LETTER TO THE EDITOR

To the Editor

Biceps Brachii Botulinum Toxin Injections: To Be or Not to Be

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Botulinum toxin type-A intramuscular injections are very effective in decreasing elbow flexor spasticity.[1,2] The biceps brachii is one of the most commonly injected elbow flexor muscles.[3,4] There is a lack of clarity among physicians, likely stemming from insufficient guidelines, regarding which muscles to inject to optimally manage upper extremity spasticity. There are three major elbow flexor muscles: biceps brachii, brachialis, and brachioradialis.[5] It has been clearly established in the literature that brachialis is the predominantly activated elbow flexor,[6] irrespective of the forearm position. It has been described as "the workhorse of the elbow joint."[5] On the other hand, brachioradialis is primarily recruited during quick and powerful elbow flexion movements. Biceps brachii is inactive when elbow flexion is performed from a forearm-pronated position.[5,7] Based on needle and surface electromyelogram findings, it appears that injections of brachialis should be most frequently undertaken among the elbow flexor group; however, the opposite holds true in adults[3] as well as in children.[8]

If the biceps brachii, also a forearm supinator, is injected, then it is possible that biceps brachii weakness can increase forearm pronation, which is already problematic in the typical poststroke upper extremity spasticity patient. Indeed, biceps brachii muscle injections are more frequent (39%) than brachioradialis (13%) or brachialis (3%), and a high rate of pronator injections (12%) may be related to a high rate of biceps brachii injections.[3] In fact, some studies have explicitly avoided injecting the brachialis muscle in favor of biceps brachii and brachioradialis muscles.[1] Key past studies have used biceps brachii botulinum injections[9] to demonstrate muscle cocontraction associated with spasticity[4] and endplate targeting and botulinum toxin dilution techniques that used biceps brachii purely because of availability of endplate landmark data from cadaver studies.[2]

Biceps brachii offers a very visible muscle mass that is relatively easy to inject; however, to inject or not to inject is the question. Brachialis lies deep beneath the biceps brachii and can require electromyelogram and/or ultrasound guidance for accurate needle placement. We suggest that physicians review the spasticity distribution in the upper extremities to decide which muscles to inject. If along with elbow flexor spasticity, forearm pronators are spastic resulting in pronated forearm posture, then it may be more effective to inject the brachialis rather than biceps brachii. It is not clear which muscles among the elbow flexors experience greatest levels of spasticity in patients with upper motor neuron lesions. Based on the activation patterns noted earlier, we hypothesize that brachialis muscle spasticity may be the primary contributor to elbow flexor spasticity.

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