

Location: Emergency room

Vitals: B.P: 110/70 mmHg; P.R:100/minute; Temperature: 102° F; R.R: 15/minute.

C.C: Fever and chills.

HPI:

A 54-year-old retired businessman is brought into the emergency room. Family members report that he has had a mild fever, chills, and body aches, for two days. However, this morning the patient exhibited a high-grade fever with chills, rigors, altered mental status, and a severe headache. He is nauseated and had non-bloody vomiting. The patient denies any neck pain, sensory changes in his extremities, weakness, seizures, or visual changes. His bowel and bladder functions are intact. PMH: Significant for hypertension the last ten years and has been taking atenolol 50 mg. once daily. SH: He denies smoking or drinking alcohol. He has no known allergies. FH: Nothing significant. ROS: No H/O head trauma. Rest is unremarkable.

How would you approach this patient?

This is a 54-year old male with a two to three day history of high-grade fever with chills, severe headache, vomiting, and altered mental status. The most likely diagnosis is either meningitis or encephalitis. It is difficult to differentiate encephalitis from meningitis, on clinical grounds alone. All patients should be treated as having meningitis, until proven otherwise.

Order physical examination:

HEENT/Neck
CNS
Heart
Lungs
Abdomen
Extremities
Skin

Results:

On general examination the patient appears alert, awake, and oriented to time, place, and person. The patient appears mildly confused, and sleepy. He appears very ill. The only positive findings on exam are neck stiffness and Kernig sign. No focus of infection or other abnormalities are found. Fundoscopy did not reveal any papilledema.

Orders:

Pulse oximetry, stat and every two hours
IV access
IV NS, 100 cc/hr
NPO except medications
Hold his atenolol
Complete bed rest
DVT prophylaxis (Type 'Pneumatic compression stockings')
Vitals Q 2 hours
Urine output every two hours
Head elevation
Blood cultures, stat
Urinalysis, stat
Urine culture and sensitivity, stat
CBC with diff, stat and Q day
BMP, stat and Q day
PT/INR, stat
PTT, stat
Phenergan, IV PRN for vomiting
Acetaminophen, oral, PRN for headache and fever

Once the blood cultures are obtained:

IV ceftriaxone, continuous

IV vancomycin, continuous

Lumbar puncture, stat

Send the CSF for cell count, protein, glucose, Gram stain, Fungal stain, culture, and sensitivity

Results:

Gram stain of the CSF shows Gram positive cocci

CBC showed elevated white count with left shift

BMP is normal

PT/INR/PTT is within normal limits

Review orders:

Change the antibiotic according to the organism and sensitivities. Do not forget to stop the initial or unnecessary antibiotics.

Order interim history and focused physical exam every four hours until you see improvement, then Q12 hours.

Once the mentation is improved start clear liquids, then advance the diet. Order 'out of bed to chair'.

D/C daily CBC with diff, and BMP when no longer required.

Discussion:

Basically, this patient is showing signs and symptoms of meningitis. He needs to be hospitalized immediately because of his altered mental status. The patient should be kept NPO. Start IV with normal saline because the patient is on NPO and his diastolic blood pressure is 70, in spite of having a history of hypertension. Blood should be drawn immediately and sent for CBC with a differential, BMP, blood cultures, and coagulation studies (PT, INR and PTT to rule out the possibility of DIC and to obtain his baseline coagulation studies). Immediately after ordering these investigations, intravenous antibiotics should be started which are mostly empirical. The use of prior imaging studies, like a CT scan of the brain, is not necessary to proceed with a lumbar puncture. In a patient with a normal level of consciousness, without any focal neurological signs, a lumbar puncture can be safely performed even without prior imaging studies. We recommend starting intravenous antibiotics, even before obtaining a lumbar puncture. Antibiotic therapy for several hours, prior to lumbar puncture, will not significantly alter the CSF, WBC count, glucose concentration, or the results of culture. However, blood cultures should be obtained prior to starting antibiotics. CSF should be sent for gram stain, culture and sensitivity, protein, glucose, and cell count with a differential. If the patient has a history of seizures, with focal neurological signs, herpes simplex should be considered and empirical IV acyclovir should be started along with IV antibiotics. In all HIV patients, CSF should be sent for cryptococcal antigen assay to rule out cryptococcal meningitis.

In acute bacterial meningitis, the CSF, WBC count will be elevated and red blood cells will be absent unless there is a traumatic tap. Glucose is usually low (less than 40 mg/dl) and the protein is elevated (more than 40 mg/dl). Gram stain is usually positive in 70-90% of untreated patients and culture is positive in around 80% of cases. The use of empirical antibiotics depends on the patient's age and risk factors.

- In infants of less than three months, cefoxitin plus ampicillin should be given. Cefoxitin covers most of the gram negatives and ampicillin is to cover *Listeria* meningitis. Dexamethasone has been indicated for *H. influenza* meningitis.
- Immunocompetent children of more than three months to adults age of less than 50 years should receive a third generation cephalosporin, preferably ceftriaxone plus vancomycin.
- Adults of more than 50 years of age and individuals with alcoholism or other debilitating illnesses should receive ceftriaxone plus vancomycin plus ampicillin (to cover *Listeria*).
- Meningitis, which develops after head trauma, or neurosurgical procedures, or in patients with neutropenia, should receive vancomycin plus ceftazidime. Ceftazidime

covers gram-negative organisms, preferably *Pseudomonas*.

Once the organism has been identified on gram stain, antibiotics should be directed against a specific organism. If you find gram-negative bacilli on the gram stain, ceftriaxone again is the drug of choice. If you find a *Pseudomonas* on the gram stain and the culture, the drug of choice is IV ceftazidime. If you find gram-positive cocci in clusters (*staphylococcus*), IV nafcillin is the drug of choice. First generation cephalosporins should not be used for *staphylococcus* infections because they do not have high permeability into the CSF. IV vancomycin is the drug of choice for penicillin allergic patients and methicillin resistant *Staph aureus*. If the Gram stain shows *Haemophilus influenza*, IV ceftriaxone is the drug of choice. If the patient is having meningococcal meningitis, the patient should be placed in respiratory isolation and the patient can be tested for terminal component complement deficiencies (C6-C9). If you identify *Listeria monocytogenes* and the patient is an immunocompromised or undergoing dialysis, IV ampicillin plus IV gentamicin should be given for at least three to four weeks. Usually the period of antibiotic doses is in between 10-14 days of intravenous antibiotics.

Primary diagnosis:

Bacterial meningitis

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