

Epidural Steroid Injection for Lumbosacral Radiculopathy

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Low back pain combined with radicular pain remains as one of the most challenging musculoskeletal problems for its therapeutic management (1). This malady results from nerve root impingement and/or inflammation that causes neurologic symptoms in the distribution of the affected nerve root(s). Conservative treatment, percutaneous spine interventions and surgery have all been used as treatments; and the particular treatment that's chosen depends on the severity of the clinical and neurologic presentation. In 1930, Evans reported that sciatica could be treated by epidural injection. The use of epidural corticosteroid injections for the treatment of axial and radicular back pain was first reported in 1953 (2). Epidural steroid injections are currently used by many medical professionals for the treatment of lumbosacral radiculopathy. Performing "blind" epidural steroid injection lacks target specificity that often results in incorrect delivery of medication to the lesion. Imaging-guided steroid injections are now becoming more popular despite the controversy regarding their efficacy. Many reports, including a few randomized controlled trials, have documented the clinical utility of epidural steroid injections.

There has been confusion in the literature regarding the terminology of a 'proper' epidural steroid injection (2). The term transforaminal epidural injection has been incorrectly referred to as selective epidural injections, selective nerve root blocks or nerve root sleeve injections. Additionally, the interlaminar epidural injections have been referred to the translaminar epidural injections. In our review of the MEDLINE literature, most of the articles entitled epidural steroid injection were concerned with the interlaminar approach. Gajraj (3) recommended that this therapeutic procedure be referred to a transforaminal epidural injection and the diagnostic procedure should be referred to as selective spinal nerve block. The International Spinal Injection Society (ISIS) recommends the utilization of the nomenclature based on the precise anatomic descriptors, i.e., transforaminal and interlaminar for the description of epidural injections.

The epidural space has been accessed inferiorly through

the caudal approach or posteriorly through the interlaminar approach, and often without employing fluoroscopy. The transforaminal technique described by Derby et al. (4) involves positioning of a needle without pain provocation. Both the interlaminar and caudal epidural injections require relatively large volumes of the injectants for delivering steroids to the target site. This has the risk of an extra-epidural and intravascular needle placement. A transforaminal epidural steroid injection (TFESI) using a small volume of local anesthetic will anesthetize the spinal nerve and also partially anesthetize the dura, the posterior longitudinal ligament, the intervertebral disc and the facet joint. For these reasons, fluoroscopy-guided TFESI has become the preferred approach to the epidural space.

Some reports have demonstrated the efficacy of TFESI for the treatment of radiculopathy. When the conventional TFESI technique is employed, a spinal needle is positioned within the "safe triangle" with the bevel below the inferior aspect of the pedicle. A safe triangle is described with the sides corresponding to the horizontal base of the pedicle, the exiting nerve root and the posterolateral border of the vertebral body. In most cases of lumbosacral radiculopathy that are secondary to spinal stenosis or disc herniation, the site of impingement can lie at the level of the supra-adjacent intervertebral disc, which is rostral to the conventional lumbar TFESI bevel position. Lew et al. (5) suggested that because one cannot always guarantee a rostral spread of the injectant to bathe the epidural/preganglionic portion of the nerve root, a preganglionic approach at the level of the supra-adjacent intervertebral disc would be useful as a supplementary injection technique to the conventional TFESI. By utilizing the preganglionic approach to TFESI, the theoretical benefits are placing the injectant closer to the site of neural impingement to create a more effective washout of the related inflammatory disc material. However, their suggestion was not based on a clinical study.

The study by Lee et al. (6) in this issue has clinically assessed the effectiveness of TFESI with using a preganglionic approach for lumbar radiculopathy when the nerve root compression is located at the level of the supra-

adjacent intervertebral disc. This study reflects the responses of 13 patients following the conventional TFESI, and also the responses of 20 patients following the preganglionic TFESI. The conventional group had a success rate of 69.2% (9/13 patients), whereas the preganglionic group had a success rate of 90% (18/20). The difference in the success rates between the two groups was of the borderline significance with a p value of 0.056. The authors addressed some limitations to their study, including that it was a nonrandomized study, it lacked long-term follow-up and there was the possibility that other factors influenced the therapeutic outcome. Despite the limitations, they were able to conclude that the preganglionic TFESI is more effective in managing radiculopathy than was the conventional TFESI. In that study, there was no statistically significant positive impact on the pain reducing benefit from the preganglionic approach. I believe that this statistically borderline significance with performing the nonparametric analysis probably reflects the small sample size when the preganglionic TFESI was compared to the conventional TFESI. Future studies may include a larger patient population to better evaluate the efficacy of preganglionic TFESI for the management of radicular pain from herniated disc and spinal stenosis.

The main advantage of the preganglionic approach over the conventional technique is the accurate delivery of medications to the target site. This requires the use of an imaging-guided transforaminal access to the side at the level of the nerve impingement and a preinjection test, with demonstration of flow of the contrast medium to the target tissue. This often requires changing the direction of the needle for correct placement. The authors of the above study attempted to use a modified approach based on Lew et al's technique. They have done a superb job in comparing the two approaches of TFESI. They should be commended for their efforts in providing the basis for a future prospective study for the treatment of lumbosacral radiculopathy. A future, controlled, prospective study needs to be designed with a consensus opinion on the effective route of administration, the timing of injection, the follow-up periods and the outcome measurement with using both subjective and objective scales. It is hoped that a prospective, clinical trial with this newer approach will define the clinical utility and effectiveness of the preganglionic TFESI.

Is an injection of corticosteroid into the epidural space an effective means of controlling subjective complaints and improving objective measures? In the literature, the efficacy of lumbar epidural injections for radicular pain lasts for less than 3 months (7). Ridley et al. (8) reported that the therapeutic benefits disappeared within 6 months

of the treatment. However, Lutz et al. (9) reported the therapeutic long-term effects (75.4%) of TFESI at an average follow-up of 20 months. How does epidural steroid injection compare with the other forms of non-surgical or surgical management? Several studies have suggested that TFESI is effective in treating radicular pain. A randomized trial of TFESI should compare alternative therapies, including conservative treatment, surgical decompression or the interlaminar steroid injection approach. Thomas et al. (10) have reported that TFESI showed significantly better results on days 6 and 30 and at 6 months as compared with the blindly performed interlaminar approach. Manchikanti et al. (11) found that transforaminal injections were the most effective with the least expense when compared with blind interlaminar injection and the caudal approach under fluoroscopy. There is controversy as to the ability of epidural steroid injection to reduce the need for an operation in the patients suffering with radicular pain (12). However, a temporary response to TFESI may predict a favorable surgical outcome (4).

Epidural steroid injections and selective nerve root blocks have been used for spinal pain management for many years. A major criticism of most of the early studies done on epidural steroid efficacy is their use of "blind" approaches and therefore, their lack of target specificity. Even in experienced hands, blind epidural injections result in incorrect placement of the injectant in up to 30% of the cases. The newer minimally invasive, imaging guided percutaneous techniques with fluoroscopy or computed tomography have recently been added to the list of available treatment options for spinal pain. Imaging-guided injections are more likely to place medication at the exact target, which yields diagnostic feedback and maximizes the therapeutic effects. Therefore, these newer technique are gaining popularity despite the controversy regarding their effectiveness.

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