

Ultrasound-Guided Dorsal Scapular Nerve Blockade in the Diagnosis and Management of Neck Pain

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Abstract

Neck pain is common and has multiple sources, but correct diagnosis and matched treatment provide the best outcomes. The first description of ultrasound-guided dorsal scapular nerve blockade using a single-shot local anesthetic technique for the diagnosis and treatment of neck pain is reported. A 38-year-old female patient presented with neck pain, and the history and clinical examination strongly suggested myofascial pain affecting the middle scalene muscle. The pain had been unresponsive to pharmacological therapy or physiotherapy. After identifying the dorsal scapular nerve (DSN) in the body of the middle scalene muscle, an ultrasound-guided nerve block was performed using a single injection of local anesthetic to alleviate the patient's pain. It has been demonstrated that the dorsal scapular nerve can be identified in the neck and effectively blocked using ultrasound guidance. This technique has the potential to assist in the diagnosis and treatment of neck pain originating from the middle scalene muscle.

Keywords

Technique, Ultrasound, Neck Pain, Middle Scalene Muscle, Dorsal Scapular Nerve

1. Introduction

Neck pain is a prevalent condition characterized by multiple pain sources. Among these sources, myofascial pain plays a significant role. The pathophysiology of myofascial pain, however, remains incompletely understood. It is believed that muscle fiber injury triggers the release of inflammatory mediators, leading to the activation of nociceptors and subsequent reflex muscle contrac-

tion, resulting in the formation of trigger points [1]. Another perspective suggests that myofascial pain may arise from peripheral neural origins, manifesting as secondary hyperalgesia [2]. Due to the extensive range of potential differential diagnoses, the diagnosis of myofascial pain often involves a process of exclusion. Properly identifying and differentiating myofascial pain from other conditions is crucial for optimal patient management and treatment outcomes.

2. Case Report

A 38-year-old female patient presented with neck pain, specifically experiencing interscapular discomfort on the right side. During the examination, it was observed that the patient's range of motion was restricted due to pain. Additionally, tenderness was detected in the front of the neck on the right side. The neurological examination yielded normal results (Figure 1). A pain score of 7/10 was reported.

Initially, various potential causes were considered as part of the differential diagnosis, including shoulder joint pathology, cervical radiculopathy, and myofascial pain in the rhomboid region. Before being referred to the pain team, the patient underwent an MRI (Figure 2), which did not reveal any abnormalities. Previous attempts at managing the condition through physiotherapy and oral analgesics had proven ineffective.

Based on the lack of success with prior investigations and treatments, as well as the clinical examination findings, it was inferred that myofascial pain involving the middle scalene muscle was the probable etiology of the neck pain [3]. The hypothesis was formulated that administering a local anesthetic block to the dorsal scapular nerve (DSN) could potentially alleviate the pain by inducing relaxation in the middle scalene muscle.

The dorsal scapular nerve (DSN) originates from the C5 spinal nerve root and traverses the interscalene groove situated between the anterior and middle scalene muscles. From there, it proceeds to penetrate the middle scalene muscle upon exiting this region. It was at this particular point that the decision was made to perform the nerve block [4].

The nerve block procedure was carried out employing a 38 mm, 6 - 13 MHz, linear array transducer (Sonosite S-nerve, Bothell, WA, USA). Within the neck, the dorsal scapular nerve (DSN) was visualized within the body of the middle scalene muscle. At this location, it appeared as a flattened structure, but assumed a rounded shape upon exiting the muscle (Figure 3). To perform the block, a 22-G, 50 mm short beveled spinal needle (Stimuplex A; B Braun, Melsungen, Germany) was inserted in alignment with the ultrasound transducer's plane. Subsequently, a perineural injection was administered using 8 ml of Levobupivacaine 0.5% and 40 mg of Triamcinolone.

The patient reported experiencing approximately 80% pain relief shortly after the injection. No motor weakness was observed, and there was an improvement in the patient's range of motion.

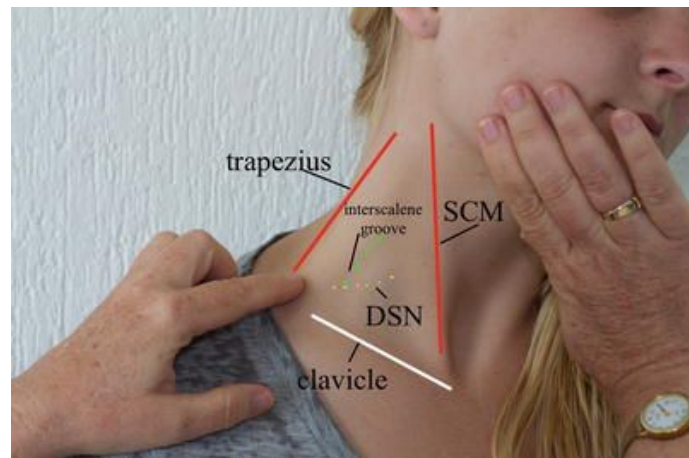


Figure 1. The distribution of pain described by the patient. Most tender in the interscalene groove. Posterior cervical triangle marked by boundaries.

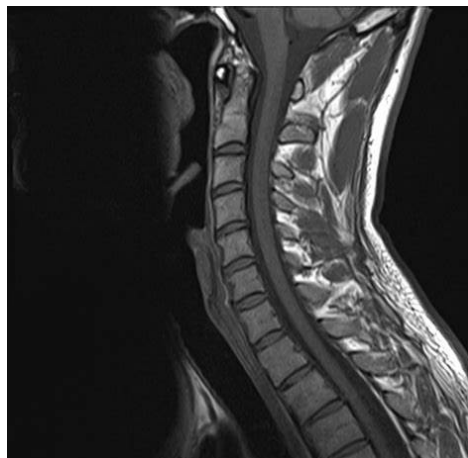


Figure 2. MRI of cervical spine.

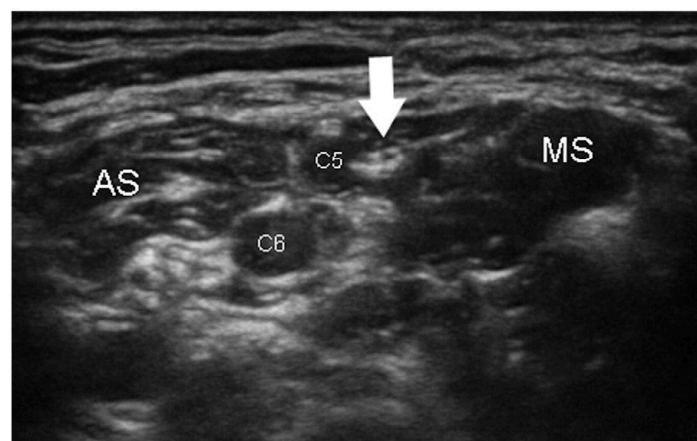


Figure 3. Ultrasound image depicting anatomy of Dorsal Scapular Nerve (indicated by arrow) originating from C5 nerve root. AS = Anterior Scalene, MS = Middle Scalene muscle. Note the picture depth was 1.7 cm.

Despite attempting physiotherapy involving stretching and prescribed exer-

cises, as well as oral analgesics such as Solpodol and Neurontin, the desired outcome for alleviating neck pain has not been achieved.

At the one-week follow-up, it was noted that although some pain had returned (rated at 3 out of 10), the symptoms were not as severe as they were prior to the injection.

3. Discussion

Although ultrasound imaging of DSN has been previously described [5], we believe this is the first report of ultrasound guided blockade of this nerve for neck pain. There was a good outcome in the case report described.

In the presented case report, the patient experienced significant right-sided interscapular pain with a reported pain score of 7 out of 10. Physical examination revealed a restricted range of motion accompanied by pain, as well as tenderness in the anterior neck on the right side. Neurological examination yielded normal findings, and an MRI of the cervical spine showed no abnormalities. Despite prior attempts with physiotherapy and analgesics, no satisfactory relief was achieved. However, a positive outcome was attained through the application of ultrasound-guided deep cervical plexus neurolysis (DSN).

The dorsal scapular nerve (DSN) is primarily a motor nerve and emerges from the C5 spinal nerve root as the uppermost branch of the brachial plexus. Upon entering the interscalene triangle, the nerve promptly traverses the middle scalene muscle before descending behind the brachial plexus and deep to the levator scapulae muscle, which it innervates. Its trajectory concludes by penetrating the deep surfaces of the rhomboid major and minor muscles, providing innervation to both. The characteristic manifestation of DSN entrapment often involves scapular winging when raising the arm above the head.

Three potential theories have been proposed to explain the entrapment of the dorsal scapular nerve (DSN). The first hypothesis involves the prolonged stretching of the nerve, specifically affecting the *nervi nervorum* [6]. As a consequence, compression ensues, disrupting the blood-nerve barrier and leading to fluid leakage from the microvessels that supply the nerve (*vasa nervorum*). This leakage facilitates the infiltration of inflammatory mediators, ultimately resulting in scar formation. With repetitive insults, a detrimental cycle of neural desensitization is initiated, wherein less trauma leads to increased inflammation.

The second mechanism is linked to Myofascial Pain Syndrome, whereby a taut band in the rhomboid muscles, which includes trigger points, results in DSN entrapment. Fibrous bands and adhesions within these muscles, which are highly innervated and inflammatory, restrict the mobility of the nerve [7]. Consequently, a condition known as “double crush syndrome” occurs, where compression at proximal sites leads to compression at distal sites as well.

The third potential theory proposes that scapular winging, accompanied by a loss of scapular protraction, can result in the stretching of the cutaneous medial branches of the thoracic dorsal primary rami of spinal nerves [8]. Consequently,

pain may be referred to the region between the scapula and the spine. This phenomenon is commonly referred to as notalgia paresthetica. However, it should be noted that this theory is applicable only to patients displaying the characteristic presentation of scapular winging.

4. Conclusions

The utilization of peripheral nerve block in the management of neck pain has the potential to enhance our comprehension of neck pain with unknown origins.

However, this approach has been constrained by the predominant emphasis on proximal spinal structures such as joints, discs, and nerve roots. By selectively blocking a peripheral motor nerve, it becomes feasible to induce relaxation in a specific muscle or group of muscles, thereby aiding in pain relief.

Once a precise diagnosis is established regarding the specific muscle implicated as the cause, subsequent treatments can be more targeted.

Therefore, our technique can be employed to facilitate the diagnosis of neck pain characterized by anterior neck tenderness.

Acknowledgements

We would like to extend our gratitude to the patient for her consent to publish this report.

Statements and Declarations

Conflicts of Interest

There were no other competing interests involved in this research. There was no support from any organisation for the submitted work and no other relationships or activities that could appear to have influenced the submitted work.

Availability of Data and Material/Data Transparency

This case report is an honest, accurate, and transparent account of the case being reported. No important aspects of the report have been omitted. Any queries should be directed via email to the corresponding author. Requests for reprints should also be addressed to the corresponding author.

Ethics Approval

This study is fully compliant with the ethical guidelines of the Research Ethics and Clinical Trials Committee of the University of Limerick Hospitals Group. Consent to participate: The patient described consented to participation and publication of the report as described.

Consent for Publication

The corresponding author has the right to grant on behalf of all authors and does grant on behalf of all authors, an exclusive licence to PAIN Practice to permit this case report (if accepted) to be published in PAIN Practice editions.

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