

POLIOMYELITIS



DEFINITION

- ⊙ Poliomyelitis is an acute viral infection caused by an RNA virus.
- ⊙ It is primarily an infection of the human alimentary tract but the virus may infect the central nervous system in a very small percentage (about 1 percent) of cases resulting in varying degrees of paralyses , and possibly death

INCIDENCE

Polio mellitus can occur sporadically, endemically or epidemically.

- ⦿ it occurs in varying degree of severity
- ⦿ Before it was disease of infants but now a days it is affecting the other age groups also
- ⦿ It is increasingly reported in tropical countries

HISTORY

- ⦿ First outbreaks in Europe in early 1800's
- ⦿ First outbreak in U.S. reported in 1843
- ⦿ Peaked in the U.S. in 1952
- ⦿ Became known as the Heine-Medin disease due to the work of Dr. Jakob Heine and Dr. Karl Oskar Medin.
- ⦿ Still a problem in Africa, India, Pakistan and Afghanistan

RISK FACTORS

- ⦿ Travel to endemic area or area with recent outbreak
- ⦿ Living with or caring for someone shedding wild poliovirus
- ⦿ Handling lab specimens that contain poliovirus

- ⊙ Trauma to mouth, nose, or throat; dental surgery or tonsillectomy
- ⊙ Extreme stress after being exposed to virus; emotional or physical, depresses immune system

POLIO CLASSIFICATIONS

1. Asymptomatic Polio

2. Non-paralytic

3. Paralytic

⦿-Spinal

⦿-Bulbar

⦿-Bulbospinal

ASYMPTOMATIC POLIO

- Accounts for approximately 95% of cases
- Virus stays in intestinal tract and does not attack the nerves •
- Virus is shed in the stool so infected individual is still able to infect others

NON PARALYTIC POLIOMYELITIS

- ◉ Does not lead to paralysis
- ◉ Mild symptoms seen such as sore throat, fever, n/v, diarrhea, constipation
- ◉ Most recover in <1 week
- ◉ Non-paralytic aseptic meningitis
- ◉ Occurs in 1-2% of polio infections
- ◉ Symptoms are stiffness in the neck, back, and/or legs
- ◉ Increased or abnormal sensations can occur
- ◉ Complete recovery after 2-10 days of symptoms

PARALYTIC POLIO

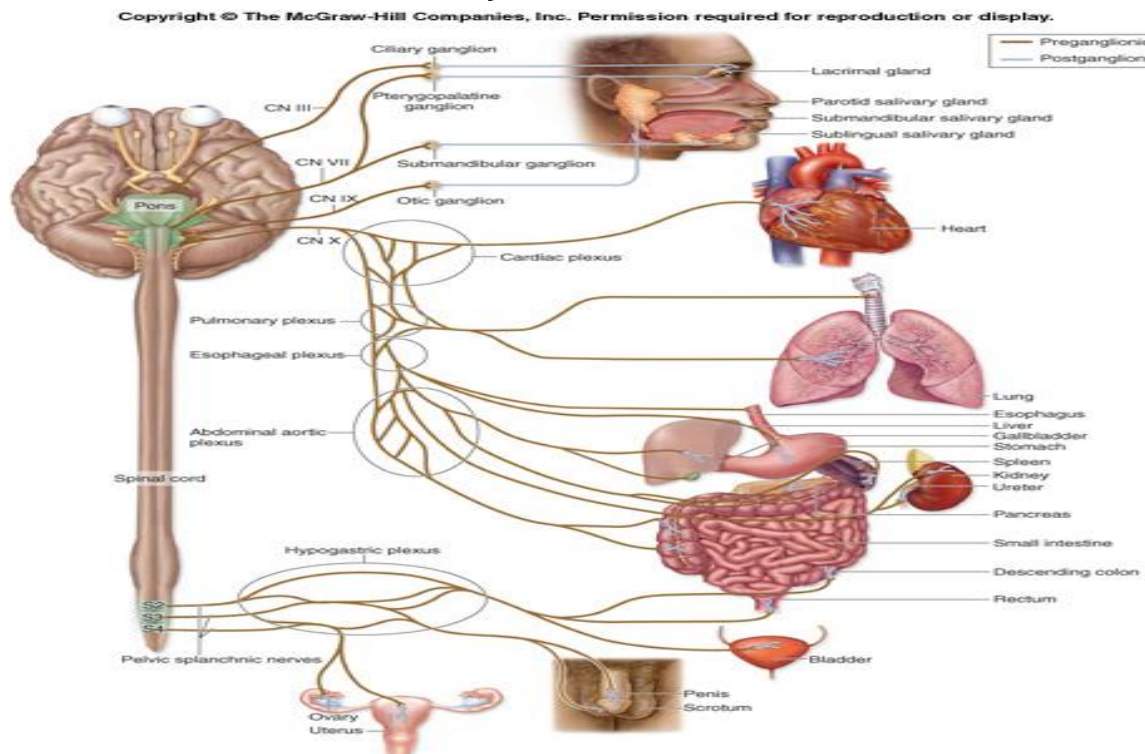
- Most serious form
- Fewer than 1% of those infected develop this type
- Acute flaccid paralysis seen
- Headache, neck/back stiffness, unusual sensations, increased sensitivity to touch

SPINAL POLIO

- -Most common form of paralytic; 79%
- -Attacks motor neurons and causes paralysis of muscles of respiration and muscles of extremities
- -Children <5 years most likely to become paralyzed in one leg
- -Adults are most commonly paralyzed in both arms and legs
- -Those affected still retain sensation in extremities

BULBAR POLIO

- Accounts for 2% of paralytic polio
- Virus attacks motor neurons in brainstem
- Affects cranial nerve function
- Primarily inhibits ability to breathe, speak, and swallow effectively



BULBO SPINAL POLIO

- Accounts for 19% of paralytic cases
- Affects extremities and cranial nerves
- Leads to severe respiratory involvement



AGENT FACTORS

- ⦿ Agent - poliovirus (1,2,3)
- ⦿ Transmits through fecooral route
- ⦿ Reservoir of infection - man
- ⦿ Infectious material- faeces and oropharyngeal secretion of infected person
- ⦿ Period of communicability- 7-10 days before after occurrence of symptoms
- ⦿ In faeces virus continue to be excreted from 3 wks to 4 months.

HOST FACTORS

- ⦿ 1. age - infancy and childhood . Especialy 6 months - 3 years
- ⦿ 2. sex - 3:1 male and female ratio
- ⦿ 3. Risk factors -precipitating factors- fatigue, tonsillectomy , IM injections taken
- ⦿ 4. Immunity - neutralizing the antibody is the important index of immunity to polio virus.

ENVIRONMENTAL FACTORS

- ◉ Rainy season
- ◉ June- September
- ◉ Contaminated water food and flies
- ◉ Overcrowding and poor sanitation

INCUBATION PERIOD

- 7-14 days (ranges 3 - 35 days)

CLINICAL SPECTRUM

1. In apparent infection

- ⊙ No symptoms
- ⊙ Recognized only by virus isolation
- ⊙ Seen in 95 % cases

2. Abortive polio or minor illness

- ⊙ Mild or self limiting illness due to viremia
- ⊙ 4-8% infections
- ⊙ Self limiting illness and recovers fast

3. Non paralytic polio

- ◉ Occurs in 1% of all infections
- ◉ Stiffness and pain in neck and back
- ◉ Lasts for 2-10 days
- ◉ Confused with aseptic meningitis

Paralytic polio

- ◉ occurs in less than 1% of infections
- ◉ Virus invades CNS and causes varying degrees of paralysis.
- ◉ Asymmetrical flaccid paralysis
- ◉ Fever at the onset
- ◉ Associated symptoms
- ◉ Malaise
- ◉ Anorexia

- Nausea
- Vomiting
- Headache
- Sore throat
- Constipation
- Abdominal pain
- Meningeal irritation
- Tripod sign
- Complication can occur within 4 days

- ⦿ Paralysis will be descending
- ⦿ Proximal muscle will be more affected
- ⦿ Muscle strength diminished
- ⦿ Deep tendon reflexes will be diminished
- ⦿ No sensory loss
- ⦿ Facial asymmetry
- ⦿ Difficulty in swallowing
- ⦿ Respiratory insufficiency
- ⦿ Atrophy of muscles with residual paralysis

DIAGNOSIS

- History and physical examination

PHYSICAL EXAMINATION

- ◉ Muscle weakness can be assessed by muscle strength testing
- ◉ Usually asymmetric proximal weakness is present with more involvement of lumbar than cervical segments and more spinal cord than brainstem segments.
- ◉ The trunk muscles are affected least.
- ◉ Sensation should be within normal limits objectively.

- ◉ Deep tendon reflexes are diminished or absent.
- ◉ Atrophy of muscle may be detected 3 weeks after onset of paralysis
- ◉ 50% of adult patients experience transient acute urinary retention.
- ◉ Stiffness and pain in the neck and back

- ◉ Cranial nerve involvement:
- ◉ Approximately 10-15% of cases affect the lower brainstem motor nuclei.
- ◉ When cranial nerves IX and X are involved, patients develop paralysis of pharyngeal and laryngeal musculature.
- ◉ External oculomotor weakness with pupil sparing may occur in rare cases.

LUMBAR PUNCTURE

- completely normal in 5% of patients.
- CSF pressure may be increased.
- Pleocytosis -neutrophils in the first few days, then lymphocytes during onset.
- protein content may be elevated slightly with a normal glucose, except in patients with severe paralysis
- Sever cases protein > 100-300 mg/dl.

- ◉ Order a CBC (leukocytosis may be present).
- ◉ Perform virus recovery from throat washing, stool culture, blood culture, and CSF culture. Viral studies in stool specimens are essential for the diagnosis of poliomyelitis.
- ◉ Recover the virus from throat washing during the first week and stool culture from the first 2-5 weeks.
- ◉ In rare cases, the virus may be isolated from CSF or serum, in contrast to the paralytic illnesses caused by other enteroviruses.
- ◉ These tests require additional demonstration of a four-fold rise in the virus antibody titer to make a specific diagnosis.

- ◉ Histologic findings:
- ◉ Under microscopy, the spinal anterior horn cells are surrounded by inflammatory cells. Spongiosis of the gray matter, containing many scattered inflammatory cells, also is noted. Most of the inflammatory cells are neutrophils.
- ◉ Order an MRI.
- ◉ MRI may show localization of inflammation to the spinal cord anterior horns.

- ◉ Electromyography
- ◉ The earliest electromyographic finding in poliomyelitis is a reduction in the recruitment pattern and a diminished interference pattern due to acute motor axon fiber involvement.
- ◉ Fibrillations develop in 2-4 weeks and persist indefinitely. Fasciculations also may be observed.
- ◉ Motor unit action potentials initially have decreased amplitude and then become large in amplitude with increased duration. Later, polyphasic motor units are observed because of nerve reinnervation.
- ◉ The motor nerve conduction velocities remain within normal limits. However, the compound muscle action potential is reduced in direct proportion to the number of motor axons that are affected. Sensory nerve conduction studies remain within normal parameters, due to sparing of the dorsal root ganglion.

TREATMENT

- ⦿ No specific treatment
- ⦿ Antimicrobials or gamma globulin
- ⦿ Complete bed rest during acute phase
- ⦿ Assisted respiratory ventilation in case of respiratory paralysis
- ⦿ Physical therapy for muscles following acute stage

COMPLICATIONS

- ⦿ Permanent paralysis
- ⦿ Respiratory arrest
- ⦿ Hypertension
- ⦿ Kidney stones

NURSING CONSIDERATIONS

- ⦿ Maintain complete bed rest
- ⦿ Administer sedatives
- ⦿ Participate in physiotherapy procedures
- ⦿ Give proper body alignment
- ⦿ Encourage child to move
- ⦿ Administer analgesics
- ⦿ Observe for respiratory paralysis.
- ⦿ Have tracheotomy at bed side.

PREVENTION

- Immunization is the sole effective means of preventing poliomyelitis.
- Both killed and live attenuated vaccine is available
- Children has to be immunized after 6 months till 5 years.

- Two types of vaccine are available
 1. inactivated (salk) polio vaccine
 2. oral (sabin) polio vaccine

INACTIVATED (SALK) POLIO VACCINE

- ◉ The primary or initial course of immunization consists of 4 inoculations .and first 3 doses given 1-2 months interval the 4th dose will be given at the interval of 6-12 month after third dose .
- ◉ IPV induces humoral antibodies
- ◉ But does not induce local and intestinal immunity .
- ◉ Immunity is not rapidly achieved as more than one dose is needed
- ◉ Injections are to be avoided in epidemics.

ADVANTAGES

- ◉ Safe to administer

1. to persons with immune deficiency diseases
2. To person undergoing cortico steroidal therapy
3. After 50yrs taking vaccine for first time
4. During preganancy

RISKS

No serious adverse reactions

IMPROVED IPV

- A modified and improved IPV has become more effective and it gives 90% protection in 1st dose and 100% protection in second dose.

ORAL POLIO VACCINE

- Oral polio vaccine was described by sabin in 1957
- It contains live attenuated vaccine grown in primary monkey kidney or human diploid cell cultures
- It contains trivalent vaccine types in ratio of 2:1:2

NATIONAL IMMUNIZATION SCHEDULE

- ◉ EPI recommends primary course of 3 doses of OPV at one month intervals
- ◉ Should complete 3 doses of vaccine before 6 months starting in 6 weeks
- ◉ Booster dose is recommended at 12 - 18 months

DOSE AND MODE OF ADMINISTRATION

- ◉ 3 drops
- ◉ Better to give in dropper
- ◉ Tilt the child's back, and gently squeeze the cheeks or pinch the nose to make the mouth open . Let the drop fall on tongue
- ◉ If given in spoon do not clean spoon with the lysol or detol
- ◉ Boil the spoon hot water and give
- ◉ Repeat the dose if baby spits the drop

DEVELOPMENT OF IMMUNITY

- ◉ Lie vaccine infects the epithelial cells
- ◉ After replication transfer to payers patch and secondary multiplication occurs and vireamia occurs
- ◉ The virus spreads to other area and results in production of antibodies