

CNS INFECTIONS - 2

Encephalitis

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Concepts Encephalitis

- Present as acute confusional states
- Hundreds of viruses produce acute infection and injury to the central or peripheral nervous systems.
- Infectious process and inflammatory response is limited largely to the brain parenchyma.
- Many patients with encephalitis also have evidence of associated meningitis (meningo-encephalitis).



Etiology

- The same organisms responsible for viral meningitis/ encephalitis, but their relative frequencies differ.
- Sporadic cases in immunocompetent adults are HSV-1, VZV, and, less commonly, enteroviruses.
- Epidemics of encephalitis are caused by arboviruses.
- *Enterovirus* : coxsackie, echoviruses, polioviruses, and human enteroviruses 68-71.



Table 1. Seasonal Prevalence of Viruses Commonly Causing Meningitis/ encephalitis

Summer and Early Fall	Arboviruses Enteroviruses
Fall and Winter	LCMV (lympocytic chorio-meningitis)
Winter and Spring	Mumps
Non seasonal	HIV HSV



Table 2. Viruses Causing Encephalitis

Common	Arboviruses, enteroviruses, HSV-1, mumps
Less Common	CMV, EBV, HIV, measles, VZV
Rare	Adenoviruses, CTFV, influenza A, LCMV, parainfluenza, rabies, rubella



Pathology

- Inflammation can occur in the cortex, white matter, basal ganglia and brain stem and the distribution of lesions varies with type of virus.
- There is infiltration of polymorphonuclear cells in the perivascular space; neuronal degeneration and diffuse glial proliferation, often associated with cerebral edema.



Clinical Manifestations

- Acute febrile illness
- altered level of consciousness (mild lethargy to deep coma),
- an abnormal mental state (hallucinations, agitation, personality change, psychotic state),
- focal or diffuse neurologic signs or symptoms. aphasia, ataxia, hemiparesis, involuntary movements (e.g., myoclonic jerks), and cranial nerve deficits (e.g., ocular palsies, facial weakness).
- Focal or generalized seizures occur in >50% of patients with severe encephalitis.
- Systemic viral infection: skin rash, pharyngitis, lymphadenopathy, pleuritis, carditis, jaundice, organomegaly.

Laboratory Diagnosis

- CSF examination: suspected viral encephalitis unless ICP raised
- CSF indistinguishable from viral meningitis
- lymphocytic pleocytosis occurs in >95%, a mildly elevated protein level, and a normal glucose level.
- lymphocytic pleocytosis absence: search for other causes of an encephalopathy (severely immunocompromised by HIV infection, steroid, chemotherapy).

CSF PCR

- PCR amplification of viral nucleic acid: diagnostic procedure of choice for viral encephalitis.
- PCR has become the primary diagnostic test for CNS infections caused by CMV, EBV, VZV, and enteroviruses.
- Recent studies with HSV encephalitis indicate that the sensitivity (~98%) and specificity (~94%) of CSF PCR equal or exceed those of brain biopsy.

CSF culture

- Attempts to culture viruses are often disappointing.

- **Serologic Studies and Antigen Detection:**
Optimal detection of both viral antibodies and antigen typically occurs after the first week of illness, limiting the utility of these tests in acute diagnosis.
- Blood counts: normal WBC count, leucopenia or mild leukocytosis.
- Atypical lymphocytes in blood smears: infectious mononucleosis (EB virus infection).
- Serum amylase is frequently elevated in mumps;
- Abnormal liver function tests are often associated with hepatitis virus infection.

MRI, CT, EEG

- identify or exclude alternative diagnoses and assist in the differentiation between a focal, as opposed to diffuse, encephalitic process.
- EEG is diffusely slowed, esp if there is direct cerebral involvement; more characteristic findings can be found in encephalitis caused by HSV (show periodic slow wave complexes arising from one or both temporal lobes).

Brain Biopsy

- reserved for patients
 1. CSF PCR studies fail to lead to a DX
 2. focal abnormalities on MRI, and
 3. progressive clinical deterioration despite RX with acyclovir and supportive therapy.
- When biopsy is performed, the tissue is cultured for virus and examined histopathologically and ultrastructurally.

Differential Diagnosis

- includes both infectious and noninfectious causes of encephalitis.
- Some of the most common illnesses like vascular diseases; abscess and empyema; fungal, parasitic, tuberculous infections; tumors; toxic encephalopathy.
- In ? viral meningitis: more profound alterations in consciousness, such as stupor, coma, or marked confusion, should prompt consideration of alternative diagnoses.
- seizures, cranial nerve palsies, or other focal neurologic signs or symptoms suggests parenchymal involvement and is not typical of uncomplicated viral meningitis.



Treatment

- require care in intensive care unit
- Vital functions should be monitored continuously and supported as required.
- Basic management and supportive therapy: monitoring of ICP, fluid restriction and avoidance of hypotonic intravenous solutions, and suppression of fever, mechanical ventilation and IV or nasogastric feeding for comatose patients.
- Headache and severe hyperthermia can be treated with aspirin or acetaminophen; mild fever requires no treatment and may contribute host response to the virus.
- Specific antiviral therapy should be initiated when appropriate.



- Seizures: Rx with standard anticonvulsant regimens, and prophylactic therapy for severe cases of encephalitis.
- Immobilized patients with altered levels of consciousness, are at risk for aspiration pneumonia, stress ulcers and DVT and its complications,
- Infections of indwelling lines and catheters.



Acyclovir

- Acyclovir is of benefit in the treatment of HSV and should be started empirically in all patients with suspected viral encephalitis.
- Treatment should be discontinued in patients found not to have HSV encephalitis.
- Adults: 10 mg/kg IV Q8h (30 mg/kg/d) for a minimum of 14 days.
- Corticosteroids are of no benefit except in immune-mediated post-infectious syndromes.



Sequelae

- variation in the incidence and severity in patients surviving
- directly related to the age of the patient and the level of consciousness at the time of initiation of therapy.



Prognosis

- Mortality rates 20%
- Outcome of viral encephalitis varies with specific virus
- However, arbovirus and HSV infections are associated with severe morbidity and high mortality rates.

