

The Diagnostic Conundrum of a Brain Abscess

First Author: Jessica Rose

Classification: EM resident

Additional Authors: Caroline Molins, MSMed

Affiliations: Advent Health East Orlando Emergency Department

Research Type: Case Report Abstract

IRB Approval or Exemption: No

Mailing Address of First Author: 926 Warehouse Rd, Apt 90210
Orlando, FL, 32803

Email Address of First Author: jlrose1993@gmail.com

Official submission to the FCEP Emergency Medicine Research Competition at Symposium by the Sea 2022

Title: The Diagnostic Conundrum of a Brain Abscess

Introduction: Brain abscess is a focal collection within the brain parenchyma, which can be caused by infections, surgery, or trauma which can occur through direct or hematogenous spread. A wide variety of pathogens may cause brain abscess as it varies depending upon the site of the primary infection, patient demographic, and epidemiologic risk factors. Despite advances in treatment and management of brain abscesses over the past few decades, mortality remains high. There is high variability among etiology and clinical presentations along with very nonspecific and often subtle symptoms which poses a significant challenge to clinicians. Therefore, it is of utmost importance for clinicians to maintain a high clinical suspicion for early evaluation and treatment. The typical clinical presentation includes fever, headache, and focal neurologic deficit, however, the minority of patients present with all three signs or symptoms. Therefore, brain abscess should be considered in any patient presenting with altered mental status (AMS) or focal neurological signs. The overall aims of this case report are to increase awareness and encourage physicians to maintain a high level of suspicion in patients that present with AMS to the emergency department (ED).

Case description: A 49 year-old male with a history of diabetes, hypertension, and tobacco abuse presented to the emergency department with AMS, agitation, headache, nausea and vomiting. Despite multiple doses of medication for symptom relief, the patient's AMS led to agitation, confusion and ultimately combative behavior. Despite medication, the patient required procedural sedation for Head CT. Many diagnoses were considered including but not limited to subarachnoid hemorrhage, cerebral vascular accident, drug abuse, alcohol withdrawal, and infection. After initial Head CT without contrast which was reported as unremarkable (Image 1), the patient required intubation due to confusion and combative behavior and then a lumbar puncture was performed, at which time the patient developed a fever which prompted the emergency physicians to initiate treatment with broad spectrum antibiotics, intravenous fluid resuscitation and blood cultures. Cerebral spinal fluid (CSF) analysis revealed neutrophilic pleocytosis leading to a presumptive diagnosis of meningitis. Upon admission to the ICU, the patient's neurological status decompensated prompting a second Head CT without contrast approximately 10 hours later (Image 2). This second scan revealed findings suspicious for a 1.8 cm abscess in the right parietal periventricular white matter decompressed into the right lateral ventricle with associated ventriculitis and purulent material layering within the right lateral ventricle, global cerebral edema and new mild obstructive hydrocephalus.

Discussion: As evident by the patient's case above, there is a diagnostic conundrum when it comes to brain abscesses. Brain abscesses are a potentially life-threatening condition requiring rapid identification and treatment. Most patients with brain abscesses are older and often immunocompromised with multiple underlying conditions. Common pathogens include *Staphylococcus* spp., *Streptococcus* spp., and gram-negative bacteria. Antibiotic therapy should be initiated as soon as there is suspicion for brain abscess because delay in administration is associated with increased mortality. Broad spectrum antibiotic therapy is recommended until the cultures are available since over 27% of all brain abscesses are polymicrobial. A definitive diagnosis of brain abscess is based on MRI or CT in addition to cultures of blood and cerebrospinal fluid. Any brain abscess over 1 cm should undergo stereotactic aspiration by a skilled neurosurgeon for diagnostic and treatment purposes. Steroids may be administered when mass effect is shown on imaging to reduce edema and neurologic sequelae. The duration of antibiotics must be individualized, however should usually last at least four to eight weeks. The prognosis of brain abscess has improved since the utilization of CT, however, mortality in hospitalized patients with brain abscess varies from 5% to 32%. In conclusion, brain abscesses

are a critical diagnosis that should be considered in patients who present to the emergency department with altered mental status, confusion, headache and/or fever. An increased awareness of the various clinical presentations of brain abscess and a high index of clinical suspicion can aid in a rapid diagnosis and improve survival in an otherwise fatal disease. This case highlights the importance of CT and lumbar puncture for diagnosis when an infectious process is considered along with early initiation of broad-spectrum antibiotics.

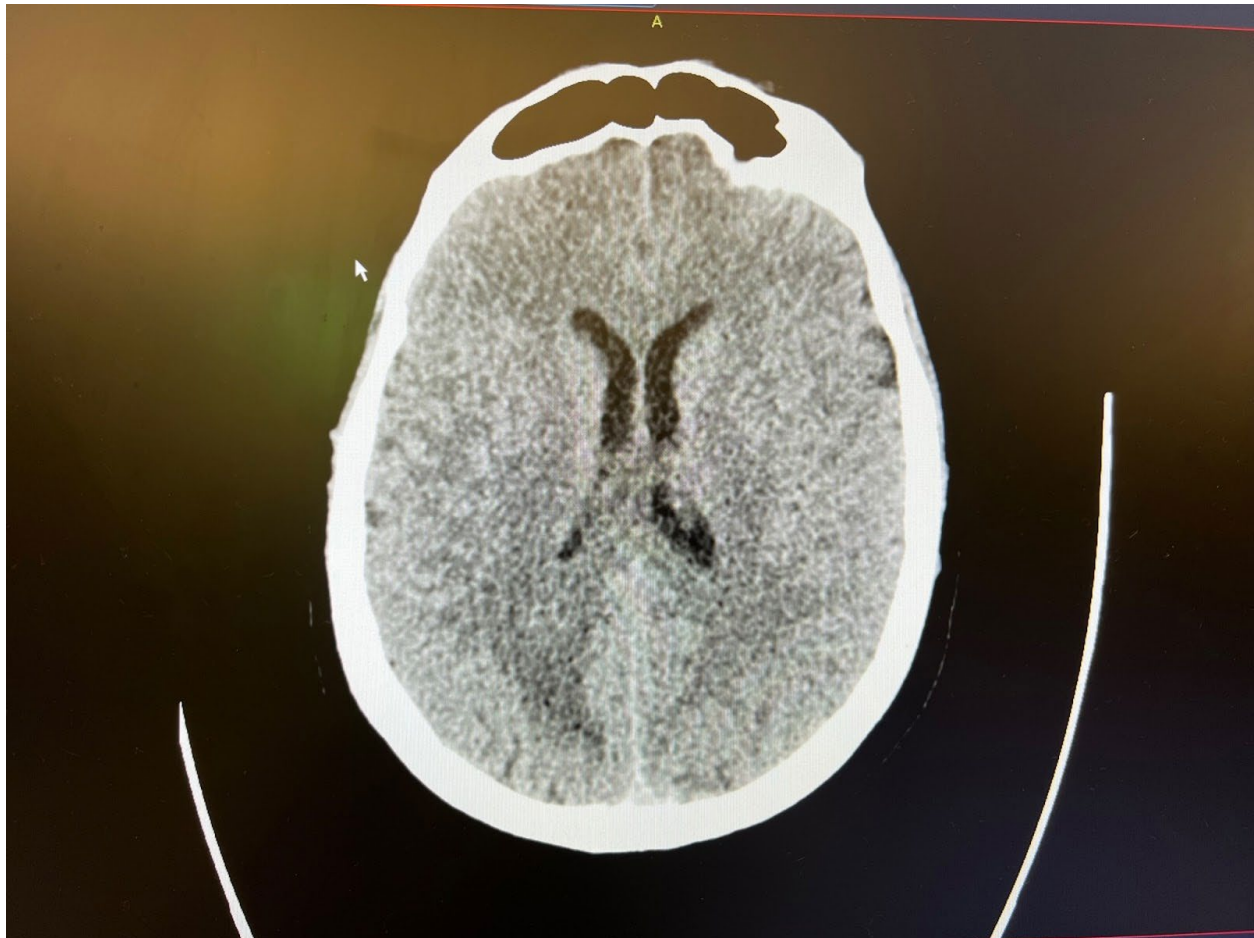


Image 1

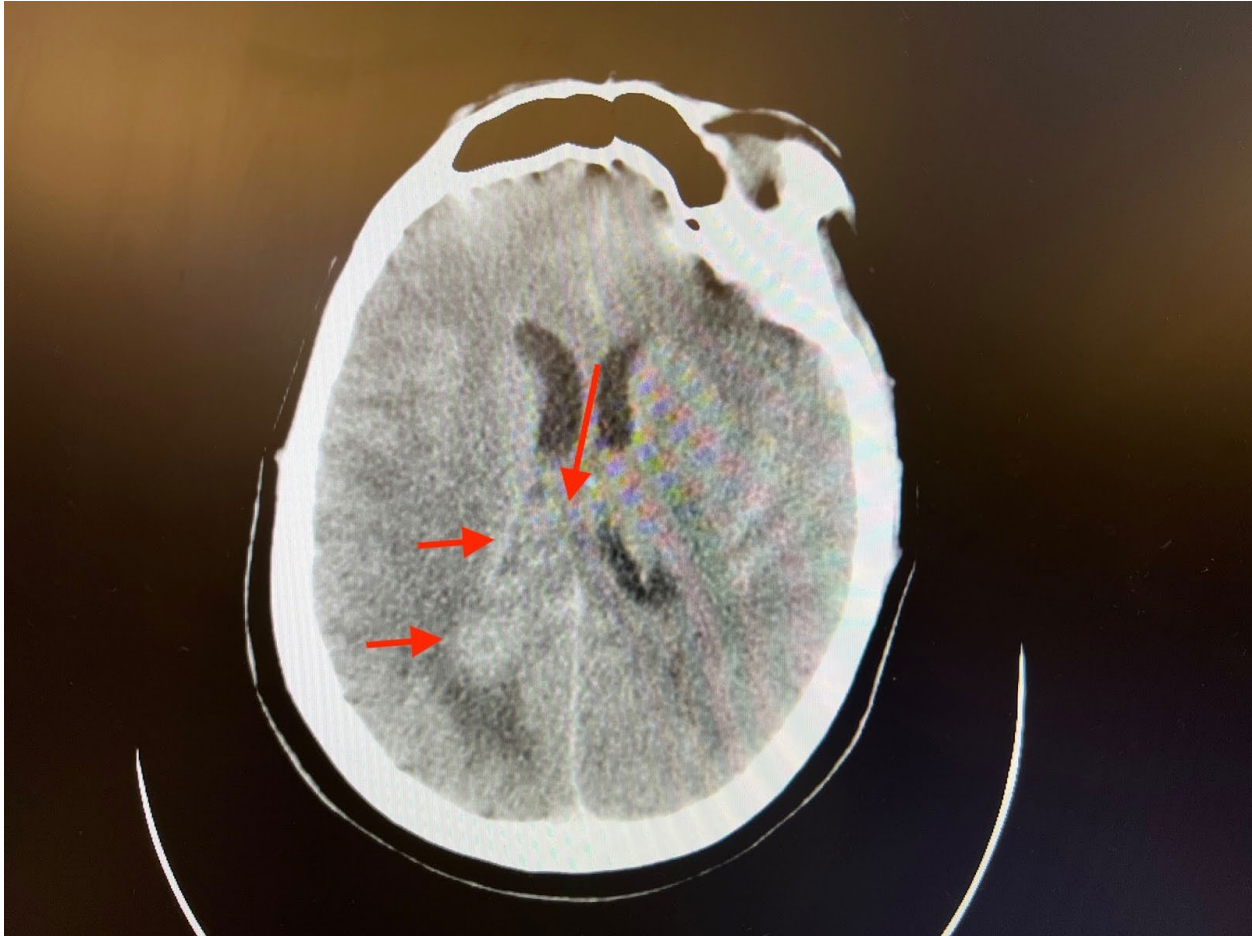


Image 2

References:

Rivera K, Truckner R, Furiato A, Martinez S. The Diagnostic Challenge of the Pediatric Brain Abscess. *Cureus*. 2021 Jun 2;13(6):e15402. doi: 10.7759/cureus.15402. PMID: 34104611; PMCID: PMC8174389.

Corsini Campioli C, Castillo Almeida NE, O'Horo JC, Esquer Garrigos Z, Wilson WR, Cano E, DeSimone DC, Baddour LM, Van Gompel JJ, Sohail MR. Bacterial Brain Abscess: An Outline for Diagnosis and Management. *Am J Med*. 2021 Oct;134(10):1210-1217.e2. doi: 10.1016/j.amjmed.2021.05.027. Epub 2021 Jul 21. PMID: 34297973.

Oordt-Speets AM, Bolijn R, van Hoorn RC, et al. Global etiology of bacterial meningitis: A systematic review and meta-analysis. *PLoS One* 2018; 13:e0198772

Brouwer MC, Tunkel AR, McKhann GM 2nd, van de Beek D. Brain abscess. *N Engl J Med*. 2014 Jul 31;371(5):447-56. doi: 10.1056/NEJMra1301635. PMID: 25075836.

Fumihiro Ochi, Hisamichi Tauchi, Toyohisa Miyata, Tomozo Moritani, Toshiyuki Chisaka, Junpei Hamada, Kozo Nagai, Minenori Eguchi-Ishimae, Mariko Eguchi,

"Brain Abscess Associated with Polymicrobial Infection after Intraoral Laceration: A Pediatric Case Report", *Case Reports in Pediatrics*, vol. 2020, Article ID 8304302, 5 pages, 2020. <https://doi.org/10.1155/2020/8304302>

Patel, K., & Clifford, D. B. (2014). Bacterial brain abscess. *The Neurohospitalist*, 4(4), 196–204. <https://doi.org/10.1177/1941874414540684>