

VIRAL MENINGITIS AND ENCEPHALITIS



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Bonita Biegelke, PhD

Department of Biomedical Sciences
Ohio University College of Osteopathic Medicine
Athens, Ohio 45701
biegalke@exchange.oucom.ohiou.edu

Meningitis

- Most common viral CNS infection
- Usually follows high titer secondary viremia
- Relatively benign, self-limited illness

Encephalitis

- Usually viral
- Associated with increased morbidity and mortality

Viral meningitis

- Usually epidemic in nature
- Enteroviruses cause 60-90% of cases
- Arboviruses cause 10-30% of cases
 - EEE, WEE, Japanese encephalitis, HSV, lymphocytic choriomeningitis virus
- Mumps infection is also commonly associated with encephalitis.

Symptoms of viral meningitis

- Influenced by host physiology and viral etiology

- Long term prognosis is excellent.
- Typically a mononuclear infiltrate is seen in the CSF.

Enteroviral Meningitis

- Seen in the summer and early autumn.
- Host physiology plays a critical role in seriousness of infection.
- Symptoms: fever, malaise and headache
- 50% - nausea and vomiting
- Nuchal rigidity

Enterovirus 71

- Major cause of flaccid paralysis
- Causes hand-foot and mouth disease
- Progression to meningoencephalitis
- MRI - lesions of the thalamus, basal ganglia, hippocampus
- Long term effects

Diagnosis of viral meningitis

- CSF - mononuclear infiltrate
- Polymerase chain reaction

Other causes of "Aseptic" meningitis

- Spirochetes, mycobacteria
- Fastidious bacteria
- Coccidiomycosis, *Cryptococcus*
- Hematologic malignancies
- Drug-induced

Encephalitis

- Neurologic symptoms vary
- Rapid onset
- Progression
- Sequelae
 - Mental retardation
 - Paralysis
 - Parkinsonism

Symptoms of Encephalitis

- Reflect location and degree of involvement
- Case fatality rates vary with the virus

Pathogenesis

- Viral factors
- Host factors
 - Age
 - Sex
 - Genetics

Encephalitis

- Neurons
 - Primary infected cells
- Developmental stage influences course of infection

Causes of viral encephalitis

- Arboviruses
 - Leading cause
 - Asymptomatic infections predominate
 - Case fatality rate is 5-70%
- Herpes Simplex virus
 - Affects all ages
 - No seasonal variation
 - Major causes of fatal endemic encephalitis
 - Temporal lobe lesion
 - If left untreated, 70% mortality

Causes of encephalitis outside of North America

- Japanese B encephalitis
- Rabies
- Post-infectious encephalitis

Other viruses that cause encephalitis

- Cytomegalovirus
- Varicella zoster virus
- Polio and other enteroviruses
- Mumps
- HIV
- JC virus

Diagnosis

- Epidemiologic trends
- Patient history
- Laboratory data
 - CSF
 - Pleocytosis
 - Slightly elevated protein
 - Glucose levels are usually normal
 - PCR
- MRI

Treatment and prognosis

- Therapy for treatable infections
- Anticipate complications
- Supportive therapy

Other causes of encephalitis

- Infectious
- Post-infectious
- Non-Infectious
- Drug induced
- Tumors
- Poisons, toxins

Access to the CNS

- Hematogenous spread
 - Disruption of blood brain barrier
 - Incomplete blood-brain barrier
- Viruses
 - polio
 - HIV
 - Mumps
 - Measles
 - Other neurotropic viruses

Neuronal spread

- HSV, Rabies virus, some enteroviruses
- Replication at primary site of infection
- Virus is taken up at axon termini
- Transport to CNS

Neuronal Cell Injury

- Poorly understood
- Cytopathic effects
- Inflammation
- Vasculitis
- Apoptosis

- Apoptosis
 - Triggering of programmed cell death
 - Activation of caspases - ser/thr proteases

Post-infectious encephalitis

- Acute demyelinating process
- Measles
- Inflammatory reaction
- Defective virus

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