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Sonography guided lumbar nerve and facet blocks: The first report of clinical outcome from Iran

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ABSTRACT

Introduction: Nerve root block (NRB) and facet block (FB) are viable options for pain arising from facet and lumbar disc herniation (LDH) not responding to conservative therapy but still not suitable for surgery. Classically, they are performed under fluoroscopy and computed tomography (CT) guidance, which have the disadvantages of radiation exposure and limited accessibility. The aim of this study was to assess the effectiveness of US guided FB and NRB in patients suffering from facet arthropathy and LDH.
Methods: 14 patients were involved in the study. After defining nerve root (for NRB) or facet joints (for FB) under a standard US investigation, real-time injection of methylprednisolone and bupivacaine was performed. Pain was measured before and after procedure by VAS.
Results: Ten patients underwent FBs (8 bilateral and 2 unilateral) and 4 underwent NRBs (2 bilateral and 2 unilateral). 11/14 (79%) patients improved after the block (8 in FB, 3 in NRB) and the VAS had significantly decreased 1 week after procedure (mean [range] −1.7 [−6 to 0]). For the 11 patients that improved after FB or NRB, the effect lasted for a mean of 59 days (range: 30–130 days). Analysis showed that neither block procedure (NRB vs. FB) nor block level (L4L5 vs. L5S1) had an effect on result.
Conclusions: Results of our preliminary study shows that in appropriately selected patients, nerve root and facet blocks can be effectively performed under ultrasonography guidance without notable complications, with effects lasting for a mean 2 months.

Introduction

Low back pain (LBP) and radicular leg pain (RLP) are common symptoms that are experienced by 90% of the adult population at some point of life.[1] The main causes of LBP are lumbar disc herniation (LDH), zygapophysial (facet) joints, and myofascial pain.[2] The natural course, however, is generally favorable and the majority of patients recover within 4–6 weeks with conservative therapy alone, which usually consists of medication, physical therapy, and regional injections and blocks.[3]

Selective nerve root (NRB) or medial branch/facet block (FB) are viable options for pain arising from facet and LDH, not responding fully to medical and physical therapy but still not suitable for surgery.[4] They may also be used to diagnose or rule out facet joint-mediated pain.[5] Classically, they are performed under fluoroscopy or computed tomography (CT) guidance, which have the disadvantages of ionizing radiation exposure to both the patient and operator, and the need for equipment that are not available in all settings (i.e. available only in the hospital operation room and radiology department, and not outpatient clinics).[6–9]

In the last decade, there have been efforts to perform the blocks under ultrasound (US) guidance, which has the advantages of greater availability, no radiation exposure, and the option to perform the procedure in most inpatient and outpatient settings.[10] Previously, US has been used in peripheral nerve, lumbar and brachial plexus, and neuraxial blocks.[11–13] More recent studies have tried to elucidate its role in NRB and FB.[5,9] It has been shown that procedures performed under US guidance can generate comparable results, when compared to fluoroscopy and CT, in terms of injection needle location accuracy,[4,5,8,14] safety, and efficacy,[7,8,15] and superior results in terms of cost and procedure time.[16] However, to date, most studies have focused on the accuracy of needle tip insertion compared to fluoroscopic and CT guided blocks and fewer studies

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have compared clinical outcomes. Moreover, very few studies have reported the outcomes of independent US-guided blocks (i.e., without concomitant use of fluoroscopy).

In this study, the effectiveness of US guided medial nerve (facet) block and lumbar nerve root blocks were assessed in a series of patients complaining from chronic LBP, without or with RCP. The aim of the study was to provide the first clinical evaluation of independent-US guided blocks in Iran.

Materials and methods

Patients

Patients were selected consecutively from those presenting to the neurosurgery clinic of Bam University of Medical Sciences (Bam, Iran) from March 2014 to March 2015. The study was prospective in design and included patients with 1) LBP without or with RCP 2) symptoms attributable to facet pain (pain intensified by extension and rotation, existence of paravertebral tenderness, etc.) or nerve root pain; 3) history of adequate and appropriate medical and physical therapy; 4) no convincing indication for surgical intervention (paresis on physical examination, significant disc protrusion or extrusion on MRI). The exclusion criteria were: 1) allergy to steroids or anesthetics; 2) local infection in the injection route or systemic infection; 3) pregnancy; 4) coagulopathy or anticoagulant drug use; 5) other differential diagnosis of LBP and RLP including tumor, vertebral fracture, spondylolisthesis, spondylosis, osteodiscitis, significant disk protrusion or extrusion.

After explaining all treatment options and the presumptive efficacy of a block, patients' gave their written consent for the injection, block procedure, and further medications. All procedures were performed in accordance with the Ethical Committee of Bam University of Medical Sciences, Iran.

Pain evaluation

The level for block was determined based on history, clinical examination, lumbosacral radiography, and MRI. Pain was quantified prior to the procedure using a Visual Analogue Scale (VAS) on a scale of 0 (no pain) to 10 (worst pain). The patients were seen 1 week after the procedure and monthly thereafter, and a VAS was obtained at the first visit (1 week after procedure). The patients overall pain status (either improvement, getting worse, or no change) at their last follow-up visit was also evaluated and recorded.

Ultrasonography guided localization

Both NRB and FB were performed using the method described by Loizides et al.,[17] which will be described here in brief. In a prone position, interventions were performed using a standard ultrasound machine with a broadband curved (9–14 MHz) probe. The patient was prepared with povidone-iodine (betadine) solution and covered with sterile drapes, and the ultrasound transducer was placed in a sterile sheath.

For NRB, a midline scan was undertaken along the spinous processes to define the typical transition from the 1st sacral (S1) to the 5th lumbar (L5) spinous process. Then, all other levels could be recognized through cephalad counting of the spinous processes (Fig. 1A). The transducer was moved laterally in a paravertebral parasagittal orientation towards the transition from the vertebral arch to the zygapophysial joints, and finally to the transverse processes. The nerve root was visualised as a hypoechoic round structure surrounded by hyperechoic fat and was targeted ventral

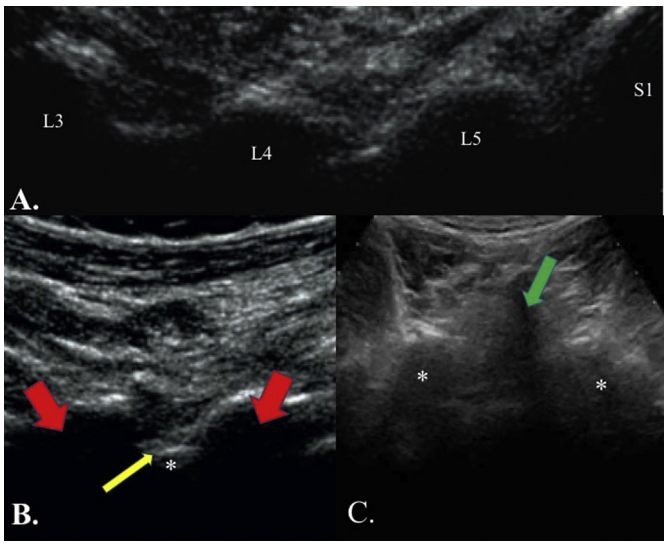

Figure 1. A US view demonstrating structures during nerve root and facet block. A) Determining the correct level through localizing spinous processes with the probe in midline over spinous processes. B) With the probe in midsagittal paravertebral line, the target for NRB (star) is localized beneath a hyperechoic line (intertransverse ligament, yellow arrow) between transverse processed (red arrows). C) View of facet (star) during FB. Spinous process is also seen (green arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

to the intertransverse ligament seen as a thin hyperechoic band between the two adjacent transverse processes (Fig. 1B).

For FB, a midline scan along the spinous processes was performed as previously described for NRB. After the segment of interest was defined, the transducer was rotated axially centering over the according spinous process. Then moving laterally, the respective facet joint was delineated (Fig. 1C).

Ultrasonography guided block

A 20 or 22 G spinal needle was advanced parallel to the long axis of the transducer into the paravertebral muscles under real-time US guidance. The complete needle path was visualized using an in-plane technique. After localization of the target (nerve root for NRB and facet for FB) and confirmation of accurate placement of the needle at the target by US, 40 mg of methylprednisolone (Caspian Tamin Pharmaceutical Co. Rasht, Iran) and 5 mg of bupivacaine (Exir Pharmaceutical Co., Boroujerd, Iran) was injected for each respective target.

All blocks were performed by the senior author (RML), who had received training and had passed the learning curve before starting the study. Assessment of pain and complications (including nerve injury, muscle weakness, drug allergy, etc.) were performed by the senior author during pre- and post-procedure.

Data analysis

All analyses were performed with PASW Statistics (version 18) package (IBM Inc, Armonk, NY). For all analysis, p values less than 0.05 were considered statistically significant.

Results

From March 2014 till August 2015, 24 blocks were performed in 14 patients. There were 9 males and 5 females with a mean age of 33.7 years (range: 23–50 years). The body mass index (BMI) was within normal ranges in all patients (18.5–24.9). Ten patients underwent FBs (8 bilateral and 2 unilateral) and 4 NRBs (2 bilateral

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