Foodborne Botulism in British Columbia: A 30 Year history

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Background

Foodborne botulism is a rare but severe neuroparalytic disorder resulting from ingestion of preformed neurotoxin produced during the growth of Clostridium botulinum in contaminated food. C. botulinum strains differ in heat resistance and growth temperature requirements, two contributing factors that make this organism responsible for food poisoning. Only a few nanograms of the toxin can cause illness which usually presents with gastrointestinal symptoms, blurred or double vision, progressing to dry mouth, dysphagia and symmetrical flaccid paralysis. When the neurotoxin enters the gastrointestinal tract, it is absorbed into the blood and lymphatic circulation where it acts to block the release of acetylcholine from nerve synapses resulting in paralysis. A single case of foodborne botulism constitutes an outbreak and could represent significant public health implications by potentially heralding a larger outbreak if a commercial food product is involved.

Methods

Once approval to perform the test has been given by a BCCDC Medical Microbiologist, collection and submission of implicated food and clinical samples is coordinated through the B.C. Centre for Disease Control (BCCDC) Laboratory Services, the only laboratory in BC carrying out this testing. Rapid diagnosis of foodborne botulism is critical for the survival and treatment of the patient. Diagnosis of foodborne botulism is confirmed in the laboratory by identifying botulinum neurotoxin in implicated food, serum, feces, vomitus, gastric contents or post mortem samples. Currently, the only acceptable method for the identification and detection of botulinum neurotoxin is the mouse neutralization bioassay, which identifies the toxin type by using monovalent antitoxin. Finding viable C. botulinum organisms in an implicated food sample is not sufficient evidence to confirm botulism illness in the absence of other laboratory data. Detection of viable C. botulinum organisms by enrichment culture, followed by mouse neutralization bioassay in feces or vomitus samples also provides good confirmatory evidence of illness, as the organism is rarely encountered in healthy humans.

Results

21 outbreaks of foodborne botulism involving 80 cases and four fatalities have been investigated by the BCCDC Environmental Microbiology Laboratory since 1977. Figure 1 shows the number of outbreaks that occurred from 1977-2007 (Table 1). Figure 2 shows the geographic distribution of foodborne botulism cases in British Columbia from 1977-2007. Of the 21 outbreaks in BC, 67% have been caused by C. botulinum Type E (Figure 3), involving 26 cases caused by Type E, 15 cases caused by Type A, involving only 15 cases, the majority of which were caused by home canned products. 9% of outbreaks consisted of only two outbreaks but involved 39 cases and were caused by C. botulinum Type B and resulted in the largest single outbreak seen in BC.

Conclusions

BC’s last outbreak of foodborne botulism was in 2001. Over the last few years, there have been efforts made by public health to discourage the fermentation and improper smoking of salmon products which may have attributed to the decline in C. botulinum cases caused by Type E. A decline in the number of foodborne botulism incidents in home processed foods may also be attributed to the efforts made by province-wide public health agencies to further educate the public on proper food handling and preparation practices. Luckily, no foodborne botulism outbreaks in commercial products in BC have been documented during this time which has been largely controlled by a better understanding of safe canning and food manufacturing processes.

References