



## **An Unusual Case of Cerebral Nocardiosis Masquerading as Tuberculosis**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Authors GP, S. Smita, S. Sharmila and GN participated in concept, design and data analysis/interpretation. Authors GP and S. Smita conducted the literature search and created the manuscript which involved critical writing and revision of the content. All authors read and approved the final version of the manuscript.*

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**Case Report**

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### **ABSTRACT**

This is a report of a unique case of cerebral nocardiosis in an immunocompetent host who was initially diagnosed with extra pulmonary tuberculosis not responding to 1<sup>st</sup> line anti tubercular treatment (ATT). The deteriorating abscess required multiple drainage procedures before the correct diagnosis was clinched by microbiological analysis. Cerebral nocardiosis is a rare entity, typically occurs in immunocompromised host and is associated with poor prognosis. As it can be easily confused with tuberculosis, a high index of clinical suspicion and supporting microbiological evidence is essential for the correct diagnosis.

**Keywords:** Cerebral nocardiosis; tuberculosis; modified ziehl neelsen (ZN) stain.

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*Key Messages: Cerebral nocardiosis is a fatal condition and can be confused with tuberculosis. Poor prognosis can be improved by correct and timely diagnosis. A strong clinical suspicion and confirmation by specific microbiological techniques such as special stains and culture, along with newer molecular methods are pivotal in the diagnosis and favorable outcome.*

## 1. INTRODUCTION

Cerebral nocardiosis is regarded as a serious opportunistic infection [1]. It is a rare cause of intracranial abscess, but is associated with a high mortality rate (31%) which is considerably greater than the other causes (<10%) [2]. In the Indian scenario, the information on prevalence of *Nocardia* spp. infections is limited to a few case reports/series and majority of these refer to pulmonary, cutaneous or disseminated nocardiosis [3]. Although Infections caused by *Nocardia* spp. are not infrequent but it is challenging for the clinicians as it can be easily confused with tuberculosis which is endemic in India. A high index of clinical suspicion is required for the correct and timely diagnosis as laboratory work-up requires specific stains and growth requirements for the culture. This is a report of a unique case of cerebral nocardiosis in an immunocompetent male from North India.

## 2. CASE HISTORY

A 49 year old male undergoing antitubercular treatment (ATT) for cerebral abscess, developed a progressive frontal scalp swelling 8 days ago. It was tender and tense on palpation. The patient was afebrile and other vitals were within normal limits. Glasgow coma scale (GCS) was 15/15 with intact high mental functions and no evidence of cranial nerve palsy, meningism or any focal neurological deficit.

The patient who was otherwise in usual state of health had developed dyspnoea and haemoptysis around six months back. Radiological investigations conducted in another hospital at that time revealed a solitary pulmonary lymphnode. Bronchoscopy was performed but he developed pneumothorax for which a chest tube was inserted. A month later, the patient was diagnosed with pneumonitis and was managed with prednisolone 10 mg for 15 days and amoxicillin / clavulanic acid for 7 days.

After an asymptomatic period of a month, he developed partial seizure with left sided facial deviation and dysarthria. Magnetic resonance imaging (MRI) of the brain revealed ring enhancing lesions in the right frontal area which was suggestive of an abscess. Surgical excision

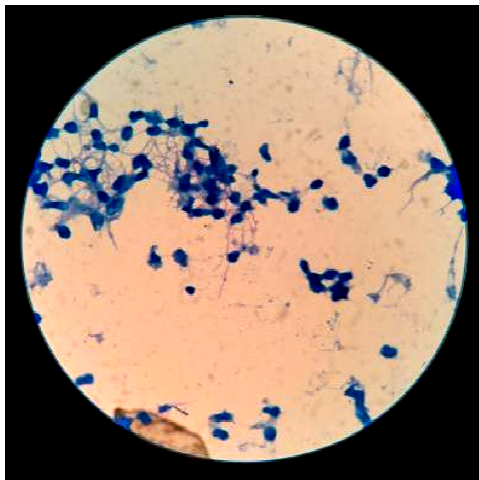
was performed and a diagnosis of tuberculosis was made based on Ziehl Neelsen (ZN) smear positivity of the pus. First line ATT was initiated. Three weeks after the surgery, patient developed new complaints of severe headache. Imaging revealed an increase in the size of the abscess. A redo surgical drainage of the abscess was performed and ATT continued.

He presented in our hospital with a swelling on his frontal scalp region after being asymptomatic for almost 2 months. MRI of the brain with contrast revealed evidence of postoperative changes in the right frontal region with signs of liquefaction and abscess formation in right frontoparietal location. There was significant perilesional edema and mass effect causing effacement of the right lateral and third ventricles with midline shift towards the contralateral side. Superolateral extension of the lesion was observed reaching superficially up to the cortical margin with evidence of adjacent meningeal enhancement. The morphology of the lesion suggested possibility of tubercular etiology.

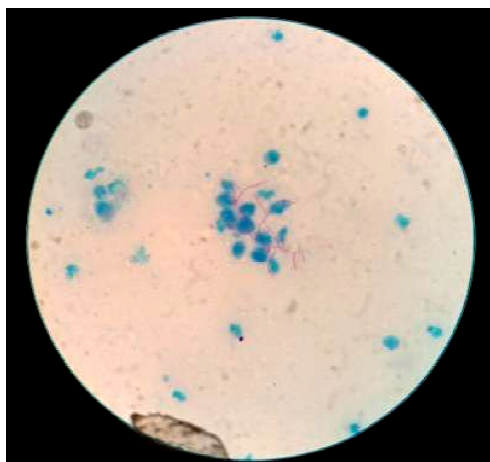
Based on history of non-responsiveness to treatment with 1st line ATT for last 4 months, 2nd line ATT was initiated and right frontoparietal craniectomy with abscess excision was done. The pus specimen was found to be smear negative by ZN and Grams stain. Aerobic culture of the drained pus was sterile after 48 hours.

The sample was processed for acid fast bacilli (AFB) culture (MGIT). ZN stain of the smear made from the concentrated sample pellet after decontamination revealed weakly acid fast branching filamentous structures (Fig. 1). Modified ZN stain was performed with 1% sulfuric acid which showed acid fast filamentous branching bacilli consistent with nocardioforms (Fig. 2). AFB culture remained sterile after 6 weeks of incubation, probably because the patient was initiated on 2nd line ATT comprising of amikacin, moxifloxacin, linezolid and clofazimine (all of which have anti-nocardia activity). GeneXpert for tuberculosis came out to be negative for *Mycobacterium tuberculosis* complex. Histopathological examination of the tissue gave a differential diagnosis of autoimmune encephalitis.

Based on the positive smear microscopy report by the modified ZN method, the patient was empirically initiated on trimethoprim/sulfamethoxazole (TMP/SMX) (TMP -15 mg/kg/day and SMX 75 mg/kg/day) and amikacin (7.5 mg/kg q12h). Rest of the ATT was discontinued. At six weeks follow up, patient had improved symptomatically and was advised to continue treatment with TMP/SMX and amoxicillin/ clavulanic acid (875 mg twice daily) till the next follow up after 1 month.



**Fig. 1. ZN stain showing partially acid fast branching filamentous bacilli**



**Fig. 2. Modified ZN stain showing acid fast filamentous branching bacilli consistent with nocardioforms**

His past medical history revealed pulmonary sarcoidosis for which he was treated 10 years back. He was a diagnosed case of diabetes mellitus on oral hypoglycemic

agents for the last 4 years. His blood sugar level was under control and he was not on any other medication.

### 3. DISCUSSION

Nocardiosis is typically regarded as an opportunistic infection in immunocompromised hosts. However reports of infection in immunocompetent host can also be found in the literature [1]. It can affect organs like lungs, brain, skin, lymphatic system or can cause disseminated infections. Its tendency to aerosolize makes respiratory infections as the most common manifestation accounting for more than two thirds of the occurrence of cases [4]. Pulmonary nocardiosis can mimic an exacerbation of an underlying lung disease like chronic obstructive pulmonary disease and pulmonary sarcoidosis [5]. The onset can be acute, subacute or chronic with non-specific symptoms. Majority of *Nocardia* spp. infections are usually a consequence of primary pulmonary nocardiosis [6].

*Nocardia* spp. bears tropism for neural tissue and can manifest as cerebral nocardiosis which accounts for 2% of all cerebral abscesses [3]. The hallmark of CNS nocardiosis is formation of a parenchymal abscess that can occur in any region of the brain and can present with nonspecific symptoms like fever, seizures and focal neurological deficit. Risk factors like mitotic pathology and immune-suppression are known predisposing factors [3,7,2]. In immune-competent host, cerebral nocardiosis can present as a mass lesion and are erroneously diagnosed as primary tumor or metastatic lesion [7,8]. The diagnosis can also be confused with cerebral abscess due to other microbial causes like bacterial, tubercular, mycotic or parasitic, all of which can present as a ring enhancing lesion on imaging [9]. This results in consequent delay in both surgical excision as well as institution of appropriate antibiotic therapy. Isolation and identification of the causative organism forms the backbone of the definitive diagnosis, which is most successful after invasive sampling of the pus and the abscess wall of the lesion [10].

In this case, the illness started as a sudden onset dyspnea and haemoptysis followed by pneumonitis for which steroids were started. Pulmonary *Nocardia* spp. infection can manifest as acute, subacute or chronic pneumonitis [4] which raises a strong suspicion of primary

pulmonary manifestation in this patient, despite no evidence. This may be attributed to difficulties associated with diagnosis of pulmonary nocardiosis like lack of specific signs, lack of suspicion, slow growth and special requirements for the isolation of the *Nocardia* spp. due to rapid growth of commensals in the respiratory sample.

*Nocardial* brain abscess carries a higher morbidity and mortality (30%) as compared to other bacterial causes (10%) [3]. Mortality varies with immune status and the character of the abscess [8]. Multiple modalities have been in practice for the management of cerebral nocardiosis. Synergetic combination of TMP/SMX is the treatment of choice often requiring prolonged therapy from 6 weeks to 1 year. Craniotomy and excision carries better prognosis in terms of reduced mortality (24%) as compared to non-operative antimicrobial therapy (30%) and aspiration alone (50%) [8]. Combination therapy with total excision of the abscess followed by administration of appropriate antimicrobial therapy is known to result in complete resolution [2].

#### 4. CONCLUSION

Cerebral nocardiosis is a fatal condition and can be confused with tuberculosis. Cases of tubercular abscess not responding to ATT should be reviewed with high index of clinical suspicion to rule out nocardiosis. Microbiological methods like smear microscopy, culture for species identification and in vitro susceptibility testing play a pivotal role in the definitive diagnosis and the appropriate management of antibiotic therapy.

#### CONSENT

It is not applicable.

#### ETHICAL APPROVAL

It is not applicable.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Sorrell TC, Mitchell DH, Iredell JR, Chen SC-A. *Nocardia* species. In: Principles and practice of infectious diseases, 7, Mandell GL, Bennett JE, Dolin R (Eds), Churchill Livingstone Elsevier, Philadelphia. 2010; 3199.
2. Lin YJ, Yang KY, Ho JT, Lee TC, Wang HC, Su FW. Nocardial brain abscess. J Clin Neurosci. 2010;17:250–253.
3. Kennedy KJ, Chung KH, Bowden FJ, Mews PJ, Pik JH, Fuller JW, et al. A cluster of nocardial brain abscesses. Surg Neurol. 2007;68:43–49.
4. Lederman ER, Crum NF. A case series and focused review of nocardiosis: Clinical and microbiologic aspects. Medicine (Baltimore). 2004;83:300-313.
5. Zuk J, Bazan-Socha S, Zarychta J, et al. Disseminated nocardiosis mimicking exacerbation of pulmonary sarcoidosis. Sarcoidosis Vasc Diffuse Lung Dis. 2013; 30:65-69.
6. McNeil MM, Brown JM. The medically important aerobic actinomycetes: Epidemiology and microbiology. Clin Microbiol Rev. 1994;7(3):357-417.
7. Beaman BL, Beaman L. *Nocardia* species: Host-parasite relationships. Clin Microbiol Rev. 1994;7:213-264.
8. Mamelak AN, Obana WG, Flaherty JF, Rosenblum ML. Nocardial brain abscess: Treatment strategies and factors influencing outcome. Neurosurgery. 1994; 35:622-631.
9. Garg RK, Sinha MK. Multiple ring-enhancing lesions of the brain. J Postgrad Med. 2010;56:307-316.
10. Braga M, Beretta S, Farina C, Pederzoli M, Repaci M, Casati G, et al. Medical treatment for nocardial brain abscesses case report. J Neurol. 2005;252:1120–1121.

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