CYTOLOGICAL DIAGNOSIS OF PULMONARY NOCARDIOSIS IN AN IMMUNOCOMPROMISED PATIENT

We report a case of pulmonary nocardiosis in an immunosuppressed patient having vasculitis who presented with fever, cough and chest pain. A suspicion of nocardiosis was made on auramine O staining of material procured by CT guided fine needle aspiration cytology right lung. Modified Ziehl-Neelsen staining was useful in confirming the diagnosis. The patient showed remarkable recovery after treatment with co-trimoxazole. Quick identification of this uncommon pathogen in the cytological material using special stains helped in timely diagnosis and successful treatment of the patient.

Key words: Fine-needle aspiration cytology, nocardiosis, pulmonary, immunosuppression.

_Nocardia_ is an uncommon pathogen in immunocompetent patients; however, it has been increasingly recognized as a significant opportunistic pathogen in immunocompromised individuals. Pneumonia is one of the most common presentations in nocardiosis. Infection can disseminate to any part of the body but brain and skin infections are the most common complications. In the lungs, _Nocardia_ can cause a wide spectrum of injury ranging from minimal infiltration to abscess formation and necrotizing pneumonitis. Diagnosis is usually made by culture or cytological examination of pulmonary specimens including sputum and brushing/washings or by histological evaluation of tissue biopsy material. Pneumonia caused by _Nocardia_ occasionally simulates a mass that may mimic tuberculosis, staphylococcal or mycotic infections or even neoplasia.[1] Pulmonary infection by this pathogen may thus be difficult to diagnose based on clinical and radiological features as these are not specific.[2]

We report a case of pulmonary nocardiosis in an immunocompromised patient, diagnosed by auramine O and modified Ziehl-Neelsen (ZN) staining of the material obtained by fine-needle aspiration cytology (FNAC) of right lung.

Case Report

A 60-year-old female patient was admitted to Dayanand Medical College and Hospital, Ludhiana, on 13th October 2007, with a history of fever, non-productive cough and chest pain on the right side for five days. The patient was a known case of hypertension and was on regular medication. She was diagnosed as a case of cutaneous leukocytoclastic vasculitis of medium sized vessel based on skin biopsy performed in April 2007. Because of positive anti-neutrophil cytoplasmic antibody (ANCA) (serum c-ANCA-18.5u/mL and p-ANCA-13.4u/mL), she was on immunosuppressive medication (azathioprine and prednisone) for the last seven months.

On examination, the patient was febrile, debilitated and anaemic. Pulse rate was 132/minute and blood pressure of 100/70. Chest auscultation revealed crepitations in right scapular and infra-scapular region. Abdominal examination was normal. Chest x-ray revealed indistinct areas of haziness in right lower zone with prominent broncho-vascular markings which looked like a patch of pneumonitis. Left lung and CP angles were clear (Fig. 1). Ultrasound chest showed a large patch of consolidation with air bronchogram in Infra-scapular region.

Laboratory investigations showed haemoglobin of 6.3 g/dL, a WBC count of 8.9x10³/μL with neutrophilic leukocytosis, (91% neutrophils, 6% lymphocytes and 3% monocytes). Liver function tests were normal and enzyme linked immunosorbent assay for HIV was non-reactive. Sputum smear was negative for acid fast bacilli (AFB) and sputum culture for pyogenic organisms revealed “normal flora.” Pleural fluid was negative for malignant cells.

Based on clinical, laboratory and radiological features, smear and culture and modified Ziehl-Neelsen stain of sputum was suggestive of _Nocardia_ infection. The patient was started on co-trimoxazole (250 mg twice daily) and showed remarkable recovery.

![Figure 1: X-ray chest showing indistinct areas of haziness with prominent broncho-vascular markings in the lower zone of the right lung](https://www.ijmm.org)
investigations a provisional diagnosis of pneumonia with sepsis was made and the patient was put on meropenem, targcid and fluconazole. Over the next seven days the lesion regressed but the spikes of fever persisted. A spiral CT chest was done which showed a lobulated intraparenchymal lesion measuring 4.0x3.4 cm in the superior segment of right lower lobe (Fig. 2). CT guided FNAC was performed and prepared slides were sent to microbiology laboratory for Gram stain and ZN stain for AFB. Gram stained smear showed presence of slender, weakly gram-positive, branching filamentous bacilli. Another smear which was subjected to auramine O staining (routinely done in our hospital for screening of smears for AFB) showed numerous thin, beaded, branching, filamentous bacilli showing yellow green fluorescence that were suggestive of Nocardia spp. (Fig. 3). A suspicion of Nocardiia infection was made and the smear was subjected to modified Ziehl-Neelsen staining (1% H2SO4) which showed numerous acid fast branching filamentous organisms morphologically resembling Nocardia spp. (Fig. 4). Owing to the lack of availability of suitable clinical specimen, culture for Nocardia could not be put up. ZN staining was negative for AFB.

Based on the findings of special stains i.e. auramine O and modified ZN staining, a final diagnosis of pulmonary nocardiosis was established. The patient was started on high dose of co-trimoxazole (trimethoprim - 1,280 mg and sulphamethoxazole - 6,400 mg) given as 4 tablets of double strength, twice a day. She responded favourably to the treatment, became afebrile and was discharged in the first week of November 2007. The patient showed remarkable recovery and follow-up x-ray showed complete regression of the lesion.

Discussion

Immunocompromised individuals with underlying illness including renal transplant, human immunodeficiency virus infection and long-term steroid therapy have high risk of developing Nocardia infection.[3] The chronic debilitating course of pulmonary nocardiosis often mimics tuberculosis, pneumocystosis, invasive fungal disease, or malignancy. Pleomorphic and non-specific radiological manifestations further complicate the diagnosis.[4]

Sputum examination, bronchoalveolar lavage, chest ultrasound and CT guided fine needle aspiration cytology offer a simple means of procuring material for diagnostic evaluation.[2] In these specimens, Nocardia spp. may be difficult to identify due to a background of chronic inflammation, suppurative inflammation, and necrosis.[1] Very few articles have described the morphologic appearance of this uncommon pathogen in cytological material.[5]

The present study highlights the importance of special stains in confirming the diagnosis of nocardiosis in cytological material. It was for the first time that fluorescent filamentous bacteria morphologically resembling Nocardia were observed in our laboratory in an FNAC slide submitted for mycobacterial examination. According to a recent case report of Nocardial abscess of spinal cord, Auramine O staining and fluorescent microscopy of pus showed weak acid fast filamentous forms.[5] Another report highlights the

Figure 2: CT chest showing lobulated intraparenchymal lesion in the lower lobe of the right lung

Figure 3: Auramine O stained smear of FNAC material showing thin, beaded, yellow green fluorescent, filamentous, branching structures of Nocardia spp. seen in a fluorescent microscope (x1000)

Figure 4: Modified Ziehl-Neelsen stained smear showing thin branching filamentous acid fast bacilli of Nocardia spp. (x1000)
utility of special stains and fluorescent microscopy when applied to aspiration cytology material as it allowed quick and accurate diagnosis of opportunistic infectious organisms, specifically Nocardiosis and Actinomycosis. The ability to identify Nocardia in acid fast and auramine O stained smears varies considerably between different species.

Identification by standard methods is a lengthy process that can delay the start of appropriate antibiotic therapy, and such a delay can have serious consequences. In an interesting case of thyroid swelling in a patient of vasculitis, the clinical and radiological findings strongly suggested neoplasia but FNAC showed a purulent material with no malignant cells. However, filamentous structures strongly suggestive of Nocardia were seen. In the present case, a presumptive diagnosis of pulmonary nocardiosis was made on the basis of auramine O staining and was confirmed by modified ZN staining. Culture for Nocardia could not be put up in the present case as prepared slides of FNAC material were sent to the lab. Quick identification of this uncommon pathogen in the cytological material using special stains like auramine O and modified ZN staining helped in timely diagnosis and successful treatment of the patient. Thus, a high index of suspicion for nocardiosis must be maintained while assessing cytological material in immunosuppressed individuals as it may be masked by the intense inflammatory exudate associated with this infection. We advocate the routine screening of FNAC material by auramine O staining as it can pick up even scanty organisms in the cytological material especially in immunocompromised individuals.

References


R Kumar, DK Chhina, *V Kaushal, R Mahajan, H Kaur

Departments of Microbiology (RK, DKC, VK, HK) and Medicine (RK), Dayanand Medical College and Hospital, Ludhiana- 141 001, Punjab, India

*Correspondence author (email: <kaushal_vandana@yahoo.co.in>)

Received: 23-03-2008
Accepted: 21-05-2008