Botulism

What is botulism?

Botulism is a rare but serious paralytic illness caused by a nerve toxin that is produced by the bacterium Clostridium botulinum. There are three main kinds of botulism. Foodborne botulism is caused by eating foods that contain the botulism toxin. Wound botulism is caused by toxin produced from a wound infected with Clostridium botulinum. Infant botulism is caused by consuming the spores of the botulinum bacteria, which then grow in the intestines and release toxin. All forms of botulism can be fatal and are considered medical emergencies. Foodborne botulism can be especially dangerous because many people can be poisoned by eating a contaminated food.

What kind of germ is Clostridium botulinum?

Clostridium botulinum is the name of a group of bacteria commonly found in soil. These rod-shaped organisms grow best in low oxygen conditions. The bacteria form spores which allow them to survive in a dormant state until exposed to conditions that can support their growth. There are seven types of botulism toxin designated by the letters A through G; only types A, B, E and F cause illness in humans.

How common is botulism?

In the United States an average of 110 cases of botulism are reported each year. Of these, approximately 25% are foodborne, 72% are infant botulism, and the rest are wound botulism. Outbreaks of foodborne botulism involving two or more persons occur most years and usually caused by eating contaminated home-canned foods. The number of cases of foodborne and infant botulism has changed little in recent years, but wound botulism has increased because of the use of black-tar heroin, especially in California.

What are the symptoms of botulism?

The classic symptoms of botulism include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness. Infants with botulism appear lethargic, feed poorly, are constipated, and have a weak cry and poor muscle tone. These are all symptoms of the muscle paralysis caused by the bacterial toxin. If untreated, these symptoms may progress to cause paralysis of the arms, legs, trunk and respiratory muscles. In foodborne botulism, symptoms generally begin 18 to 36 hours after eating a contaminated food, but they can occur as early as 6 hours or as late as 10 days.

How is botulism diagnosed?

Physicians may consider the diagnosis if the patient's history and physical examination suggest botulism. However, these clues are usually not enough to allow a diagnosis of botulism. Other diseases such as Guillain-Barré syndrome, stroke, and myasthenia gravis can appear similar to botulism, and special tests may be needed to exclude these other conditions. These tests may include a brain scan, spinal fluid examination, nerve conduction test (electromyography, or EMG), and a tensilon test for myasthenia gravis. The most direct way to confirm the diagnosis is to demonstrate the botulinum toxin in the patient's serum or stool by injecting serum or stool into mice and looking for signs of botulism. The bacteria can also be isolated from the stool of persons with foodborne and infant botulism. These tests can be performed at some state health department laboratories and at CDC.

How can botulism be treated?

The respiratory failure and paralysis that occur with severe botulism may require a patient to be on a breathing machine (ventilator) for weeks, plus intensive medical and nursing care. After several

weeks, the paralysis slowly improves. If diagnosed early, foodborne and wound botulism can be treated with an antitoxin which blocks the action of toxin circulating in the blood. This can prevent patients from worsening, but recovery still takes many weeks. Physicians may try to remove contaminated food still in the gut by inducing vomiting or by using enemas. Wounds should be treated, usually surgically, to remove the source of the toxin-producing bacteria. Good supportive care in a hospital is the mainstay of therapy for all forms of botulism. Currently, antitoxin is not routinely given for treatment of infant botulism.

Are there complications from botulism?

Botulism can result in death due to respiratory failure. However, in the past 50 years the proportion of patients with botulism who die has fallen from about 50% to 8%. A patient with severe botulism may require a breathing machine as well as intensive medical and nursing care for several months. Patients who survive an episode of botulism poisoning may have fatigue and shortness of breath for years and long-term therapy may be needed to aid recovery.

How can botulism be prevented?

Botulism can be prevented. Foodborne botulism has often been from home-canned foods with low acid content, such as asparagus, green beans, beets and corn. However, outbreaks of botulism from more unusual sources such as chopped garlic in oil, chile peppers, tomatoes, improperly handled baked potatoes wrapped in aluminum foil, and home-canned or fermented fish. Persons who do home canning should follow strict hygienic procedures to reduce contamination of foods. Oils infused with garlic or herbs should be refrigerated. Potatoes which have been baked while wrapped in aluminum foil should be kept hot until served or refrigerated. Because the botulism toxin is destroyed by high temperatures, persons who eat home-canned foods should consider boiling the food for 10 minutes before eating it to ensure safety. Instructions on safe home canning can be obtained from county extension services or from the US Department of Agriculture. Because honey can contain spores of Clostridium botulinum and this has been a source of infection for infants, children less than 12 months old should not be fed honey. Honey is safe for persons 1 year of age and older. Wound botulism can be prevented by promptly seeking medical care for infected wounds and by not using injectable street drugs.

What are public health agencies doing to prevent or control botulism?

Public education about botulism prevention is an ongoing activity. Information about safe canning is widely available for consumers. State health departments and CDC have persons knowledgeable about botulism available to consult with physicians 24 hours a day. If antitoxin is needed to treat a patient, it can be quickly delivered to a physician anywhere in the country. Suspected outbreaks of botulism are quickly investigated, and if they involve a commercial product, the appropriate control measures are coordinated among public health and regulatory agencies. Physicians should report suspected cases of botulism to a state health department.

Clinical Features

A neuroparalytic illness characterized by symmetric, descending flaccid paralysis of motor and autonomic nerves, usually beginning with the cranial nerves. Symptoms usually include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness. If untreated, illness might progress to cause descending paralysis of respiratory muscles, arms and legs. Botulinum antitoxin (supplied by CDC) can prevent progression of illness and shorten symptoms in severe botulism cases if administered early.

Etiologic Agent

A potent neurotoxin produced from Clostridium botulinum, an anaerobic, spore-forming bacterium. Incidence In 1999, 174 cases of botulism were reported to the CDC. Of these, 26 were foodborne,

107 were infant botulism, and 41 were cases of wound botulism.

Sequelae

Death can result from respiratory failure. About 5% die. Those who survive may have fatigue and shortness of breath for years.

Transmission

Foodborne botulism follows ingestion of toxin produced in food by C. botulinum. The most frequent source is home-canned foods, prepared in an unsafe manner. Wound botulism occurs when C. botulinum spores germinate within wounds. Intestinal colonization botulism occurs when C. botulinum spores germinate and produce toxin in the gastrointestinal tract. Recently, the potential terrorist use of botulinum toxin has become a concern.

Risk Groups

All persons. Intestinal colonization botulism usually occurs in infants, and is often called infant botulism. Injection drug users are at increased risk for wound botulism.

Surveillance

In collaboration with state health departments, CDC maintains intensive surveillance for botulism in the United States. Every case of foodborne botulism is treated as a public health emergency because the responsible food, whether homemade or commercial, might still be available for consumption and could make unsuspecting persons ill.

Trends

Other vehicles of transmission include homemade salsa, baked potatoes cooked in aluminum foil, cheese sauce, garlic in oil, and traditionally prepared salted or fermented fish in Alaska. Wound botulism related to the use of black-tar heroin has increased, especially in California.

Challenges

Prompt recognition of clinical syndrome by physicians. Maintenance of adequate supply of botulinum antitoxin, because production of this product is limited. Preparing for bioterrorist use.

Opportunities

Clinician education. Consumer education about home canning. Educating Alaska natives about proper fermentation techniques. Applying tools of molecular biology.

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