

viral infections of the CNS [created by Paul Young 17/11/07]

general

- all components of the CNS are vulnerable to viral infection
- acute viral meningitis is characterised by meningeal irritation, cerebrospinal fluid pleocytosis and a self limited clinical course
- myelitis implies infection of the spinal cord & may be present in isolation (eg polio) or as part of an overlap syndrome of encephalomyelitis (eg West Nile virus)
- encephalitis is characterised by alteration in cognition lasting 24 hours or more. As a result of parenchymal involvement, CNS function may deteriorate over several days; confusion, lethargy, somnolence, coma and seizures are common

pathophysiology

- most viral infections of the CNS occur through haematogenous spread
- the virus may initially transverse the mucus membranes (eg enteroviruses) or be inoculated into subcutaneous tissue (eg arboviruses)
- after local replication in within in the extraneural tissues, sustained viraemia occurs
- alternatively, the virus may gain access to the CNS by direct neuronal invasion as occurs when rabies spreads retrogradely along the peripheral nerves into the CNS
- olfactory tracts may provide a route of entry for herpes simplex type 1
- individual viruses demonstrate affinities for different anatomic areas of the CNS
- enteroviruses and mumps viruses usually infect the ependyma & tissues of the subarachnoid space, producing meningeal irritation
- arboviruses and rabies almost always involve the parenchyma and cause encephalitis
- in older children and adults, herpes simplex virus type 1 characteristically causes temporal lobe encephalitis, whereas herpes simplex type 2 more typically causes meningitis

acute viral meningitis

- many viruses cause meningitis & in clinical practice a specific pathogen is rarely identified
- epidemiological studies suggest the enteroviruses are the most common cause of viral meningitis. Other causes include arboviruses, herpes simplex type 2, acute HIV infection and lymphocytic choriomeningitis virus
- at the time of presentation, it may be difficult to differentiate viral meningitis from other forms of culture negative meningitis the may be more aggressive or require directed therapy
- the differential diagnosis for culture negative or aseptic meningitis includes tick borne infections such as Ehrlichia or Rickettsia, secondary Syphilis, mycobacterial or fungal infections & partially treated bacterial meningitis
- signs and symptoms of bacterial and viral meningitis are indistinguishable
- CSF findings suggestive of a viral cause include lymphocytic pleocytosis (typically with a total WCC <1000), normal glucose & normal to slightly elevated protein
- management is supportive & meningeal symptoms usually resolve in the first 2 weeks

viral encephalitis

- a host of viral infections infect the parenchyma of the brain or spinal cord to cause encephalitis or myelitis, respectively; however, no organism is identified in the majority of cases
- viral encephalitis is typically an acute febrile illness associated with headache, an altered conscious disproportionate to the systemic illness, behavioural or speech disturbances and focal neurological signs such as seizures or hemiparesis
- viral myelitis causes hemiparesis or hemiplegia but spares higher centres
- overlap or encephalitis and myelitis can occur
- clinically, viral encephalitis must be differentiated from acute disseminated encephalomyelitis (ADEM) which is an autoimmune phenomenon that typically occurs 5-21 days after a viral respiratory or gastrointestinal illness
- MRI in ADEM reveals enhancing multifocal white matter lesions suggestive of demyelination
- ADEM is an important diagnosis because it is responsive to high dose steroids
- management of viral encephalitis revolves around supportive care

herpes simplex encephalitis

- herpes simplex encephalitis is a common cause of sporadic encephalitis
- although mortality of untreated HSE exceeds 70%, timely administration of acyclovir has been shown to improve survival
- although clinical, laboratory or radiographic findings may be suggestive of HSE, no combination of presenting features is sufficiently sensitive and empirical acyclovir should be given to all patients with encephalitis until definitive diagnostic studies are complete
- common manifestations of HSE include fever, behavioural change and dysphasia
- hemiparesis and seizures occur in approximately 40% of cases
- without treatment, progressive obtundation occurs
- CSF typically exhibits a lymphocytic pleocytosis
- temporal localisation on MRI and CT is suggestive & there are periodic lateralising epileptiform discharges on EEG
- definitive diagnosis requires detection of herpes simplex in brain or spinal fluid
- PCR on CSF is now considered the gold standard for diagnosis
- For adults and children in suspected or proven cases, use: acyclovir 10 mg/kg IV, 8-hourly for at least 14 days (adjust dose for renal function).
- acyclovir can generally be discontinued if PCR is negative