Infantile botulism

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SUMMARY A 4 month old boy presented with respiratory difficulty and hypotonia. *Clostridium botulinum* and its toxin were isolated from his faeces and he had electromyographic changes typical of infantile botulism. This is only the second case in the United Kingdom: unfamiliarity with the presentation could result in misdiagnosis.

Infantile botulism results from the production of *Clostridium botulinum* toxin in the infant gut. It was first recognised in 1976¹ and more than 600 cases have been reported since, most of them from North America. Only one previous case has been reported in the United Kingdom, which was caused by *C botulinum* type A.² We describe a second case, and only the third ever reported caused by *C botulinum* producing toxins B and F.

Case report

The patient was a boy aged 4 months. He was born at full term after a normal pregnancy, was breast fed from birth, and growth and development were normal. He was given his first doses of diphtheria, tetanus, pertussis, and oral poliomyelitis vaccines three weeks before admission to hospital. Baby rice and rusks were added to his diet about one week later because of 'constipation' attributed by his parents to underfeeding, and for the week before admission he had had profuse rhinorrhoea.

Twenty four hours before admission he had difficulty feeding, and was less active than normal. By the next day he was 'floppy' and in respiratory distress, and on admission there was profound generalised hypotonia with bilateral ptosis, impassive facies, reduced tendon reflexes, a poor gag reflex, and pharyngeal pooling. Spontaneous movements were few but he seemed visually alert and showed definite withdrawal from pain. Physical examination otherwise yielded normal results.

Haematological measurements were unremarkable, and normal biochemical results included blood urea, electrolytes, creatinine, glucose, and lead concentrations, and normal aspartate transaminase activity. Urinary screening for drugs, porphyrins,

and other metabolic abnormalities gave normal results. Examination of the cerebrospinal fluid on admission showed no cells, a normal glucose concentration, protein concentration of 0.19 g/l, and no growth on culture for bacteria or viruses. A rhinovirus was isolated from two separate nasopharyngeal aspirates, and poliovirus type 3 (thought to be the vaccine strain) from his stool. No clinical change was observed after an intravenous dose of edrophonium (0.1 mg/kg).

Electrophysiological testing within 24 hours of admission showed normal sensory nerve conduction and normal motor conduction velocities, but a greatly reduced amplitude of motor action potentials. Tetanic stimulation caused reproducible incrementation but there was no post-tetanic facilitation. An electroencephalogram on admission showed generalised excess high amplitude slow wave activity. This non-specific abnormality was rather more pronounced a week later, but thereafter returned to normal.

The patient was initially treated with netilmicin and ampicillin; subsequent management was supportive. Two days after admission (day four of the illness) intermittent positive pressure ventilation was required. Although he retained some respiratory movements throughout his illness he showed profound hypotonia, losing pupillary reflexes for several days.

The child began to show definite improvement by day 18 and was extubated on day 24. Improvement was then rapid, his air of alertness progressing in advance of his muscular strength. He was discharged on day 45, able to feed from a bottle. He still had considerable hypotonia but was responsive, babbled, and was able to grasp toys. This improvement has continued.

Faecal specimens were sent to the Food Hygiene Laboratory, Central Public Health Laboratory, London. Mouse neutralisation tests showed *C botulinum* toxin in a stool specimen from day 9. *C botulinum* producing toxins B and F were later isolated. Toxin was not detected in his serum.

Discussion

Infantile botulism presents with characteristic signs:

the first is usually constipation and poor feeding, progressing to a more profound hypotonia with loss of head control, a weak cry, cranial nerve palsies, and pharyngeal pooling. Severity varies from sudden infant death to mild cases presenting with hypotonia and failure to thrive. Asymptomatic carriers have been described. Differential diagnoses include septicaemia, meningitis, drug or chemical poisoning, metabolic imbalance, and neuromuscular disturbances such as Guillain-Barré syndrome, myasthenia gravis, and poliomyelitis.

The diagnosis is confirmed by a typical electromyographic pattern and from the isolation of *C botulinum* and usually of its toxin from faeces, but in this case the picture was complicated by a recent upper respiratory infection, immunisation, and the presence of type 3 poliovirus in the child's stool. Because the peak incidence of infantile botulism occurs between 2 and 4 months of age, this fortuitous association with immunisation is common in the United States.

Our case showed typical clinical and electromyographic features. The presence of *C botulinum* and its toxin in his stool confirmed the clinical diagnosis. Other diagnoses, particularly paralytic poliomyelitis and Guillain-Barré syndrome, were rejected because of the absence of fever, normal cerebrospinal fluid, the absence of sensory abnormalities, and the extent and speed of his recovery.

Electrophysiological testing provides a useful guide to the diagnosis. If there are normal sensory and motor nerve conduction velocities on repeated examinations, it helps to exclude primary nerve disorders such as the Guillain-Barré syndrome. Of greater help are the electromyographic findings. Botulinum toxin blocks the release of acetylcholine from the neuromuscular junction. The motor action potentials are characteristically greatly reduced in amplitude and decrement is seen on low amplitude repetitive stimulation (1–5/s). This phenomenon is seen in many conditions causing defects in neuromuscular transmission. Repetitive stimulation at fast rates (50/s), however, causes a progressive increment, and occasionally (but not in the present case) post-tetanic potentiation. These changes are similar to but less severe than those seen in the Eaton-Lambert syndrome.

This is the second case of infantile botulism to be described in the United Kingdom—a disease incidence much lower than that reported in the United States. One possible explanation of this difference is the variation in the number of *C botulinum* spores in the environment, which may be reflected in the likelihood of contamination of food or dust. There was no history of building locally, but there had been recent digging in a road near the parent's

house. Other workers have noted an association between the onset of illness and an increase in dusty conditions.³ No environmental specimens were examined in this case. Honey has been implicated in several cases from the United States, but a survey of honey in the United Kingdom did not report any contamination.⁴ There was no history of the child having eaten honey, and the mother's diet was normal. As in our case other authors have noted an association between the onset of illness and the introduction of solid foods to previously breast fed infants.³ It has been proposed that formula fed infants may experience a more severe form of the illness and present as sudden infant death syndrome; this, however, has not been proved.

The isolation of a *C botulinum* strain producing two serologically distinct neurotoxins is rare. In this case type B and F toxins were produced predominantly when the isolate was incubated at 37°C and 30°C, respectively. Only two cases of infantile botulism attributed to a strain producing toxins B and F have been previously reported (C Hatheway, personal communication).⁵

The diagnosis of infantile botulism requires laboratory confirmation, and will not be made if the illness is not considered. It is possible that cases of infantile botulism are currently being missed in the United Kingdom, and in view of this second report we suggest that infantile botulism should be actively entertained in the differential diagnosis of any acutely 'floppy' baby.

In suspected cases of infantile botulism about 5–10 g of faeces and 2–3 ml of serum should be sent to the Food Hygiene Laboratory, Central Public Health Laboratory, 61 Colindale Avenue, London NW9 5HT.

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