

MENINGITIS

Clinical Data	
Prior disease	Febrile illness, URI, acute otitis /mastoiditis, pneumonia (<i>S.pneumoniae</i>), herpangina (Coxsackie), pleurodynia (Coxsackie B) Parotitis (mumps) Fever, rigors, profuse sweat, nausea, vomiting
Onset	Fulminant, major disease in 24hrs (25%); URI then meningitis in 3-7 days (50%); URI 3 weeks then meningitis (20%) Gastro-intestinal disease then meningitis (entero-virus);
Meningeal irritation	Drowsiness, decreased mentation, stiff neck, Brudzinski sign, Kernig; minimal in infants or elderlies
Brain swelling	Headache, photophobia, altered mental status (confusion, coma), seizure (25%), hypertension, bradycardia, abnormal reflexes
Focal neurologic deficit	Hemiparesis (10%), aphasia (5%), visual field defect (2%), gaze preference (10%)
Cranial nerve dysfunct	3,4,6,7;
Rash	Rash macular erythematous then petechial or purpuric; myalgia (Meningococemia /Emergency; rarely <i>S.pneumoniae</i> , <i>H.flu</i> , ECHO 9) Rubella-like rash (ECHO, Coxsackie)
History/Risk factors	
Outbreak in community	Mumps, measles, varicella, meningococcal meningitis
Season	Late summer /early autumn (enterovirus, arbovirus), late winter early spring (mumps)
Age for bacterial M	Neonates <i>E.coli</i> , <i>Streptococcus</i> group B or D, <i>Listeria monocytogenes</i> Neonate + few days + <i>Klebsiella /Enterobacter /Serratia</i> nosocomial from nursery Infants /Children <i>Hemophilus influenzae</i> (48%), <i>Streptococcus pneumoniae</i> (13%), <i>Neisseria meningitidis</i> Adults <i>Streptococcus pneumoniae</i> (30-50%), <i>Neisseria meningitidis</i> (10-35%), <i>Staphylococci</i> (5-15%), Gram neg (1-10%), <i>Streptococci</i> (5%), <i>Listeria</i> (5%) <i>Hemophilus influenzae</i> (1-3%)
Risk Factors	<i>S.pneumoniae</i> HIV, Hodgkin, multiple myeloma, spleen dysfn, sickle cell, diabetes, alcoholism <i>Staphylococci</i> congestive heart failure, chronic pulmonary, nephrotic Σome, <i>Leptospira</i> Neurosurgery, penetrating trauma Farmer, work with sewer, animal (vet, dairy, abattoir, hunter), exposure to animal urine
Lab tests	
CSF	Bacteremia & Sepsis; Brain abscess; Seizures; Encephalitis Increased pressure: Abn > 150 mmH2O; >450mm = acute brain swelling
Cell count	Bacterial: Early 10-20; later 100-10,000 /mm3 with 80% polymorphonuclear; Bacteria special lymphocytes (Mtb, Borellia, Treponema, Listeria, Leptospirosis) Viral: 50-100; rarely up to 4,000; partially treated bacterial meningitis similar to viral Eosinophilia (see eosinophilic meningitis)
Glucose	Bacterial Low 40 mg/dL or 40% of blood level (+++ most useful to differentiate from viral); Viral Normal (compare with blood level in diabetics)
Protein	High 100-150mg /dL, up to 500; >1,000 in subarachnoid blockage
Bacteriology	Gram stain (80% pos in bacterial meningitis); Culture; Phadebact
Virology	During outbreak: throat washing, CSF, stool, blood rarely
Other	Blood cultures; renal function (for Tx); electrolytes and creatinine for inadequate ADH Σome; coagulation
Differential	
	Seizures; Brain abscess, subdural empyema: Focal lesions, high cell count (>50,000) Bacteremia & Sepsis, endocarditis with embolic infarction in brain Post infectious encephalomyelopathy: measles, mumps, varicella; Viral Σome (influenza) Post vaccinal reactions: rabies, smallpox Encephalitis; Carcinomatous meningitis, meningeal leukemia,
Etiology: Bacterial	
	URI colonizers w capsular antigens: <i>Streptococcus pneumoniae</i> ; S. group B or D, <i>Hemophilus influenzae</i> ; <i>Neisseria meningitidis</i> <i>Staphylococci</i> , <i>Listeria monocytogenes</i> <i>E.coli</i> , Gram neg
Etiology: Viral	
	Enteroviruses: CoxsackieA (2,3,4,7,9,10), B (1-6: US 33%), ECHO (US 50%), polio Lymphocytic chorio meningitis (LCM), Cytomegalovirus (CMV), Mumps Herpes simplex, herpes zoster, adenovirus Arbor virus
Etiology: Fungal	
	<i>Cryptococcus</i>
Treatment	
	Empiric based on age as main determinant of etiology Neonate Ampicillin 200 mg/kg + Aminoglycoside (Gentamicin) 2.5-5 mg/kg for 10 days Children <2mos Cefotaxime 50 mg/kg qid (200 mg/kd/day) or ceftriaxone 100 mg/kg /day Adult:S.pn, H.i. Cefotaxime 2g IV x6/day or Ceftriaxone 2g IV /day Adult: Staph Vancomycin 1g bid Listeria TMP 160mg – SMX 800 mg IV qid
HDept Management	
	Collect Hx of travel, food, household, school attendance, participation in groups – Hx of outbreak in community Management depends on etiologic diagnosis Investigate source, contacts, associates for <i>H.influenzae</i> type b, <i>Neisseria meningitidis</i> , aseptic meningitis <i>H.influenzae</i> type b HH Contact prophylaxis; Vaccine <i>N. meningitidis</i> HH /day care /intimate contact prophylaxis; Vaccine Aseptic / Day care Exclusion while sx; notice to parent for early detection; hygiene in diaper area
Infection Control	
	Depending on etiologic diagnosis: Droplet or Contact (enteric) precautions while infectious