P 1-57

Botulinum Toxin Injection for Functional Assistance in Cerebral Palsy with Swan- neck Deformity Hand

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Introduction

Swan-neck deformities are defined by the hyperextension of the PIP joints and the flexion of the distal interphalangeal (DIP) joints. In cerebral palsy, patients can present with swan-neck deformity of 2 different etiologies—intrinsic or extrinsic. The intrinsic type of swan-neck deformity is caused by spastic contraction of the intrinsic muscles of the hand while the extrinsic type is caused by excessive tension of the long extensors due to wrist flexion contractures; these forces lead to weakening of the volar plate of the PIP joint. Stretching of the volar plate ultimately results in severe hyperextension of the PIP joint that persists after correction of the wrist flexion contractures. Because of these spastic forces, patients with cerebral palsy often present with advanced swan-neck deformities. In this study, we tried to provide functional assist to their swan neck deformity through botulinum toxin injection.

Case series

The first patient was 8-year-old female, who was born at 35 weeks and 5 days of gestation via cesarean section with 1.91 kg (March 3, 2009). IVH was found on brain sonography immediately after birth, and bilateral IVH grades 3 and 4 were observed on brain MRI (2009.9). Neurologic examination revealed spasticity in Rt upper extremity and both lower extremities. The caregiver's wish was that she would be able to make the finger flexion movement more natural when she was trying to use her Rt hand. Before the injection treatment, her right hand showed swan neck deformity in 2-4th fingers, supination limitation, and thumb in palm pattern. Swan neck pattern was more severe with wrist drop when she tried to grasp. Therefore, we injected botulinum toxin into her Rt EDC 30u, PT 30u, AP 15u, PI 25 (total 100 unit). After the injection, the swan neck pattern has been improved so that she can grasp with more natural movements as she tries to use her hands. The second patient was a 17-year-old Rt hemiplegic CP male patient. When we first examined him, his Rt. wrist flexor spasticity was G1, supinator spasticity G1 with thumb up limitation and 2-4th finger swan neck deformity was observed. He also complained about the inconvenience of finger movement in using buttons when changing clothes alone. So we injected botulinum toxin into his Rt EDC 20u, PT 30u, PI 30 (total 80 unit). After 2 weeks of injection, he was examined again and his DIP hyperflexion, PIP hyperextension was improved. And we saw him grasp and move his hands more finely and comfortably.

Conclusion

The results of this study suggest that botulinum toxin injections safely and effectively decrease muscle tone and increase range of motion. Because some functional improvements were seen after injections, regular follow up through global functional assessment method may be necessary. Further studies with large sample size will provide more insight into clinical utilization of botulinum toxin injection for swan neck deformity of cerebral palsy.