Inflammatory Conditions

- Meningitis
- Encephalitis
- Brain Abscess
- Neurosyphilis

Meningitis

Inflammation of the lining around the brain and spinal cord caused by bacteria or viruses

- Causes: bacterial, viral, fungal, protozoa
- Viral and bacterial most common
- Often preceded by something as simple as URI
- Increased Risk:
  - Immunodefficient, smokers, chronic disease, close quarters, elderly

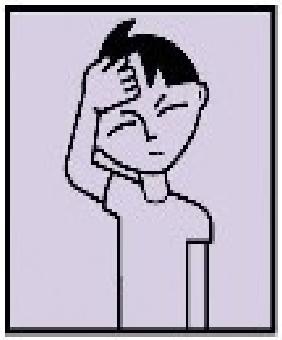
Pathophysiology

- Organism enters CNS via blood stream or extension from localized site
- Crosses the BBB, mixes and infects the CSF
- Causes inflammation of meningeal tissue
- Inflammatory response causes increased CSF production which can then increase the ICP

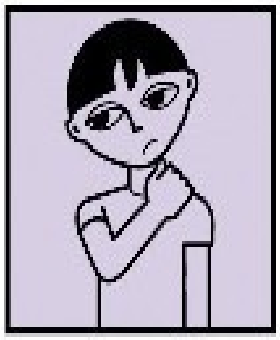
Bacterial Meningitis

- Causes: Strep pneumoniae and Neisseria meningitides (meningococcus)
- H-Influenzae-not as common due to vaccination
- Occurs: winter, early spring
- EMERGENCY!! SEEK CARE QUICKLY!!

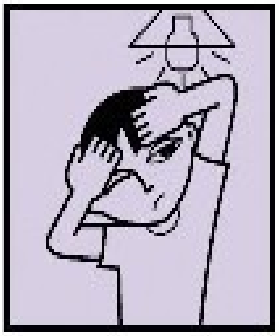
Clinical Manifestations



Severe headache

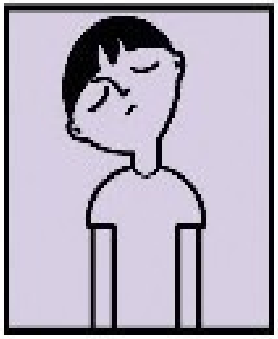


Stiff neck

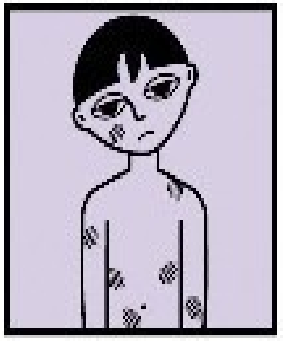


Dislike of bright lights

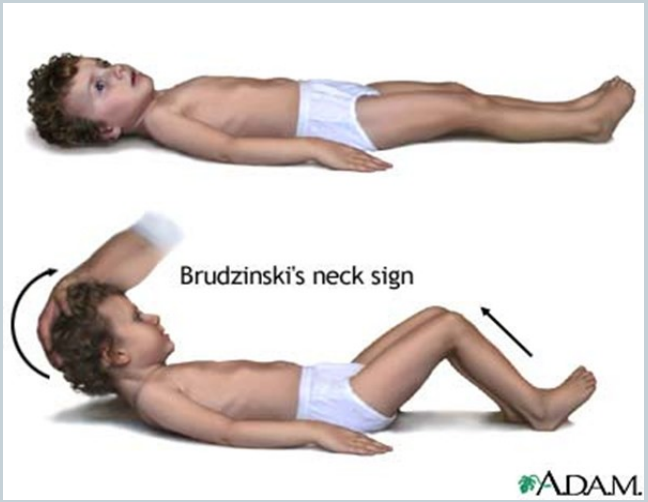
Fever/vomiting

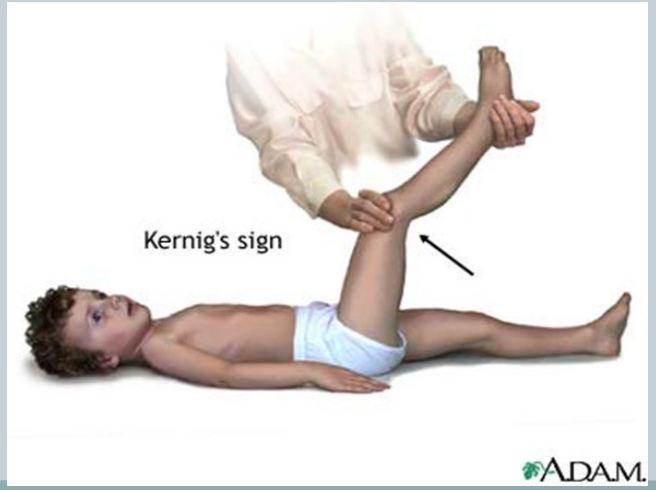


Drowsy and less responsive/ vacant



Rash (develops anywhere on body)





Complications

- Increased Intracranial Pressure
  - Altered mental state
  - Seizures, coma, death
  - CN involvement

  #2- Optic Nerve

  #3,4,6- Oculomotor, Trochlear, Abducens

  # 5- Trigeminal

  # 7- Facial

  #8- Vestibulocochlear

- Waterhouse-Friderichsen syndrome

Diagnostics

- Blood cultures
- Imaging
  - CT scan
- CSF studies via LP
  - Pressure, Appearance, Protein, glucose, and WBC levels
    - high WBC (neutrophils), purulent/ cloudy CSF, protein elevated, glucose decreased, CSF pressure high
- Culture
  - Sputum, nasopharyngeal

Medical Management

- Large Doses Antibiotics/ Broad Spectrum Antibiotics
- Cultures prior to start of Antibiotics
- Admin STAT! EMERGENCY
- Corticosteroids (Dexamethasone)
- Symptomatic support

Nursing Care

- Assessments
- Respiratory Isolation
- Fever
  - Medicate, cool blanket, fluids
- Headache
  - Medicate, position
- Environment
  - Limit light, noise, and visitors
  - Seizure precautions

Recovery

- Several weeks to recover
- Headaches continue for weeks/months
- Muscle rigidity requires ROM
- Residual deficits vary on disease course and treatment
  - Mental status, vision, hearing, sensory function

Prevention of Bacterial Meningitis

- Meningococcal vaccine recommended by CDC for high school and college students
- Prevent URI's and receive prompt treatment for ear or UR infections
- Continue to encourage HIB vaccine (Haemophilus influenza)

Viral Meningitis

- Viral origin
  - Enteroviruses, arboviruses, HSV, HIV
- Self limiting-not as severe
- Resolves in 2 weeks and full recovery expected
- Pathophysiology:
  - no pus formation as with bacterial meningitis so no brain involvement, more viral symptoms (HA, fever, photophobia, stiff neck)

Symptoms of Viral Meningitis

- Headache
- Fever
- Photophobia
- Stiff neck
- Brain involvement less likely

Diagnosis

- Xpert EV with CSF sample
  - Rapidly diagnoses
- LP with CSF examination
  - May have slightly elevated pressure, Clear to cloudy appearance, could have increased protein, WBC mainly lymphocytes, and usually normal glucose
- Stains and smears are negative for organisms
- PCR-detects viral RNA and DNA

Treatment

- Symptomatic Support
- D/C antibiotics after ruling out bacterial meningitis

Encephalitis

- Acute inflammatory process of the brain tissue usually caused by a virus
- Many viruses can lead to encephalitis
- Mosquitoes and Ticks transmit via a bite
  - Times: late summer, early fall
  - Locations: West Nile, California, St Louis, Eastern
- Complication of: measles, mumps, chickenpox, HSV (common), and CMV

Pathophysiology

- Virus enters host via bite or contact
  - Uses host to reproduce
    - Accesses CNS via circulation
      - Results in diffuse inflammation of the brain tissue
        - Cell damage, widespread edema, and IICP

Clinical Manifestations

- 2-3 days after onset
- Range from mild to severe
- Flu like symptoms: headache, fever, N/V, aches
- Mental status changes: confusion to coma
- Varied CNS symptoms: seizures, memory loss, CN dysfunction, personality changes, motor disturbances

Diagnosis

- Early diagnosis is essential for favorable outcome
- History: travel, virus
- Imaging
- PCR test
- Ig M

Management

Medications

- Antivirals-start early for better outcomes in viral causes like HSV. If mosquito/tick borne-symptomatic treatment only.
- Dexamethasone-to decrease or prevent IICP

Nursing Care

- VS and neuro checks
- Symptomatic Treatment: fever, headaches, seizures

Prevention of Encephalitis

- Public Education
- How to avoid mosquitos and ticks
- Early medical intervention

Brain Abscess

- Accumulation of pus within the brain tissue
- Common with direct extension
  - Ear
  - Tooth
  - Mastoid
  - Sinus
- Trauma, neurosurgery, bloodstream, septic emboli
- Streptococci and Staph aureus

Pathophysiology

- Infection spreads to brain from primary location causing acute inflammation and tissue necrosis
- A necrotic collection of pus develops with tissue liquefying
- That is encapsulated within two weeks and an abscess is formed

Manifestations

- Signs/symptoms begin slowly
- Similar to meningitis and encephalitis
- Headache, fever, chills, N/V, malaise
- Neuro Deficits (WITH IICP)
  - Decreased LOC, confusion, drowsy, seizures
- Focal Deficits- depends on location of abscess

Diagnosis of Brain Abscess

- WBC and ESR
- Culture: ear, nose, throat
- Imaging: ring around abscess

Medical Management of Brain Abscess

- IV antibiotics in high doses to penetrate the BBB
- Craniotomy to remove abscess or to drain
- Treat symptoms

- If untreated, mortality rate near 100% due to increasing size then leading to increased ICP and rupture of the abscess into the ventricles… BAD!

Neurosyphilis

- Infection of any part of the nervous system by *Treponema Pallidum bacteria*
- Un or inadequately
  treated syphilis
- Can be fatal

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Neurosyphilis

- Diagnosis
  - RPR test

- Signs Symptoms

Progressive ataxia

Lightening pain in legs

Slapping gait

Loss of DTR

Loss of Proprioception

Charcot's joints

- Treatment

  PCN

  - Neuro deficits are permanent