

Effectiveness of Lumbar Erector Spinae Plane Block with Methylprednisolone and Bupivacaine in Low Back and Leg Pain due to Lumbar Disc Herniation: Case Series

Lomber Disk Hernisine Bağlı Bel ve Bacak Ağrısı Olan Hastalarda Metilprednizolon ve Bupivakain ile Yapılan Lomber Erektör Spina Plan Bloğunun Etkinliği: Vaka Serisi

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ABSTRACT Low back and leg pain is a severe problem in society and causes a decrease in quality of life and significant workforce loss. Lumbar disc herniation (LDH) is one of the most important causes of this pain. LDH manifests itself with increasing back and leg pain over time. In 10 patients with unilateral LDH, we applied an erector spinae plane block (ESPB) with local anesthetic fluid containing methylprednisolone and bupivacaine at the lumbar vertebra level to treat acute low back and leg pain due to LDH. We evaluated the pain levels of the patients in the first trimester with a Numerical Rating Scale score. As a result of our follow-up, we concluded that lumbar ESPB might be an effective method in treating low back and leg pain due to LDH.

Keywords: Bupivacaine; intervertebral disc displacement; interventional ultrasound; local anesthetics; methylprednisolone acetate; pain management

ÖZET Bel ve bacak ağrısı, toplumda ciddi bir problem olup; yaşam kalitesinde düşüş ve önemli iş gücü kaybına neden olur. Lomber disk hernisi (LDH), bu ağrının en önemli nedenlerinden birisidir. LDH, zamanla artan bel ve bacak ağrısı ile kendini gösterir. Tek taraflı LDH'si olan 10 hastaya, akut bel ve bacak ağrılarını tedavi etmek amacıyla lomber vertebra seviyesinde metilprednizolon ve bupivakain içeren mayi ile erektör spina plan bloğu (ESPB) uyguladık. İlk 3 ayda hastaların ağrı düzeylerini, Sayısal Derecelendirme Ölçeği skoru ile değerlendirdik. Bu çalışmada, elde ettiğimiz verilere göre lomber ESPB'nin, LDH'ye bağlı bel ve bacak ağrısını tedavi etmede etkin olabileceği sonucuna vardık.

Anahtar Kelimeler: Bupivakain; vertebral arası disk kayması; girişimsel ultrasonografi; lokal anestezi; metilprednizolon asetat; ağrı yönetimi

While the hospital admissions rate due to low back pain is 15% in the adult population, its lifetime prevalence reaches 80%. Thirty-nine percent of intervertebral disc pathologies have been shown as the source of discogenic low back pain.¹ Lumbar disc herniation (LDH) and degenerative disc disease take the lead among these pathologies. LDH manifests itself with hip or leg pain that develops following back pain that increases over time.

The erector spinae plane block (ESPB), described by Forero et al. In 2016, is one of the

interfacial plane blocks.² It shows its effect by blocking the dorsal and ventral roots of the spinal nerves and sympathetic nerve fibers. It has been shown that the drug administered during the procedure spreads to the transforaminal and epidural area.³

Our study aims to determine the effectiveness of the ESPB applied with particle steroids in the treatment of LDH and evaluate its effect on acute pain depending on the effect of the local anesthetic agent.

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CASE REPORTS

Verbal and written consents of the patients were obtained for the procedure. All data used in this case series were recorded after obtaining verbal and written consent from the patients. The patients who did not have any additional disease other than LDH were included in the procedure. Patients were with a diagnosis of LDH, who had pain for more than three months and whose pain levels had increased for at least two weeks. The patients had low back and leg pain together. Patients with Numerical Rating Scale (NRS) score of seven or more were included in the study, although they used drug therapy (non-steroidal inflammatory drugs, centrally acting muscle relaxants, intramuscular) and rest for at least one week for LDH. All of these patients were evaluated by neurosurgery before the procedure, and surgical intervention was not considered. They were patients who did not have complaints such as incontinence in their physical examinations, had no loss of strength, and had unilateral neuropathic pain in L2-S1 dermatomes. In magnetic resonance imaging (MRI), seven patients had LDH at the bulging stage and three patients (patient 4, patient 5, patient 8) had at most one level of LDH at the prolapse stage. Block procedures were performed at levels consistent with pain described dermatomes, neurological tests, and MRI (most advanced disc herniation).

Vascular access was established in all patients with 18 Gauge branules before the procedure. For the ESPB procedure, patients were taken on a stretcher in the prone position, monitored, and intravenously administered 2 mg of midazolam (Figure 1). Hemodynamic findings of the patients were recorded before the procedure. The skin area to be treated was sterilized with 2% chlorhexidine. Convex ultrasonography (USG) probe (Esaote MyLab30®, CA631 low-frequency probe, United Kingdom) was sterile coated for the procedure. A 20 G 100 mm block needle (Stumpflex® Ultra 360®, Braun, Germany) was used with the “in-plane” technique during the procedure. USG probe was placed on the vertebral column at the lumbar level over the midline. The transverse process of the L5 vertebra and the sacrum on the side to be ESPB was



FIGURE 1: Physician and patient position during erector spinae plane block.

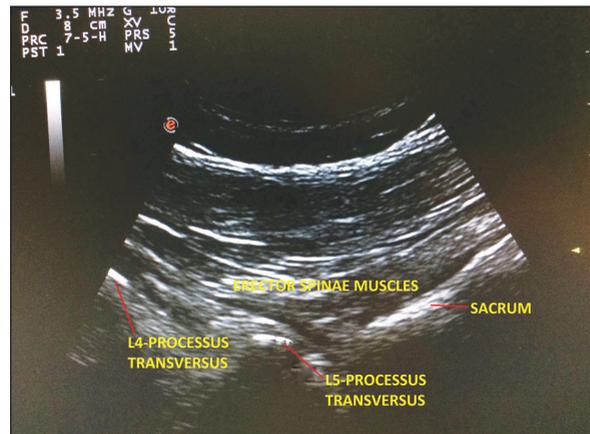


FIGURE 2: Anatomy under ultrasound (L4: Lumbar 4th vertebra, L5: Lumbar 5th vertebra).

imaged (Figure 2). Based on these points, the USG probe was directed to the level to be processed. After the erector spinae muscle and transverse process were visualized in the sagittal plane, the erector spinae muscle's deep fascia was entered with a needle, and the transverse process was touched. The injection site was confirmed with 2 mL of 0.9% NaCl, and block fluid containing 20 mL of 0.25% bupivacaine and 40 mg of methylprednisolone was applied to this area (Figure 3). USG observed the spread of the ESPB fluid to the cranial and caudal. Lumbar ESP procedure was applied unilaterally to all patients.

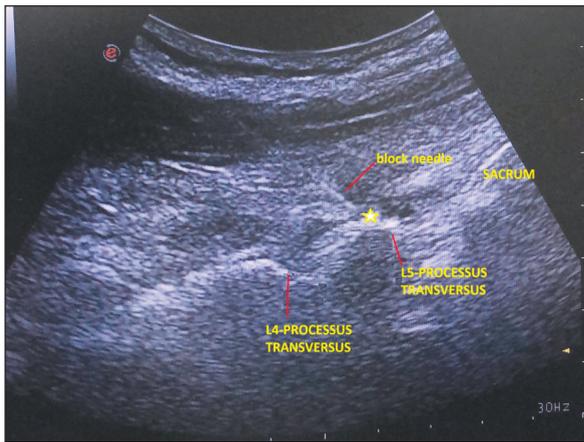


FIGURE 3: Yellow star shows the block needle and block plane.

After the procedure, patients were taken to the service rooms to observe vital signs. All patients were monitored, and vital signs were followed for four hours. Dermatome areas where the block procedure was expected to be effective were confirmed with an ice battery. The decrease in cold sensation in L2-S1 dermatomes was accepted as an effective block procedure. At the end of the first hour, the pain levels of all patients were re-evaluated

with NRS and recorded. All patients were discharged at the end of the fourth hour with stable hemodynamic findings, without losing leg strength during the examination and walking. The pain control of the patients was done in the outpatient clinic in the first and third months in the pain clinic. It was considered significant that the NRS values were reduced by at least half at all follow-up times compared to the pre-procedure.

The effectiveness of lumbar ESP in the treatment of low back and leg pain due to LDH is not yet clear. There are not enough studies on this treatment. In this study, we did not prescribe additional analgesic agents after the procedure in order to clearly observe the effectiveness of the block procedure. If their pain, which decreased significantly after the procedure, increased to an intolerable level again, they were recommended to reapply to our outpatient clinic. A rescue analgesic agent was prescribed in this application.

The data of the patients regarding demographic, clinical, and pain scores are shown in Table 1.

TABLE 1: The data of the patients regarding demographic, clinical, and pain scores.

	Demographic Data	Lumbar disc herniation level	NRS value before block		First hour NRS value		First month NRS value		Third month NRS value	
			A	R	A	R	A	R	A	R
Patient 1	Aged 33, 60 kg, 160 cm, F	*L4-L5, L5-S1 (right)	9	8	2	1	0	0	0	0
Patient 2	Aged 32, 65 kg, 163 cm, F	*L3-L4 (left)	9	8	2	2	0	0	1	2
Patient 3	Aged 47, 80 kg, 165 cm, F	L3-L4, *L4-L5 (left)	9	7	2	1	3	2	4	3
Patient 4	Aged 61, 75 kg, 170 cm, M	L4-L5, *L5-S1 (left)	8	8	2	1	3	2	6	5
Patient 5	Aged 30, 76 kg, 178 cm, M	*L5-S1 (left)	10	9	3	2	5	4	7	9
Patient 6	Aged 52, 69 kg, 160 cm, F	*L3-L4 (right)	10	10	3	2	2	1	3	2
Patient 7	Aged 38, 87 kg, 190 cm, M	L4-L5, *L5-S1 (left)	9	8	3	2	0	0	0	0
Patient 8	Aged 59, 70 kg, 178 cm, M	L1-L4, *L5-S1 (left)	7	7	1	1	4	3	8	7
Patient 9	Aged 43, 72 kg, 163 cm, F	L3-L4, *L4-L5 (right)	8	8	2	2	5	4	8	7
Patient 10	Aged 33, 72 kg, 165 cm, F	*L5-S1 (left)	8	7	2	2	4	3	7	6

NRS: Numerical Rating Scale; L: Lumbar vertebra; A: Active movement; R: Rest; F: Female; M: Male; *Block level.

DISCUSSION

There is a wide range of treatment options available in the treatment of low back and leg pain due to LDH. Paramedical treatments for treatment are among the frequently used methods, but the reliability of these treatments is controversial, and there is no definitive evidence that they are useful in the literature.⁴ Again, non-steroidal anti-inflammatory drugs, opioids, antiepileptics, and systemic steroids are widely used in treatment.^{5,6} However, many undesirable side effects occur due to these drugs.

Interlaminar and transforaminal epidural steroids or ozone applications are used to treat low back and leg pain due to LDH.^{7,8} However, these invasive but non-surgical procedures require special equipment (fluoroscopy room) and a highly experienced team. Surgical treatments are the last step in the treatment of low back and leg pain due to LDH. However, surgical treatments are controversial, and the patients' fear and reservations about the procedure are relatively high.

ESPB is one of the interfascial block techniques based on the injection of local anesthetic between the transverse process of the vertebra, which is at the same level as the deep fascia of the erector spinae muscle. The dorsal and ventral roots of the spinal nerves are affected. It is thought that its analgesic effect is provided by the spread of the local anesthetic fluid to the paravertebral area, transforaminal area, and anterior epidural area.^{3,9,10}

ESPB is one of the interfascial plane blocks successfully used in preventing postoperative pain in pediatric and adult patients in thoracic surgery, abdominal surgery, breast surgeries, and hip surgeries.¹¹⁻¹⁴

In this case series, we considered the effectiveness of the ESPB in other surgeries and the positive effect of the spreading of the fluid applied to the epidural, transforaminal, and paravertebral region during the procedure.

Methylprednisolone is used to treat pain caused by root compression and inflammation due to lumbar disc hernias due to its anti-edema and anti-inflammatory activity.¹⁵ Besides, steroids have been shown to prolong the action of local anesthetic agents.

After the procedure, we applied at the lumbar vertebra level, and we followed the patients in the first hour, first month, and third month periods. Based on the data we obtained, we concluded that this procedure successfully prevented acute pain in all patients, and this effect lasted from one month to three months without the need for additional analgesic agents. In this case series, the pain of all patients decreased significantly in the first hour, and the pain levels of the patients were very low in the first month. At the third month controls, all patients' pain levels were significantly lower than the pain before the procedure. At the end of three months, only one patient had a pain score above seven, while two patients had almost no pain. We concluded that the applied bupivacaine effectively reduced acute pain, especially in patients with LDH in the bulging stage, and the administered methylprednisolone effectively reduced pain in the long term by reducing disc compression.

Oral dextketoprofen and thiocolchicoside were prescribed as rescue analgesics for patients with a visual analogue scale score of four or higher who applied to the outpatient clinic. Rescue analgesic agents were prescribed to four patients at the first month controls and to three more at the third month controls.

Three of our patients (patient 4, patient 5, patient 8) had LDH in the prolapse stage, and the pain levels of two of them (patient 5, patient 8) significantly relapsed within three months. Seven patients had LDH at the bulging stage, and the pain levels of two of them (patient 9, patient 10) significantly relapsed within three months.

Transforaminal and epidural steroid applications, which are used in the treatment of low back and leg pain due to LDH, are usually performed in operating room conditions. For these procedures, an experienced team (expertise and auxiliary personnel), advanced technological equipment such as fluoroscopy room and fluoroscopy device are required. In addition, patients and employees are exposed to significant levels of radiation during these procedures. Lumbar ESPB operation can be performed in the outpatient clinic with USG, no

special team or technological equipment is needed. Patients can be treated on the day they apply to the polyclinic and there is no need for a long preparation stage before the procedure. In addition, the procedure is applied to more superficial tissues and seems to be safer for patients using anticoagulants.

According to the case series results, it was thought that lumbar ESPB, which can be applied in outpatient clinic conditions, could be an effective method in reducing unilateral low back and leg pain due to LDH.

Source of Finance

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Uğur Peksöz, Mine Çelik; **Design:** Uğur Peksöz; **Control/Supervision:** Uğur Peksöz, Mine Çelik; **Data Collection and/or Processing:** Uğur Peksöz; **Analysis and/or Interpretation:** Uğur Peksöz, Mine Çelik; **Literature Review:** Uğur Peksöz; **Writing the Article:** Uğur Peksöz; **Critical Review:** Mine Çelik.

REFERENCES

1. Hermenau S, Grower J. The evaluation and management of axial neck and low back pain. In: Rao R, Smuck M, eds. Orthopedic Knowledge Update: Spine 4. 4th ed. Madrid, España: AAOS; 2012. p.283-8.
2. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ. The erector spinae plane block: a novel analgesic technique in thoracic neuropathic pain. Reg Anesth Pain Med. 2016;41(5):621-7. [Crossref] [PubMed]
3. Schwartzmann A, Peng P, Antunez Maciel M, Forero M. Bilateral erector spinae plane block (ESPB) epidural spread. Reg Anesth Pain Med. 2019;44(1):131. [Crossref] [PubMed]
4. Yuan S, Lin X, Hong J, Qiu C, Chen D. Effects of traditional Chinese exercise on lumbar disc herniation: A protocol of network meta-analysis of randomized controlled trials. Medicine (Baltimore). 2020;99(5):e18781. [Crossref] [PubMed] [PMC]
5. Ozturk S, Ucler N, Hergunsel OB, Gulkesen A, Kaplan M. The efficacy of gabapentin in the treatment of pain due to far lateral lumbar disc herniations. Clin Neuropharmacol. 2016;39(3): 140-3. [Crossref] [PubMed]
6. Gastaldi R, Durand M, Roustit M, Zulian M, Monteiro I, Juvin R, et al. Short-term efficiency and tolerance of ketoprofen and methylprednisolone in acute sciatica: a randomized trial. Pain Med. 2019;20(7):1294-9. [Crossref] [PubMed]
7. Maadawy AAE, Mazy A, Adrosy MEMME, El-Mitwalli AA, Naby AMAE, Gomma M. A comparative study between interlaminar nerve root targeted epidural versus infraneural transforaminal epidural steroids for treatment of intervertebral disc herniation. Saudi J Anaesth. 2018;12(4):599-605. [PubMed] [PMC]
8. Bhatia A, Munk P, Lee D, Elias G, Murphy K. Percutaneous ozone treatment for herniated lumbar discs: 1-year follow-up of a multicenter pilot study of a handheld disposable ozone-generating device. J Vasc Interv Radiol. 2019;30(5):752-60. [Crossref] [PubMed]
9. Vidal E, Giménez H, Forero M, Fajardo M. Erector spinae plane block: A cadaver study to determine its mechanism of action. Rev Esp Anestesiol Reanim (Engl Ed). 2018;65(9):514-9. English, Spanish. [Crossref] [PubMed]
10. Celik M, Tulgar S, Ahiskalioglu A, Alper F. Is high volume lumbar erector spinae plane block an alternative to transforaminal epidural injection? Evaluation with MRI. Reg Anesth Pain Med. 2019;rapm-2019-100514. [Crossref] [PubMed]
11. Ueshima H, Otake H. Clinical experiences of ultrasound-guided erector spinae plane block for thoracic vertebra surgery. J Clin Anesth. 2017;38:137. [Crossref] [PubMed]
12. Aksu C, Gürkan Y. Ultrasound guided erector spinae block for postoperative analgesia in pediatric nephrectomy surgeries. J Clin Anesth. 2018;45:35-36. [Crossref] [PubMed]
13. Bonvicini D, Tagliapietra L, Giacomazzi A, Pizzirani E. Bilateral ultrasound-guided erector spinae plane blocks in breast cancer and reconstruction surgery. J Clin Anesth. 2018;44:3-4. [Crossref] [PubMed]
14. Tulgar S, Senturk O. Ultrasound guided Erector Spinae Plane block at L-4 transverse process level provides effective postoperative analgesia for total hip arthroplasty. J Clin Anesth. 2018;44:68. [Crossref] [PubMed]
15. Tafazal S, Ng L, Chaudhary N, Sell P. Corticosteroids in peri-radicular infiltration for radicular pain: a randomised double blind controlled trial. One year results and subgroup analysis. Eur Spine J. 2009;18(8):1220-5. [Crossref] [PubMed] [PMC]