botulism. A history of recent abdominal surgery or antibiotic use may be important in the diagnosis of adult intestinal colonization botulism.

Differential Diagnosis The illnesses most commonly considered in the differential diagnosis of adult botulism cases include Guillain-Barré syndrome (GBS), myasthenia gravis, stroke syndromes, Eaton-Lambert syndrome, and tick paralysis. Less likely possibilities are poisoning by tetrodotoxin, shellfish, or a host of rarer agents and antimicrobial drug–associated paralysis. A thorough history and a meticulous physical examination can effectively eliminate most alternative diagnoses, but a workup for other diagnoses should not delay treatment with botulinum antitoxin.

GBS, a rare autoimmune demyelinating polyneuropathy that often follows an acute infection, presents most often as an ascending paralysis. Case clusters are rare. Occasional GBS cases present as the Miller Fisher variant, whose characteristic triad of ophthalmoplegia, ataxia, and areflexia is easily mistaken for the early descending paralysis of botulism. Protein levels in cerebrospinal fluid (CSF) are elevated in GBS; because this increase may be delayed until several days after symptom onset, an early lumbar puncture with a negative result may need to be repeated. In contrast, CSF findings are generally normal in botulism, although marginally elevated CSF protein concentrations have been reported. In experienced hands, electromyography may differentiate GBS from botulism.

The edrophonium (Tensilon) test is sometimes of value in distinguishing botulism (usually a negative result) from myasthenia gravis (usually a positive result).

In most cerebrovascular accidents, physical examination reveals asymmetry of paralysis and upper motor neuron signs. Brain imaging can reveal the rare basilar stroke that produces symmetric bulbar palsies. Eaton-Lambert syndrome usually manifests as proximal limb weakness in a patient already debilitated by cancer. Tick paralysis is a rare flaccid condition closely resembling botulism and caused by neurotoxins of certain ticks.

Botulism-Specific Laboratory Tests Botulism is confirmed in the laboratory by demonstration of toxin in clinical specimens (e.g., serum, stool, gastric aspirate, and sterile-water enema samples) or in samples of ingested foods. Isolation of toxigenic clostridia from stool also provides evidence of botulism. Wound cultures yielding the organism are highly suggestive in symptomatic cases. The universally accepted method for confirmation of botulism is the mouse bioassay, which is available only in specialized laboratories. Specific guidance about what specimens to collect should be obtained from the testing laboratory because the requirements vary with the form of botulism suspected. Clinical specimens collected early in the hospital admission process should be submitted for testing; toxin results may be negative if specimens are collected >7 days after symptom onset. Because of the extreme potency of botulinum toxin, a test may yield a negative result even when a patient has botulism; thus, a negative result does not exclude this diagnosis. In suspected wound botulism, material from abscesses should be collected in anaerobic culture tubes. New laboratory tests for botulism are being developed but remain experimental. Nerve conduction studies showing reduced amplitude of motor potentials—with or without potentiation by rapid repetitive stimulation in weak muscles—and needle electromyography showing small-motor-unit action potentials are consistent with botulism; these results and those that make alternative diagnoses more likely may be useful. Standard blood work and radiologic studies are not useful in diagnosing botulism.

TREATMENT BOTULISM

The cornerstones of treatment for botulism are meticulous intensive care and immediate administration of botulinum antitoxin. Because antitoxin is most beneficial early in the course of clinical illness, it should be administered as soon as botulism is suspected and before the time-consuming workup for other illnesses is complete. Persons of all ages (including infants) in whom botulism is suspected should be hospitalized immediately so that respiratory failure—the usual cause of death—can be detected and managed promptly. Vital capacity should be monitored frequently and mechanical ventilation provided as needed. Botulinum antitoxin can limit the progression of illness because it neutralizes toxin molecules in the circulation that have not yet bound to nerve endings. However, antitoxin does not reverse existing paralysis, which may take weeks to improve. In the United States, there are two licensed antitoxin products: Botulism Antitoxin Heptavalent® (BAT; Emergent Biosolutions, Rockville, MD), an equine-derived heptavalent (A through G) product enzymatically de-speciated for treatment of all forms of adult botulism and infant cases not involving serotypes A and B; and Botulism Immune Globulin Intravenous (BabyBIG®; California Department of Public Health, Sacramento, CA), a human-derived product for treating infant botulism caused by serotype A and/or B only. Antitoxin is also available in some other countries. Aminoglycosides and other medications that block the neuromuscular junction may potentiate botulism and should be avoided.

In wound botulism, suspect wounds and abscesses should be cleaned, debrided, and drained promptly. The role of penicillin and metronidazole in treatment and decolonization is unclear. It has been hypothesized that antimicrobial agents may increase circulating botulinum toxin from lysis of bacterial cells.

Person-to-person transmission of botulism does not occur. Universal precautions are the only infection-control measures required during inpatient care.

NOTIFICATION, EXPERT CONSULTATION, AND ANTITOXIN PROVISION

Every botulism case is a public health emergency. Antitoxin is not universally available. Some countries maintain stockpiles of antitoxin for immediate response, whereas others must access supplies from other nations when an outbreak occurs.

In the United States, clinicians must report every suspected case, regardless of form, on an emergency basis to their state health department. The state health department may put the physician in contact with the 24/7 botulism consultation service at the Centers for Disease Control and Prevention (CDC) through the CDC Emergency Operations Center (770-488-7100) or a locally available service. The botulism consultant will review the case and determine whether botulism is likely. If indicated, the consultant will coordinate laboratory confirmation at appropriate testing facilities and facilitate emergency shipment of antitoxin for all adult cases and for infant cases not involving serotypes A and B. In this country, botulinum antitoxin for noninfant cases is available exclusively from the CDC. Physicians who see suspected infant botulism cases should contact the California Department of Public Health Infant Botulism Treatment and Prevention Program (510-231-7600), which provides 24-h consultation and distributes antitoxin (BabyBIG) for the treatment of infant botulism nationwide. Except in cases involving infants who reside in California, laboratory testing requests must still be authorized by the state health department where the infant is located or by the CDC.

PREVENTION

No prophylaxis or licensed vaccine is available against botulism. Home-canning instructions and equipment have changed over the years. Up-to-date canning instructions from reliable sources (e.g., the U.S. Department of Agriculture or the U.S. Food and Drug Administration) should be followed to ensure food safety. Processed food should be stored properly and heated thoroughly prior to consumption. Because of the possible presence of spores, honey should not be given to infants (≤12 months of age). Injection of illicit drugs should be avoided. All wounds should be meticulously cleaned to eliminate possible contamination with bacterial spores. Clinicians should educate individuals or family members of at-risk individuals, including infants, illegal drug users, and preparers of home-preserved foods.

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