

EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

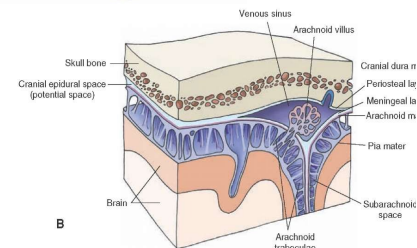
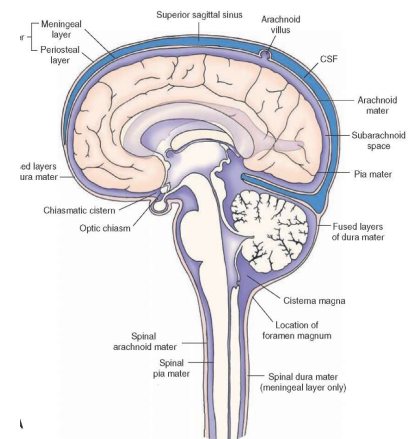
Author: Vanessa Freeman, MS IV | Editors: Andrea Sarchi, DO ; Jason Mansour, MD

December 2016 | Vol 3 | Issue 15

Meningitis: More than a Headache

A 39-year-old female with no past medical history presents to the ED with severe, bilateral, generalized, non-radiating, 9/10 headache that has persisted for the past 24 hours. She has taken several over-the-counter analgesics to no avail and has never had a headache like this before. She endorses nausea, subjective fever, sweats, malaise, and a feeling of "slowness" with the onset of the headache. She also reports flu-like symptoms with congestion for the past 3 days. She denies photophobia, phonophobia, change in weight/appetite, recent sick contacts, or recent travel. Her temperature is 102°F; blood pressure is 110/72, and pulse is 100 bpm. Physical exam is positive for nuchal rigidity, otherwise unremarkable. Which of the following are the most appropriate initial steps in managing this patient's condition?

- A. Order a CBC with differential, blood cultures, chemistry panel, and INR; perform a stat lumbar puncture and obtain a head CT scan
- B. Obtain a head CT scan and perform a stat lumbar puncture
- C. Order a CBC with differential, blood cultures, chemistry panel, and INR; perform a stat lumbar puncture
- D. Order a CBC with differential, blood cultures, chemistry panel, and INR; begin empiric antibiotic treatment, then perform a lumbar puncture



Meningitis, defined as inflammation of the meningeal membranes that surround the brain and spinal cord, is usually associated with infectious causes; these can be viral, bacterial, or parasitic. The characteristic triad includes:

- (1) Fever
- (2) Nuchal rigidity
- (3) Altered mental status

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.

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Department of Emergency Medicine
1625 SE 3rd Avenue
Fort Lauderdale, FL 33316

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The correct answer is D. **Ordering a CBC with differential/blood cultures/chemistry panel/INR, initiating empiric antibiotic treatment, and performing a stat lumbar puncture is the best choice for the initial steps in management of this case.**

This patient is presenting with the characteristic triad of meningitis: fever, nuchal rigidity, and altered mental status. As she was noticing “slowness” – latency in response times and overall information processing – she was likely approaching a state of altered mentation. Additionally, she had a severe headache which is common in meningitis. Generally, 2 of the 4 main symptoms (fever, nuchal rigidity, headache and altered mental status) is present in 95% of patients with meningitis. Patients may also present with photosensitivity and seizures. The elderly may have an atypical presentation such as lethargy without fever.

In this patient, the next step in diagnosis is ordering labs in which case a WBC > 10,000 would be expected and to determine other lab abnormalities as a cause of infection. If bacterial meningitis is clinically suspected, as in this case, empiric antibiotic treatment should be initiated before a lumbar puncture is performed. An analysis of the cerebral spinal fluid with an LP will likely determine the source of infection and either confirm or direct treatment changes if needed. A CT is not indicated in this patient because of the lack of focal neurologic deficits.

DISCUSSION

How does one get meningitis? It is the result of an infectious agent entering the central nervous system through the following ways:

- Invasion into the bloodstream
- Retrograde transport along central or peripheral nerves
- Spread from the facial sinuses and/or respiratory tract (e.g. via sinusitis, otitis media, surgery, or trauma.)

In the US, the incidence of aseptic meningitis is greater than that of bacterial meningitis. Clinically, bacterial meningitis cannot be distinguished from aseptic meningitis – that is, infection from viruses, fungi, and parasites – by symptomology. Whether aseptic or bacterial, acute meningitis is defined by onset of symptoms within hours to days; it is a medical emergency and thus must be recognized immediately to prevent high morbidity and mortality.

In addition to the symptoms presented in the patient above, some characteristic alarming signs on physical exam may be Kernig’s sign (resistance to passive extension of the knee when supine with hip and knee flexed at 90°) and Brudzinksi’s sign (involuntary flexion of hip or knee with neck flexion while supine), focal neurologic deficits (hemiparesis, cranial nerve palsies, aphasia, or changes in vision), papilledema, or rash (maculopapular, petechial, or purpuric). If a patient presents with any of these symptoms, the initial evaluation must include a lumbar puncture with the addition of routine labs and a blood culture.

CSF Finding in Bacterial Versus Aseptic Meningitis			
	Normal	Bacterial	Aseptic
WBC count (cells/mm ³)	<5	>1000 (1000-20000)	<5000
WBC differential	All lymphocytes or monocytes, no PMNs	Mostly PMNs	Mostly lymphocytes and monocytes
Glucose (mg/dL)	50-75	Low	Normal/slightly elevated
Protein (mg/dL)	<60	High	Moderate elevation

Patients with risk factors for occult intracranial abnormalities, typically those who present with focal neurologic symptoms, should undergo CT scan of the brain before LP. This includes patients with CNS disease (including CSF shunts, hydrocephalus, trauma, space-occupying lesions or recent neurosurgery, immunocompromised state, papilledema, focal neurologic signs) and adults with new-onset seizures or moderately to severely impaired

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consciousness. During the initial evaluation, therapeutic treatment should closely follow. When a CT scan is indicated prior to performing a LP, blood cultures should be obtained followed by the initiation of empiric treatment. This is done to prevent interference with the yield of blood culture and CSF results.

TREATMENT

Initial empiric treatment for bacterial meningitis is based on the patient's age, clinical features, and risk factors for infection. Typically, the patient is started on a 3rd generation cephalosporin (gram negative coverage) as well as vancomycin (gram positive coverage), which covers the common bacterial pathogens until results are obtained. Once diagnostic testing is complete, if it is found that aseptic meningitis is the case, antimicrobial therapy can be discontinued. If the results are unequivocal, however, then antimicrobial therapy should continue.

The most common causes of aseptic meningitis are enteroviruses which do not require antimicrobial therapy. Other causes are herpes species (HSV-1 and VZV), cytomegalovirus, and arboviruses, among others. The only antiviral agents used in viral meningitis at this time are acyclovir (HSV and VZV) and ganciclovir (CMV).

Empiric treatment of Meningitis		
Age or Risk Factor	Likely etiology	Empiric treatment
Infants (< 3mo)	Group B streptococci, E.coli, Klebsiella, Listeria	Cefotaxime +ampicillin +vancomycin
3mo-50yo	Neisseria meningitides, S. pneumo, H. Influenzae	Ceftriaxone IV + vanco IV
>50yo	Neisseria meningitides, S. pneumo, Listeria	Ceftriaxone IV + vanco IV + ampicillin
Immunocompromised (HIV, asplenic, etc.)	Neisseria meningitides, S. pneumo, Listeria, aerobic gram-negative bacilli (including Pseudomonas)	Ceftazidime IV + vanco IV + ampicillin + acyclovir*

*In immunocompromised both viral and bacterial organism-directed treatment is provided despite findings.

Take Home Points

- Meningitis is the inflammation of the meningeal membranes that surround the brain and spinal cord and can be caused by multiple infectious agents. The classic triad is fever, nuchal rigidity, and altered mental status.
- In acute meningitis without symptoms indicating CNS abnormalities, imaging studies are not required. Empiric antibiotics should be initiated if bacterial meningitis is suspected; this is followed by a lumbar puncture.
- The diagnosis of meningitis is based upon analysis of cerebral spinal fluid as well as acute presentation of symptoms. If CSF findings are unequivocal, the patient should continue with empiric antibiotic therapy. If findings suggest an aseptic meningitis, then other treatments should be initiated.



ABOUT THE AUTHOR

This month's case was written by Vanessa Freeman. Vanessa is a 4th year medical student from FIU-HWCOM. She did her emergency medicine rotation at BHMC in October 2016. Vanessa plans on pursuing a career in Psychiatry after graduation.

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