

Anatomical Features of the Flexor Digitorum Longus Muscle and the Response to Botulinum Toxin Treatment in Patients with Post-Stroke Claw Foot Deformity

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Abstract

The purpose of this retrospective case-control study was to investigate the relationship between flexor hallucis longus (FHL) and flexor digitorum longus (FDL) control of toe movement and response to botulinum toxin (BoNT) treatment after stroke. Identify patients with claws. (2). Patients with leg paralysis/spasticity and toes due to stroke received multiple injections of BoNT (onabotulinum toxin A) into the FHL or FDL muscle. Using data from 53 patients who received 124 injections with clinically documented treatment outcomes, the relationship between modes of transmission of FHL and FDL muscle tone to each toe (MCT) and treatment outcome I checked. We also analyzed potential variables that may determine treatment outcome. (3. Results:

The efficacy of BoNT treatment varied significantly with FDL-MCT (OR = 0.400, 95% CI = 0.162-0.987, p = 0.047). Analysis of response to the first BoNT injection showed an odds ratio for FDL-MCT of approximately 6.0-fold (OR=0.168, 95% CI=0.033-0.857, p=0.032). The more tibial side of her FDL muscle influence on each toe, the better the nail toe treatment results. The anatomical relationship between the FDL muscle and each toe appears to influence the response of a post-stroke patient with clawed toes to her treatment with BoNT.

Keywords: Cerebrovascular disorders; Anatomic variation; Hammer toe syndrome; Flexor hallucis longus; Flexor digitorum longus; Electric stimulation; Muscle contraction

Introduction

We have previously proposed using botulinum toxin (BoNT) to treat clawfoot deformity (CFD) by injecting it into the flexor hallucis longus (FHL) muscle. In general, contraction of the FHL muscle flexes the first toe, while contraction of the flexor digitorum longus (FDL) flexes the second to fifth toes contraction pattern. However, there is little or no information about which of her CFD patients are best suited for treatment with her BoNT [1-3].

Local BoNT injection is a common treatment for leg spasticity after stroke. The estimated incidence of his CFD in patients admitted for rehabilitation after a single ischemic or hemorrhagic stroke was 46% and 83%, respectively, in patients who regained mean functional capacity before 3 months post-stroke. %is. Therefore, CFD associated with leg spasticity is common in such patients and several studies have reported BoNT injection treatment for this condition. Injections are in the FHL, FDL, flexor digitorum brevis (FDB) or quadratus plantaris (QP) muscles [4-8].

The current multicenter retrospective case-control study is an extension of previous studies and was designed to identify the effects of her FHL and FDL muscle control on toes. Specifically, we determined the relationship between control of these two muscle groups and response to treatment with local BoNT injections in her CFD patients after stroke [9,10].

Discussion

In this study, we showed that the outcome of BoNT treatment in CFD after stroke depends on the effect of FDL on individual toes. Treatment was more effective when FDL muscle contraction controlled multiple toe movements. B. Second (tibial side) to fifth toe. His BoNT treatment of CFD was 2.5-6.0 times more effective when the action of the FDL muscle spread around the toes on the tibial side. This finding was statistically adjusted for confounders of causative disease.

Because the FDL muscle is small compared to the space/volume of the lower leg, an electrical stimulator, electromyography (EMG) meter, or echo device is required to reliably deliver drugs to the muscle belly. In recent years, it has become more popular to use echo devices to deliver drugs in a more non-invasive manner. In this case as well, while observing the FHL and FDL muscles with an echo device, if you passively move each toe and make the cross section of the muscle move on the screen, the muscle will transmit tension to the toe. It can be concluded that there are therefore, this is a clinically useful method of drug delivery without the use of electro stimulators. We have had many botulinum toxin treatments for CFD, and we experienced only one side effect of excessive extension of the first toe after administering the drug to the FHL muscle, but not to the FDL muscle. I have never experienced any side effects.

In this study, we used two indices to classify the type of control of her FHL and her FDL muscles in each toe. MCT (mode of toe control) is a qualitative variable that provides an ordinal scale for individual patients. In other words, it is a single index that reflects how the FHL or FDL muscles control toe movement. On the other hand, NSM (number of strongly moving toes) is a quantitative variable representing the number of patient toes that moved in response to each BoNT injection. The same patient may respond differently to multiple doses of BoNT, so the same patient may have different numbers of these measures. MCTs

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seem to be more relevant to treatment efficacy than his NSM. Rather than focus on inducing more toe movement by electrical stimulation of the FDL muscle during BoNT injection, the patient-specific nature of his FDL muscle dominance over each toe may be a factor post-stroke with CFD. May influence the outcome of his BoNT treatment in this patient. In this study, we were unable to find any specific therapist-controllable factors that influence treatment outcomes. We could not clarify how to enhance the therapeutic effect in patients whose FDL muscles control only a few toes. Future studies should be more objective and detailed in evaluating the effects of her BoNT treatment in this patient population. In addition, regarding long-term treatment strategies, dosages over time can be suggested.

Although not influencing the conclusions of this study, analysis of the relationship between FHL muscle NSM and causative disease and treatment outcome suggested its multicollinearity. Multicollinearity is likely related to the non-ideal methodology for determining treatment outcomes and the impact of relatively small numbers of patients.

Conclusions

Treatment of CFD with BoNT was effective in approximately 68% of cases. The way the FDL muscle controls each toe varies from patient to patient, and patients with more toe control by the FDL muscle are more likely to benefit from treatment than patients with poor toe control. The results of this study suggest that the efficacy of BoNT treatment can be predicted based on the number of toes moving with FDL stimulation. Treatment outcomes may have been influenced, at least in part, by the predominance of control of her FDL muscles over each toe movement. The FHL muscles often affect his second toe or less, and the FDL muscles do not necessarily control his second to fifth

toe, and such a correlation was revealed in this study. The movement of each toe during electrical stimulation of the FHL and FDL muscles varied with each electrical stimulation, but the range of change was generally within or below the adjacent toes.

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