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Single Needle Approach for Multiple Medial Branch Blocks: A New Technique

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Abstract:

Background and Objectives: Medial branch blocks are an important tool for the diagnosis of facet joint arthropathy. The most commonly used technique involves multiple needle placements, one for each nerve blocked. This multiple needle technique may require a large amount of local anesthetic for anesthetizing the skin, thereby increasing the rate of false-positive blocks.

Technique: Diagnostic lumbar medial branch blocks are usually performed using multiple needles, one for each branch. The authors describe a different technique using a single needle for all levels. Initially, the needle is directed toward the medial branch located at the level of the affected facet joint in the antero–posterior view. After anesthetizing this nerve with local anesthetic, the same needle is withdrawn to the skin with the tip still in the subcutaneous tissue and repositioned to block the medial branch above, and thereafter below, while continuing to use only the antero–posterior view, thereby using only one entry site.

Conclusions: When performed correctly, the single needle technique provides accuracy similar to the more conventional multiple needle approach during the performance of diagnostic facet joint nerve blocks. Because only one skin entry point is needed, however, this technique may afford several advantages over the multiple needle approach. These may include less patient discomfort, less time required and less radiation exposure since only one C-arm position is used, a smaller volume of local anesthetic, and possibly a lower incidence of false-positive blocks.

Key Words: Diagnostic block—Facet joint—Lumbar zygapophyseal joint—Medial branch.

Low back pain is a significant cause of disability among the adult population. Owing to the myriad of possible different causes, this entity remains one of the most challenging disorders confronting the pain physician. Recently, abnormalities in the lumbar zygapophyseal joints have been identified as a frequent cause of low back pain in select patients, with its prevalence ranging from 15% to 40%.[1] The zygapophyseal joint, better known as the facet joint, is innervated by medial branches emerging from the dorsal rami of the spinal nerves, and the L5 dorsal ramus itself. At each level, this innervation is derived from the dorsal ramus of the adjacent spinal nerve, as well as the medial branches located one level above and perhaps one level below.

Diagnostic medial branch blocks are a widely used method to diagnose facet joint pain.[2,3] These blocks can be performed at lumbar, thoracic, or cervical spinal levels.[4–6] In clinical studies, medial branch blocks and

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intra-articular facet joint injections have been shown to be of equal value as a diagnostic tool for facet joint pain.[7,8] Patients experiencing at least 50% pain relief with diagnostic medial branch blocks may then go on to experience long-term pain relief after radio-frequency (RF) denervation of these nerves.[2,9]

North et al.,[10] however, have shown that diagnostic local anesthetic blocks have a very low specificity. Numerous factors can increase the false-positive rate for medial branch blocks, including the spread of local anesthetic to adjacent structures such as the epidural space, intervertebral foramen, and posterior spinal muscles[2] and the placebo effect.[3] Dreyfuss et al.[2] have shown that, using strict needle placement and injection criteria, the false-positive rate can be dramatically reduced and the specificity significantly increased.

The most commonly used technique for medial branch blocks involves multiple needle placements, one for each nerve anesthetized.[11] This technique may increase the likelihood of a false-positive response for several reasons: the relief of myofascial pain if a large amount of local anesthetic used,[12] the systemic absorption of local anesthetics, and the diffusion of local anesthetic to nearby pain-generating structures.[2] In addition, placing multiple needles can be painful, thereby reducing the ability of the patient to adequately assess the effectiveness of the blocks. In this article we describe a new, "single needle" technique that potentially holds several advantages over the more conventional "multiple needle" approach.

TECHNIQUE

The patient is placed in the prone position, and the lower lumbar area is prepared and draped in standard fashion. When targeting the L4–L5 facet joint, an antero–posterior (AP) fluoroscopic image is obtained visualizing the L3, L4, and L5 transverse processes and L3–L4, L4–5, and L5–S1 facet joints on the affected side. A 25-gauge spinal needle is then bent at its distal ½ inch, at a 20° angle to the shaft to facilitate navigation.[13] This curved needle is inserted into the skin at the most lateral margin of the L5 transverse process (Fig. 1A). Local anesthetic for the skin is administered through the same needle.

Using intermittent fluoroscopic screening in the same AP view, the needle is then directed toward the dorsal medial surface of L5 transverse process to block the L4 medial branch. The target point is below the medial end of its superior border. The needle is advanced using the curved tip until contact with the bone at the target point is achieved (Fig. 1C). Once correct needle placement is confirmed, 0.3 mL of contrast medium is administered to demonstrate envelopment of the targeted nerve without vascular uptake or diffusion into adjacent neural structures (i.e., epidural space and intervertebral foramina). At this point, 0.3 mL of local anesthetic is injected through the needle.[11] The alternate target for L2–L4 medial branches is midway between the upper border of the transverse process and mamillo-accessory ligament.[2]

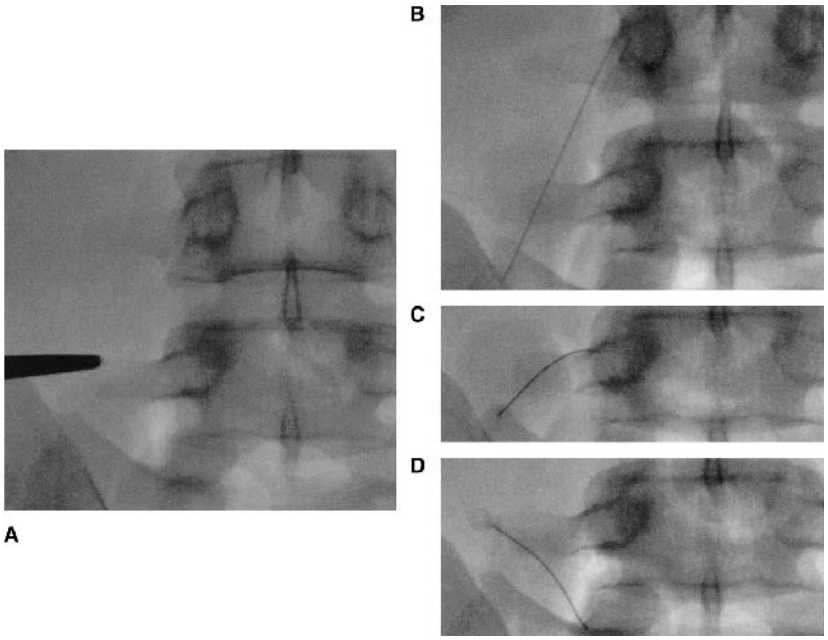

FIG. 1. The technique for the single needle approach (antero–posterior fluoroscopic view): **(A)** Skin entry site; **(B)** target point for L3 medial branch block; **(C)** target point for L4 medial branch block; and **(D)** target point for L5 dorsal ramus block.

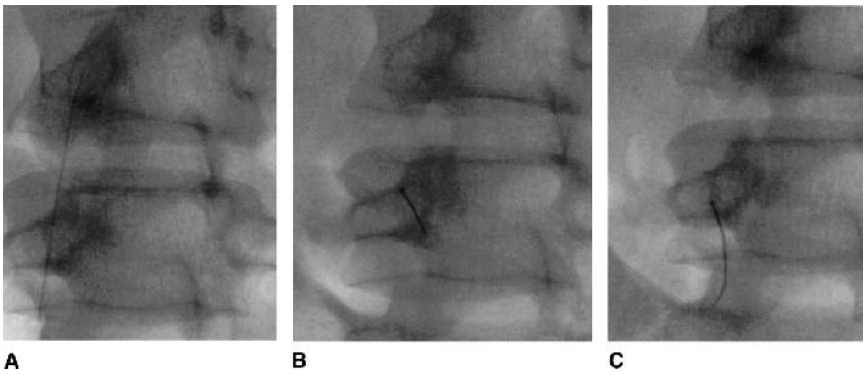

FIG. 2. Optional confirmation of the needle tip placement in oblique fluoroscopic views for: **(A)** L3 medial branch; **(B)** L4 medial branch; and **(C)** L5 dorsal ramus.

After blockade of the L4 dorsal ramus medial branch, the needle is withdrawn close to the skin without exiting it. While continuing to maintain the same intermittent AP view, the needle is navigated toward the L4 transverse process with the target point being the dorsal surface of the L4 transverse process just below the medial end of its superior border (the needle tip may appear more superior at L4 transverse process owing to possible fluoroscopic caudo-cephalad angle). Once contact with the bone is achieved (Fig. 1B), 0.3 mL of contrast medium followed by 0.3 mL of local anesthetic is administered for the blockade of the L3 dorsal ramus medial branch.

The needle is withdrawn close to the skin without exiting it and then directed toward the junction of the superior articular process of sacrum and the superior border of the ala of the sacrum while maintaining the same intermittent AP fluoroscopic view. The needle tip target point is slightly caudal to the superior border of the ala of the sacrum (Fig. 1D).[2] Once contact with the bone is achieved, 0.3 mL of contrast medium followed by 0.3 mL of local anesthetic is administered for the blockade of the L5 dorsal ramus.

To minimize the local anesthetic spread to the epidural space and intervertebral foramen, the caudal rotation of the needle bevel should be maintained during the injection of contrast and local anesthetic at all levels.[2]

After positive confirmatory diagnostic blocks, RF denervation of the lumbar medial branches is performed at a later visit. Since a larger lesion and, hence, greater efficacy is obtained by placing the electrode parallel to the target nerve, the single needle approach should not be used for RF denervation.

CONCLUSIONS

Whereas using multiple cannulae is necessary to obtain optimum positioning of the active electrode tip parallel to the nerve for RF denervation of the medial branches, this is not the case for diagnostic blocks. In the study by Dreyfuss et al.,[2] the authors found that 0.5 mL of contrast medium engulfed the target nerve in all 120 medial branch blocks they performed. In other words, even local anesthetic injected through a needle that is located several millimeters from the target point is likely to reach the targeted medial branch and produce the desired effect. Although most of the published literature on the subject reports using 0.5 mL of local anesthetic to block each targeted nerve, it may be prudent to use smaller amounts of local anesthetic (0.3 mL) to minimize inadvertent spread.[2,11] We advocate the use of contrast medium for confirmation of each nerve block before injecting local anesthetic.

When properly performed, the single needle technique may provide the same diagnostic information about facet joint pain as the multiple needle technique. This technique, however, may be difficult to perform in morbidly obese patients.

At the Massachusetts General Hospital and Walter Reed Army Medical Center Pain Management Centers, we have been routinely using the single needle technique in our clinical practices at both lumbar and cervical levels, covering up to four target points. Initially, we compared each final lumbar needle placement in the AP view with a traditional oblique view. We found very high accuracy of needle placement in comparing these two fluoroscopic views (Figs. 2A–C), obviating the need for oblique views.

Our clinical impression is that the single needle technique produces less discomfort to the patient, is faster to perform, may reduce the rate of false-positive blocks, and can potentially reduce radiation exposure in comparison with the more commonly used multiple needle technique. Future studies are needed to better address the differences between these two technical approaches.

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