

## *Nocardia farcinica* pituitary abscess in an immunocompetent patient: illustrative case

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**BACKGROUND** Pituitary abscess is a rare clinical entity, typically precipitated by *Staphylococcus*, *Pseudomonas*, or *Aspergillus* infection. Although *Nocardia* species–associated central nervous system abscesses have been documented in immunocompromised patients, no case of *Nocardia* pituitary abscesses has been previously reported.

**OBSERVATIONS** A 44-year-old man presented with hemoptysis and was found to have a cavitary right lung nodule, which was presumed histoplasmosis, prompting antifungal treatment. Several months later, he developed panhypopituitarism. Magnetic resonance imaging identified a pituitary mass, which subsequently underwent transsphenoidal endoscopic biopsy. Infectious workup was negative, and the patient was discharged on intravenous ertapenem therapy. Over several months, he developed progressive headaches, and updated imaging confirmed interval enlargement of the mass with new cavernous sinus invasion. He underwent repeat endoscopic biopsy, which yielded positive cultures for *Nocardia farcinica* and prompted successful treatment with trimethoprim-sulfamethoxazole and linezolid.

**LESSONS** The current study highlights a previously unreported clinical entity, the first pituitary abscess attributable to *Nocardia* sp. or *N. farcinica*, which arose in a young, immunocompetent individual. Although rare, atypical infections represent an important component in the differential diagnosis for sellar mass lesions.

<https://thejns.org/doi/abs/10.3171/CASE22266>

**KEYWORDS** pituitary; pituitary abscess; *Nocardia farcinica*; skull base

Pituitary abscesses are rare, accounting for 1% of pituitary lesions, and may be challenging to differentiate from pituitary adenomas using clinical or radiographic criteria.<sup>1</sup> The most common presenting symptoms are headaches, vision disturbances, and endocrine abnormalities.<sup>1</sup> Systemic signs of infection are uncommon, particularly in immunocompetent patients, and pituitary cultures from endoscopic endonasal biopsies are frequently negative.<sup>2</sup> Where positive, cultures predominantly isolate *Staphylococci* genus, with *Pseudomonas* and *Aspergillus* also reported in association with pituitary abscesses.<sup>1,2</sup>

*Nocardia* is a genus of aerobic actinomycetes that are most commonly observed as opportunistic pathogens causing localized or disseminated infections in immunocompromised hosts.<sup>3</sup> *Nocardia* rarely infects the central nervous system (CNS), accounting for <2% of all intracranial abscesses.<sup>4</sup> Within the *Nocardia* genus, *N. farcinica* is the most likely to

manifest with intracranial abscesses formation.<sup>5</sup> *N. farcinica* is noteworthy for easy dissemination and propensity for antibiotic resistance, resulting in high case fatality rates.<sup>6</sup> Given their contrasting antimicrobial susceptibilities, distinguishing *N. farcinica* from *N. asteroides* is clinically salient, particularly in the setting of CNS infection, because *N. farcinica* is frequently resistant to common agents used in this setting, such as third-generation cephalosporins.<sup>7,8</sup>

Rare *N. farcinica* CNS abscesses have been reported, almost exclusively among immunocompromised or elderly patients.<sup>5,9–11</sup> No prior case of *Nocardia* pituitary abscesses has been documented, neither in an immunocompromised nor an immunocompetent patient. We present the index case of *N. farcinica* pituitary abscess, which arose in a young, healthy host and was subject to a challenging course before the correct diagnosis was established and curative treatment was initiated.

**ABBREVIATIONS** CNS = central nervous system; CSF = cerebrospinal fluid; MR = magnetic resonance; MRI = MR imaging.

**INCLUDE WHEN CITING** Published October 31, 2022; DOI: 10.3171/CASE22266.

**SUBMITTED** June 14, 2022. **ACCEPTED** June 15, 2022.

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## Illustrative Case

A healthy 44-year-old male landscaper in the midwestern United States presented with isolated hemoptysis. He was found to have a cavitating right pulmonary nodule, and bronchoalveolar lavage demonstrated an elevated histoplasmosis yeast complement fixation titer of 1:16. The patient was diagnosed with presumed histoplasmosis; however, a repeat titer 6 months later was negative. After initial diagnosis, the patient did not follow up and denied taking antifungal therapy. No further testing was conducted to assess for disease dissemination. Five months later, he developed severe headaches, fatigue, weakness, chills, and marked unintentional weight loss. Laboratory studies confirmed new panhypopituitarism (serum cortisol, 1.9 mcg/dL; serum testosterone, <7.0 ng/dL; thyroid-stimulating hormone, 0.2 mIU/L; insulin-like growth factor 1, 48 ng/mL), central diabetes insipidus, and cerebrospinal fluid (CSF) lymphocytosis; magnetic resonance imaging (MRI) of the brain revealed a 1.8-cm sellar mass with suprasellar extension and upward displacement of the optic chiasm. The lesion was T1-hypointense and well-circumscribed and had a comparable enhancement pattern to normal gland (Fig. 1A and B). On neurological examination, he had new bitemporal superior quadrantanopsia.

Hormone replacement therapy was initiated, and the patient underwent endoscopic transsphenoidal exploration and biopsy. Intraoperatively, the mass appeared purulent. Tissue specimens were obtained, and empirical broad-spectrum antibiotics were initiated, including cefepime and vancomycin. Comprehensive infectious testing of the serum, CSF, and biopsy specimen produced negative results, including explicit testing for *Nocardia* sp. Pathology revealed fibrinopurulent exudate and chronic

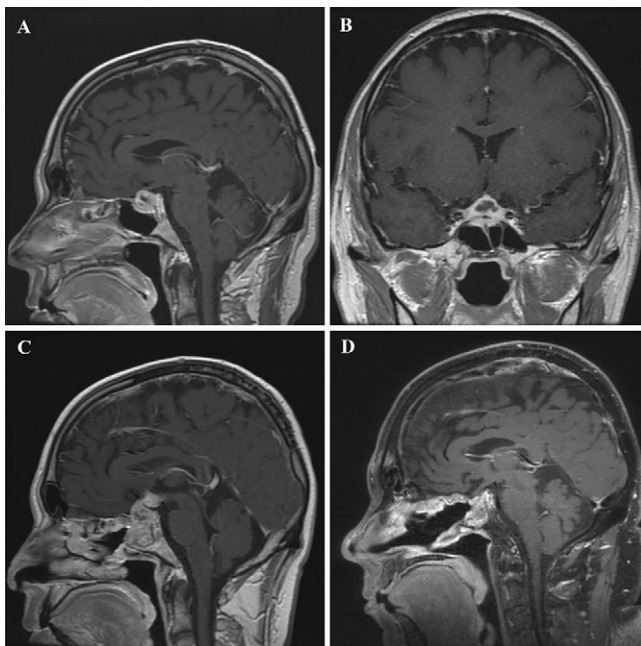
inflammation, consistent with an infectious process (Fig. 2). Following completion of the workup, the patient was discharged home on intravenous ertapenem therapy. He subsequently developed progressive headache over several months, prompting updated MRI, which confirmed enlargement of the pituitary mass with new cavernous sinus and third ventricular involvement (Fig. 1C). CSF analysis identified worsening lymphocytosis, but comprehensive infectious workup remained unrevealing, including positron emission tomography–computed tomography imaging. In light of the clinical and radiographic disease progression, the patient was received repeat transsphenoidal resection of the sellar mass. Tissue cultures from this second resection specimen were positive for *N. farcinica*, susceptible to amikacin, minocycline, linezolid, and trimethoprim-sulfamethoxazole. A 2-month treatment protocol was initiated with trimethoprim-sulfamethoxazole and linezolid, during which time the headaches and visual deficits improved in tandem with radiographic resolution of residual disease (Fig. 1D). Pituitary deficits persisted in follow-up, while all test results for possible immunocompromise, including CD4 count and human immunodeficiency virus testing, remained negative.

## Discussion

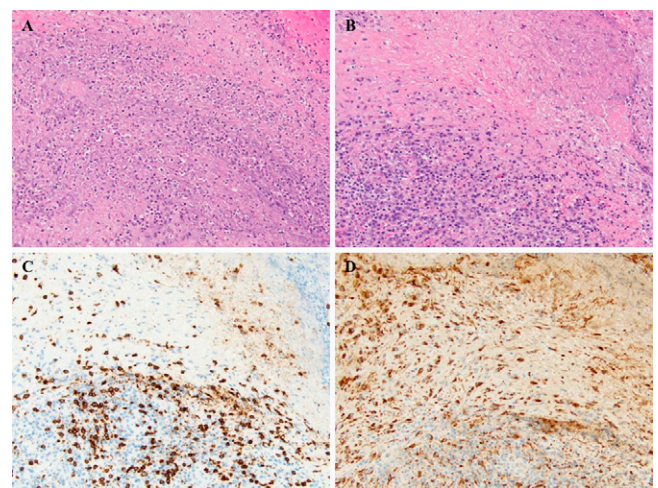
### Observations

We report the index case of a pituitary abscess attributable to *Nocardia* sp. (*N. farcinica*). In addition to a unique clinical history, the present case is noteworthy for the patient's young, healthy clinical status without evidence for immunocompromise and the difficulties encountered clinically in attempting to establish a definitive diagnosis. Taken together, these features emphasize the importance of atypical infectious processes in the differential diagnosis for sellar mass lesions.

*Nocardia* intracranial abscesses are rare; where observed, they appear to arise via hematogenous spread from a primary pulmonary source.<sup>3,12</sup> Abscess formation in nocardiosis is particularly rare absent immunocompromise,<sup>5</sup> however, scattered case reports have documented other unusual instances of *Nocardia* CNS abscesses



**FIG. 1. A:** Preoperative sagittal MR image with gadolinium showing abnormal soft tissue mass expanding the sella. **B:** Preoperative coronal MR image with gadolinium showing abnormal soft tissue mass expanding the sella. **C:** MR image with gadolinium from before the second surgery showing an increased size of the mass compared to preoperative imaging with extension into the cavernous sinus. **D:** Three-month postoperative MR image with gadolinium showing radiological regression of the mass.



**FIG. 2. A and B:** Low-power-magnification histopathological images showing a necroinflammatory process with granulomatous features. **C:** Low-power-magnification CD3 immunostain highlighting T cells. **D:** Low-power-magnification CD68 immunostain highlighting macrophages.

in healthy individuals.<sup>11</sup> As with many CNS mass lesions, *Nocardia* abscesses within the cerebral cortex prototypically present with signs or symptoms of raised intracranial pressure, including headache, nausea, vomiting, or altered mental status.<sup>3</sup> CNS nocardiosis appears to present synchronously with pulmonary disease; correspondingly, *Nocardia* sp. is an important consideration among individuals presenting with simultaneous nonneoplastic lung and brain lesions.<sup>3</sup>

Although our patient initially presented with an infectious pulmonary lesion that, in retrospect, was almost certainly attributable to *Nocardia* sp., his case does not fully adhere to this prototypical pattern. Most likely, this is due to the sellar rather than cerebral location of the intracranial mass lesion, which is more accommodating in terms of the lesion size that may be tolerated before symptoms develop, and the fact that the pattern of signs and symptoms will more likely involve the hypophyseal axis, visual system, or both rather than simple intracranial hypertension.<sup>1,2</sup>

Several other features of the present case are unusual and potentially insightful. The radiographic findings were clearly abnormal but not consistent with typical features of pituitary abscess, adenoma, or other more common sellar pathologies.<sup>2</sup> The infectious workup was also confounding throughout most of the patient's course, with many tests remaining equivocal even after the diagnosis was established, and infection was considered a less likely item on the differential until frank purulence was encountered intraoperatively. Although negative cultures are common in pituitary abscess across essentially all reported bacterial and fungal species, the intersection of a rare infection with an immunocompetent host likely explains the near-complete lack of definitive findings.<sup>2</sup>

Yet another key point is with respect to treatment: following the initial transsphenoidal resection, routine broad-spectrum agents were considered most reasonable, absent any microbiological data to guide decision-making. As the present case demonstrates, disease recurrence after debulking is a potentially morbid outcome, influenced by a range of factors such as antibiotic resistance, poor abscess penetration, and rapid disease spread into other anatomical compartments. This emphasizes the need for close follow-up and consideration for repeat imaging or neurosurgical exploration if an appropriate treatment response is not observed. Single-agent treatment with ertapenem failed to provide adequate disease control in the present case, indicating that multiagent strategies may be warranted for cases in which atypical organisms are suspected. Fortunately, following repeat transsphenoidal resection, microbiology data confirmed both the organism and antibiotic sensitivities, allowing initiation of definitive *N. farcinica* treatment with trimethoprim-sulfamethoxazole and linezolid combination therapy. Finally, although many patients with more routine *Nocardia* cerebral abscesses recover without residual deficit,<sup>5,11</sup> our patient had persistent pituitary dysfunction after treatment. This dysfunction reflects the sensitivity of the hypothalamic-pituitary axis to injury and is more aligned with the broader literature regarding mass lesions involving the sella.<sup>2</sup>

## Lessons

We report the index case of *N. farcinica*, which arose in a healthy, young, immunocompetent individual. His clinical course was challenging, particularly from a diagnostic perspective, with equivocal radiographic and laboratory findings delaying the ultimate diagnosis and definitive treatment. Although the present case is highly unusual, it emphasizes several important, generalizable lessons; most importantly, the importance of maintaining a degree of suspicion for atypical infections when more common diagnoses for a pituitary lesion have been excluded,

including among immunocompetent patients. Above all, we emphasize the highly variable range of diagnoses that may arise in and around the sella and recommend consideration for neurosurgical exploration as a means to potentially diagnose and treat symptomatic lesions that otherwise confound clinical investigation.

## References

1. Cabuk B, Caklılı M, Anık I, Ceylan S, Celik O, Ustün C. Primary pituitary abscess case series and a review of the literature. *Neuroendocrinol Lett.* 2019;40(2):99–104.
2. Gao L, Guo X, Tian R, et al. Pituitary abscess: clinical manifestations, diagnosis and treatment of 66 cases from a large pituitary center over 23 years. *Pituitary.* 2017;20(2):189–194.
3. Wilson JW. Nocardiosis: updates and clinical overview. *Mayo Clin Proc.* 2012;87(4):403–407.
4. Palmer DL, Harvey RL, Wheeler JK. Diagnostic and therapeutic considerations in *Nocardia asteroides* infection. *Medicine (Baltimore).* 1974;53(5):391–401.
5. Galacho-Harriero A, Delgado-Lopez PD, Ortega-Lafont MP, Martin-Alonso J, Castilla-Diez JM, Sanchez-Borge B. *Nocardia farcinica* brain abscess: report of 3 cases. *World Neurosurg.* 2017;106:1053.e1015–1053.e1024.
6. Budzik JM, Hosseini M, Mackinnon AC Jr, Taxy JB. Disseminated *Nocardia farcinica*: literature review and fatal outcome in an immunocompetent patient. *Surg Infect (Larchmt).* 2012;13(3):163–170.
7. Wallace RJ Jr, Tsukamura M, Brown BA, et al. Cefotaxime-resistant *Nocardia asteroides* strains are isolates of the controversial species *Nocardia farcinica*. *J Clin Microbiol.* 1990;28(12):2726–2732.
8. Brown JM, Pham KN, McNeil MM, Lasker BA. Rapid identification of *Nocardia farcinica* clinical isolates by a PCR assay targeting a 314-base-pair species-specific DNA fragment. *J Clin Microbiol.* 2004;42(8):3655–3660.
9. Mylona E, Golfino-poulou S, Tragousti A, Skoutelis A. Primary *Nocardia farcinica* brain abscess with secondary relapsing meningitis in an immunocompromised patient. *J Med Cases.* 2015;6(7):304–306.
10. Chaudhari DM, Renjen PN, Sardana R, Butta H. *Nocardia Farcinica* brain abscess in an immunocompetent old patient: a case report and review of literature. *Ann Indian Acad Neurol.* 2017;20(4):399–402.
11. Menkü A, Kurtsoy A, Tucer B, Yildiz O, Akdemir H. *Nocardia* brain abscess mimicking brain tumour in immunocompetent patients: report of two cases and review of the literature. *Acta Neurochir (Wien).* 2004;146(4):411–414.
12. Kumar VA, Augustine D, Panikar D, et al. *Nocardia farcinica* brain abscess: epidemiology, pathophysiology, and literature review. *Surg Infect (Larchmt).* 2014;15(5):640–646.

## Disclosures

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

## Author Contributions

Conception and design: Meyer, Carlstrom, Graffeo. Acquisition of data: Meyer, Scheitler, Carlstrom, Graffeo. Analysis and interpretation of data: Meyer, Scheitler, Graffeo. Drafting the article: Scheitler, Bauman. Critically revising the article: all authors. Reviewed submitted version of manuscript: Meyer, Bauman, Carlstrom, Graffeo. Administrative/technical/material support: Carlstrom. Study supervision: Carlstrom, Graffeo.

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