steroids in North America or Europe in healthy volunteers [16,17]. A few cases of complicating pulmonary tuberculosis and mycetoma have been reported during aerosol steroid treatment [18,19]. Inhaled corticosteroids along with the parenchymal lung lesions appear to be the major deter-

minants of nocardia infection in our patient. Although it is not possible to determine the relative burden of dry powder steroid treatment leading to nocardia infection in our patient its contributory effect appears to be inevitable. Consequently, inhaled steroids should be used carefully in patients parenchymal structural lesions that may harbor nocardia, mycobacteria or fungal organisms.

Another crucial aspect of our patient is the presence of frequent chronic obstructive pulmonary disease exacerbations due to pulmonary nocardiosis. After pulmonary nocardiosis treatment, the patient did not have any exacerbations in the following year. Pulmonary nocardiosis may cause acute, subacute or chronic lung infection. The ongoing persistent exacerbations in the previous year that did not recur after nocardia eradication by antibiotic treatment is the explanation for the subacute or chronic nocardiosis as the hallmark of chronic obstructive pulmonary disease exacerbations in this case. Clinicians should bear in mind that *Nocardia asteroides* complex may be the occult bacterial agent in chronic obstructive pulmonary disease patients that leads to frequent exacerbations. Obviously, the probability of nocardia infection will be even higher in subjects with parenchymal lung injury using inhaled steroids as it is the case in our patient.

Inhaled corticosteroid treatment may be the cause of serious lung infections. Clinicians should be cautious about dry powder steroid treatment in chronic obstructive pulmonary disease patients with coexisting previous parenchymal lesions. Inhaled corticosteroids may promote opportunistic infections thereby leading to misdiagnosis of the etiologic agent. Second, pulmonary nocardiosis may emerge as the cause of frequent exacerbations in chronic obstructive pulmonary disease patients. It is difficult to appraise the contributory role of each factor including the inhaled steroid treatment and the presence of pulmonary parenchymal lesions in the development of nocardiosis for chronic obstructive pulmonary disease patients. Frequent chronic obstructive pulmonary disease exacerbations should point out to the probable presence of insidious and occult nocardia infection in these patients. This case highlights that pulmonary nocardiosis should be kept in mind especially in immunocompetent patients due to prolonged inhaled steroid treatment and as an etiologic factor in patients with frequent exacerbations.

Conclusion

Nocardia is an opportunistic infection that usually develops in immunocompromised patients. The infection may occur in association with parenchymal lesions such as chronic obstructive lung disease or bronchiectasis even if the patient is immunocompetent. Our patient has significant risk factors for pulmonary nocardiosis including parenchymal structural lesions of chronic obstructive lung disease and bronchiectasis. Prolonged dry powder steroid treatment has a major impact in the infection development by depressing cell-mediated immunity. The patients had severe exacerbations while on steroid treatment with a chronic disease course because of undiagnosed nocardia infection that did not respond standard antibiotic regimens while there were no attacks in the following eighteen months after the termination of dry powder steroid. Nocardia can lead to serious consequences for the patient. Early identification of this pathogen leads to a successful treatment outcome. Probability of a nocardia infection in a patient whether immunocompromised or immunocompetent, should never be ignored if there are clinical manifestations of infection in the appropriate clinical setting.

Author Contributions

- Muammer Bilir has contributed to patient follow-up and data evaluation.
- Cuneyt Tetikkurt has contributed to manuscript preparation.
- Halil Yanardag has contributed to references.

Conflicts of Interest

The authors does not have any conflicts of interest to declare associated with this study.

Further Information

There is no funding and poster presentation concerning this study.

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Volume 1 Issue 1 November 2018

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