

Case Report & Case Series

Cryptogenic left parieto-occipital brain abscess in a previously healthy 24 year old woman



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ABSTRACT

Background: Brain abscesses are a rare form of neurologic infection that can be attributed to a primary source of infection 60–70% of the time. Cases that cannot be attributed to a primary source of infection are rare and are deemed cryptogenic. Brain abscesses are more commonly seen in the frontal & temporal lobes contiguous with primary infections. Parietal and occipital lobe abscesses are uncommon locations. Diagnosis is typically made through advanced imaging, CT scan or MRI. Treatment involves neurosurgical drainage and intravenous antibiotics. Prognosis of an abscess depends on myriad factors but residual neurologic deficits or development of epilepsy can be seen. Death can occur if an abscess ruptures or the abscess is complicated by the patient's underlying chronic health problems.

Case study: A 24 year old, previously healthy and immunocompetent woman presented to the emergency department with complaints of new headache and suspected seizure at home. She subsequently had two witnessed seizures in the ER and underwent CT of the head which showed a parieto-occipital mass, suspected to be a neoplasm. MRI findings were consistent with CT, abscess was less likely. She underwent biopsy which revealed a brain abscess with *Streptococcus intermedius*. No primary source of infection or risk factor other than marijuana use was identified. During regular screening her abscess increased in size and she subsequently underwent further drainage and intravenous antibiotic therapy.

Conclusion: Advanced imaging has helped to diagnose brain abscesses in patients who present with new neurologic complaints. While brain abscesses are rare they should remain on a clinician's differential in a patient with new neurologic symptoms, particularly if they have risk of developing an abscess such as immunodeficiency, recent neurologic procedure, or cranial trauma. Clinicians must be aware that an abscess can occur without risk factors being present such as this case.

1. Introduction

Brain abscesses represent a rare, and potentially catastrophic, form of neurologic infection with ~1500–2500 cases/year seen in the United States [1,2]. An abscess can occur at any age though there exists a bimodal distribution with some series reporting 25% of cases occurring in adolescents < 15 years old, and a majority occurring between the ages of 24–57. Additionally, literature including retrospective analysis of brain abscesses shows a male predominance with a range of 1.5–4.5:1 men to women [2,3]. While the brain is notably resistant to infection a brain abscess can occur secondary to direct inoculation due to trauma, sinus, ear, or dental infections, and occasionally from hematologic seeding from extracranial sources [1,4]. However, 20–30% of reported brain abscesses lack a defined source of infection and are thus identified as cryptogenic [4]. The location of a brain abscess is often consistent with the origin of infection. Paranasal sinus infections can result in frontal lobe abscesses and severe otogenic infections can spread to the

temporal lobe. Metastatic spread of infection can mimic distribution of the middle cerebral artery and involve any lobe [4]. Abscesses are most commonly seen in the frontal lobe, followed by temporal and parietal lobes, with occipital lobe being more rarely reported [3,5].

The microbiological flora of an abscess is often dependent on specific location of the abscess along with the likely source of seeding. In an immunocompetent host, Streptococci, Enterobacteriaceae, Staphylococci, and anaerobes such as Bacteroides and Fusobacterium are most often seen [4]. As such, the coverage with antibiotics typically presumes infection with the above.

The clinical presentation of a patient with a brain abscess features complaints consistent with increased intracranial pressure such as headache, nausea, emesis, altered mental status, seizure, or other neurologic symptoms [1,2,4].

Headache is the most common presenting sign and is often difficult for the patient to characterize [3,4]. Fever is notably seen < 55% of the time, and it is reported that new onset seizures account for the initial

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presentation of an abscess anywhere from 16 to 50% of the time [1,3,4].

The advent of CT and the availability of MRI have significantly aided in the diagnosis of a brain abscess. It is through these studies that an abscess is typically diagnosed. Basic laboratory studies, such as a complete blood count, are often noncontributory and do not rule out the diagnosis [2,4].

Typical treatment involves prompt antibiotic therapy and neurosurgical intervention to drain the abscess [1,2,4]. After drainage, intravenous antibiotics should be continued for several weeks with serial imaging to ensure resolution of the abscess [2,4].

Persistent epilepsy can result after diagnosis and treatment of an abscess and focal neurologic deficits are not uncommon [2]. The most worrisome complication of an abscess is intraventricular rupture which can cause a patient's condition to rapidly deteriorate. Prognosis following an intraventricular rupture is almost universally poor with severe debility, neurologic deficits, or death occurring [2,5].

Despite the seriousness of complications, the availability of advanced imaging and surgical intervention has decreased the mortality from the pre-CT era from 40 to 60% to currently a reported all-cause mortality of 5–32% [1,2].

2. Case report

The patient is a 24-year-old woman with a past medical history significant for kidney stones, non-recurrent urinary tract infections, and Prothrombin G20210A Mutation. Social history was significant for regular marijuana use. She presented to the emergency department with her family for altered mental status and suspected seizure at home. Her boyfriend, whom she lived with, reported that she began to complain of headaches the day before presentation and had no history of headaches or migraine. The following day her headache resolved, however, she appeared confused at home and suffered a suspected, but unwitnessed seizure that prompted her family to bring her to the emergency department.

In the emergency department she had two witnessed seizures. Vital signs were unremarkable. Labs were unremarkable apart from an elevated white blood count (WBC) of 12.3 K/ μ L. CT of the head showed a “wedge-shaped area of heterogeneous primarily decreased attenuation in the left parietal-occipital region, measuring up to 4.2 \times 3.4 \times 4.3 cm. Within this area of decreased attenuation was a cystic-appearing focus measuring 1.4 \times 1.9 \times 1.9 cm.” MRI follow-up was recommended. The differential diagnosis at this time included subacute infarction, intra-axial mass lesion with adjacent vasogenic edema, or abscess. CT of the abdomen and pelvis was performed given complaints of abdominal pain and history of kidney stones which was negative.

MRI showed a lobular mass lesion of the left paramedian parieto-occipital region which demonstrated rim enhancement of the largest lobular component and less rim enhancement of other components with surrounding edema and moderate blood supply (Fig. 1). Findings were suggestive of cystic primary neoplasm or cystic astrocytoma. Brain abscess was noted to be less likely.

Neurosurgery was consulted at time of admission and planned for outpatient brain biopsy. During her stay she remained neurologically intact after resolution of altered mental status with primary complaints of headache and nausea. She was discharged from this initial hospital stay with steroids, pain medication, anti-nausea medication, and levetiracetam for seizure prophylaxis.

She was brought back to the hospital shortly after her discharge for an outpatient brain biopsy. During the operation a Navigus Biopsy needle was passed into the core of the lesion. When samples were pulled back, ~25 mL of purulent material was expressed from the lesion. This was sent to pathology and microbiology at the time of the surgery and was confirmed to be pus. The field was irrigated at that time and the patient's operational site closed.

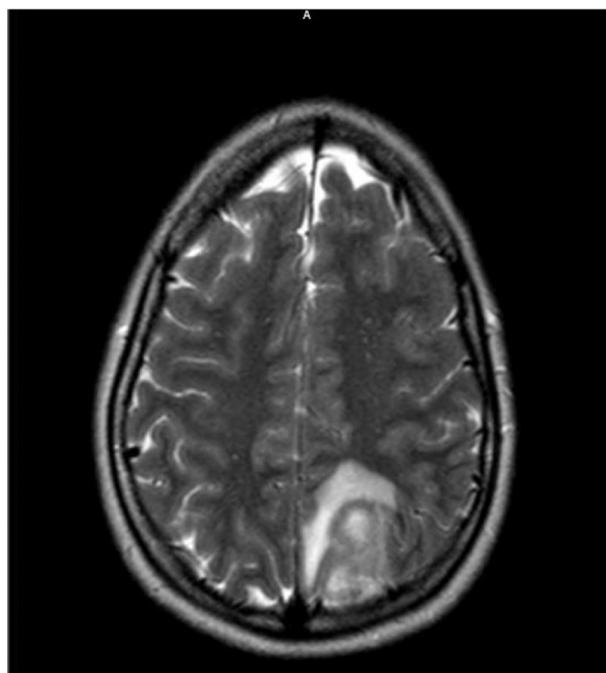


Fig. 1. Initial MRI on day of admission showing a lobular mass lesion of the left paramedian parieto-occipital region with rim enhancement. Interpreted as a cystic primary neoplasm or cystic astrocytoma. Brain abscess less likely.

Infectious disease was consulted and they noted no history or physical examination findings that would be consistent as the cause for abscess formation. The patient was started on IV vancomycin along with ceftriaxone and metronidazole empirically. HIV tests and toxoplasma serology were negative. The patient denied any neurologic symptoms apart from headache that was intermittent accompanied by occasional nausea. Wound cultures grew *Streptococcus intermedius*. She was subsequently discharged and finished a course of IV metronidazole and ceftriaxone outpatient.

Despite antibiotic treatment a follow-up MRI after six weeks showed an extension of the previous brain abscess (Fig. 2). She was readmitted, underwent a second drainage operation, and received further IV antibiotic treatment. Hospital course otherwise was notable for two of two positive blood cultures with *Staphylococcus epidermidis*, though repeat cultures and transthoracic echocardiogram was negative. Her hospital course was otherwise unremarkable and she was discharged with IV vancomycin and ceftriaxone in addition to PO metronidazole. Over the following six months her brain abscess resolved though breakthrough seizures continue to occur. The cause of the abscess remains undetermined.

3. Discussion

This case was unique for several reasons. A brain abscess formed in a previously healthy immunocompetent 24 year old woman without significant risk factors. The location that the abscess formed was also uncommon, and despite substantive workup, no etiology was determined. Additionally, her underlying G21012 mutation should remind clinicians to consider the ramifications of a patient's entire health history, particularly with a severe pathologic process such as this. In her case, with a recurrent abscess and repeated hospitalizations, she is at an even more substantial risk of DVT despite her young age.

While advanced imaging, CT and MRI, are tools that greatly aid in the diagnosis of an abscess or other brain lesion, it is important to remember that they are far from definitive. As noted in this case, initial findings were believed to be consistent with a primary cystic neoplasm rather than an abscess and initial workup and plan was formulated

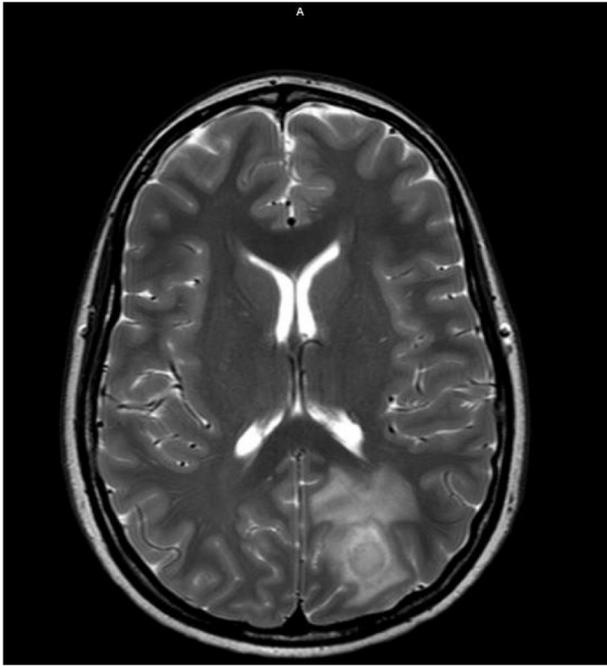


Fig. 2. Follow-up MRI after initial drainage and intravenous antibiotic course showing persistent left parietal abscess with slight enlargement and new channel extending anteriorly.

behind this thought prior to her biopsy.

Clinicians should remain alert that new neurologic symptoms, such as seizure, may be the first sign of a brain abscess despite a patient's lack of risk factors. Once an abscess is diagnosed a complete survey should be undertaken to determine the etiology. Clinicians should be aware

that in rare circumstances an etiology may not be determined.

Lastly, clinicians who are seeing a patient with a history of brain abscess and new non-specific symptoms should maintain a low threshold for imaging studies to evaluate for a reoccurrence of the abscess. The risks and benefits of such a scan should be considered as patients with abscesses are likely to have already had significant radiologic exposure from imaging studies.

4. Conclusion

The patient's case above highlights the rare case of a cryptogenic parieto-occipital brain abscess in an immunocompetent young woman. While surgical management combined with IV antibiotic therapy is the standard of care, recurrence remains a possibility and clinicians should remain observant in those patients who have been diagnosed with an abscess in the past. Though rare, brain abscess should remain on a clinician's differential after development of new neurologic symptoms in a patient, particularly if they have other serious infections, are immunocompromised, or have had skull trauma.

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