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Botulism: A decade in review—1996 to 2007

ABSTRACT: Botulism is a rare but serious disease of both children and adults. Neurotoxins produced from the bacterium *Clostridium botulinum* produce a descending, symmetrical, flaccid paralysis that may result in respiratory distress and death. We review the epidemiology of infant and adult botulism in British Columbia and Yukon between 1996 and 2007 and present an overview of the clinical manifestations of the disease, requirements for public health follow-up, clinical management, and available treatments.

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Botulism is a rare but potentially life-threatening paralytic disease caused by one of several serologically distinct toxins of the bacterium *Clostridium botulinum*.[1]

Infant botulism usually results from in situ toxin production following ingestion of *C. botulinum* spores from a contaminated environmental source (e.g., food or dust). In adults, botulism is caused by ingestion of preformed botulinum toxin present in poorly prepared food items.[1] Botulinum toxins are some of the most potent neurotoxins in existence. They exert their effect by inhibiting acetylcholine release from nerve synapses.[2] Botulism is potentially life threatening and should be considered a medical emergency. Severe botulism may require significant care and lengthy hospital stays.[1,3]

Epidemiology

Between 1996 and 2007, 71 cases of clinically defined botulism were identified in British Columbia. Two cases from Whitehorse, Yukon, were also included in the review. Twenty-three cases were in infants with intestinal botulism. The median and mean ages of infant cases were 6 and 8.3 respectively. A majority of cases (17/23, 74%) were less than 12 months of age and 19/23 (83%) were female. Stool samples from 20 infants, in addition to serum and implicated food/environmental sources from two cases, were submitted to the provincial public health laboratory at BCCDC for testing. Stool samples from four cases were positive for *C. botulinum* type A. A clear annual or geographic distribution among infant cases was not observed.

The remaining 48 cases were clinically defined as classic adult foodborne botulism (median and mean ages of 45 and 46.4). Ten patients were older than 65 years. One patient was an 8-month-old who did not present with typical infant intestinal botulism.

Four outbreaks (two or more patients linked epidemiologically) accounted for 10 of the 48 (21%) adult cases. Three outbreaks occurred in northern regions (Terrace, September 1996; Kitimat, August 2001; Whitehorse, August 2001). These outbreaks were associated with fermented salmon roe, a delicacy in some communities. Decreasing overall incidence of botulism observed during this period may be partly due to changing dietary patterns in these populations. Serum, stool, and/or implicated food specimens were tested by the standard mouse bioassay. Seven of the adult patients, including five patients associated with the outbreaks, were positive for *C. botulinum* type E, typically associated with fish intestinal flora.

Clinical presentation and required public health follow-up

The primary presenting symptom of infant botulism is constipation (>95%), although symptoms are often nonspecific, including listlessness, poor head control, difficulty swallowing or sucking, weak cry, flaccid expressions, and a weak gag reflex. Adults present with descending, symmetrical, flaccid paralysis, although other presentations, including gastrointestinal symptoms (depending on the amount of toxin ingested), may occur. Cranial nerve abnormalities (ptosis, diplopia, and dysarthria) are often seen first, followed by descending muscular paralysis. If diaphragmatic function is compromised, respiratory arrest may follow.[1] Differential diagnosis includes neuromuscular disorders such as Guillain-Barré syndrome or myasthenia gravis with electro-

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myogram findings consistent with acute nerve degeneration. Physicians must urgently discuss suspect cases with the provincial public health laboratory BCCDC medical microbiologist (office hours: 604 660-6032; after hours [medical microbiologist on call]: 604 661-7033). On approval, samples of serum, stool, gastric contents, or implicated foods will be tested at the provincial public health laboratory (BCCDC Guide to Program and Services Version 4, www.bccdc.org/division.php?item=2). Since diagnostic tests may require up to several days, both clinical and public health measures must be taken prior to laboratory confirmation. All suspected cases must be urgently reported to local medical officers of health.

Management

Treatment often requires supportive and respiratory care, including nasogastric feeding and mechanical respiration in some cases.[1,3] It may be up to 1 year before regeneration of motor neurons and recovery of nerve function. Antitoxin therapy is available through public health. A bivalent equine botulism antitoxin A/B and a monovalent antitoxin E may be used in adults, while the human immunoglobulin Baby-BIG (containing neutralizing antibodies to botulinum toxin A and B) is recommended for children.

References

1. Sobel J. Botulism. Clin Infect Dis 2005;41:1167-73.
2. Cai S, Singh BR, Sharma S. Botulism diagnostics: From clinical symptoms to in vitro assays. Crit Rev Microbiol 2007;33:109-25.
3. Tseng-Ong L, Mitchell WG. Infant botulism: 20 years' experience at a single institution. J Child Neurol 2007;22:1333-7.

Guide to Drive

The Office of the Superintendent of Motor Vehicles (OSMV), in partnership with the BCMA, is revising the BC *Guide for Physicians in Determining Fitness to Drive a Motor Vehicle* to ensure that it reflects changes in the case law and the best evidence available regarding medical conditions and fitness to drive.

Draft chapters may be viewed at Drivesafe.com, on the public side of the BCMA web site, and at the SGP web site.

Chapters available include Brain Injury, Brain Tumor, Cardiovascular Disorders, Cerebral Palsy, Cerebrovascular Disease, Diabetes, Epilepsy and Seizure, Hearing, Multiple Sclerosis, Musculoskeletal Disorders, Parkinson's Disease, Peripheral Vascular Disease, Psychiatric Disorders, Renal Disease, Respiratory Disorders, Sleep Disorders, Syncope, and Traumatic Vestibular Disorders.

Feedback to the project team is encouraged, even if it is positive. Feedback instructions are in the documents themselves.

—John McCracken, MD, Medical Consultant, OSMV