Acute Flaccid Myelitis: An Ongoing Investigation

This polio-like illness typically affects children.

Eight-year-old Bailey Sheehan of Welches, Oregon, suddenly lost the use of most of her right arm and leg in October. Thanks to physical therapy, she can walk with a leg brace and walker. Photo © NashCO.

Since 2014, 491 cases of acute flaccid myelitis (AFM) have been confirmed in the United States.[1] They have occurred in 46 states and the District of Columbia.[1] AFM is a polio-like illness that typically affects children and in most cases follows an unremarkable upper respiratory or gastrointestinal illness.[2,3] Two to seven days after the onset of infection, neurological symptoms occur suddenly and progress rapidly over hours or a few days.[2-5]

AFM affects fewer than two in a million people.[1] Because the cause of AFM is not yet known, there are currently no targeted therapies; there are only general recommendations for prevention of the illness. This emerging problem is seasonal, occurring primarily in the late summer and early fall. Interestingly, cases have shown a clear, every-other-year epidemiological pattern, with large spikes during 2014, 2016, and 2018.[6]

CLINICAL COURSE

Flaccid limb weakness is the characteristic presenting symptom of AFM. The weakness may be asymmetric.[5] A Centers for Disease Control and Prevention (CDC) review of 80 confirmed U.S. cases from the first 10 months of 2018 found that 47.5% of people with AFM had arm weakness only, 8.8% experienced leg weakness only, 15% had two or three upper and lower limbs involved, and in 28.8% all extremities were involved.[7] In an earlier review, of the 120 cases identified in 2014, it was noted that in addition to limb weakness, reflexes in the affected limbs were diminished or absent. Cranial nerve dysfunction, resulting in such symptoms as dysphagia, diplopia, and facial weakness, was evident in 28% of those cases. Mechanical ventilation for neuromuscular respiratory failure was needed in 20% of patients (information on how long patients needed mechanical ventilation is not available).[4,5] One death has been reported.[8]

Magnetic resonance imaging (MRI) and cerebrospinal fluid (CSF) examination of patients with AFM have revealed two consistent findings. MRI scans show inflammation in the gray matter of the spinal cord, usually extending through several levels of the cord. CSF specimens have an elevated white blood cell count and, in many cases, elevated protein levels.[2,3,5] Without a definite causative organism to confirm a diagnosis of AFM, clinicians must use these clinical, MRI, and CSF findings for diagnosis.

The long-term effects of AFM are not yet known. Current evidence confirms that residual motor deficits (which are sometimes severe) can persist for months—at least—after the initial onset of neurological symptoms.[3,4] According to the review of the 2014 cases, at a median of four months of follow-up, 68% of the children remained somewhat functionally impaired, 18% were fully functional, and 14% were completely dependent on caregivers.[5] In a November 2018 CDC telebriefing, Nancy Messonnier, MD, director of the National Center for Immunization and Respiratory Diseases, said that "at least half of the patients don't recover." It is possible that in some cases, muscle weakness will be permanent. The CDC plans

to create a database to ensure long-term follow-up of confirmed cases.

WHAT CAUSES THIS ILLNESS?

The cause of AFM has been elusive. No poliovirus has been detected in any of the cases. Many organisms are known as rare causes of flaccid paralysis or flaccid myelitis, including nonpolio enteroviruses, flaviviruses such as West Nile virus, adenoviruses, and herpesviruses. Similar symptoms have been caused by environmental toxins, genetic disorders, and Guillain–Barré syndrome. However, clinical, laboratory, radiographic, and epidemiological evidence point most strongly to some kind of causal association with a neuroinvasive virus—possibly a virus that causes only mild symptoms in most people but triggers neurological damage in a small number of infected individuals.[5,9]

Consistent findings of a particular virus in CSF samples would provide clinical investigators with nearly indisputable evidence of a causative organism, but no specific organism has been isolated from a sterile site (that is, blood or CSF) in a majority of people with AFM.[10] Of the 491 U.S. cases of AFM confirmed since 2014, viruses have been found in the spinal fluid of only four people.[1] The organisms detected were enterovirus D68 (EV-D68), enterovirus A71 (EV-A71), and coxsackievirus A16.[6]

The initial 2014 cluster of cases was thought at first to be related to a simultaneous outbreak of severe respiratory illness caused by EV-D68. But in 2016, when cases of AFM once again peaked, there were no large outbreaks of EV-D68 or any other respiratory illnesses in the United States.[7] EV-D68 has been identified in respiratory and other samples from people subsequently diagnosed with AFM, but clinical investigators have also identified EV-A71, adenoviruses, rhinoviruses, echovirus 6, and parechovirus A6 in patient specimens.[2,7,8]

There are many possible reasons for the difficulty in identifying one overriding causative organism. Testing is almost always done when limb weakness is identified, which can be days or weeks after the initial infection began. Has testing missed the organism? Does the organism somehow hide by that point in the clinical course of the disease? Is the real culprit an organism not being tested for? Or are our testing methods still not sophisticated enough to identify the pathogen?[11]

WHO IS MOST AT RISK?

Case clusters since 2014 have been associated with different age ranges, but in all clusters AFM has primarily affected children.[2-5] Ninety percent of U.S. cases have been in children 18 years of age and younger.[8] In some reviews of case clusters, a small number of children were noted to have had underlying asthma or an immunosuppressive illness.[4,5]

TREATMENT

With no identified (and treatable) cause, the management of AFM consists of supportive care. Acyclovir, corticosteroids and other immunosuppressive medications, fluoxetine, interferon, intravenous immune globulin, and plasma exchange have been tried but have not been effective.[10] CDC experts state that "there are currently no targeted therapies [or] interventions with enough evidence to endorse or discourage their use" in managing AFM.[10]

The CDC does note that neurologists may recommend interventions on a case-by-case basis, such as initiating physical or occupational therapy for leg and arm weakness.[12] This might help to prevent muscle atrophy and contractures and may ultimately improve muscle function.

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PREVENTION

The CDC emphasizes basic infection prevention measures: keeping vaccinations up to date; employing mosquito bite prevention measures; frequent handwashing; frequent disinfection of surfaces, including toys; and avoiding people who are obviously sick.[1] In a Colorado AFM cluster investigation in which the question was asked, 67% of affected children had been exposed to household members with respiratory illnesses before the onset of their AFM.[4] Although AFM itself is not contagious, if the underlying cause is a virus, that virus itself may be easily transmissible, even if it induces AFM in only a small number of those infected.

In addition to emphasizing basic infection prevention, nurses can help by being vigilant for possible cases, especially during the late summer and fall seasons, and ensuring that the local or state health department is notified as soon as AFM is suspected. Collection of serum, CSF, respiratory, and stool specimens as early as possible in the course of disease (ideally, on the day of symptom onset) is most likely to yield useful results.[7] Instructions on specimen collection can be found at www.cdc.gov/acute-flaccid-myelitis/hcp/instructions.html. ▼

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