

Meningitis

Meningitis vs Encephalitis: Patients with solely meningitis can have lethargy/headache however generally do not have altered cerebral function (AMS, motor/sensory deficits, behavioral changes)

Etiologies to consider

- Bacterial- Strep pneumo, Neisseria meningitidis, Listeria monocytogenes (immunocompromised, elderly, EtOH), Staph aureus/Pseudomonas (post-surgical, device placement)
- Viral- Enteroviruses (coxsackievirus, echovirus), HIV, HSV (HSV2 more likely to cause meningitis and HSV1 more likely to cause encephalitis), VZV, EBV, CMV
*West Nile Virus more likely to cause encephalitis and can present with extrapyramidal symptoms, flaccid paralysis
- Fungal- Cryptococcus neoformans, Coccidioides immitis
- Other- Neurosyphilis, Tb meningitis, non-infectious (malignancy, sarcoid, lupus, vasculitis)

Empiric Therapy

-Community acquired meningitis: Ceftriaxone 2g IV q12hr + Vancomycin 15-20mg/kg IV q8-12hr (trough 15-20) + Ampicillin 2g IV q4hr (if >50 year old, immunocompromised)

**Dexamethasone improves outcomes in acute bacterial meningitis and decreases neurologic complications. Start early in suspected pneumococcal meningitis cases, continue for 4 days if culture proven Strep pneumo.

Diagnosis

-Ideally lumbar punctures should be performed within 6 hours of starting antibiotics.

-When to obtain imaging prior to lumbar puncture?

- Immunocompromised, history of CNS disease, altered level of consciousness, focal neurologic deficit, papilledema, new onset seizure within 1 week of presentation

-Correction for RBCs in a traumatic tap: Subtract 1 WBC for every 500-1000 RBCs

-Keep platelets > 75-100,000 for lumbar punctures

-See table for typical CSF findings

-Droplet precautions should be continued for 24 hours after initiation of antibiotics (Neisseria and H influenza per CDC recommendations)

Etiologies to consider in HIV+ patients

-Tuberculous meningitis (at any CD4 count)

-Toxoplasmosis (CD4<100): multiple ring enhancing lesions

-Neurosyphilis (CSF VDRL can be negative in early infection, look for elevated CSF WBC and protein)

-Primary CNS Lymphoma (CD4<100)

-Progressive Multifocal Leukoencephalopathy (CD4<200)

-Cryptococcal meningitis (CD4<100)

Typical Cerebrospinal Fluid Findings in Various Types of Meningitis

<i>TEST</i>	<i>BACTERIAL</i>	<i>VIRAL</i>	<i>FUNGAL</i>	<i>TUBERCULAR</i>
Opening pressure	Elevated	Usually normal	Variable	Variable
White blood cell count	$\geq 1,000$ per mm^3	< 100 per mm^3	Variable	Variable
Cell differential	Predominance of PMNs*	Predominance of lymphocytes†	Predominance of lymphocytes	Predominance of lymphocytes
Protein	Mild to marked elevation	Normal to elevated	Elevated	Elevated
CSF-to-serum glucose ratio	Normal to marked decrease	Usually normal	Low	Low