Acute flaccid paralysis surveillance: The need for ruling out polio infection

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A five-year-old, previously well male was admitted to hospital with severe headache after a three-day history of fever, cough and breathing difficulty. The child had not travelled outside of Canada and had received all recommended immunizations. The following day, he developed leg weakness, right-sided calf pain, limited lower extremity movement and decreased lower extremity reflexes bilaterally. Although given a presumptive diagnosis of Guillain-Barré syndrome (GBS) and started on intravenous immunoglobulin, his leg weakness continued to progress. To determine the etiology of his acute flaccid paralysis (AFP), brain and spine magnetic resonance imaging and lumbar puncture were conducted. Because viral culture from stool is the most sensitive test for identifying poliovirus, a stool sample was sent to the National Microbiology Laboratory (NML, Winnipeg, Manitoba) to rule out poliomyelitis. Samples from other sources (eg, nasopharyngeal swab) may be useful for detecting other viruses but stool culture is still recommended for detecting polio. The stool sample was obtained early within the recommended 14 days to ensure the highest probability of poliovirus detection. Results returned after 10 days were negative for poliovirus and further investigations were undertaken. The present case was reported to the local public health unit and the Canadian Paediatric Surveillance Program (CPSP). A 60-day follow-up with the attending physician was scheduled through neurology.

LEARNING POINTS

Polio

- Poliomyelitis is a highly infectious disease caused by the human enterovirus poliovirus. Spread generally occurs from person-to-person via the fecal-oral route, with virus replication occurring in the gastrointestinal tract. While most cases are asymptomatic or experience minor illness, <1% develop AFP.
- In 2014, the WHO declared the international spread of wild poliovirus a public health emergency of international concern after numerous exportations from polio-infected countries to previously polio-free countries(1).
- All poliomyelitis cases must be immediately reported to local public health. Because many individuals can become infected before a paralytic case is identified, a single diagnosed case is a public health emergency and reportable under the International Health Regulations(2).
- Although Canada was certified polio-free in 1994, continued surveillance for poliomyelitis is essential due to the risk for importation from polio-endemic regions, vaccine-derived poliovirus importation from countries still using the oral polio vaccine and the existence of nonimmunizing populations in Canada.
  - Four cases of vaccine-derived poliovirus were detected in Canada between 2004 and 2012 in infants who had travelled to, and were vaccinated in, countries using the oral polio vaccine. One child developed paralysis (3) while the others presented with nonspecific symptoms, including fever, sore throat and diarrhea.

AFP surveillance for detecting polio

- Based on WHO recommendations, Canada conducts AFP surveillance in children <15 years of age to detect polio activity and reports on three quality assurance indicators:
  i. Detection of ≥1 nonpolio AFP cases per 100,000 children <15 years of age annually (the minimum expected incidence of AFP from viral and nonviral causes in the absence of polio).
  ii. Poliovirus testing in a stool sample collected within 14 days of paralysis onset in ≥80% of cases (stool being the ideal source for the detection of poliovirus).
  iii. A follow-up examination 60 days after paralysis onset in ≥80% of AFP cases to document residual paralysis. Because paralysis associated with poliomyelitis is irreversible, only AFP cases with no residual weakness at 60 days can be classified as nonpolio in the absence of a negative stool sample.
- Physician reporting is critical to the success of Canada's AFP surveillance program.
- In Canada, the most common causes of AFP are GBS, transverse myelitis, acute disseminated encephalomyelitis and neurological complications secondary to viral and bacterial infections. The recent occurrence of Enterovirus D68 associated with AFP reinforces the need for thorough microbiological investigation, including stool analysis.

What to do when observing an AFP case to rule out polio

- All AFP cases should be reported to:
  i. The CPSP.
  ii. Your local public health unit if legislatively required in your jurisdiction (Alberta, Saskatchewan, Ontario, Quebec, Newfoundland and Labrador, New Brunswick [only GBS], Nova Scotia, Prince Edward Island and the Northwest Territories).
- One stool sample should be collected and sent to the NML within 14 days of onset, in addition to other neurological investigations(4).
  - The national AFP questionnaire and user manual contain detailed procedures for collecting and submitting samples to NML (at the NML's expense), as well as a copy of the NML requisition form(5).

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- The NML (www.nml-lnm.gc.ca/) is the only WHO-accredited laboratory in Canada that performs poliovirus testing. In addition to culture testing, NML conducts molecular testing to genotype any enterovirus (stool, cerebrospinal fluid or respiratory specimens) and rule out wild-type, vaccine-strain, or vaccine-derived poliovirus. Results are returned within two weeks of specimen receipt.

- Every AFP case should be followed-up at least 60 days after paralysis onset for residual paralysis. Follow-up information should be provided to the CPSP.

Bottom line

- Any child younger than 15 years of age presenting with AFP should be investigated for poliomyelitis in addition to the more likely causes of AFP, including stool analysis, and reported as described above.
- Take every opportunity to ensure that patients are up-to-date for recommended immunizations.

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