



Case Report

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Erector Spinae Plane Block in Patients with Low Back Pain

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The erector spinae plane (ESP) block is a novel interfascial block technique to relieve various postoperative pain. We described successful management of acute or subacute low back pain in 3 patients using ultrasound guided ESP blocks. Three patients of low back pain visited our pain clinic with variable duration of pain development with numerical rating scale 7. Before the visit of pain clinic, they were treated with physical therapy and acupuncture with minimal efficacy. For their pain relief, lumbar ESP block at L4 or L5 level using ultrasound guidance was performed. After lumbar ESP block, all 3 patients showed good treatment effect in relieving their low back pain (numerical rating scale 1-2). This effect was maintained even after 2 months after injection. Lumbar ESP block is a good treatment option for acute or subacute low back pain. Further studies are needed to clarify the clinical efficacy.

Keywords: Acute pain, Erector spinae, Low back pain, Pregnancy, Ultrasound

Introduction

The erector spinae plane (ESP) block is a novel interfascial block technique which was first described by Forero et al [1], in 2016 to relieve thoracic neuropathic pain. Although the first description of ESP block was its use in thoracic neuropathic pain, the use of ESP block for the purpose of postoperative pain control has expanded a lot to include variable clinical situation.

In the abdomen and thoracic wall, thoracic ESP can be applied for pain control after cardiac surgery [2], mastectomy [3], video-assisted thoracic surgery [4], and thoracotomy [5]. More recently, good postoperative pain controls have been reported after lumbar spinal or lower limb surgeries when lumbar ESP was applied [6,7].

The advantage of ESP block over neuraxial analgesia includes relatively simple technique with ultrasound guidance, lesser sympathetic block with fewer cardiovascular side effects, and safe regional block option even in patients with an altered hemostasis [1,2,8,9]. For the safe performance of ESP block, ultrasound guidance is always required. Not infrequently, we can encounter female chronic pain patient who is pregnant or planning a pregnancy in the pain clinic. Such female pregnant patients have very limited option to relieve their pain. Therefore, if injection technique with ultrasound guidance could provide good analgesia, it would be the best treatment option compared to fluoroscopic guided injection or taking any medication.

We describe case series of 3 patients with subacute low back pain in whom the ESP block was performed for their pain relief. One of three patients presented that she was trying to be pregnant although urine or blood test was not confirmed yet.

Case report

The authors certify that written informed consent for publication was obtained from the patient or guardian. The potential risks and benefits were discussed with all patients before the ESP block.

All 3 patients in this case series received the ESP block as follows. The patient was placed in a prone position and a low-frequency curved ultrasound transducer (GE Healthcare, Logiq S8, USA) was placed in a longitudinal direction 5 cm lateral to the L4 or L5 spinous process. Using the parasagittal approach, the ultrasound transducer was placed that the transverse process of L3, L4, and L5 was shown in the image. The desired level of the transverse process was L4 or L5 (Fig. 1). Once identifying the target level, Quincke needle (25-gauge, 9 cm, Taechang Industrial Co. Kongju, Korea) was inserted in plane along the caudal to cephalad direction. We advanced the needle until bony contact was made between the needle tip and the transverse process. A total of 20-40 ml of 0.1% ropivacaine was injected. During the injection of ropivacaine, we could confirm that injected local anesthetics was spreading linearly between the transverse process and erector spinae muscle.

Case 1

A male patient of 30 years old, who complained of severe low back pain, visited our pain clinic. He started to feel severe low back pain 2 month ago and his numerical rating scale (NRS) was 7. He was a production worker in a factory. Due to his job, he had to repeat lifting heavy things during his work time.

His back pain became aggravated when he tried to bend

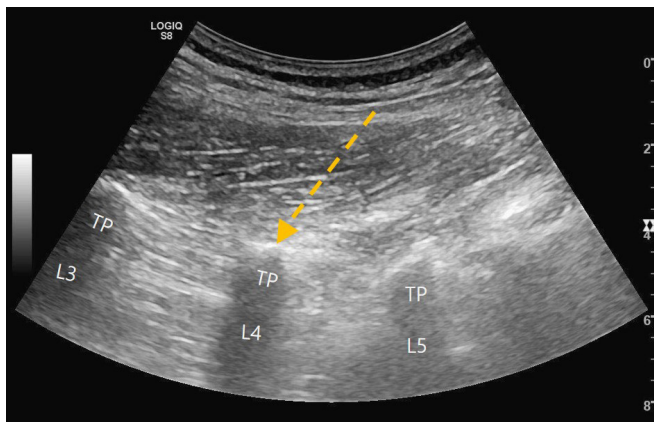


Fig. 1. Ultrasound image The passage of needle for the lumbar erector spinae block at L4. Yellow arrow is the trajectory of needle. TP, transverse process.

over to wash his face. Also, sitting a chair more than 30 minutes was not comfortable. During his walk, he felt moderate pain. Before the visit of pain clinic, he received acupuncture and physical therapy at local pain clinic with little efficacy. Physical examination revealed severe tenderness at both para-spinal muscle area. Magnetic resonance imaging (MRI) was performed to evaluate the cause of back pain. According to the pain nature described above, we suspected that his back pain is coming from the discogenic problem. However, his MRI of lumbar spine was normal without any disc degeneration, facet arthropathy, or stenosis.

Since his lumbar MRI was normal, myofascial pain syndrome or lumbar sprain which was occurred at back muscle was suspected as the source of pain. There was no special traumatic event before pain development. We assumed that lifting and taking down heavy things repeatedly during his work time might have caused accumulated injury to his back muscles.

For his pain relief, we suggested a bilateral ultrasound-guided ESP block at the level of L5 and 20 ml of 0.1% ropivacaine at each side of back was injected. We made 0.1% ropivacaine 20 ml using 10 ml of 0.2% ropivacaine, 5 ml of 0.9% normal saline, and 5 ml of contrast medium. To avoid any vascular injection of local anesthetics during ESP block, we added 5 ml of contrast medium and confirmed it by the fluoroscopic image. Subsequent to successful ESP block by ultrasound guidance, fluoroscopic image was obtained lastly (Fig. 2).

From the next day of injection, he could not feel any previous back pain with NRS 1-2. We contacted him by a phone call 2 months after injection, and he told that he could do his job as a production worker without any back pain.

Case 2

A female patient of 32 years old, who complained of severe low back pain, visited our pain clinic. She started to feel severe low back pain 3 days ago and her NRS was 8. She was working as a nurse in an intensive care unit. She told that she started to feel her back pain suddenly during the changing position of the patient. Before this pain development, she did not feel any back pain previously. She could feel her back pain at any posture of body. Due to severe nature of pain, she was thinking a sick leave. We thought that the lumbar muscular sprain might be a possible reason because the onset of pain was recent and there was a traumatic event before pain development.

When we explained variable treatment options for her pain relief, she wanted to avoid taking any oral medication or fluoroscopic guided injections since she was making an effort to be pregnant. For her pain relief, a bilateral ultrasound-guided

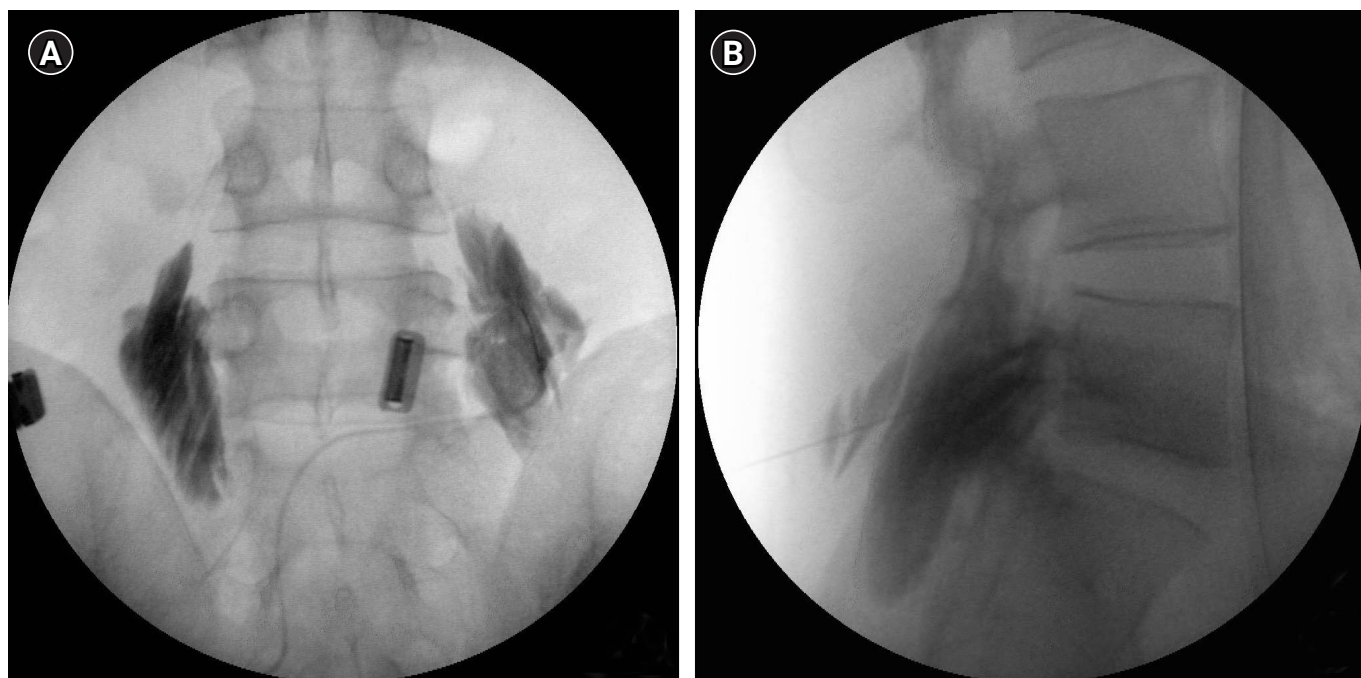


Fig. 2. Fluoroscopic images Anteroposterior (A) and lateral (B) images of lumbar erector spinae plane block at L5.

ESP block at L4 level using 10 ml of 0.1% ropivacaine at each side of back was performed successfully. After completion of the procedure, we monitored and observed her while she was lying in bed for recovery. No complication related to block was observed. From 2 days after ESP block, her severe back pain became mild with NRS 2-3 out of 10. After taking a rest of 4 weeks of sick leave, she could start her nursing job at an intensive care unit without any back pain.

Case 3

A female patient of 50 years old, who complained of severe low back pain with NRS 7, visited our pain clinic. Her first low back pain started 15 years ago, and her back pain continued to be present or absent depending on physical activity such as heavy lifting or sitting for a long time. She was previously diagnosed as having a discogenic low back pain according to MRI (Fig. 3). Physical examination demonstrated severe mid-line tenderness at L4-5 and L5-S1 level.

Whenever her low back pain appeared, oral medications including acetaminophen and tramadol showed temporary relief. Also, epidural injection with or without steroid improved her back pain. When she visited our pain clinic, she started to feel her back pain 2 months ago. Before this pain development, she was doing a new exercise program to enhance a core muscle volume. She told that a new exercise program might have overloaded her back. She could not sit down more than 30

minutes and had difficulty in bending over due to severe low back pain.

For her pain relief, unilateral ultrasound-guided ESP block at L4 level using 20 ml of 0.1% ropivacaine at right side of back was performed. Right sided ESP block was performed because her back pain was felt dominantly at right side. The effect of pain relief (NRS 1-2) was maintained until 2 months after injection.

Discussion

The progress of ultrasound technology has led to increased popularity in interfascial plane blocks. Previously, interfascial plane blocks were limited to abdominal wall blocks including ilioinguinal-iliohypogastric blocks, rectus sheath blocks, and transversus abdominis plane blocks. Recently, the range of block has expanded to include posterior thoracoabdominal blocks, anterior and lateral thoracic wall blocks, and peri-paravertebral blocks [10].

ESP block has attracted attention due to its technical ease of clinical application and safe profile compared to neuraxial block. Although the first description of ESP block was thoracic area for the pain relief of thoracic neuropathic pain, the application of ESP block has increased to lumbar, cervical and sacral areas to relieve acute and chronic pain [1,10]. Most of clinical studies of lumbar ESP on its efficacy was focused on

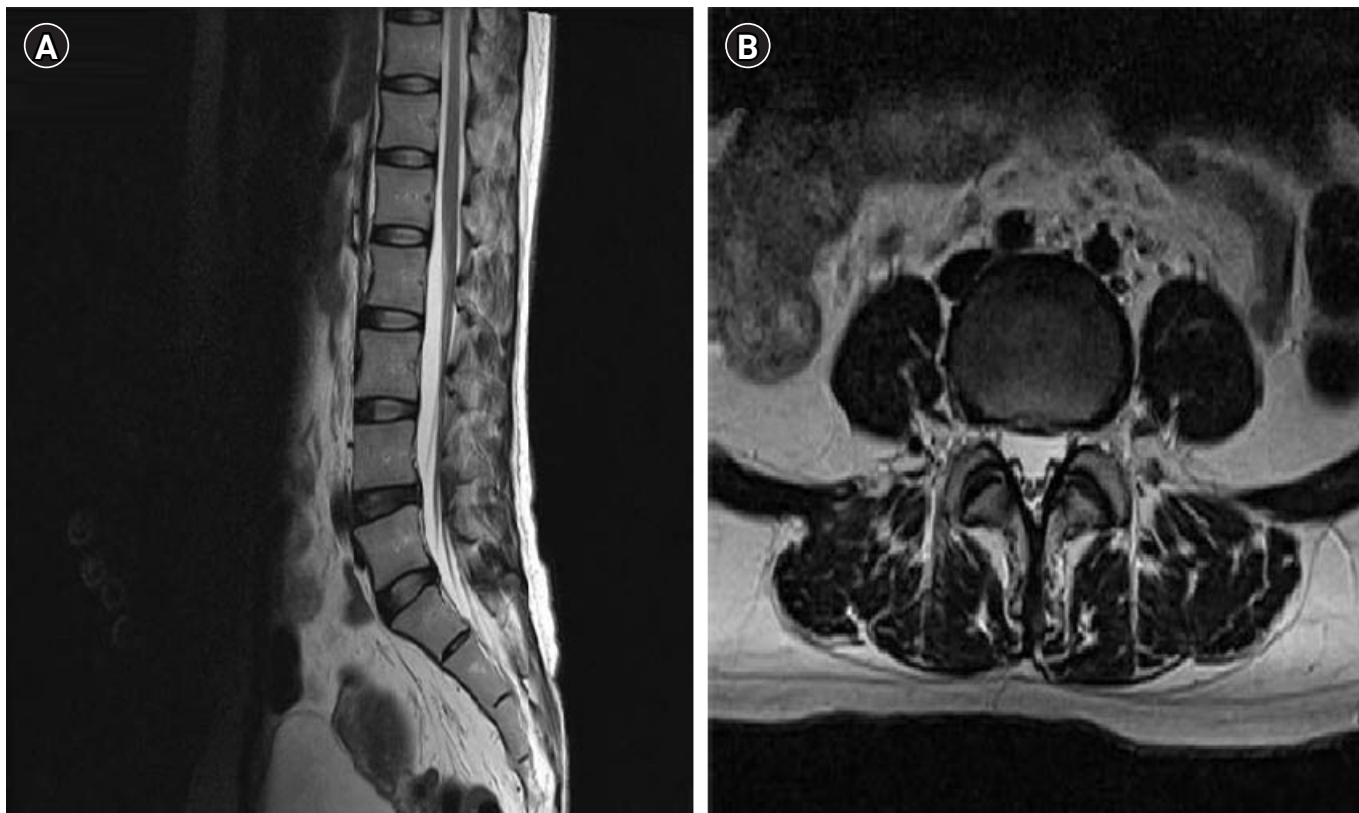


Fig. 3. Magnetic resonance images sagittal (A) and axial (B) images in a patient of case 3 showing disc generation at L4-5.

relieving postoperative pain after lumbar spinal surgery or lower limb surgery [6,7]. Low back pain is one of the most common musculoskeletal pain that physicians might encounter in their pain clinic. Although the clinical course of back pain is benign, it can result in disability and significant socio-economic impact when treated improperly [7]. There is one case report showing the clinical efficacy of lumbar ESP to improve low back pain [11]. However, that case report was unclear to demonstrate the clinical efficacy of lumbar ESP in low back pain, because dry needling was performed subsequent to lumbar ESP block. Actually, when moderate pain relief was achieved after ESP block combined with dry needling, only dry needling was performed to treat the remnant low back pain [11].

The erector spinae muscles (ESM) are back muscles and its main action is keeping the body in upright position. The ESM can be found from the cervical to sacral levels. From medial to lateral, this muscle in the thoracic area presents as the semispinalis, longissimus, and iliocostalis muscles [4,8,12]. The multifidus muscle, which also exists in the cervico-thoracic region, becomes thick and prominent towards the medial side of the spinous process when it descends to the lumbosacral level [6,10]. In contrast to thoracic level, multifidus muscle consti-

tute one of the ESM in lumbosacral area.

The exact mechanism of action why the ESP block could improve subacute or chronic low back pain is not known. Cadaveric study by Harbell et al. [13] performed 9 lumbar ESP blocks on 5 cadavers using 20 ml of 0.166% methylene blue at the L4 transverse process. According to their study, lumbar ESP injection showed limited craniocaudal spread compared to injection in the thoracic level. Also, it showed consistent spread to dorsal rami, whereas anterior spread to ventral rami or paravertebral space was not found [13].

Low back pain with or without radiculopathy can commonly be found during pregnancy and its treatment is very challenging. Taking oral medication can improve low back pain, but the use of medication during pregnancy is not a preferred method due to the possibility of utero-placental transition [10]. The ESP block performed at T3 level improved the cervical radiculopathy in a 13-week pregnant woman [14]. Like a patient presented as case 2, ultrasound guided ESP block at L4 could be an attractive treatment for back pain improvement if a patient is pregnant.

Although the injection volume might be variable depending on the physician, the injection volume is usually high in the ESP block. Local anesthetic systemic toxicity has been report-

ed previously using 30 ml of 0.5% levobupivacaine in the ESP block. A local systemic toxicity was observed even after negative aspiration and visualization of linear local anesthetic spreading [15]. A patient of case 1 in this case report, the injection volume was higher than the patients of case 2 and 3 due to bilateral ESP blocks, therefore, fluoroscopic image was used to avoid any vascular injection. We think that if a positive blood aspiration or an absence of visualization of linear fluid spreading was observed even after needle redirection, using the fluoroscopic image is a reliable method to avoid any local anesthetic systemic toxicity.

The location of ESP block is far from the nerve root and spinal cord, therefore, it provides better safety profile compared to epidural injection. Even in altered coagulation status, ESP block could be performed safely without any complication [1,7,9].

Until now, epidural injection has been the favored method to treat low back pain with or without radiculopathy. However, considering the fatal complication after epidural injection, although its incidence is rare, such as spinal cord infarction, epidural hemorrhage, dural-subdural puncture, and neurologic deficit, clinical application of ESP block in low back pain is required [16]. Further clinical studies are needed to clarify the efficacy of ESP block in low back pain.

Conflict of interest

The authors declare no conflicts-of-interest related to this article.

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