

Received: 2019-06-12  
Accepted: 2019-08-29  
Published: 2020-03-30

# **PRE-CONTRAST INJECTION MULTIPLE NEEDLE PLACEMENT TECHNIQUE: AN ALTERNATIVE METHOD FOR PERFORMING CHALLENGING TRANSFORAMINAL EPIDURAL STEROID INJECTIONS FOR RADICULAR PAIN**

Sanjeeva Gupta, MD

**Abstract:** A subpedicular transforaminal epidural steroid injection (TFESI) at the L5-S1 level can be technically challenging due to lumbar spondylosis. As described in the cases below, in challenging cases, placing multiple needles (normally 2 needles, occasionally 3 needles) before injecting the radiocontrast dye can improve the chances of depositing the steroid in the area of pathology responsible for pain. This will, of course, add to the risk of the procedure due to multiple needles being close to the nerve root. On balance, however, it may be less risky than not placing the steroid at the appropriate pathological site, which may fail to provide pain relief leading to unnecessary suffering and, in some cases, surgical intervention. However, if the spread of contrast medium and the subsequent steroid injection through the first needle is satisfactory, then the other needles can be removed without injecting. The “pre-contrast injection multiple needle placement” technique has been used by the author on multiple occasions and 3 cases are described below.

**Key words:** Epidural steroid injection, transforaminal epidural injection, sciatica, radicular pain, multiple needle technique

From: Consultant in Pain Medicine, Bradford Teaching Hospitals NHS Foundation Trust, UK  
Corresponding Author: Sanjeeva Gupta, MD, E-mail: stoppain@btinternet.com  
Conflict of Interest: None Declared

Disclaimer: There was no external funding in the preparation of this manuscript. Conflict of interest: Each author certifies that he or she, or a member of his or her immediate family, has no commercial association (i.e., consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted manuscript.

## BACKGROUND

Radicular pain in the lower limbs due to inflammation/irritation of nerve root/roots due to disc prolapse and/or foraminal stenosis is a common condition for which transforaminal epidural steroid injection is performed with good outcomes (1,2). The most common levels involved are the L5-S1 and the L4-5 levels.

A subpedicular transforaminal epidural steroid injection (TFESI) at the L5-S1 level can be technically challenging due to multiple reasons, including facet joint hypertrophy, bony osteophytes, spondylolisthesis, and iliac crest shadowing the target area, which can limit the degree of obliquity needed to perform the procedure. If contrast medium is injected through a suboptimally placed needle, it will cover the surrounding areas, making it difficult to reposition the needle and forcing us to abandon or use a different, less optimal technique. The "pre-contrast injection multiple needle placement" technique can help overcome such problems (3).

### Case 1

A patient presented with right L5 radicular pain due to L5 nerve root involvement in the L4-5 recess. A 22-gauge spinal needle was placed using the subpedicular technique at the L5-S1 level. As the tip of the needle

was in a suboptimal position (lateral to the pedicle) in the anteroposterior (AP) view, it was thought that the injected contrast medium may not reach the target site and hence a second needle was placed inferiorly aiming to place the tip of the needle medial to the first needle. As the procedure was proving to be technically challenging because of the changes in the area of injection due to lumbar spondylosis, it was decided to place another needle at the L4-5 level using the infraneural/retrodiscal approach (4). Once the needles were in place, contrast medium was injected through the extension tubing attached to the needle with its tip more medial at the L5-S1 level in AP view under continuous fluoroscopy (Figs. 1,2). Although the spread of contrast medium was along the right L5 nerve root and into the epidural space inferiorly, it did not spread into the L4-5 recess, the site of the pathology (Fig. 3). Contrast medium was then injected through the already placed needle at the L4-5 level (infraneural/retrodiscal), which demonstrated adequate spread into the L4-5 recess, the site of the pathology (Fig. 4). Steroid was injected through both of the needles that covered the area of the pathology (5). The first needle, placed at the L5-S1 level with the tip lateral to the pedicle, was removed without injecting anything through it.

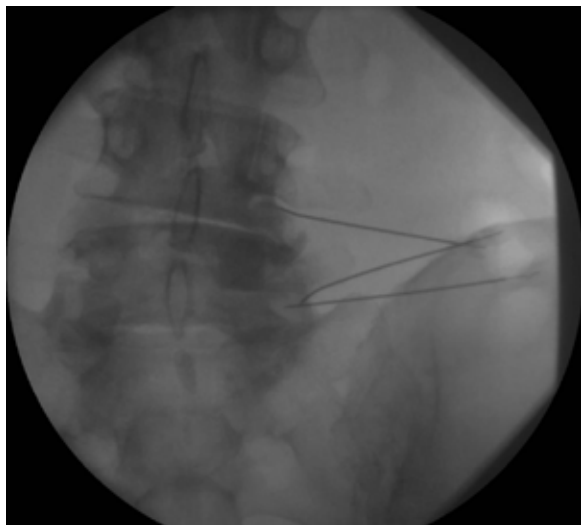


Fig. 1. Needle position in AP view. The tip of the first needle at the right L5-S1 level is just lateral to the L5 pedicle and hence another needle was placed with its tip more medial. A needle was also placed at the right L4-5 level using the infraneural/retrodiscal technique.

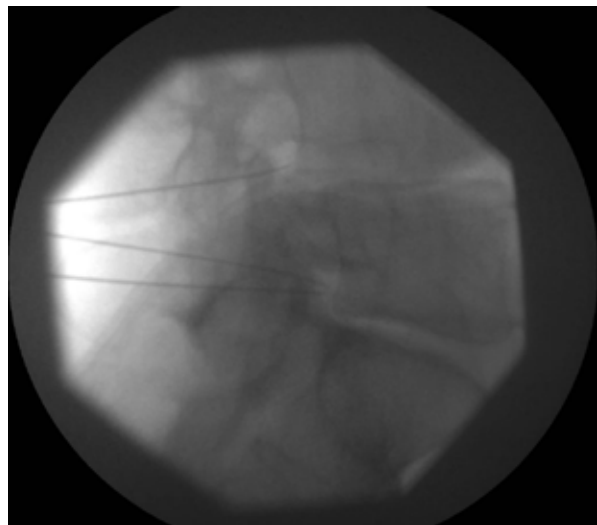


Fig. 2. Lateral view showing the tips of the needle at the L5-S1 and L4-5 levels (infraneural/retrodiscal).

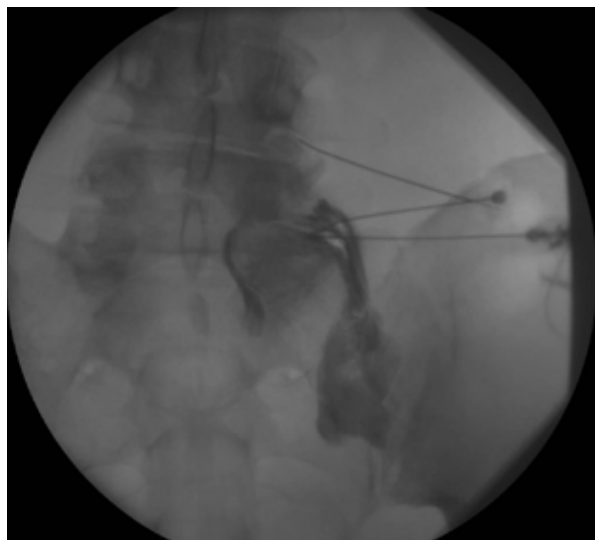


Fig. 3. Contrast medium injected through the needle with its tip medial at the right L5-S1 level shows spread along the L5 nerve root and into the epidural space inferiorly but not into the L4-5 recess, the site of the pathology.

### Case 2

A patient presented with right L5 radicular pain due to L5 nerve root involvement in the L4-5 recess. A 22-gauge spinal needle was placed using the subpedicular technique at the L5-S1 level. As the needle tip was thought to be in a suboptimal position in the AP view, another needle was placed using the infraneural/retrodiscal technique at the L4-5 level. Contrast medium was injected through extension tubing attached to the needle at the L5-S1 level in the AP view under continuous fluoroscopy with adequate spread; hence the needle at the L4-5 level was removed (Figs. 5-7). Had there not been satisfactory spread of contrast medium on injection at the L5-S1 level, injection at the L4-5 level would have been justified to assess the spread and plan further. In my practice, there have been instances when, in patients with a similar presentation as above, the spread of contrast medium was not satisfactory at the L5-S1 level but was satisfactory with injection at the L4-5 level (infraneural/retrodiscal technique). Positioning an extra needle before injecting the contrast medium has helped me inject contrast medium followed by the steroid on many occasions when the spread of contrast medium injected through the first needle was not satisfactory. If contrast medium is injected without placing the second needle, the landmarks that may be needed to place a second needle may be obscured, forcing us to abandon

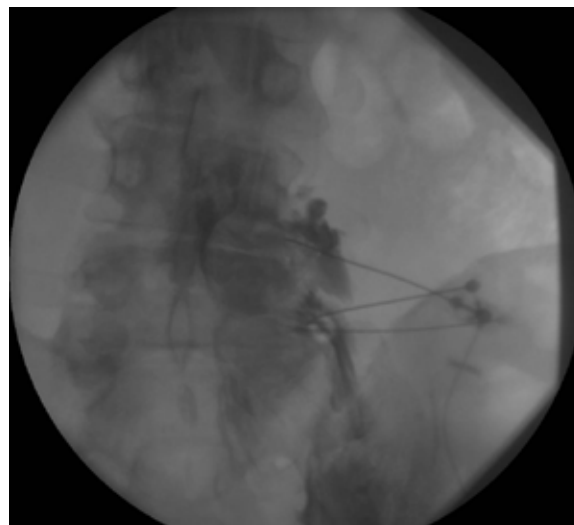


Fig. 4. Contrast medium injected through the needle placed at the right L4-5 level (infraneural/retrodiscal) showing contrast spread into the L4-5 recess, the site of the pathology.

the procedure or to use a suboptimal technique, especially if a patient has tight spinal stenosis or has had lumbar spine surgery in the past.

### Case 3

A patient presented with L5 and S1 nerve root involvement at the L5-S1 level with symptoms in the right L5 and S1 distribution. It was decided to do a TFESI at the L5-S1 level and/or an S1 nerve root block. A 22-gauge needle was placed at the L5-S1 level using the subpedicular technique and another 22-gauge needle was also placed for an S1 root block. On injecting the contrast medium at the L5-S1 level, the contrast spread did not cover the S1 area and hence contrast medium was injected at the S1 level followed by a steroid injection at both levels (Figs. 8-11). The needle at the S1 level would have been removed if the injection at the L5-S1 level had covered the S1 nerve root area.

### DISCUSSION

The target area for a transforaminal epidural at the lumbar levels, especially at the L5-S1 level, can be difficult to access in some patients due to severe lumbar spondylosis. To add to this challenge, anatomical variations in the iliac crest in some patients may limit the degree of obliquity necessary to perform the procedure, which can lead to the tip of the spinal needle being

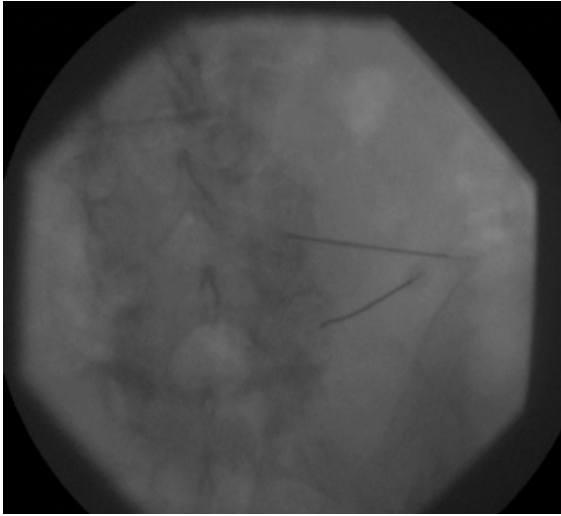


Fig. 5. Elderly patient with significant lumbar spondylosis. Needle placed at the L5-S1 level using a subpedicular technique and another needle placed in the L4-5 infraneural/retrodiscal area.



Fig. 7. On injecting contrast medium through the needle placed at the L5-S1 level, the contrast medium spread into the L4-5 recess, the site of pathology. The needle at L4-5 was removed without injecting anything.



Fig. 6. Lateral view showing the subpedicular needle at the L5-S1 level and the infraneural/retrodiscal needle at the L4-5 level.

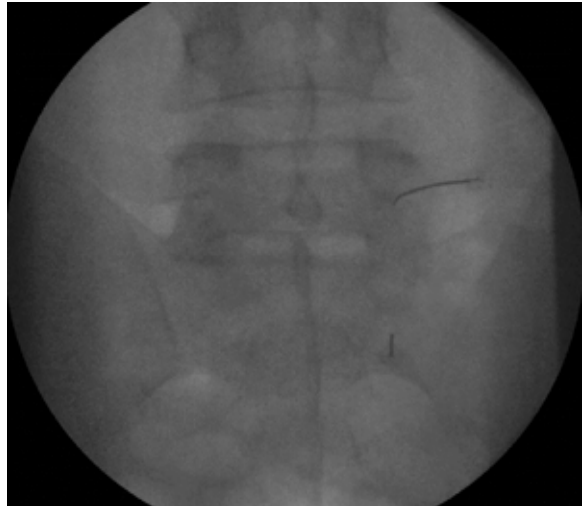


Fig. 8. Anteroposterior view showing the needle placed at the right L5-S1 level using the subpedicular technique and at the S1 level.

placed in a less optimal position. If radiocontrast dye is injected in such situations, and if it does not spread to the target pathological area, it will be difficult/unsafe to reposition the needle or to place another needle at the target site, as this area will be covered with the injected contrast medium. However, if one more (occasionally

2 more) needle is placed at the same level and/or at a higher or lower level before injecting the contrast medium, the likelihood of the contrast medium and then the steroid reaching the target pathological site can increase. Placing 2 or more needles can increase the risks of the procedure, but an incorrectly done procedure

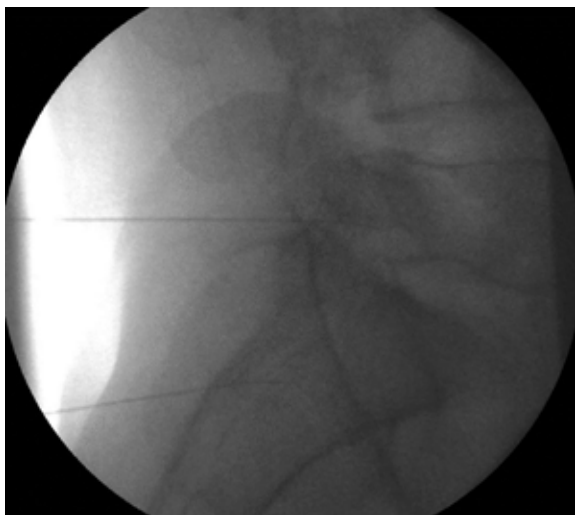


Fig. 9. Lateral view with needles at the L5-S1 level and at the S1 level.

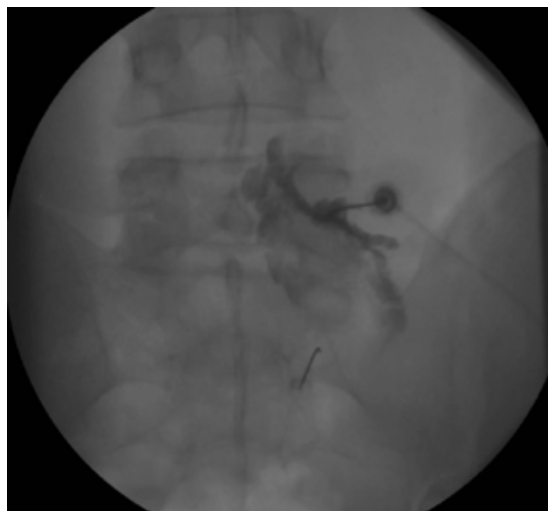


Fig. 10. Contrast medium injected through the needle at the right L5-S1 level covers the L5 nerve root but not the S1 root.

will probably be more harmful to the patient and may lead to opioid escalation with its associated problems and/or to a surgical intervention which could have been avoided. However, if the spread of contrast medium and subsequent steroid injection through the first needle is satisfactory, then the other needles can be removed without injecting.

Careful interpretation of the pre-procedure magnetic resonance imaging (MRI) scan and other available images can help in planning the procedure. The presence of osteophytes or other changes close to the area of the pathology may assist in choosing the most appropriate approach/technique to perform the transforaminal epidural injection.

If the pathology at the L5-S1 level involves both the L5 and the S1 nerve roots, then it would be reasonable to place the spinal needle at the L5-S1 level and at the S1 level before injecting the contrast medium. If, upon injecting contrast at the L5-S1 level, the spread of contrast medium covers both the L5 and the S1 nerve root areas, then the needle placed at the S1 level can be removed. However, placing an extra needle at the S1 level is likely to increase the risks associated with the procedure but the risk is likely to be significantly less if the contrast medium and steroid are not injected through the needle.

The above-described pre-contrast injection multiple

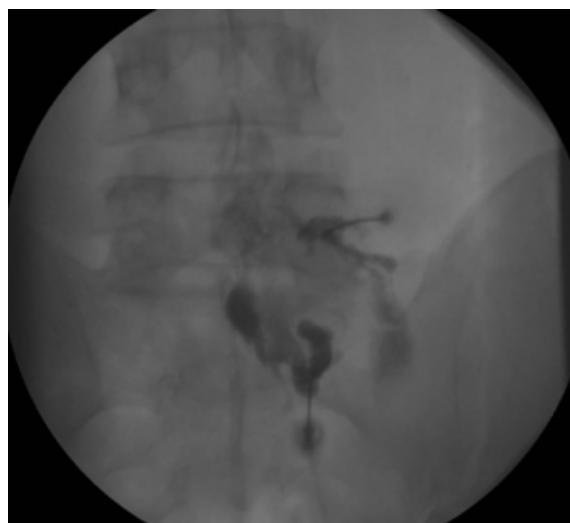


Fig. 11. Contrast medium injected through the needle at the right S1 level covers the area of the S1 nerve root.

needle placement technique can be used at any level of the spine, although, as of the time of this report, I have used this technique at the lower lumbar levels only. The above-described cases are not intended to compare the preganglionic vs postganglionic lumbar transforaminal procedures (6).

## REFERENCES

1. Ghahreman A, Ferch R, Bogduk N. The efficacy of transforaminal injection of steroid for the treatment of lumbar radicular pain. *Pain Med* 2010; 11:1149-1168.
2. Manchikanti L, Buenaventura RM, Manchikanti KM, et al. Effectiveness of therapeutic lumbar transforaminal epidural steroid injections in managing lumbar spinal pain. *Pain Physician* 2012; 15:E199-E245.
3. Gupta S. Double needle technique: An alternative method for performing difficult sacroiliac joint injections. *Pain Physician* 2011; 14:281-284.
4. Won-Joong K, Hwa-Yong S, Seung Hee Y, Hahck Soo P. Comparison of epidural spreading patterns and clinical outcomes of transforaminal epidural steroid injection with high-volume injectate via the subpedicular versus the retrodiscal approach. *Pain Physician* 2018; 21:269-278.
5. Min Cheol C, Dong Gyu L. Outcome of transforaminal epidural steroid injection according to the severity of lumbar foraminal spinal stenosis. *Pain Physician* 2018; 21:67-72.
6. Pairuchvej S, Arirachakaran A, Keorochana G, et al. The short and midterm outcomes of lumbar transforaminal epidural injection with preganglionic and postganglionic approach in lumbosacral radiculopathy: A systematic review and meta-analysis. *Neurosurg Rev* 2018; 41:909-916.