LETTER TO THE EDITOR EDİTÖRE MEKTUP

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Overcoming the Challenge of Selecting Muscles for Elbow Flexor Spasticity Treatment in a Patient with Poststroke Spasticity: A Sequential Approach Using Diagnostic and Prognostic Nerve Blocks

İnme Sonrası Dirsek Fleksör Spastisitesi Tedavisinde Kas Seçimi Zorluğunun Aşılması: Tanısal ve Prognostik Sinir Blokları Kullanılarak Adım Adım Bir Yaklaşım

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Identifying right muscles for treatment is a challenge, often considered the "black box" of botulinum toxin (BoNT) injections. While randomized controlled trials are considered the gold standard, their protocols often don't reflect real-world practice, where muscle selection is typically individualized.[1] Mayer and Esquenazi were the first to link spasticity patterns to specific muscles, and a Delphi study provided expert consensus on muscle selection.[2,3] For a flexed arm spastic pattern, common muscles include the biceps brachii, brachialis, and brachioradialis.[2,3] However, individual variability exists, and some studies suggest the brachioradialis shows more spasticity than the biceps and brachialis in flexed elbows. Injecting the biceps brachii could also increase forearm pronation due to its role in supination.[4]

Herein, we present a case of post-stroke spasticity with a flexed elbow pattern and discuss our approach to muscle selection for BoNT injection. The patient was able to initiate voluntary elbow flexion, extension, and supination, but exhibited impaired selective motor control in the affected limb. The patient's elbow flexor muscle spasticity was graded as Modified Ashworth Grade 2 and the elbow angle at rest while standing was 122 degrees. First, a selective brachialis branch of the musculocutaneous nerve block was performed to assess the contribution of the brachialis muscle to the elbow flexor spasticity pattern and the angle increased to 158 degrees. Consequently, a proximal block of the musculocutaneous nerve was performed to reveal contribution of biceps. This increased the angle increased the angle to 167

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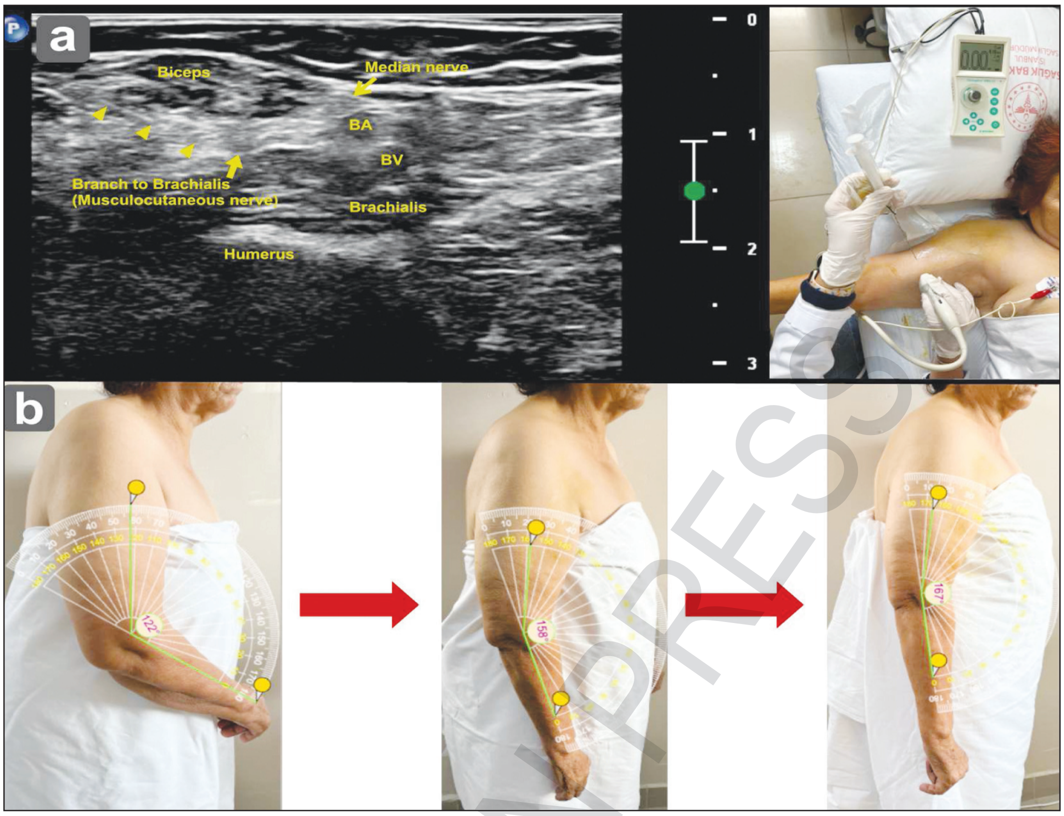

FIGURE 1: a) Ultrasound and electrical stimulator-guided selective block of the brachialis branch of the musculocutaneous nerve.
BA: brachial artery; BV: brachial vein. Arrowhead, needle.
b) Change in the angle of the elbow at rest while in standing position after sequential nerve blocks for flexed elbow arm spastic pattern in poststroke spasticity.
Both ultrasonography and electrical stimulator were used to confirm correct needle localization and visualize the cessation of muscle stimulation with the use of a sufficient amount of agent for nerve block. After identifying the selective brachialis branch of the musculocutaneous nerve by ultrasound to ensure correct needle localization (Stimuplex® Ultra 360® 20G 6-inch) connected to the electrical stimulator (Stimuplex1 HNS 12, B. BraunTM, Melsungen, Germany), we started with 5 mA to stimulate the muscle fibers and gradually reduced it to less than 1 mA, which is sufficient for nerve stimulation without muscle contraction. The nerve block was performed by injecting 2 mL of 2% lidocaine, resulting in complete cessation of muscle contraction during the injection. After the selective block of the brachialis branch of the musculocutaneous nerve, the angle increased by 36 degrees, resulting in an angle of 158 degrees. A subsequent proximal block of the musculocutaneous nerve increased the angle by 9 degrees, resulting in an angle of 167 degrees.

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degrees, indicating that no further intervention was necessary (Figure 1). We also evaluated the patient's pronated forearm posture and ability to initiate active supination, neither of which worsened. Based on the results of the sequential blocks, we decided that BoNT injections into both the brachialis and biceps muscles were appropriate, albeit with a reduced dosage for the biceps due to the lesser change in the angle of the elbow. If this angle had remained unchanged, we would have needed to block the radial nerve to evaluate the spasticity arising from the brachioradialis. If the angle persisted after the radial nerve block, we would have assessed spasticity in the accessory flexors (flexor digitorum superficialis, pronator teres, etc.), as they are the only active elbow flexors following the three blocks.[5] Finally, to assess their spasticity, we could temporarily block the median nerve at the arm level before the innervation of the pronator muscles, serving both diagnostic and prognostic purposes.

Muscle selection may vary depending on the treatment goals. Diagnostic nerve blocks allow for the comparison of pre- and post-procedure assessments to achieve these goals. To promote supination, it is advisable to target the brachialis muscle if supination is affected after a diagnostic nerve block. However, if the objective is to reduce elbow flexion deformity, targeting both the biceps brachii and brachialis may be considered. In conclusion, the contribution of each muscle to the arm flexion pattern can best be determined using diagnostic nerve blocks, which may shed light on which elbow flexor should be targeted with BoNT.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

All authors contributed equally while this study preparing.

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