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REVISITING NOCARDIA ARTHRITIDIS- A CASE REPORT OF RECURRENT INTRACRANIAL ABSCESS

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ABSTRACT Nocardia is often implicated in infections among immunocompromised host. It can disseminate from primary foci to different organs. In this study, we report a case of CNS nocardiosis diagnosed initially on the basis of clinical suspicion and simple diagnostic test. This was further confirmed through advanced diagnostic modality and targeted therapy proved to be life- saving for the patient.

KEYWORDS : Nocardiosis, immunocompromised, Nocardia arthritidis

INTRODUCTION

The genus Nocardia is a gram positive bacteria, member of Nocardiaceae family[1]. Nocardia species often cause opportunistic infections primarily in immunocompromised patients[2]. Though, it can also lead to infection in immunocompetent individuals[3,4].

With the advancement in medical field, the incidence of nocardiosis has been increasing owing to increment in the immunocompromised population. Nocardia can infect the lungs, skin, central nervous system (CNS) and other organs of body leading to either localized or disseminated infections. Pulmonary nocardiosis is the predominant type of nocardiosis. Lung involvement is seen in 60–70% of cases[4].

In approximately one-third of patients, dissemination occurs to other organs with preponderance for the central nervous system (CNS) and skin and soft tissues[5]. Imaging results of brain abscesses due to Nocardia infection are not very specific. Hence, misdiagnosis and delayed treatment is a notable concern with respect to this condition

In this study, we report the case of disseminated Nocardia infection affecting central nervous system. The patient presented with recurrent brain abscess and got admitted in the hospital in 2024.

Case Study

A 55 year old male patient admitted on December 24, 2024 with complaints of forgetfulness since 1 month and headache and pus discharge (left temporal area) since 15 days

Patient had a history of bronchial asthma, type-2 diabetes mellitus, ischemic heart disease and surgery (left front temporal parietal craniotomy and excision of space occupying lesion) 2 months back. He was on unknown medication (alternative medicine) for allergic rhinitis and cough for 12 months.

On examination, patient was stable and conscious. Temperature was 97 °F; pulse 78 beats/minute; respiratory rate 19 times/min and blood pressure, 120/78 mm Hg. He had tenderness in left temporal lobe with pus discharge. Cardiac and respiratory sounds were normal.

Laboratory findings showed the following: hemoglobin concentration, 13.3 g/dl; leukocyte count, 15,200/µl (79% neutrophils, 11% lymphocytes); platelet count, 322 × 10^3/ µl; Absolute Neutrophil Count, 11.97 x10^3cells/µl creatinine concentration, 0.70 mg/dl; blood glucose concentration, 132 mg/dl; Procalcitonin 0.06 ng/ml; hemoglobin A1C level, 8.08. Tests for HIV, HBV and HCV were non reactive

HRCT scan of chest revealed tiny ground-glass densities in peripheral aspects of anterior segment of both upper lobes with peribronchovascular and centrilobular distribution. Minimal bilateral apical pleural thickening was seen. Trachea and bronchi were normal. No consolidation, bonchiectasis, emphysema or honeycombing noted.

Contrast enhanced computed tomography (CECT) of brain showed irregular peripherally enhancing lesion in left temporal lobe with central cystic/necrotic component with irregular peripheral post contrast enhancement.

Patient was admitted with a diagnosis of recurrent brain abscess left temporal lobe and was advised medical as well as surgical management. Patient was operated on December 27, 2024 and abscess tissue and pus samples sent for histopathological and microbiological examination respectively.

Histopathology findings- Sections from the brain tissue show marked acute and chronic inflammatory infiltrate forming abscess. Few areas show histiocytic collection forming focal vague granulomas. Few giant cells are identified. Surrounding areas show cortical tissue showing features of reactive glial cells. Areas of necrosis are seen. Isocitrate dehydrogenase 1(IDH1) was negative. Ziehl Neelsen (ZN) and Periodic Acid-Schiff (PAS) stains do not highlight any organisms. There was no evidence of malignancy. Findings were suggestive of chronic abscess with focal vague granulomas

Microbiological findings revealed no fungal element on KOH mount. On ZN stain acid fast bacilli were not seen. Fungal culture and anaerobic culture yielded no growth. MGIT (Mycobacteria Growth Indicator Tube) culture revealed no growth of Mycobacterium tuberculosis.

Gram stain had gram positive branching filamentous bacilli. Modified ZN Stain showed weakly acid fast bacilli which were branching and filamentous suggestive of Nocardia species (Fig 1a). Next-Generation Sequencing (NGS) was done which detected Nocardia arthritidis.

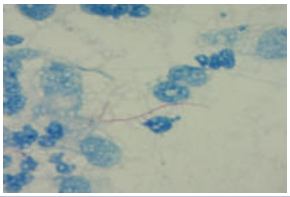

Fig1. Modified ZN Stain showing weakly acid fast bacilli

Aerobic bacterial culture was performed on 5%SBA (sheep blood agar) and Mac conkey agar. Chalky white colonies appeared on blood agar on day 4 of aerobic incubation (Fig 2) identified as Nocardia species by Maldi tof (Vitek MS, Biomerieux).

Fig 2. Nocardia colonies on sheep blood agar

Antimicrobial susceptibility testing was done using broth micro dilution method and the isolate was found to be susceptible to all the antimicrobials tested (Table 1).

Table1. Antimicrobial Susceptibility Testing Result

Antimicrobial	MIC (ug/ml)	INTERPRETATION
Trimethoprim/Sulfamethoxazole	1/19	Susceptible
Ciprofloxacin	0.12	Susceptible
Moxifloxacin	0.25	Susceptible
Cefoxitin	4	Susceptible
Amikacin	1	Susceptible
Doxycycline	0.12	Susceptible
Tigecycline	0.015	Susceptible
Linezolid	1	Susceptible
Imipenem	2	Susceptible
Cefepime	1	Susceptible
Amoxicillin/ Clavulanic Acid	2/1	Susceptible
Clarithromycin	0.12	Susceptible
Ceftriaxone	4	Susceptible
Minocycline	1	Susceptible
Tobramycin	1	Susceptible

Patient was started on treatement with oral to cotrimoxazole (160/800 mg BD) and I.V amikacin 750mg OD. The patient experienced an improvement of symptoms. He was discharged with the advice of continuing with oral linezolid for 6 weeks and oral cotrimoxazole planned to be continued for 12months.

DISCUSSION-

Pulmonary and disseminated infections are the major types of systemic nocardiosis. Disseminated disease often involves central nervous system (CNS) along with significant mortality and recurrence, especially in immunocompromised host[6].

Pulmonary infection predominantly disseminates to CNS which is seen in 3–26% of patients with nocardiosis[7].

CNS nocardiosis usually presents with a varying range of symptoms often difficult to identify. Hence, timely diagnosis is challenging, especially in immunodeficient patients. The patient in our case also got operated twice before getting an accurate diagnosis. Strong clinical suspicion especially regarding intake of unknown medication for over a year which could be an immunosuppressant combined with a simple investigation like modified ZN helped in accurate diagnosis of this case.

The clinical presentation of CNS involvement mainly depends on the site of infection as well as and severity of illness. Single brain abscess with no apparent symptoms is common in immunocompetent patients. Meningitis is a rare finding and only meningitis without accompanying brain abscess is even rarer. Fever is also infrequent in extra pulmonary nocardiosis[6]. Nocardia farcinica is the commonest cause of CNS disease; newer species are being discovered due to enhancement in technology and availability of advanced molecular methods[8]. Nocardia beijingensis, N. exalbida, and N. lillensis have been isolated from cases of CNS nocardiosis[9].

In this case, Nocardia arthritidis was detected by NGS performed on pus sample from abscess. Previous studies have reported Nocardia arthritidis as a causative agent of pulmonary or disseminated nocardiosis[10]. Diagnosing Nocardia is challenging using traditional culture technique. On conventional culture on solid media Nocardia form visible colonies in 2 days to several weeks.

Moreover, growth of other concomitant organism may mask the actual pathogen. Inconclusive finding on radiology makes it difficult to suspect the condition in CNS involvement. Hence, it is imperative to suspect Nocardia infection especially in immunocompromised patients with non specific radiological findings, recurrence or lack of improvement despite antimicrobial treatment and in whom tubercular, fungal and atypical pathogens have been ruled out[11].Next generation sequencing has the potential to give timely and accurate results. As it is performed directly from patients sample turnaround time is shorter compared to culture and provides valuable information in severe conditions[11].

CONCLUSION

This case highlights the significance of strong clinical suspicion in cases of recurrent brain abscesses. NGS is an indispensable tool to identify exact pathogen and importance of a simple diagnostic tool like modified acid fast stain cannot be underestimated in such cases. Appropriate diagnostic testing and initiation of treatment based on results were critical to the patient's survival. Prolonged treatment of up to 12 months is needed for complete cure and antimicrobial sensitivity testing can help to guide with the best option for treatment.

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