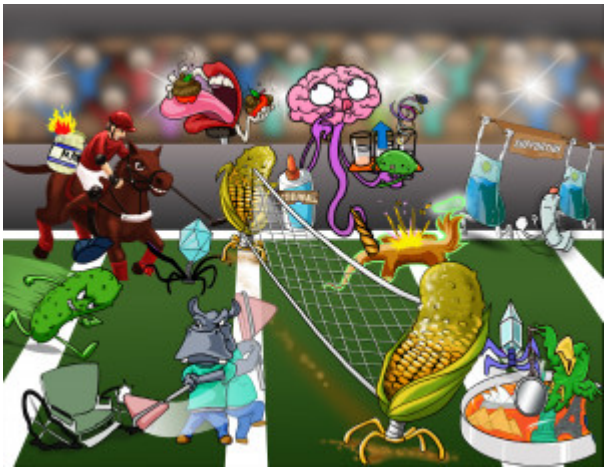
Poliomyelitis

Poliomyelitis is a neurodegenerative condition caused by poliovirus, which is a member of the picornavirus family. It is transmitted via the fecal-oral route, and its pathophysiology is characterized by destruction of anterior horn cells of the spinal cord, making it a lower motor neuron lesion. Clinical findings are consistent with those typical for other lower motor neuron lesions and include flaccid paralysis, hyporeflexia, fasciculations, and skeletal muscle atrophy. Studies of cerebrospinal fluid will show elevated white blood cells with lymphocyte predominance as well as slightly elevated protein with no change in glucose. The definitive establishment of poliovirus as the cause however requires isolation of the virus from stool, cerebrospinal fluid, or the throat. Treatment for poliomyelitis is supportive, and consists of measures such as mechanical ventillation for respiratory failure.



PLAY PICMONIC

Characteristics

Poliovirus

Polo-player hitting virus

Poliomyelitis is a neurodegenerative condition caused by infectioin by poliovirus. This condition only occurs in a portion of patients infected with poliovirus, and is exceedingly rare in most developed countries due to vaccination.

Picornavirus

Pickle-corn-virus

Picornaviruses are a family of RNA viruses which infect various mammals and birds. The characteristics shared among picornaviruses include being non-enveloped, having a single-stranded positive-sense RNA genome, and containing an icosahedral capsid. The diseases caused by this family of viruses vary and include forms of meningitis, hepatitis, and poliomyelitis.

Fecal-Oral Transmission

Eating poop

Poliovirus infection occurs via the fecal-oral route, meaning that it is ingested and through the gastrointestinal tract where it replicates and is then shed in the feces. Transmission most commonly occurs via ingestion of contaminated water or food.

Destruction of Anterior Horn

Anteater-horn exploding

The neurologic sequelae characteristic of poliovirus are caused by destruction of the anterior horn of the spinal cord. Recall that the anterior horn is where upper motor neurons from the contralateral primary motor cortex synapse with lower motor neurons to control voluntary movement of the limb contralateral to the primary motor cortex.

Clinical Features

Flaccid Paralysis

Limp Wheelchair

The clinical manifestation of poliomyelitis is a lower motor neuron syndrome. Flaccid paralysis is one typical finding of lower motor neuron syndromes and is caused by lack of excitatory signal from the spinal cord to muscle fibers.

Hyporeflexia

Hippo-reflex-hammer

Destruction of lower motor neurons leads to elimination of the neural feedback loops responsible for skeletal muscle reflexes.

Fasciculations

Fast-pickle

Fasciculations are a finding typical of lower motor neuron syndromes, and are defined as small, local, involuntary muscle contractions. Fasciculations alone are common in healthy individuals, however in lower motor neuron lesions such as poliomyelitis they are pathological and result from increased expression of neuroreceptors on muscle fibers to compensate for lack of innervation.

Diagnosis

Elevated CSF Lymphocytes and Proteins

Brain-spinal cord-drinks with Up-arrow-lime and proteins

CSF studies in patients with poliomyelitis will characteristically demonstrate an elevated white blood cell count with lymphocyte predominance and a slight elevation in protein. This CSF finding is consistent with a viral infection of the central nervous system, but is not specific to poliomyelitis. Elevated CSF lymphocytes and proteins may also be seen as a result of fungal infection, therefore CSF glucose levels are helpful in differentiating viral from fungal etiologies.

Normal CSF Glucose

Normal Glue-bottle

CSF glucose in poliomyelitis will be within normal limits. This is typical of viral infections of the central nervous system and is useful in differentiating viral from fungal etiologies. Both will demonstrate elevated CSF lymphocytes and proteins, but fungal infections are typically associated with low CSF glucose.

Viral Culture or PCR

Virus on cultures-plate with poly-chain-mirror reacting

Definitive diagnosis of poliomyelitis requires that infection by polio be demonstrated by either viral culture or polymerase chain reaction (PCR). The isolate used can be obtained from the throat, stool, or CSF.

Management

Supportive Care

Supportive IV bags

As there is no cure for poliomyelitis, once a patient has been diagnosed management is mostly supportive, consisting of measures such as mechanical ventillation if respiratory failure occurs.

Vaccination

Vaccine syringe

The best method for prevention of poliomyelitis is vaccination. Most developed countries have essentially eliminated poliomyelitis as a major threat to public health, as it is part of the routine childhood vaccination regimen.