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Perspective

Treatment of *Enterovirus* Infection and its Causes

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DESCRIPTION

Enterovirus is a genus of positive single-stranded RNA viruses associated with several human and mammalian diseases. Enteroviruses are named after their route of transmission through the intestine ('enteric' means intestinal).

Serological studies have distinguished 71 human Enterovirus serotypes based on antibody neutralization tests. Additional antigenic variants have been defined within several serotypes based on reduced or nonreciprocal cross-neutralization between variant strains. Based on their pathogenesis in humans and animals, enteroviruses were originally classified into four groups, polioviruses, Coxsackie A (CA), Coxsackie B (CB), and echoviruses, but it was quickly discovered that there was significant overlap in the biological properties of the viruses in the different groups. Recently isolated enteroviruses are named using a consecutive numbering system: EV-D68, EV-B69, EV-D70, EV-A71, etc., where genotyping is based on the VP1 capsid region.

Enteroviruses affect millions of people worldwide each year and are often found in the respiratory secretions (eg saliva, sputum or nasal mucus) and stool of an infected person. Historically, poliomyelitis was the most important disease caused by an enterovirus, namely poliovirus. There are 81 non-polio enteroviruses and 3 polio enteroviruses that can cause disease in humans. Of the 81 non-polio types, 22 are Coxsackie A viruses, 6 Coxsackie B viruses, 28 echoviruses, and 25 other enteroviruses.

Poliovirus, like coxsackie and echovirus, is spread by the fecal-oral route. Infection can result in a wide variety of symptoms, including: mild respiratory illness (common cold), hand, foot, and mouth disease, acute hemorrhagic conjunctivitis, aseptic meningitis, myocarditis, severe neonatal sepsis-like illness, acute flaccid paralysis, and associated acute flaccid myelitis.

Treatment

Treatment of enterovirus infection is mainly supportive. In cases of pleurodynia, treatment consists of analgesics to relieve the severe pain that occurs in patients with this condition; opiates may be needed in some severe cases. Treatment of aseptic meningitis caused by enteroviruses is also mainly symptomatic. In patients with enterovirus carditis, treatment consists of preventing and treating complications such as arrhythmias, pericardial effusion, and heart failure. Other treatments that have been investigated for enterovirus carditis include intravenous immunoglobulin.

Causes

Enteroviruses cause a wide variety of symptoms, and although their long list of signs and symptoms should place them on the differential diagnosis list of many diseases, they often go unnoticed. Enteroviruses can cause anything from rashes in young children, to summer colds, encephalitis, blurred vision, to pericarditis. Enterovirus infections have a wide range of presentation and severity. Non-polio enteroviruses cause 10-15 million infections and tens of thousands of hospitalizations in the US annually. Enteroviruses can be identified by cell culture or PCR testing, collected from stool or respiratory tract samples.

Common diseases associated with enterovirus, including poliomyelitis, are listed below.

- Poliomyelitis primarilythe fecal-oral route.
- Polio-like syndrome found in children testing positive for enterovirus 68.
- Non-specific febrile illness is the most common manifestation of enterovirus infection. Symptoms other than fever include muscle pain, sore throat, gastrointestinal/abdominal discomfort, and headache. However, in newborns, it can present as sepsis and can be severe and life-threatening.
- Enteroviruses are by far the most common cause of aseptic meningitis in children. In the United States, enteroviruses are responsible for 30,000 to 50,000 hospitalizations for meningitis annually, resulting from 10–15 million infections.
- Bornholm disease or epidemic pleurodynia is characterized by severe paroxysmal chest and abdominal pain along with fever and sometimes nausea, headache and vomiting.
- Pericarditis and/or myocarditis are typically caused by enteroviruses; symptoms consist of fever with shortness of breath and chest pain. Arrhythmias, heart failure and myocardial infarction have also been reported.

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- Acute hemorrhagic conjunctivitis can be caused by enteroviruses.
- Herpangina is caused by the Coxsackie A virus and causes a vesicular rash in the mouth and pharynx, along with high fever, sore throat, malaise and often dysphagia, loss of appetite, back pain and headache. It is also self-limiting, with symptoms usually ending in 3-4 days.
- Hand, foot and lameness disease is a childhood disease that is most often caused by infection with the Coxsackie A or EV71 virus.
- Encephalitis is a rare manifestation of *enterovirus* infection; when it does appear, the most common cause of enterovirus is echovirus 9.
- Myocarditis is characterized by inflammation of the myocardium (heart muscle cells). Over the past few decades, many culprits have been identified that play a role in the pathogenesis of myocarditis in addition to enterovirus, which was initially the most common virus involved in this pathology. One of the most common enteroviruses found to be responsible for myocarditis is Coxsackie virus B3.
- A 2007 study suggested that acute respiratory or gastrointestinal infections associated with enterovirus may be a factor in myalgic encephalomyelitis.