

EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

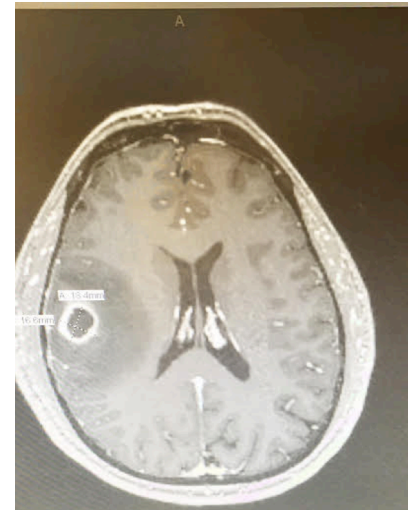
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Brain Abscess

A 48-year-old male with past medical history of HIV, Syphilis treated with penicillin, and Hepatitis B presents to the ED with progressively worsening right-sided headache and focal seizures without loss of consciousness. He experienced similar symptoms three weeks ago where a CT and MRI showed a single, solitary lesion in his right frontal-temporal lobe. Subsequent biopsy of the lesion revealed a MRSA+ brain abscess and he was started on empiric antibiotics with Vancomycin and prescribed Keppra for seizure prophylaxis. His last CD4+ count was 498 1 month ago. Today, he denies any visual disturbances, syncope, nausea, or vomiting. Patient is afebrile and vitals are within normal limits. On physical exam, the patient has weakness and sensory deficits in his left upper and lower extremities. Cranial nerves are intact. Remainder of the physical exam is unremarkable. However, at the end of the exam, patient developed clonus in his left face and upper extremities that continued for a period longer than 5 minutes. Which of the following is the most appropriate management for this patient's condition?

- A. CT with contrast of the brain
- B. Phenytoin IV
- C. Lorazepam IV
- D. Prepare to take patient back to operating room
- E. Dexamethasone IV



DDx of Brain Abscess:

- Bacterial meningitis
- Primary or metastatic cancer
- Septic dural sinus thrombosis
- Cysticercosis
- Encephalitis
- Cryptococcosis
- PML
- Toxoplasmosis

EM Case of the Week is a weekly "pop quiz" for ED staff.

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

BROWARD HEALTH MEDICAL CENTER

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Warriors

The correct answer is **C. Lorazepam**. The patient is currently seizing and Ativan is first line and should be given in order to stop the seizure. MRI is more sensitive for detecting lesions when compared to CT, but CT scan should be performed first due to its accessibility in an emergent setting. A lumbar puncture can be performed, but is contraindicated prior to CT in patients with focal neurological signs of lesions producing mass effect due to risk of brain-stem herniation. Steroids can be given once a diagnosis is made and discontinued once the mass effect and neurologic manifestations have improved but it is not a first line treatment.

Brain abscesses are a relatively rare cause of mass lesions. They are a focal suppurative collection within the brain parenchyma. Bacteria typically invade the brain through direct spread from a primary site or through hematogenous seeding. Bacterial spread through the **paranasal sinus** tracts needs to be considered with a newly diagnosed brain abscess. Other causes of direct spread include dental infections, mastoiditis, trauma, or iatrogenically following neurosurgery. Hematogenously, abscesses can develop through seeding of the brain by lung infections, skin infections, endocarditis, and pulmonary AV malformations. Usually, abscesses that arise from a hematogenous source develop **multiple** abscesses at the grey-white matter junction and those that arise from a direct spread typically develop a **solitary** lesion.

Immunocompromised Hosts:

Opportunistic infections causing mass lesions become more prevalent in severely immunosuppressed patients with **CD4 counts <200** and these must be added to your differential.

Solitary large lesions in an immunocompromised host is suspicious for primary CNS lymphoma, especially if constitutional symptoms such as fever, weight loss, and night sweats are present. *Toxoplasmosis* usually has multiple ring-enhancing lesions and is seen with CD4 counts <100. PML is another cause of a brain lesion. PML is a demyelinating disease caused by reactivation of the JC virus and it generally presents with altered mental status, limb ataxia, and visual disturbances. PML shows as symmetric, hypodense regions that do not enhance with contrast. Fungal causes of abscesses become more prevalent in the immunocompromised host and are usually defined by multiple lesions.

Organisms:

The bacteria most frequently encountered in brain abscesses are ***Staphylococcus aureus*** and ***Streptococcus viridans*** species. *Bacteroides*, *Haemophilus*, *Enterobacteriaceae*, and *Pseudomonas* are also occasionally cultured. In the immunosuppressed hosts, a wide variety of organisms are encountered including fungal organisms such as *Aspergillus*, *Cryptococcus*, and *Coccidioides*. Additionally, *Toxoplasma* and *Listeria* can prove to be the source of infection.

Table 1. Predisposing Conditions and Microbial Isolates in Patients with Brain Abscess.*

Predisposing Condition	Common Microbial Isolates
Immunocompromise	
HIV infection	<i>Toxoplasma gondii</i> , nocardia and mycobacterium species, <i>Listeria monocytogenes</i> , <i>Cryptococcus neoformans</i>
Neutropenia	Aerobic gram-negative bacilli, aspergillus species, Mucorales, candida and scedosporium species
Transplantation	Aspergillus and candida species, Mucorales, scedosporium species, Enterobacteriaceae, nocardia species, <i>T. gondii</i> , <i>Mycobacterium tuberculosis</i>
Contiguous spread of bacteria	
Penetrating trauma or neurosurgery	<i>Staphylococcus aureus</i> , <i>S. epidermidis</i> , streptococcus species (anaerobic and aerobic), Enterobacteriaceae, clostridium species†
Otitis media or mastoiditis	Streptococcus species (anaerobic and aerobic), bacteroides and prevotella species, Enterobacteriaceae†
Paranasal sinusitis	Streptococcus species (anaerobic and aerobic), bacteroides species, Enterobacteriaceae, <i>S. aureus</i> , haemophilus species†
Hematogenous spread of bacteria	
Lung abscess, empyema, bronchiectasis	Fusobacterium, actinomyces, bacteroides, prevotella, nocardia, streptococcus species
Bacterial endocarditis	<i>S. aureus</i> , streptococcus species
Congenital heart disease	Streptococcus and haemophilus species
Dental infection	Mixed infection with fusobacterium, prevotella, actinomyces, bacteroides, and streptococcus species (anaerobic and aerobic)

* HIV denotes human immunodeficiency virus.

† The Enterobacteriaceae include *Escherichia coli* and enterobacter, klebsiella, proteus, and salmonella species.

For a list of educational lectures, grand rounds, workshops, and didactics please visit BrowardER.com and click on the **"Conference"** link.

All are welcome to attend!

Signs/Symptoms:

The symptoms of a brain abscess depend on the location of the lesion. **Headache** is the most common symptom of brain abscesses seen in ~70% of patients. The pain is localized to the site of the abscess and is unlikely to be relieved by OTC medications. Fever, seizures, and papilledema are also common manifestations of an abscess. Focal seizures and other neurologic symptoms depend on the location of the lesion. **However, the triad of fever, headache, and focal deficits occur in less than 50% of all patients with an abscess**

Diagnosis:

When a brain abscess is suspected, a CBC, CRP/ESR, blood culture, CT with/without contrast, MRI, lumbar puncture, and cerebral lesion biopsy with histopathological examination and gram stain/culture should all be ordered.

Treatment:

In a solitary abscess, emergent surgery should be performed. The size of the abscess determines the procedure performed. Those larger than 2.5cm are excised, and those smaller than 2.5 cm are aspirated for diagnostic purposes. Abscesses smaller than 2.5cm have a higher likelihood of responding to antibiotics. Antibiotics should be tailored to the cultured bacteria and be given for 6-8 weeks. The antibiotic must be able to cross the blood brain barrier, therefore aminoglycosides, clindamycin, and first generation cephalosporins should never be used.

Treatment should begin with Metronidazole 15mg/kg IV + Penicillin G 20 million units per day IV for an abscess arising from an oral or sinus source

For brain abscesses arising from a hematogenous spread, unknown source, or from postop neurosurgical patients, Vancomycin 15mg/kg/dose IV q8h + another antibiotic should be started

Take Home Points

- Brain abscesses generally presents with headache and neurologic deficits depending on the location of the lesion. The patient may often be afebrile
- Lumbar puncture is an absolute contraindication until a CT is performed to prevent brainstem herniation.
- CT is the best initial modality, but MRI provides better enhancement of the lesion and is the preferred imaging modality;
- Long-term broad-spectrum antibiotics that cross the blood brain barrier are required, and antibiotic choice can be started depending on potential source of infection. Surgery should not be delayed and the decision for aspiration or excision depends on the size of the abscess.



ABOUT THE AUTHOR

This month's case was written by Matthew Risendal. Matthew is a 4th year medical student from NSU-COM. He did his emergency medicine rotation at BHMC in January 2017. Matt plans on pursuing a career in Urology after graduation.

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