Case Study: Botulism

Case Presentation

Sarah, a twenty-one year old student at Iowa State University had spent Thanksgiving Day with relatives at her grandparent’s farm. During her drive back to campus on Friday morning her vision became blurry, and she was forced to pull over to the side of the road. As she sat in her car, her vision worsened. She opened the car hood in hope of attracting aid and tried to relax.

In a short time, a highway patrol officer pulled over and approached Sarah. By this time, Sarah was having trouble swallowing and speaking clearly. The officer helped Sarah to his car and rushed her to the emergency room at a nearby hospital.

In the ER, Sarah was able to describe her symptoms to a physician. The physician made note of what Sarah had eaten during the last 24 hours and was especially interested in the fact that Sarah’s grandmother canned all of her own vegetables. The physician observed that Sarah’s breathing was becoming labored. She ordered Sarah’s blood sampled, her gastrointestinal tract pumped, and a mechanical respirator prepared for use. Fearing that Sarah suffered from a case of botulism, she asked that Sarah’s grandparents be contacted and samples of the Thanksgiving meal retained, if possible, and sent to a local clinic for analysis.

Case Background

Botulism is a form of food poisoning caused by exposure to a toxin called botulin. Botulin is produced by Clostridium botulinum, a spore forming, anaerobic bacterium that can contaminate food. Whereas commercially canned foods are specifically heated to destroy botulinum spores, home canned foods that are not boiled for a half-hour prior to canning may be contaminated.

The botulin toxin binds to the presynaptic membranes at motor end plates and prevents the release of acetylcholine from motor neurons, thereby preventing synaptic transmission and muscle contraction. Treatment includes bed rest, and if required, mechanical respiration, and/or administration of drugs to promote acetylcholine release. The mortality rate for botulism is about 15 percent and the cause of death is suffocation.
Questions

1. What two organ systems are primarily affected by botulin intoxication?

2. What were Sarah’s symptoms and how do they relate to the blockage of acetylcholine release and the prevention of a muscle impulse?

3. What is the significance of *Clostridium botulinum* being *anaerobic*?

4. Why didn’t the physician prescribe an antibiotic?