

A Novel Dual-Modality Approach Using Trapezius Hydrodissection and Botulinum Toxin for Chronic Neck Pain

Japnit Bhatia, Dominic C. Harmon

School of Medicine, University of Limerick, Limerick, Ireland
Email: japnit28@gmail.com

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Abstract

Chronic neck pain is a common and disabling condition, with Myofascial Pain Syndrome (MPS) of the upper trapezius muscle frequently contributing to symptoms. Standard treatments often provide only transient relief, and many patients remain refractory. Ultrasound-guided hydrodissection and botulinum toxin A (BoNT-A) injection are emerging therapies targeting mechanical and neuromuscular contributors to myofascial pain, respectively. However, their combined use has not previously been reported. We present the case of a 30-year-old female with chronic right-sided neck pain lasting over one year, unresponsive to oral medications, physiotherapy, and corticosteroid injections. Examination revealed localized trapezius tenderness and reduced cervical range of motion, without radiographic pathology. The patient underwent an ultra-sound-guided hydrodissection of the upper trapezius, targeting the interfascial plane between the trapezius and underlying musculature. This was followed by BoNT-A injections into three ultrasound-guided trigger points within the muscle. The patient reported immediate pain reduction (NAS 7/10 to 1/10 post-procedure) and sustained improvement at 6 and 12 weeks (3/10 and 2/10, respectively), with restoration of functional capacity and cessation of analgesic use. This is the first case to support the use of combined ultrasound-guided trapezius hydrodissection and botulinum toxin A injection as a novel, safe, and effective option for patients with chronic myofascial neck pain unresponsive to conventional therapy. The dual-modality approach addresses both mechanical adhesions and neuromuscular hyperactivity and may represent a valuable addition to the interventional pain management toolkit. These results warrant further investigation of this technique in the management of chronic myofascial pain syndrome.

Keywords

Myofascial Pain Syndrome, Chronic Neck Pain, Trapezius, Hydrodissection, Botulinum Toxin A, Ultrasound-Guided Injection, Interventional Pain Therapy

1. Introduction

Chronic neck pain is a prevalent and disabling condition within the general population. It affects up to 20% of people at a given time and ranks among the top causes of years lived with disability globally [1]. It frequently originates from musculoskeletal structures, including cervical facet joints, intervertebral discs, and surrounding musculature. Among these, myofascial pain syndrome (MPS), particularly involving the upper trapezius muscle, is a common but often underrecognized contributor [2].

The upper trapezius plays a critical role in neck and shoulder biomechanics and is highly susceptible to overuse and postural strain, especially in individuals with previous trauma. MPS is characterized by the presence of hyperirritable trigger points within taut bands of skeletal muscle, often resulting in localized and referred pain, restricted mobility, and functional impairment [3]. MPS has a significant impact on quality of life due to the burden of disease on both physical and mental health, often associated with mood disorders and sleep disturbances. Due to its high prevalence and persistent nature, MPS also imposes substantial socioeconomic cost through healthcare utilization and lost productivity, yet it remains underdiagnosed and often inadequately treated [4].

Conventional treatment strategies include pharmacologic agents (NSAIDs, muscle relaxants), physical therapy, dry needling, acupuncture, and trigger point injections with local anesthetic or corticosteroids. While many patients experience transient relief, a subset remains refractory to standard care, particularly in chronic, centrally sensitized states [5]. Botulinum toxin A (BoNT-A) has emerged as a potential treatment for refractory MPS because it not only provides a reduction in acetylcholine-mediated muscle contraction, but inhibits the release of substance P, CGRP, which are mediators in nociception [6]. This dual action works to disrupt peripheral and central pain circuits. Several clinical trials and meta-analyses have demonstrated modest but statistically significant benefits of BoNT-A in chronic myofascial pain, particularly when trigger points are well localized [7].

Separately, ultrasound-guided hydrodissection is a minimally invasive technique that involves the injection of fluid to separate fascial planes or free entrapped nerves. Originally developed for nerve entrapment syndromes, it has recently been applied to myofascial restrictions and fascial adhesions in chronic pain conditions [8] [9]. Injectates such as 5% dextrose or saline can mechanically disrupt fascial scarring, restore glide between tissue planes, and reduce local inflam-

mation, with minimal risk of adverse effects [10].

Despite growing evidence supporting each modality independently, there are no prior reports describing their combined use for chronic trapezius-related myofascial pain. Theoretically, hydrodissection can enhance BoNT-A distribution and uptake in fibrotic or contracted muscle, while the neurochemical effect of BoNT-A may prolong and augment the relief achieved by mechanical separation.

This case highlights the first reported instance of a dual-modality approach combining trapezius hydrodissection and BoNT-A injection, offering a novel and potentially synergistic treatment for patients with chronic, treatment-refractory myofascial neck pain.

2. Case Report

A 30-year-old female patient presented to our pain clinic complaining of severe pain in her neck region for more than 12 months. Symptoms included deep aching, stiffness, and pain in the cervical area exacerbated by prolonged sitting and head rotation. It was also accompanied by tingling, numbness, and hyperalgesia down the arm. She reported partial and short-lived relief from previous treatments: oral NSAIDs, physiotherapy, and corticosteroid trigger point injections. She had a history of previous RTA. Functional limitations affected sleep, work, and physical activity. This had a major impact on her daily life and mental health, as she was unable to fulfill all her work and household commitments.

On examination, pain was in the right upper cervical area and over the scalene muscles with maximum tenderness to palpation over the trapezius. Her pain was evaluated by the Numerical Analogue Scale (NAS) score. She reported it to be 7/10. There was also reported pain on active flexion and extension of the neck. Cervical rotation and lateral flexion to the right were reduced by ~30%. Neurological exam was unremarkable. Routine bloods, X-rays and MRI imaging of the neck and head were undertaken with no obvious causative pathology identified. MPS was diagnosed based on the presence of ≥ 2 active trigger points in the right upper trapezius, reproduction of the patient's pain on palpation, a characteristic referred pain pattern, and restricted cervical range of motion. She continued to report a significant impairment to her quality of life, so the decision was taken for interventional pain management. Due to the chronicity of symptoms and the failure of prior monotherapies, a dual-intervention approach was recommended.

The patient was informed about the procedure of ultrasound-guided trapezius hydrodissection and botulin toxin injection, and written informed consent was obtained. The patient was positioned in a prone position with the neck in a flexed position and muscles relaxed. She was encouraged to breathe normally. The patient was attached to continuous oxygen saturation monitoring for the short duration of the procedure, with full resuscitation equipment available. An ultrasound machine (Sonosite[®] Micromaxx) with a high frequency (4 - 5 MHz) linear transducer was used to identify the relevant anatomical structures. The procedure was performed under complete aseptic conditions. Skin sterilization was per-

formed with 2% chlorhexidine, and a sterile drape was applied to the area. The ultrasound transducer was inserted into a sterile sheath containing ultrasound gel. A thin layer of sterile gel was placed between the draped ultrasound transducer and the skin.

The ultrasound transducer was placed in an oblique transverse orientation over the upper trapezius muscle, approximately 3 - 5 cm lateral to the spinous processes at the C7-T1 level. Real-time ultrasonography was used to identify relevant anatomical structures, including the skin, subcutaneous tissue, trapezius muscle, and deep bony landmarks. The target interfascial plane, between the deep surface of the trapezius and underlying cervical paraspinal muscles, was visualized as a hypoechoic potential space (**Figure 1**). After determining the target point, a 22-gauge cutting spinal needle was inserted “in-plane” beneath the transducer. The needle was advanced from a medial to lateral direction, under direct vision, until the needle was positioned at the deep surface of the trapezius muscle. Once the needle tip position was confirmed by ultrasound, a solution of 10 ml of hydrodissection fluid (9 ml normal saline and 1 ml 40 mg/mL triamcinolone) was injected slowly (**Figure 1**). A clear separation of tissue layers was observed as the fluid expanded the space between the trapezius and deeper fascia, confirming successful hydrodissection (**Figure 1**). Immediately following hydrodissection, BoNT-A was prepared by reconstituting a 50 U vial with 1 mL preservative-free saline to achieve a final concentration of 5 U/0.1mL. This was injected into three sonographically identified taut bands corresponding to clinically active trigger points, with approximately 16 - 17 U delivered per site (**Figure 2**). The 50 U total dose was chosen in line with published dosing for focal neck muscle pain, balancing efficacy with minimization of functional muscle weakness. Under continued ultrasound visualization, the needle was repositioned for each injection, avoiding vascular structures and ensuring intramuscular delivery.

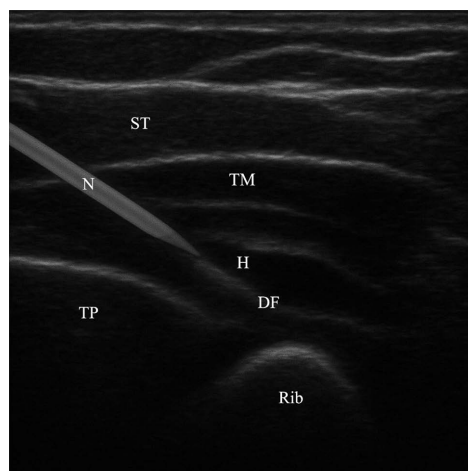


Figure 1. Illustration of trapezius hydrodissection at the C7 level under ultrasound guidance. Abbreviations: **N:** Needle, **H:** Hydrodissection, **ST:** Subcutaneous tissue, **TM:** Trapezius muscle, **DF:** Deep fascia, **TP:** Transverse process.

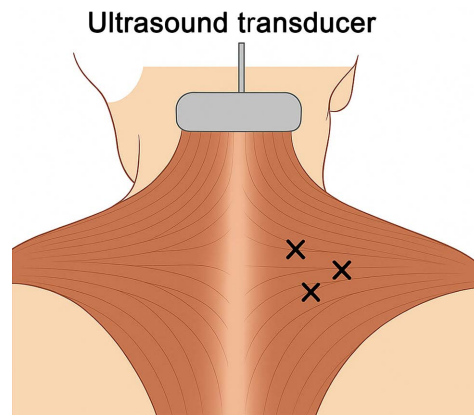


Figure 2. Schematic of three botulinum toxin injection sites targeting the right upper trapezius under ultrasound guidance.

The patient reported immediate pain reduction (NAS 7/10 to 1/10 post-procedure) with minimal tenderness over the trapezius and scalene muscles. The shoulder and pectoral muscles were intact and range of motion at the cervical spine was full without reported increase in pain from 1/10. Dynamic test was negative. She reported sustained improvement in pain scores (NAS 3/10 and 2/10 respectively) when followed up in the pain clinic at 6 and 12 weeks, with cessation of analgesic use. She also reported improved sleep, mood, and quality of life as she was able to functionally return to her daily activities and full duties at work.

3. Discussion

Chronic neck pain is a highly prevalent musculoskeletal condition that ranks among the leading causes of disability throughout the world. It has a substantial impact on quality of life, occupational performance, and healthcare utilization [8]. Among its varied etiologies, myofascial pain syndrome (MPS) involving the upper trapezius muscle is frequently implicated, particularly in individuals with poor posture, repetitive strain, or previous trauma [2]. Despite the burden of disease, management of trapezius-related MPS remains challenging, especially when symptoms are refractory to traditional first-line therapies.

In this case, we report the successful use of a novel dual-modality interventional approach, combining ultrasound-guided hydrodissection and botulinum toxin A (BoNT-A) injection, to treat persistent trapezius myofascial pain. The rationale for this combined technique lies in addressing both mechanical and neuromuscular components of pain. The mechanical component refers to structural issues within the muscle and surrounding tissues, such as fascial adhesions, tissue scarring, and muscle stiffness that disrupt normal gliding planes [9]. Hydrodissection serves to mechanically separate these interfascial adhesions and relieves entrapment of peripheral nerves within the sub-trapezial plane. This restores tissue mobility and decompresses the neural components, which overall reduces local ischemia and inflammation.

The neuromuscular component of myofascial pain involves dysfunctional mo-

tor endplate signaling in which there is spontaneous electrical activity and excessive acetylcholine release within the muscle fibers. This leads to chronic muscle contraction, restricted movement, and heightened pain perception. Here, BoNT-A offers a pharmacological intervention that inhibits acetylcholine release at the neuromuscular junction, thereby inducing localized muscle relaxation and reducing hyperactivity of affected muscle fibers. Beyond this, BoNT-A has been shown to modulate sensory afferents and reduce peripheral and central sensitization, suggesting broader analgesic effects [10].

In the presented case, both components were addressed sequentially and synergistically. The hydrodissection served to release potential interfascial restrictions beneath the trapezius, relieving mechanical compression and improving tissue glide. Immediately thereafter, BoNT-A was injected into multiple trigger points within the muscle belly to reduce ongoing neuromuscular hyperactivity and modulate nociceptive signaling. This dual-target approach led to a significant reduction in pain (NAS 7/10 to 2/10), as well as meaningful improvement in the patient's overall functionality and ability to work and sleep, without reliance on systemic analgesics.

Potential adverse effects of hydrodissection include infection, bleeding, vasovagal reaction, and transient nerve irritation; however, none were observed in this patient. Adverse effects of BoNT-A in the cervical region may include local muscle weakness, dysphagia, flu-like symptoms, and rare hypersensitivity reactions. At follow-up to 12 weeks, the patient did not experience any delayed complications.

This combined approach is further supported by emerging evidence for the utility of BoNT-A in managing chronic myofascial pain and for hydrodissection in addressing myofascial entrapment and interfascial adhesions. Recent studies from 2022-2024 have reported sustained pain relief and functional improvement with ultrasound-guided hydrodissection for cervical myofascial pain, as well as improved outcomes with BoNT-A when guided by imaging for precise trigger point localization [11] [12]. Ultrasound guidance was essential in our case, enabling precise identification of anatomical layers, real-time visualization of fluid spread during hydrodissection, and safe administration of BoNT-A into the appropriate muscular compartments. Importantly, this technique avoided injury to critical structures such as the spinal accessory nerve, which traverses the posterior triangle near the trapezius.

The results of this case warrant further research to evaluate the durability of outcomes and explore a similar methodology for other muscle groups implicated in chronic regional pain syndromes.

4. Conclusion

This case supports the use of combined ultrasound-guided trapezius hydrodissection and botulinum toxin A injection as a novel, safe, and effective option for patients with chronic myofascial neck pain unresponsive to conventional therapy. By targeting both mechanical fascial restrictions and neuromuscular hyperactiv-

ity, this technique offers a synergistic approach with the potential for sustained pain relief and functional restoration.

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Ethical Approval and Consent

Institutional ethics approval for publication of this case was obtained, and the patient provided written informed consent for the procedure and for publication of this case report.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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