



Case report

Isolated nocardial brain abscess in an immunocompetent patient with lung adenocarcinoma: A case report

Jasmin Hundal^{a,*}, Anagha Nagaraj^b, Todd Alekshun^c^a University of Connecticut Health, Department of Internal Medicine, Farmington, CT, USA^b University of Connecticut, School of Medicine, Farmington, CT, USA^c Hartford HealthCare, Department of Hematology Oncology, Hartford, CT, USA

ARTICLE INFO

Article history:

Received 13 August 2021

Accepted 30 August 2021

Available online xxxx

Keywords:

Nocardia

Non-small cell lung cancer

Brain abscess

Immunocompetent

Case report

ABSTRACT

Brain metastases are common in non-small cell lung cancer (NSCLC) and can often be the presenting symptom. However, it is important to consider other etiologies for brain masses even in patients with a malignancy with a propensity to metastasize. We discuss the case of a 60 year-old immunocompetent male who presented with neurologic deficits thought to be secondary to brain metastases in the setting of an incidentally discovered lung cancer. Instead, the mass proved to be a rare isolated Nocardial brain abscess.

© 2021 Published by Elsevier Ltd.

CC_BY_NC_ND_4.0

Introduction

Twenty percent of patients with newly diagnosed NSCLC present with brain metastases [1]. However, it is important to still consider non-oncologic etiologies of a brain mass in patients presenting with newly diagnosed NSCLC. Nocardial brain abscesses are rare and are often not preceded by infectious symptoms which can make them difficult to diagnose. Delayed treatment of *Nocardia* portends a poor prognosis. We present a patient with a new subclinical pulmonary adenocarcinoma and isolated nocardial brain abscess mimicking metastasis.

Case description

A 60-year-old male smoker with hypertension and hyperlipidemia presented with a 1-week history of intermittent left hemifacial numbness and left arm dysmetria. He had difficulty gripping objects and tying his bandana. Review of systems were otherwise negative and initial labs were unremarkable. He had a 60 pack-year smoking history and significant daily alcohol consumption for more than 20 years.

Non-contrast head CT demonstrated a right parietal lobe mass. MRI of the brain revealed a heterogeneously-enhancing 2.8-cm mass

with irregular, nodular rim enhancement and extensive perilesional edema (Fig. 1). The patient was subsequently initiated on high-dose dexamethasone.

A CT of the chest/abdomen/pelvis revealed a 3.3-cm spiculated mass in the left lower lobe and a 1.7-cm lesion in the right upper lobe along with mediastinal and left peribronchial lymphadenopathy. These findings were suspicious for primary lung cancer with metastases. CT-guided lung biopsy of the left lower lobe lesion revealed adenocarcinoma. Evaluation with PET-CT demonstrated markedly increased FDG activity in both the left lower lobe mass with associated satellite nodules and the right apical mass as well as metastatic mediastinal and left peribronchial lymphadenopathy (Fig. 2). The tumor cells demonstrated high expression of PD-L1 and no driver mutations were detected.

A diagnostic and therapeutic right parietal craniotomy was performed with excision of the lesion. Histopathology did not show any malignant cells but instead demonstrated an abscess with surrounding reactive gliosis. Gram-staining revealed gram-positive branching rods surrounded by many neutrophils (Fig. 3). Cultures resulted negative and did not identify any acid-fast bacilli. Given the gram stain results, MALDI-TOF mass spectrometry was done and revealed *Nocardia* species.

Considering these findings, a right upper lung nodule biopsy was performed to evaluate for pulmonary nocardiosis. The biopsy revealed normal lung parenchyma in a background of inflammatory cells and reactive pneumocytes but no evidence of malignancy. Gram stain and cultures for anaerobes, acid-fast bacilli including

* Corresponding author.

E-mail address: hundal@uchc.edu (J. Hundal).

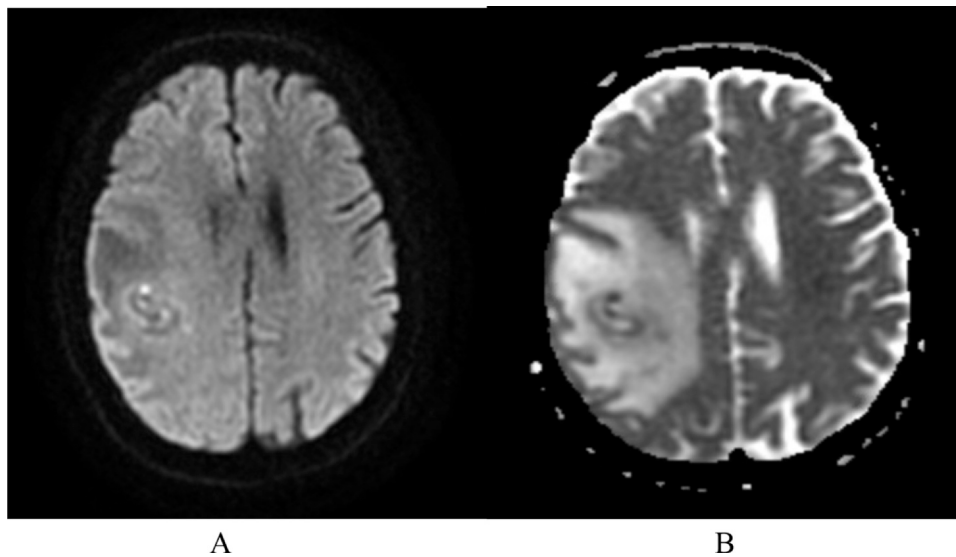


Fig. 1. MRI of the brain. (A) DWI revealing a 2.8-cm tubular shaped heterogeneously enhancing mass within the right parietal lobe with extensive perilesional edema. There is irregular and nodular rim enhancement with some areas of restricted diffusion. (B) Apparent Diffusion Coefficient (ADC) map.

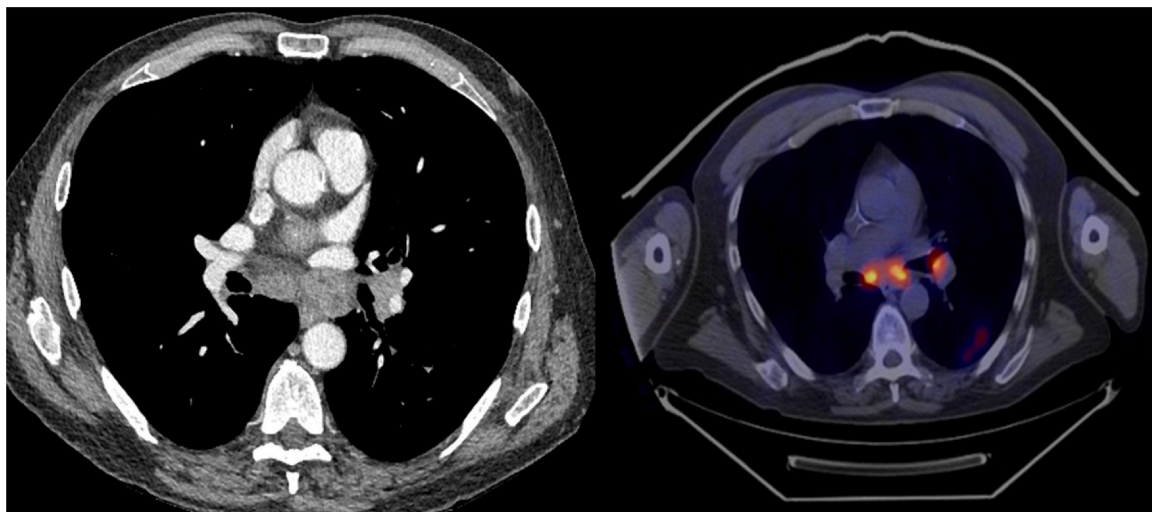


Fig. 2. PET/CT image demonstrating pronounced mediastinal lymphadenopathy in the right paratracheal, precarinal and subcarinal regions with markedly increased FDG activity.

Nocardia, and mycobacteria were all negative; as a result, mass spectroscopy was not performed.

The patient was treated with imipenem, cilastatin, and minocycline and fully recovered from his nocardial abscess. He eventually started chemotherapy with carboplatin, pemetrexed, and pembrolizumab for his lung adenocarcinoma. He achieved a complete response and remains cancer-free 41 months after his initial diagnosis.

Discussion

Nocardia is an exceedingly rare bacteria acquired through inhalation or cutaneous invasion with subsequent hematogenous spread [2]. It can lead to localized or disseminated infection in the lungs, brain, or skin [2]. Most cerebral Nocardiosis infections occur secondary to primary lung infections [3]. With regards to single-organ Nocardial infections, as in our patient, only approximately 9% are isolated to the brain [3]. Conversely, it is estimated that only 1–2% of all cerebral abscesses are due to *Nocardia* [2].

We typically associate *Nocardia* with predisposing factors including immunocompromised status, corticosteroid therapy, and

prior history of malignancy, infection, or organ transplantation [4]. Our patient is unique in that he was immunocompetent with a subclinical lung cancer that was found incidentally on imaging. Less than 10% of patients with Nocardiosis have no known predisposing factors, with many of those cases containing a history of percutaneous trauma and soft tissue inoculation, neither of which was present in our patient [3]. A history of significant alcohol consumption might have placed our patient in an immunocompromised state, however there were no signs of long-term alcohol organ dysfunction.

Nocardial brain abscesses can easily be misdiagnosed as brain metastases, especially cystic or necrotic tumors, in the setting of a primary malignancy. Brain metastases can also be the initial presentation of an undiagnosed malignancy. Diffusion-weighted MRI can help differentiate between an abscess and necrotic tumor although it is not always definitive. Abscesses tend to present with central hyperintensity and low ADC values whereas necrotic tumors present with central hypointensity and higher ADC values [5]. Making this distinction in our patient was complicated as the mass was heterogeneously-enhancing with only some areas of restricted diffusion and, given the chest CT findings, a clinical diagnosis of

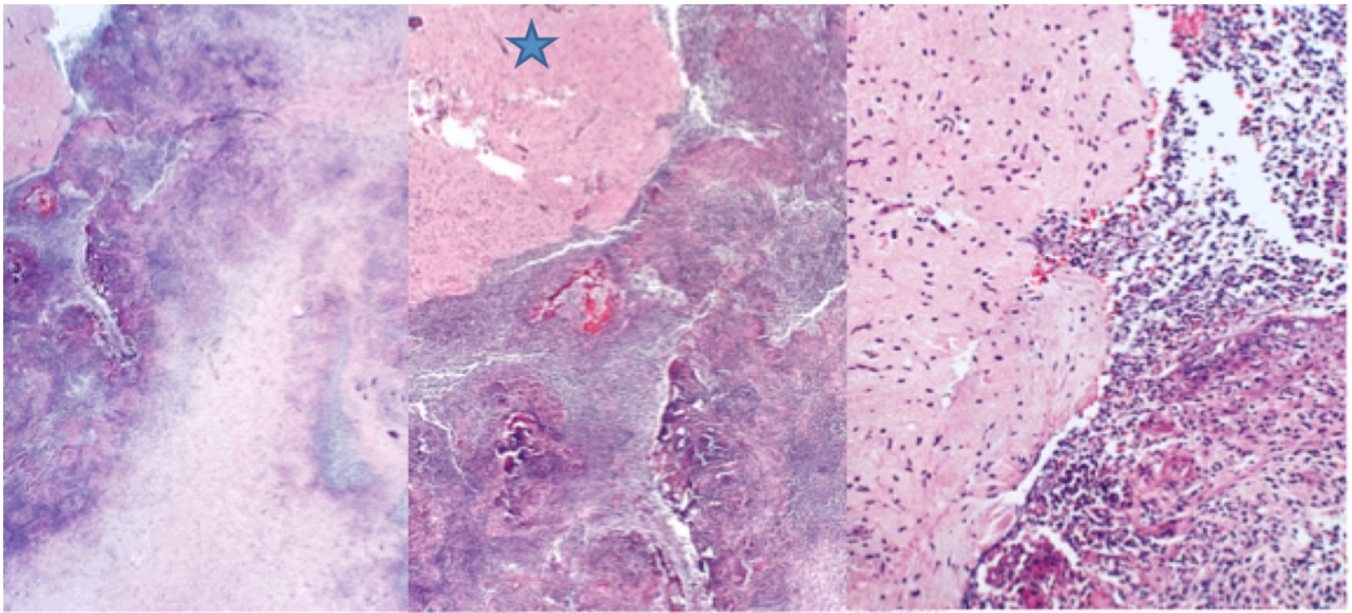


Fig. 3. Brain lesion biopsy. Low power images showing an abscess with adjacent brain parenchyma (star). The surrounding brain parenchyma shows reactive gliosis on higher power.

metastasis was favored. However, differentiating them is crucial especially with regards to planning treatment such as initiating systemic steroid therapy—as was done in our patient—which could have led to an exacerbation of his nocardial infection.

Treatment of Nocardial abscesses typically involves both surgical excision and antibiotics. Improper or delayed treatment can increase risk of recurrence or overall morbidity and mortality [4]. First-line antimicrobial recommendations include sulfonamides, trimethoprim, and aminoglycosides. Long-term maintenance therapy is recommended for 6–12 months [2]. Patients should be closely followed for signs of re-emergence.

Conclusion (99)

This is a rare case of an isolated Nocardial brain abscess mimicking metastases in an immunocompetent patient with newly diagnosed pulmonary adenocarcinoma. It is imperative to maintain a broad differential when evaluating intracranial lesions in patients with solid tumors, even with a high likelihood of brain metastases such as in NSCLC. As seen here, *Nocardia* can present in an indolent fashion in immunocompetent patients with no predisposing factors. Nocardial abscesses can mimic necrotic tumors, and diffusion-weighted MRI can help differentiate although it is not definitive. Prompt diagnosis and treatment are crucial as *Nocardia* infection is otherwise highly lethal [4].

Consent

Not required.

Conflict of interest

None.

Acknowledgements

None.

References

- [1] Ernani V, Stinchcombe TE. Management of brain metastases in non-small-cell lung cancer [published correction appears in JCO Oncol Pract. 2020 Mar;16(3):149]. J Oncol Pract 2019;15(11):563–70. <https://doi.org/10.1200/JOP.19.00357>
- [2] Karan Mladen. Nocardial brain abscess mimicking lung cancer metastasis in immunocompetent patient with pulmonary nocardiosis: a case report. Acta Clin Croat 2019;58:540–5. <https://doi.org/10.20471/acc.2019.58.03.20>
- [3] Beaman BL, Beaman L. Nocardia species: host-parasite relationships. Clin Microbiol Rev 1994;7(2):213–64. <https://doi.org/10.1128/cmr.7.2.213>
- [4] Tamarit M, Poveda P, Barón M, Del Pozo JM. Four cases of nocardial brain abscess. Surg Neurol Int 2012;3:88. <https://doi.org/10.4103/2152-7806.99927>
- [5] Kim YJ, Chang KH, Song IC, Kim HD, Seong SO, Kim YH, Han MH. Brain abscess and necrotic or cystic brain tumor: discrimination with signal intensity on diffusion-weighted MR imaging. Am J Roentgenol 1998;171(6):1487–90. <https://doi.org/10.2214/ajr.171.6.9843275>