Poliomyelitis

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Abstract
Poliomyelitis is a viral infection caused by any of three serotypes of human poliovirus and is most often recognized by the acute onset of flaccid paralysis. It affects primarily children under the age of 5 years. Transmission is primarily person-to-person spread, principally through the fecal-oral route. Usually the infection is limited to the gastrointestinal tract and nasopharynx, and is often asymptomatic. The central nervous system, primarily the spinal cord, may be affected, leading to rapidly progressive paralysis. Motor neurons are primarily affected. Encephalitis may also occur. The virus replicates in the nervous system, and may cause significant neuronal loss, most notably in the spinal cord. Poliomyelitis must be distinguished from other paralytic conditions by isolation of virus from stool. Prevention is the only cure for paralytic poliomyelitis. Both inactivated polio vaccine (IPV) and oral polio vaccine (OPV) are commercially available. Progress in poliomyelitis eradication since its beginning in 1988 has been remarkable. In 1988, 125 countries were endemic for polio and an estimated 1,000 children were being paralyzed each day by wild poliovirus. By the end of 2003, six polio-endemic countries remained (Afghanistan, Egypt, India, Niger, Nigeria, Pakistan), and less than 3 children per day were being paralyzed by the poliovirus. Interruption of human transmission of wild poliovirus worldwide is now targeted for the end of 2004.

Key-words
Poliomyelitis, acute flaccid paralysis, inactivated polio vaccine (IPV), oral polio vaccine (OPV)
poliomyelitis is Guillain-Barré syndrome (GBS). Paralysis in GBS is typically symmetrical and may progress for periods as long as 10 days. The fever, headache, nausea, vomiting and pleocytosis characteristic of poliomyelitis are usually absent in GBS: high protein and low cell counts in the cerebrospinal fluid (CSF) and sensory changes are seen in the majority of GBS cases. Other causes of AFP include transverse myelitis, Guillain-Barré syndrome, myasthenia gravis, traumatic neuritis, infectious and toxic encephalopathies, tick paralysis, botulism, porphyria, polymyositis, lymphocytic choriomeningitis, Leptospirosis, schistosomiasis and periodic paralysis. Other enteroviruses (notably types 70 and 71), echoviruses and coxsackieviruses can cause an illness simulating paralytic poliomyelitis. Definitive laboratory diagnosis requires isolation of the wild poliovirus from stool samples, CSF or oropharyngeal secretions in cell culture systems of human or monkey origin (primate cells). Specialized laboratories can differentiate “wild” virus strains from vaccine virus strains.

**Epidemiology**
Accurate data on polio case counts are available for 1996 to date from the World Health Organization (WHO) website. As a result of improved immunization worldwide and the global initiative to eradicate poliomyelitis, the disease may be on the verge of worldwide eradication: 6 countries remain endemic at mid-2004 (Afghanistan, Egypt, India, Niger, Nigeria, Pakistan) with 440 cases reported to date. Although wild poliovirus transmission has ceased in the majority of countries, importation remains a threat. A large outbreak of poliomyelitis occurred in 1992–1993 in the Netherlands among members of a religious group that refuse immunization. The virus was also found among members of a related religious group in Canada, although no cases occurred. Polio-free countries remain at risk of polio as long as the wild poliovirus continues to transmit from human to human; countries that do not maintain high immunity levels among all segments of population are at greatest risk. Historically, in endemic areas, cases of poliomyelitis occurred both sporadically and as epidemics each year in tropical countries during the rainy season. Poliomyelitis is today primarily a disease of infants and children under the age of five years. Transmission is primarily person-to-person spread, principally through the fecal-oral route. In rare instances, milk, foodstuffs and other materials contaminated with feces have been incriminated as vehicles; water and sewage are rarely implicated. The period of incubation is commonly 7–14 days for paralytic cases. Virus typically persists in the throat for approximately 1 week and in feces for 3–6 weeks after infection, with transmission greatest during the days before and after onset of symptoms. Type-specific immunity, apparently of lifelong duration, follows both clinically recognizable and unapparent infections. Intramuscular injections, trauma or surgery during the incubation period or prodromal illness may provoke paralysis in the affected extremity.

**Management/treatment**
Prevention is the only cure for paralytic poliomyelitis. Both a trivalent live, attenuated oral poliovirus vaccine (OPV) and an injectable, inactivated poliovirus vaccine (IPV) are
commercially available. OPV simulates natural infection by inducing both circulating antibody and resistance to infection of the pharynx and intestine, and also immunizes some susceptible contacts through secondary spread. WHO recommends the use of OPV alone for immunization programs in developing countries because of its superior capacity to provide population immunity through community spread. IPV likewise provides excellent individual protection by inducing circulating antibody that blocks the spread of virus to the CNS. IPV does not induce intestinal immunity of the level induced by OPV.

There are no risks associated with IPV. OPV, however, is associated with two risks: vaccine-related paralytic polio (VAPP) and outbreaks caused by circulating vaccine-derived poliovirus (cVDPV). VAPP occurs in vaccine recipients or their healthy contacts at a rate of approximately one in every 800,000 first vaccinations. Circulating VDPV are recombinants with other neurovirulent enteric viruses capable of spreading through populations. The extent of the cVDPV problem is currently being evaluated. There is no curative antiviral for poliomyelitis. Treatment during acute illness is for the complications of paralysis and requires expert knowledge and equipment, especially for patients in need of respiratory assistance. Physical therapy is used to attain maximum function after paralytic poliomyelitis and can prevent many deformities that are late manifestations of the illness.

Unresolved questions
Infrequently, recurrence of muscle weakness following recovery may occur many years after the original infection has resolved ("postpolio syndrome"); this is not believed to be related to persistence of the virus itself, but little is known of the biological mechanism that causes this syndrome.

References

Expanded Programme on Immunization. Field guide for supplemental activities aimed at achieving polio eradication. WHO/EPI/GEN 95.1.


