

Sonographic Guide for Botulinum Toxin Injections of the Neck Muscles in Cervical Dystonia



Bayram Kaymak, MD^a, Murat Kara, MD^a, Eda Gürçay, MD^b,
Levent Özçakar, MD^{a,*}

KEYWORDS

• Cervical dystonia • Muscle • Ultrasound • Botulinum toxin • Innervation zone

KEY POINTS

- Intramuscular botulinum toxin (BoTX) injection is the first-line treatment of cervical dystonia.
- In addition to its considerable benefits, poor treatment outcomes and some side effects have also been reported after BoTX applications.
- One of the most important reasons is incorrect localization of the needle during toxin injections.
- Although electromyography has commonly been used to detect targeted and dystonic muscles, without imaging, it is impossible to truly verify precise needle positioning in the proper muscle.
- Ultrasound has been recommended because of its high capability in illustrating most of the neck muscles.

INTRODUCTION

Cervical dystonia (CD) is the most commonly seen focal primary dystonia, characterized by involuntary contractions of the neck muscles resulting in abnormal movements and posture of the head and neck. Intramuscular botulinum toxin (BoTX) injection is the first-line treatment and several studies have reported its benefit in reducing dystonia and associated symptoms (eg, pain).^{1–3} Poor treatment outcomes, weakness of uninjected muscles, and some side effects, however, such as dysphagia, dysphonia, dry mouth, and ptosis, have also been reported after toxin injections.^{2,4–8} The 2 likely/considerable reasons are inaccurate detection of the dystonic muscles and imprecise

The authors have nothing to disclose.

^a Department of Physical and Rehabilitation Medicine, Hacettepe University Medical School, Ankara 06100, Turkey; ^b Department of Physical and Rehabilitation Medicine, Gaziler Training and Research Hospital, Lodumlu yolu, 06800 Bilkent, Ankara, Turkey

* Corresponding author. Hacettepe Üniversitesi, Tıp Fakültesi, Hastaneleri Zemin Kat FTR AD, Sıhhiye, Ankara 06100, Turkey.

E-mail address: lozcakar@yahoo.com

Phys Med Rehabil Clin N Am 29 (2018) 105–123

<https://doi.org/10.1016/j.pmr.2017.08.009>

1047-9651/18/© 2017 Elsevier Inc. All rights reserved.

pmr.theclinics.com

injections.^{5,9} Electromyography (EMG) has commonly been used for detecting the dystonic muscles or targeting the proper muscles for BoTX injections in CD patients.^{10,11} Physicians cannot truly verify, however, that the needle is located in the targeted muscle without imaging guidance, for example, ultrasound (US).^{9,12} In addition to incorrect needle placement, the aforementioned side effects have also been attributed to the spread of BoTX into the adjacent structures.^{13,14} Furthermore, anatomic variations, obesity, abnormal neck and head posture, and atrophy of the neck muscles may also increase the risk of incorrect needle placement using EMG or palpation guidance.^{12,15–18} In 1 study, it was observed that although dysphagia ensued as a complication after EMG-guided injections, it was not encountered when US guidance was added thereafter.⁹

Neck muscles are small and thin and some have complex orientation compared with extremity muscles. Additionally, several vital neurovascular structures pass through the head/neck and thorax in close proximity with these muscles. Therefore, imaging guidance is highly recommended.⁴ Furthermore, in clinical practice, due to the difficulties in localizing/accessing them, deep cervical muscles are generally not injected. Desirable clinical improvement cannot be achieved without injecting those deep muscles, which are frequently involved in complex forms of CD.¹⁹ In this regard, because almost all of the neck muscles can precisely be scanned with US imaging, accurate assignment of dystonic activity to a specific muscle during EMG evaluations and distribution of the toxin within the targeted muscle during injections can be ensured.¹² US is convenient and patient/physician friendly and provides real-time imaging without radiation exposure.²⁰ Its use in musculoskeletal practice has been widely accepted and already standardized.^{21–27}

Innervation zone (IZ)-targeted BoTX injections are found to be more effective with less side effects compared with nontargeted applications. In this sense, US guidance is recommended while performing BoTX injections to IZs of different compartments in a muscle. Besides, the best treatment outcomes are received with lower toxin doses.^{12,28–31} US may also be used to detect morphologic and architectural features of the skeletal muscles, which determine the functional properties, distribution of IZs, and the spreading of BoTX.²⁹ **Fig. 1** provides an example of compartmentalization of the sternocleidomastoid muscle (SCM) in a healthy subject.

Overall, morphologic/architectural features, IZs, and proper sites for BoTX injection of neck muscles, which are commonly injected in patients with CD, are summarized in this review article. The figures are arranged so as to display the probe positionings, relevant schematic drawings in the axial plane, and the corresponding US images. Muscle selection or clinical features of CD are not within the scope of this review.

MORPHOLOGY AND ARCHITECTURE OF NECK MUSCLES

Movements of the head and cervical joints are performed by approximately 20 neck muscles, some of which are commonly affected in CD (**Table 1**).^{2,32} Morphologic (origin, insertion, shape, and compartments) and architectural (fascicle length, pennation angle, and cross-sectional area [CSA]) features of the neck muscles determine their function, distribution of the IZs, and the spread of BoTX.²⁹ Neuromuscular junctions (NMJs) of a muscle may be clustered in 1 or more 3-D arranged bandlike regions called IZs or scattered throughout the muscle volume.

Because there is a paucity of data regarding the IZs of the neck muscles, in most of them, the authors tried to deduce the IZs based on the morphologic and architectural features of each muscle. Using US and high-quality cross-sectional photographs of a fresh cadaver, it was generally assumed that the IZs are located in the bulkiest region

Download English Version:

<https://daneshyari.com/en/article/8802651>

Download Persian Version:

<https://daneshyari.com/article/8802651>

[Daneshyari.com](https://daneshyari.com)