

만성 축성 경부통에 경추 다열근 평면 차단술의 유용성

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Ultrasonography-Guided Multifidus Cervicis Plane Block as a New Approach for the Treatment of Chronic Axial Neck Pain

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Multifidus cervicis plane block has been effectively used to provide analgesia during and after cervical spine surgery, but not for any other purpose. Here, we report three cases of chronic axial neck pain unresponsive to medical treatment. We performed multifidus cervicis plane block bilaterally, which lowered numerical rating scale (NRS) score within 2 weeks. Thus, multifidus cervicis plane block is one of the novel options that may be used for chronic axial neck pain. (*Clinical Pain* 2021;20:30-34)

Key Words: Fascia, Neck pain, Ultrasonography

INTRODUCTION

Axial neck pain is defined as dull ache confined to the cervical, occipital, or posterior scapular areas without radiating to the upper extremity [1]. In most cases, the pain improves within 6 weeks with conservative treatment alone; however, in approximately 14% cases, it persists for more than 6 months [2]. Identifying the primary cause of the pain is challenging as many biomechanically complicated components around the neck contribute to cervical stability and mobility, such as the bone, disc, joint, muscle, and ligament. Hence, it is difficult to treat neck pain.

Ultrasonography has become a useful tool for performing regional anesthesia, and ultrasonography-guided interfascial plane block is one of the most rapidly evolving techniques. Interfascial plane block depends on the spread of local anesthetics within the musculofascial plane to target multiple small nerves instead of targeting specific nerve

structure [3]. In this technique, transversus abdominis plane block, pectoralis nerve block, serratus anterior block, quadratus lumborum block, transversalis fascia block and erector spinae plane block are included. These procedures are effective in managing pain during or after surgery and preventing the overuse of opioid medication for pain control. Among them, ultrasonography-guided multifidus cervicis plane block (MCPB) was introduced for perioperative cervical analgesia in cervical laminoplasty [4]. However, the study only focused on the analgesic effect of MCPB for perioperative or postoperative pain control and did not investigate its effectiveness in managing axial neck pain.

Here, we have described three cases in which MCPB was effectively used to treat uncontrolled chronic axial neck pain not indicated for surgical treatment.

CASE REPORT

We have reported three patients with a minimum 1-year history of chronic axial neck pain that was unresponsive to medical treatment. The patient characteristics are shown in Table 1. They have never received MCPB before. The MCPB protocol was identical in all patients. They were placed in the prone position with their necks in a neutral position (Fig. 1-A). A high-frequency linear transducer (3 ~

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Table 1. Demographic and Clinical Characteristics of the Patients

Case	Age (years)	Sex	NRS		Imaging		Radiating pain	Complication
			Baseline (right:left)	2 weeks (right:left)	Radiography	MRI		
1	35	F	6:7	4:5	Loss of curvature	Diffuse bulging disk	-	-
2	44	F	5:6	2:4	Loss of curvature Disk space narrowing	Not done	-	Injection site pain
3	76	F	6:6	4:3	Loss of curvature Disk space narrowing Neural foramen stenosis	Diffuse bulging disk	-	Injection site pain Mild dizziness

NRS: Numerical rating scale, MRI: Magnetic resonance imaging.

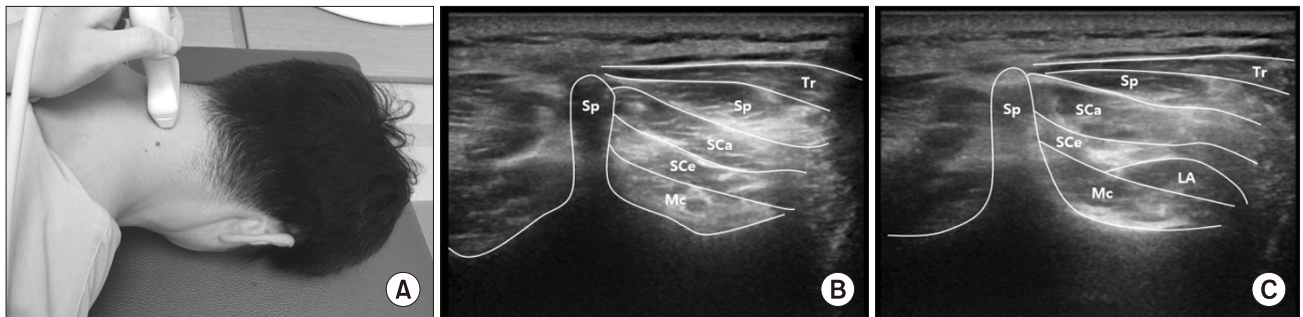


Fig. 1. (A) The patient is placed in a prone position with the neck in the neutral position. A high-frequency linear transducer is placed at the fourth to the fifth cervical level. (B) Ultrasonography image in the transversal view showing the multifidus cervicis plane block at the C5 level. (C) Local anesthetic injection in the fascial plane between the multifidus and semispinalis cervicis muscles. Sp: Spinous process, Mc: Multifidus cervicis muscle, SCe: Semispinalis cervicis muscle, SCa: Semispinalis capitis muscle, Tr: Trapezius muscle, LA: Local anesthetic solution.

12 MHz) was placed from the fourth to the fifth cervical level centrally to check the spinous process of the cervical vertebrae. Then, the transducer was placed laterally until the multifidus cervicis muscle was detected in the central plane (Fig. 1-B). The fascial plane above the multifidus cervicis muscle was targeted, and 15~20 mL of 0.5% lidocaine, local analgesic agent, was injected superficial to the multifidus cervicis muscle. When unilateral side was injected, 20 mL of 0.5% lidocaine was used, whereas when both sides were injected, 15 mL was used for each side considering possibility of side effects such as dizziness. We confirmed that the drug was injected in the correct plane between the multifidus and semispinalis cervicis muscles and spread to the interfascial space on ultrasonography (Fig. 1-C). If the pain relapsed to similar intensity as the beginning, additional injections were considered. After the MCPB, the pain intensity was measured for 2 weeks on

days 1, 2, 3, 4, 7, 10, and 14 after the injection using a numerical rating scale (NRS) (Fig. 2). For outpatients, we called on a weekly basis to follow-up on the pain score. To accurately assess the effect of the procedure, pain medication was not added during the 2-week follow-up period.

1. Case 1

A 35-year-old woman with a severe left-side dominant posterior neck pain over 5 years was hospitalized in our clinic. She had sharp pain without neurologic sign, and the pain area spanned from the occiput to the upper trapezius muscle. Intensity was severe on the NRS score of 6 on the right side and 7 on the left side. Before hospitalization, several injections including cervical transforaminal epidural block and multiple prolotherapy and oral medication such as opioid agents including codeine phosphate and buprenorphine were attempted, but little effect was noted.

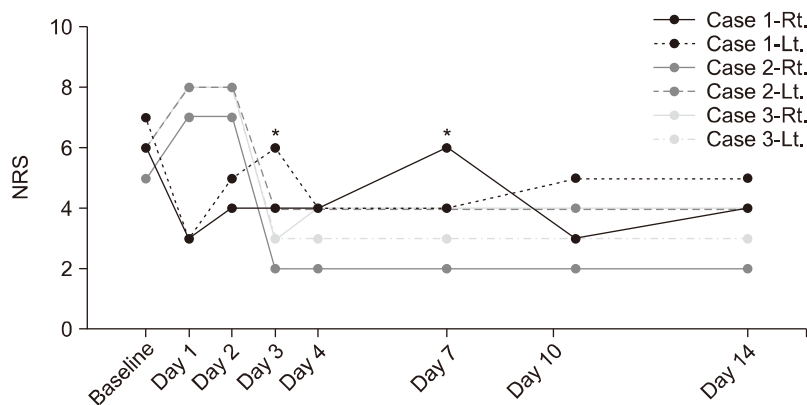


Fig. 2. Spaghetti plot of the NRS scores of the patients who underwent MCPB. NRS: Numerical rating scale, MCPB: Multifidus cervicis plane block, Rt.: Right, Lt.: Left. *Additional injection for controlling aggravated pain in case 1.

Cervical magnetic resonance imaging (MRI) showed a diffuse bulging disk at the C3~C7 level and loss of cervical curvature. The electrodiagnostic study performed during the hospitalization period showed no abnormal findings. During the hospitalization period, rehabilitation program based on cervical mobilization and exercise, one of manual therapy techniques comprising a continuum of skilled passive movements to the joints and related soft tissues [5], was combined with MCPB. MCPB was done on both sides at a 3-day interval using 20 mL of 0.5% lidocaine; right side first and then the left. After the procedure, the overall NRS score was improved from 6 to 3 on the right side and from 7 to 3 on the left side, but the pain relief persisted for 3 days for the left side and 7 days for the right side. To control the relapsed pain, an additional injection using 20 mL of 0.5% lidocaine was performed on both sides of the neck; seventh day after injection at right side and third day after injection at left side. Thereafter, the NRS score decreased from 6 to 4 and continued to decrease for approximately 1 week.

2. Case 2

A 44-year-old woman with a 10-year history of chronic bilateral posterior neck pain visited our outpatient clinic. Character of her pain was squeezing; the pain intensity on the NRS was 5 on the right side and 6 on the left side, and the area was distributed from the posterior neck to the

interscapular area bilaterally without neurologic symptom. Cervical spine radiography revealed straightening of the cervical spine curvature and decreased disk space at C3~C4. Electrodiagnostic study was not done in this patient. During the follow-up period, rehabilitation program based on cervical mobilization and exercise, cervical traction therapy, physical therapy including hot pack, therapeutic ultrasound & interference current therapy and oral medication (pelubipirofen 45 mg and tizanidine 2 mg) were attempted but there was only short-term effect less than 1 week. MCPB using 20 mL of 0.5% lidocaine was performed at 1-week intervals; the right side first and then the left side. Immediately after the injection, she developed soreness at the injection site that continued for 2 days. On the third day, the pain decreased from 5 on NRS score to 2 on the right side and from 6 to 4 on the left side for more than 2 weeks.

3. Case 3

A 76-year-old woman had a 2-year history of right-side dominant posterior neck pain induced a whiplash injury after a traffic accident and visited our outpatient clinic. She had squeezing pain, and the pain intensity on the NRS was 6 on both sides. Rehabilitation program based on cervical mobilization and exercise, physical therapy including hot pack, therapeutic ultrasound & interferential current therapy, multiple trigger point injection therapy and oral medi-

cation (pelubiprofen 45 mg, eperisone hydrochloride 150 mg and celecoxib 200 mg) were performed during the follow-up period, but there was minimal effect. Cervical spine MRI revealed a mild degree of disk herniation at C5~C6~C7, but the symptom did not correlate with the location on the imaging study. Electrodiagnostic study was not been performed. Immediately after MCPB using 30 mL of 0.5% lidocaine was performed on both sides of the neck at once, she developed soreness at the injection site, which continued for approximately 2~3 days. The overall pain decreased from NRS score of 6 to 3 on both sides. However, the pain intensity gradually exacerbated on the right side of the neck, and the NRS score was maintained at 4.

DISCUSSION

MCPB lowered NRS score in all three cases introduced in this study. Although two of the three patients developed soreness at the injection site for approximately 2 days, neck pain was relieved for more than 1 week after the injection.

MCPB targets the interfascial plane at which many posterior branches of cervical nerve run through the space between the multifidus and longissimus muscles. Especially medial branches of posterior ramus innervate most of deep neck extensor muscles as well as cervical facet joint, which can be expected to affect a wide range of cervical structures. Ohgoshi et al. [4] performed bilateral MCPB after general anesthesia for posterior cervical laminoplasty and they concluded that MCPB was beneficial owing to its analgesic effect in post-cervical spine surgery patients. However, in our study, a relatively long-term effect was observed in two of three cases. Although little is known about the mechanism of pain reduction other than analgesic effect on multiple nerves present in the interfascial plane mentioned in previous studies, we hypothesized that interfascial plane block plays a role in facilitating the mobilization of muscle layers by adhesiolysis. Degenerative deformities, including cervical kyphotic deformity, result in the limitation of the dynamics of the vertebral column and muscles enveloping the vertebral column [6], causing fascial adhesions. In particular, multifidus cervicis muscle is involved in segmental stabilization of the cervical spine, the mobilization effect by fascial adhesiolysis would be the most effective when targeting the fascial plane around multifidus cervicis muscle. In addition, in a previous study, there are other

structures in the interfascial plane other than somatosensory nerve which can be contribute to the mechanisms of action of interfascial plane blocks such as mechanoreceptors and nociceptors in fascial plane which have a connection to the wide-dynamic range neuron; most common nociceptive neurons in the spinal dorsal horn cell, and the nerve fibers associated with controlling adrenergic signaling and local blood flow which can affect pain perception indirectly [7].

MCPB has several advantages over other treatment options such as trigger point injection and physical therapies including interference current therapy, hot pack and therapeutic ultrasound which mentioned above. First, a single MCPB procedure is effective for pain over a relatively wide area compared to another injection treatment option including trigger point injection only targeting specific muscle. When a large amount of anesthetic solution such as lidocaine is injected in the interfascial space, the solution spreads vertically because approximately 30% of the contractile force of the muscle is conducted to the space around the muscle, including the bones and deep fascia, and in the interfascial space [8]. Therefore, even routine muscle contractions can squeeze and spread the solution. In a previous study, MCPB could cover skin dermatome segments ranging from the C4 vertebral segment to the T4 vertebral segment [9].

The second advantage of MCPB shows relatively longer pain-relief duration than other treatment options in this study. All patients included in this study received cervical mobilization exercise, trigger point injection and oral medication in common, but showed only a short treatment effect within one week. However, the duration of pain relief after MCPB was more than 2 weeks in 2 out of 3 patients in this study.

The third advantage of MCPB, there is no difference in safety or technical simplicity compared to other treatment options. MCPB targets the interfascial space between the multifidus and semispinalis cervicis muscles, which is relatively distant from the anatomically critical structures (Fig. 3) such as the vascular or nerve component. For this reason, it can be used as a one of the safe techniques as with other treatment options.

In cases 2 and 3, the local injection site pain persisted for approximately 2 days. Injecting solutions in the interfascial space results in the stretching of the muscular or tendinous insertions under the deep fascia, followed by lo-

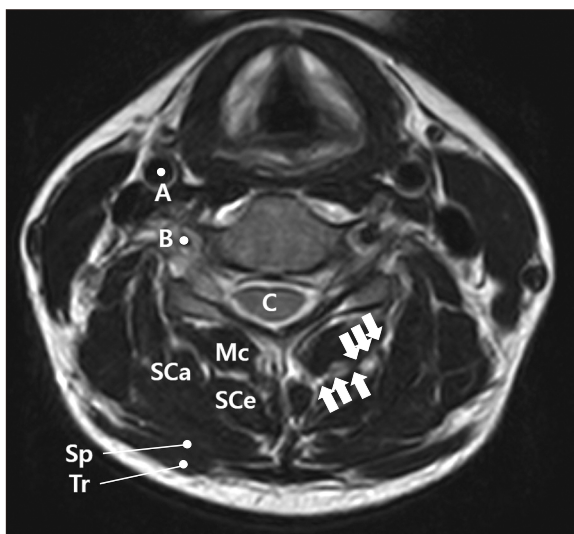


Fig. 3. Anatomical overview and target area of the injection technique depicted in cervical spine magnetic resonance T2 axial cut images at the C5 level. Mc: Multifidus cervicis, SCe: semispinalis cervicis muscle, SCa: semispinalis capitis, Sp: splenius capitis, Tr: trapezius muscle, A: common carotid artery, B: vertebral artery, and C: spinal cord. White arrow: The interfascial space between the multifidus and semispinalis cervicis muscles, which is the target space of MCPB. MCPB: Multifidus cervicis plane block.

cal tenderness when the free, encapsulated nerve endings inside the deep fascia sense the pressure. This side effect can be reduced by restricting the amount of the solution injected at once and increasing the number of injections.

In conclusion, we report that MCPB may be considered as one of the treatment options for chronic axial neck pain. The rationale for this should be further evaluated in a

randomized controlled study.

REFERENCES

1. Ahn NU, Ahn UM, Ipsen B, An HS. Mechanical neck pain and cervicogenic headache. *Neurosurgery* 2007; 60: S21-S27
2. Dvorák J. Epidemiology, physical examination, and neuro-diagnostics. *Spine* 1998; 23: 2663-2673
3. Chin KJ, McDonnell JG, Carvalho B, Sharkey A, Pawa A, Gadsden J. Essentials of our current understanding: Abdominal Wall Blocks. *Reg Anesth Pain Med* 2017; 42: 133-183
4. Ohgoshi Y, Izawa H, Kori S, Matsukawa M. Multifidus cervicis plane block is effective for cervical spine surgery. *Can J Anaesth* 2017; 64: 329-330
5. American physical therapy association. Guide to physical therapist practice. 2nd ed. *Phys Ther* 2001; 81: 9-746
6. Schwab F, Patel A, Ungar B, Farcy JP, Lafage V. Adult spinal deformity-postoperative standing imbalance: how much can you tolerate? An overview of key parameters in assessing alignment and planning corrective surgery. *Spine* 2010; 35: 2224-2231
7. Elsharkawy H, Pawa A, Mariano E. Interfascial plane blocks: back to basics. *Reg Anesth Pain Med* 2018; 43: 341-346
8. Tozzi P, Bongiorno D, Vitturini C. Fascial release effects on patients with non-specific cervical or lumbar pain. *J Bodyw Mov Ther* 2011; 15: 405-416
9. Ohgoshi Y, Nishizakura R, Takahashi Y, Takeda K, Nakayama H, Kawamata M, et al. Novel ultrasound-guided inter-semispinal plane block: a comparative pilot study in healthy volunteers. *J Anesth* 2017; 32: 143-146