

Following Newborn Botulism Type B Infection, Strabismus is Treated with a BOTOX Injection

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Abstract

Botulinum toxin is important to ophthalmologists for two reasons. Due to the neurotoxin generated by *Clostridium botulinum*, botulism, a medical emergency, frequently manifests with ocular symptoms as impaired vision, diplopia, ptosis, and photophobia [1-3]. However, medical problems like strabismus can benefit from the therapeutic use of botulinum toxins. Patients with a history of botulism have not been studied to determine the safety and effectiveness of Botulinum toxin A.

We describe a case of a 9-week-old baby who had human botulism immune globulin treatment for infant botulism and had developed a big angle exotropia [4]. The infant received intramuscular botulinum toxin A injections to the extraocular muscles, which produced a promising initial response but ultimately necessitated strabismus surgery. The use of botulinum toxin in the treatment of paediatric strabismus is reviewed, along with the clinical signs of botulism and its management.

A full-term, white 9-week-old infant who was previously healthy arrived with a two-week history of lethargy, constipation, decreased eating, and intermittent vomiting. Her cries reportedly turned feeble and loud, according to the parents [5-9]. The patient lived in an area where there was a lot of construction with her parents, siblings, and 5-year-old sister. Four weeks before delivery, she switched from breastfeeding to bottle feeding. Both parents did not consume honey or canned food, and neither one was a construction worker.

Introduction

A neurologic examination indicated full extraocular movements, bilateral reactive but sluggish pupils contracting from 5 to 3 mm, and ptosis obstructing the corneal reflex. There was no ocular misalignment found. Her face was hypomic, with barely any creasing in the perioral area and modest furrowing of the glabella. She had a weak suck. She struggled to hold her head up while pulling herself to a sitting position due to her generalised hypotonia. Reflexes in the deep tendon were challenging to elicit. She got human botulism immune globulin (BIG-IV, California Department of Public Health) after being diagnosed with newborn botulism and admitted to the intensive care unit. Richmond, California, Public Health). 1 The presence of *Clostridium botulinum* toxin type B was detected in a stool sample. Seven days after being admitted, she was released from the hospital and continued to receive physical treatment at home. At age 13 weeks, three weeks following discharge, an ophthalmologic examination was done, and the patient showed central, stable, and maintained fixation with either eye. Furthermore, there was no indication of ocular misalignment.

The infant's paediatrician identified a "left lazy eye" at age 4 months. Repeat ophthalmologic testing revealed intermittent alternating exotropia for both distant and near of greater than 40 prism diopters. Right eye: 2.00 + 2.00 at 105° and left eye: 2.00 + 2.00 at 75°, according to her cycloplegic refraction. Compared to her right eye, her left eye displayed worse fixation and more frequent deviation. Her right eye was patched for 1-2 hours each day as part of her treatment. Both eyes could fixate and follow well at the age of six months, but an exotropia that was sporadic and had poor control persisted. Even after two more months of patching, the alignment did not improve.

Subjective Heading

One week following the procedure, she displayed a flick exotropia in the primary position. Three months after the initial injection, alignment was adequate under binocular viewing however, with cross cover testing she demonstrated a poorly-controlled exophoria

of 30 prism diopters. The decision was made to again proceed with intramuscular injections of onabotulinumtoxinA. At 1 year of age, the patient underwent transconjunctival, intramuscular injections of 10 units onabotulinumtoxinA to the left lateral rectus muscle without electromyographic guidance. Her In the first month after injection, exotropia decreased to 20 prism diopters, then increased to 40 prism diopters three months later. She received bilateral 10 mm lateral rectus muscle recession at the age of 16 months. She underwent cross cover testing seven weeks after surgery and revealed a 15 prism diopter intermittent exotropia.

The soil-dwelling gram-positive obligate anaerobic rod *Clostridium botulinum* generates heat-resistant endospores and can endure harsh circumstances. During sporulation in an anaerobic environment, the bacterium creates the neurotoxic protein known as botulinum toxin. When *C. botulinum* spores penetrate a wound or multiply in the intestines, patients may develop botulism. The toxin can also enter the body through contaminated food or injections. Additionally, there have been instances of iatrogenic botulism that have been documented. 2 The most prevalent type of human botulism in the US is infant or intestinal toxemia botulism.

Discussion

The CDC received reports of 182 confirmed cases in total year 2017.

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Received: 05-Aug-2022, Manuscript No: awbd-22-75416, Editor assigned: 08-Aug -2022, PreQC No: awbd-22-75416 (PQ), Reviewed: 22- Aug -2022, QC No: awbd-22-75416, Revised: 24- Aug -2022, Manuscript No: awbd-22-75416 (R), Published: 30- Aug -2022, DOI: 10.4172/2167-7719.1000164

Citation: Jin J (2022) Following Newborn Botulism Type B Infection, Strabismus is Treated with a BOTOX Injection. Air Water Borne Dis 11: 164.

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4 Of these, infant botulism accounted for 141 cases (77%) from 26 states and the District of Columbia, with 48 instances (34%) reported from California. 72 (51%) of the patients were female, with a median age of 4 months (the range was 0 to 12 months). Seven different serotypes (A–G) of botulinum toxin are produced by the four unique phenotypic C. botulinum groups (I–IV). 5 In cases of newborn botulism, the most common toxin types were B (n = 88, 62%; and A (n = 52, 37%). 4 The majority of newborn botulism infections are assumed to be brought on by inhaling spores from the environment. Patients frequently reside close to a building site or another area of soil disturbance.

By inhibiting the fusing of vesicles carrying acetylcholine with the presynaptic membrane, botulinum toxin specifically inhibits the release of neurotransmitters [10]. First, the upper cranial nerves are damaged, which causes intraocular and extraocular ophthalmoplegias, which cause ocular symptoms. The paralysis of the lips, tongue, pharynx, larynx, and facial muscles is one of the later symptoms of injury to the lower cranial nerves. Loss of head control, hypotonia, and constipation develop during the course of the following one to three days as a result of motor neurons affecting the somatic muscles. Death may be the outcome of prolonged paralysis or respiratory failure. Usually, recovery takes weeks or months [11]. Due to ophthalmologists not typically participating in the evaluation of presenting cases of botulism, ocular findings in botulism are few in the ophthalmologic literature. Most adult patients report having "blurry vision." The most typical ophthalmologic abnormalities in newborn botulism are mydriasis and ptosis, which are both followed by an aberrant pupillary response to light. 9,10 The ocular and bulbar symptoms were described as no longer being a main complaint and likely resolved in a report on six-month or longer follow-up.

Careful supportive care with an emphasis on breathing through respiratory assistance and supervised nutrition, together with rapid delivery of human antitoxin to neutralise the circulating toxin, are the goals of botulism treatment [12-15]. Early dosing is essential because antitoxins give acquired passive immunity by neutralising free toxin before it attaches to the receptor on the presynaptic membrane. There are two different kinds of antitoxin: 1) BIG-IV contains IgG derived from immunised adult donors who contributed to the plasma pool specific for toxins A and B. Heptavalent botulism antitoxin is derived from equine IgG that can neutralise toxins A through G. 3,12, 13, 14 Following infection, individuals may develop acquired active immunity to the botulinum toxin.

The therapeutic uses of botulinum toxins' inhibition of neuromuscular junctions are available. In the US, there are two types of toxin preparations: type-A (onabotulinumtoxinA [Botox®], type-B (abobotulinumtoxinA [Dysport®], and type-C [XEOMIN®]) and type-D (rimabotulinumtoxinB [Myobloc®]). Both toxins are currently licenced by the Food and Drug Administration for the treatment of cervical dystonia; toxin A is also approved for the treatment of glabellar wrinkles, strabismus, blepharospasm, and hemifacial spasm. 15 Since many years ago, BTX-A injections have been used to cure strabismus. 16 BTX-A treatment is less intrusive and provides easier results than incisional strabismus surgery. postoperative recuperation In outpatient clinics, injections for adults are possible. Less time spent in general anaesthesia, less overcorrections, muscle preservation, and absence of post-procedure topical medicine are all benefits of BTX-A treatment for kids. BTX-A injection has claimed success rates comparable to extraocular muscle operations for some cases of esotropia. Exotropia correction has fewer predictable results. 17

According to our knowledge, neither infantile exotropia nor

BTX-A use in patients with a history of infant botulism or antitoxin treatment have been recorded cases of developing two months after recovery from infant botulism. OnabotulinumtoxinA has no negative effects on our patient. A larger than 30 prism diopter exotropia angle reduction and enhanced alignment control were seen quickly after the first injection, which was administered five months after BIG-IV treatment. This shows that acquired passive immunity has a substantial half-life for removal or degradation. BIG-IV that has been infused has a half-life of roughly 28 days. 3 We estimate that, based on this half-life, the residual antitoxin in our patient would have been gone after more than five half-lives had passed at the time of the onabotulinumtoxinA injection.

Conclusion

Additionally, our patient had a C. botulinum type B infection, and because anti-type B antibodies do not cross-neutralize toxin type A, it is possible that her acquired active immunity produced antitoxin B antibodies without any effect on toxin A. After toxin A, the onabotulinumtoxinA injections may not have been as successful, resulting in C. botulinum infection. Although onabotulinumtoxinA only temporarily improved the exotropia in this case, the injections allowed the surgeon to postpone the operation until after the patient turned one. Conclusion: In a patient with a history of infant botulism type B treated with human antitoxin, onabotulinumtoxinA is an effective therapy choice for infantile exotropia.

Acknowledgement

I would like to thank my Professor for his support and encouragement.

Conflict of Interest

The authors declare that there are no conflict of interest.

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