Guidelines for the performance of fusion procedures for degenerative disease of the lumbar spine.
Part 13: injection therapies, low-back pain, and lumbar fusion

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**Therapeutic Recommendations**

**Standards.** Facet injections are not recommended as long-term treatment for chronic low-back pain.

**Guidelines.** There is insufficient evidence to recommend a treatment guideline.

**Options.** The use of lumbar epidural injections or TPIs is not recommended as a treatment option for long-term relief of chronic low-back pain. The use of lumbar epidural injections, facet injections, or TPIs is recommended as a treatment option to provide temporary, symptomatic relief in selected patients with chronic low-back pain.

**Diagnostic Recommendations**

**Standards.** There is insufficient evidence to recommend a diagnostic standard.

**Guidelines.** There is insufficient evidence to recommend a diagnostic guideline.

**Options.** The use of lumbar facet injections is recommended as a diagnostic tool for predicting the response to lumbar fusion surgery.

**Rationale**

Several injection techniques, using an anesthetic agent, typically in combination with another agent such as a steroid, are used in the treatment of patients with chronic low-back pain due to degenerative disease of the lumbar spine. An analysis of the literature regarding these treatments was performed in an attempt to answer three questions:

1. Are lumbar ESIs effective for improving the outcomes of patients with chronic low-back pain resulting from degenerative disease of the lumbar spine? 2. Are lumbar facet injections effective for improving the outcomes of patients with chronic low-back pain resulting from degenerative disease of the lumbar spine? 3. Are lumbar TPIs effective for improving the outcomes of patients with chronic low-back pain resulting from degenerative disease of the lumbar spine?

**Search Criteria**

A computerized search of the database of the National Library of Medicine was conducted for the period of 1996 to July 2003 using the terms “epidural steroid injections or blocks,” “caudal injections or blocks,” “selective nerve root

**Abbreviations used in this paper:** ESI = epidural steroid injection; MPQ = McGill Pain Questionnaire; ODI = Oswestry Disability Index; RCT = randomized controlled trial; RF = radiofrequency; ROM = range of motion; TP = trigger point; TPI = TP injection; VAS = visual analog scale.

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injections or blocks," “transforaminal injections or blocks," "facet injections or blocks," “median nerve blocks," and "trigger point injections." The search was limited to publications in the English language. Review papers were also a source of references and any new titles identified were added to the search results yielding a total of 1486 papers. Papers not concerned with lumbar ESIs, lumbar facet injections, or lumbar TPIs were discarded. Papers restricted to the evaluation of the role of injections for the management of radiculopathy or acute back pain were also rejected. Fifty papers were identified as providing relevant medical evidence concerning the use of lumbar ESIs, 48 papers for lumbar facet injections, and 17 papers for lumbar TPIs. All papers providing Class II or better evidence and selected papers providing Class III evidence regarding the use of injections in the treatment of chronic low-back pain are recorded by injection type in Tables 1 to 3. Significant supportive data from Class III studies and review articles are provided by the references listed in the bibliography.

Scientific Foundation

The Use of Lumbar ESIs (Epidural Injections, Caudal Injections, Transforaminal Injections) in the Treatment of Chronic Low-Back Pain due to Degenerative Disease of the Lumbar Spine

Epidural injections have been used for the treatment of spinal disorders for more than 50 years.8,33,35,69 One encounters several difficulties when interpreting the literature regarding the use of these techniques for the treatment of chronic (here defined as > 3 months) low-back pain. Recent studies have indicated that the application of ESIs without radiographic confirmation is associated with a needle malposition rate as high as 40%.73,32,31,32 Because needle malposition may be responsible for treatment failure and because the needle malposition rate in studies performed without confirmatory fluoroscopic imaging are not known, the results of such studies must be interpreted with caution.20,27,31,69,71 In most reports published before 2000 fluoroscopic imaging and contrast administration to confirm needle placement were not consistently used.

Another difficulty encountered in the literature is related to mixed patient populations. Many studies mixed patients with primary radicular complaints with patients who had primary low-back pain complaints.8,33,35,39,69,85,71 There are several randomized studies that report beneficial effects of ESI on radicular complaints.21,54,69 The use of ESIs in the treatment of acute low-back pain (rather than radiculopathy) has not been subjected to the same scientific scrutiny. The results of several of these studies do not support ESIs for the treatment of acute low-back pain alone.33,35,39,36,68 The ability to discern the effect of ESI on acute low-back pain is confounded by the inclusion of patients with radiculopathy. It is generally not possible to separate out the treatment effect of ESI on the two conditions because of the manner in which the data are presented.

Nelemans and colleagues37,46 published a Cochrane Review regarding the use of injection therapy for subacute and chronic benign low-back pain. In their review the authors cite nine randomized clinical trials in which ESIs in the treatment of chronic low-back pain were investigat-
### TABLE 1

**Epidural steroid injections and chronic lower-back pain**

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>Class</th>
<th>Description</th>
<th>Comment</th>
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<tr>
<td>Breivik, et al., 1976</td>
<td>II</td>
<td>35 patients w/ incapacitating back pain randomized to 20 ml bupivacaine w/ 80 mg steroid or 100 ml saline. Up to 3 injections. Outcome measures were subjective pain relief &amp; change in physical exam at multiple levels up to 6 mos after last injection.</td>
<td>No significant short-term differences btwn the 2 groups.</td>
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<tr>
<td>Dallas, et al., 1987</td>
<td>II</td>
<td>Randomized controlled cross-over study w/ 20 patients. All received 80 mg methylprednisolone, 10 also received saline &amp; 10 morphine w/ cross-over &amp; repeat treatment in 6 wks. Outcomes were VAS &amp; change in physical exam at multiple levels up to 6 mos after last injection.</td>
<td>No significant differences in treatment groups except for morphine at 6 wks only.</td>
</tr>
<tr>
<td>Rocco, et al., 1989</td>
<td>II</td>
<td>22 patients w/ postlaminectomy syndrome received 50 mg lidocaine epidurally &amp; were randomized to 1 of 3 groups: 75 mg triamcinolone, 8 mg morphine, or both. Outcome measures were subjective pain evaluation, &amp; functional impairment up to 6 mos after injection.</td>
<td>No group had effective pain relief beyond 1 mo after last injection. Study terminated due to ventilatory depression in morphine group.</td>
</tr>
<tr>
<td>Serrao, et al., 1992</td>
<td>II</td>
<td>The therapeutic effects of epidural methylprednisolone (80 mg) were compared w/ intrathecal midazolam (2 mg). 28 patients randomized to 1 of these 2 groups in the double-blind study. Outcome measures were the MPQ, VAS, &amp; analgesic administration before, at 2 wks, &amp; at 2 mos.</td>
<td>50–75% of patients in both groups improved at 2 mos in 1 of 3 primary outcome measures. The ESI groups taking at least as much analgesic mediation as prior to the study.</td>
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### TABLE 2

**Lumbar facet injections**

<table>
<thead>
<tr>
<th>Authors &amp; Year</th>
<th>Class</th>
<th>Description</th>
<th>Comment</th>
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<tr>
<td>Jackson, et al., 1988</td>
<td>II</td>
<td>390 patients w/ low-back pain received facet injections &amp; completed a treatment protocol. 127 variables were analyzed. No facet syndrome as such could be identified &amp; facet joints were not thought to be a common or single source of back pain in &gt;90% of patients.</td>
<td>Facet injections as treatment in 390 patients did not reveal evidence for a facet syndrome or for the facet joint as an important source of back pain in the majority of patients.</td>
</tr>
<tr>
<td>Lilius, et al., 1990</td>
<td>II</td>
<td>109 patients were randomly assigned to 1 of 3 groups: Group 1, intrafacet injections of steroid &amp; anesthetic; Group 2, pericapsular injections of steroid &amp; anesthetic; &amp; Group 3, pericapsular injection of saline as a control. Outcomes measures were subjective pain scale, work, &amp; disability income. Signs of inappropriate behavior prior to injection were best predictor of outcomes &amp; no difference in overall outcomes among the 3 groups.</td>
<td>Facet injections are a nonspecific form of treatment for low-back pain &amp; good results depend on a tendency toward spontaneous regression of back pain &amp; on psychosocial aspects of back pain.</td>
</tr>
<tr>
<td>Carette, et al., 1991</td>
<td>II</td>
<td>91 patients w/ chronic pain who responded to injections in the facet joints w/ a diminution in pain were randomized to injection w/ steroid or injection w/ saline control. No difference in outcome measures at 1 &amp; 3 mos btwn the 2 groups &amp; no difference in sustained improvement from Mo 1 to Mo 6.</td>
<td>Injection of methylprednisolone into the facet joints is of little treatment value.</td>
</tr>
<tr>
<td>Marks, et al., 1992</td>
<td>II</td>
<td>86 patients w/ chronic low-back pain were randomized to a facet block–only w/ anesthetic or intraarticular injection w/ steroid &amp; anesthetic. Immediate response was same for both groups; steroid group was marginally better in a pain measure at 1 mo (p &lt; 0.05), &amp; by 3 mos only 2 patients reported any pain relief.</td>
<td>Facet blocks or intraarticular injections w/ anesthetic &amp; steroid were equally good diagnostically. Both were equally unsatisfactory treatment for chronic back pain.</td>
</tr>
<tr>
<td>Gallagher, et al., 1994</td>
<td>II</td>
<td>Prospective RCT of 41 patients by involving VAS &amp; MPQ. Patients had chronic back pain &amp; were selected by positive response to diagnostic facet injections. Patients receiving RF ablation were statistically superior to a placebo control at 1 &amp; 6 mos.</td>
<td>In patients selected by response to diagnostic facet injections, those w/ RF ablation had better outcomes at 1 &amp; 6 mos vs placebo control.</td>
</tr>
<tr>
<td>Van Kleef, et al., 1999</td>
<td>I</td>
<td>Prospective RCT double blind of 31 patients w/ ≥1 yr of low-back pain &amp; positive response to facet blocks were placed in an RF group or sham control. Outcome measurements were VAS, perceived improvement, narcotics usage, &amp; ODI. Differences in outcomes were statistically improved in the treatment group at 3, 6, &amp; 12 mos.</td>
<td>In patients selected by response to diagnostic facet injections, those w/ RF ablation had superior outcomes at 3, 6, &amp; 12 mos vs sham control.</td>
</tr>
<tr>
<td>Leclaire, et al., 2001</td>
<td>I</td>
<td>Prospective double-blind RCT of 70 patients w/ back pain for &gt;3 mos. All responded to facet blocks &amp; randomized to an RF ablation group or a sham control group. Outcome measures were ODI &amp; Roland-Morris instruments along w/ VAS. At 4 wks no difference in VAS or ODI scores &amp; at 12 wks no difference btwn the 2 groups on any outcome measures.</td>
<td>In patients selected by response to diagnostic facet injections, no difference in outcome measures at 4 &amp; 12 wks.</td>
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months after treatment. One treatment group received an epidural injection of 80 mg prednisolone in 10 ml saline along with 3 ml 5% dextrose delivered with an intrathecal injection. The second treatment group received an epidural injection of 10 ml normal saline epidurally and an intrathecal injection of 2 mg midazolam in 3 ml dextrose. Both groups noted significant pain improvement reflected on the primary outcome measures at 2 weeks. The midazolam group was found to use less oral pain medication at 2 months. No significant improvement over baseline was noted at 2 months for either group, although approximately half of the patients in each group reported that they were improved. This paper provides Class III medical evidence that ESIs and intrathecal midazolam injections are an effective short-term treatment for low-back pain. It also provides Class III evidence that such injections do not provide lasting pain relief (beyond 2 weeks). Evidentiary Table 1 summarizes the literature regarding ESIs.

Use of Lumbar Facet Injections for Chronic Low-Back Pain From Degenerative Disease of the Lumbar Spine

Injections of the facet joints (zygapophysial joints) in the lumbar spine are performed for the diagnosis and treatment of chronic low-back pain. A “facet joint syndrome" was described by Ghormley23 in 1933. The diagnostic criteria and anatomical basis for this chronic low-back pain syndrome have not been precisely defined, and the existence of such a syndrome has been debated.2,5,15–17,27,29,37,40,42,60 Authors have suggested that older age, relief of back pain with recumbency, exacerbation of pain on extension but not flexion, localized tenderness on palpation over a facet, radiological changes of degeneration at facet joints, and the lack of leg pain, muscle spasm, or pain with valsalva are all indicators of facet-related low-back pain.29,37,52

Schwarzer, et al.46 published a prospective study in which clinical signs thought to be indicative of a lumbar facet syndrome were investigated by performing selective facet injections. A double-injection technique was used with administration of a short- and a long-lasting anesthetic on separate occasions in each patient. A patient was not thought to have true zygapophysial joint pain unless there was a positive response (relief of pain with both injections for a period of time consistent with the anesthetic used). One-hundred seventy-six consecutive patients with low-back pain were studied. A history and physical examination were obtained in each patient prior to injection. The VAS was used to measure the response to the injections. A threshold of greater than 50% improvement was considered significant. Of the 176 patients injected with bupivacaine, 83 (47%) responded to the injections but only 26 (15%) reported a 50% or greater relief of back pain. Confirmatory blocks were performed in 71 of these 83 patients with bupivacaine (the remaining 12 patients were dropped from the study for a variety of reasons). Of the patients who received both injections, only seven (4% of the original sample) achieved relief of back pain with both blocks. There was no statistically significant association between response to any or both blocks and any single finding on history or physical examination. Finally, combinations of clinical features were assessed by logistical regression analysis and no model could be generated that would dis-
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criminate between patients who responded to the blocks and those who did not. This findings were true even when applied to only the 4% of patients who responded to both blocks. The one definitive finding in the study was that no patient with midline back pain responded to either facet block. The authors concluded that the facet joint is an important contributor to low-back pain in a small minority of patients.

Despite the controversy regarding the existence of facet-related low-back pain, the clinical use of facet injections in the treatment of chronic low-back pain remains common. Facet injections are used for both diagnostic purposes and as a treatment. Several authors have investigated the effectiveness of facet blocks as a diagnostic tool to predict the outcome of subsequent RF facet rhizotomy (RF ablation) and/or lumbar spinal fusion.

A prospective, double-blind RCT on this topic was reported by Gallagher, et al. In their study, 60 patients underwent diagnostic facet joint injections. Forty-one patients reported either a strongly positive response or an equivocal response. These 41 patients were randomized to receive an injection of local anesthetic (placebo) or injection of anesthetic plus RF ablation. Outcomes were assessed with the MPQ and the VAS at 1 and 6 months following injection or ablation. Patients who had a strongly positive response to the initial injection and were randomized to the ablation group did better on both outcome measures at both time points compared with similar patients in the placebo group. There was no positive effect of RF ablation in patients with an equivocal response to the initial injection. In fact, patients with an equivocal response to the initial injection did worse with RF ablation than similar patients treated with placebo. The magnitude of this difference is identical to the magnitude of the beneficial effect enjoyed by the strong response/RF ablation group; however, it does not reach statistical significance due to very small group sizes. This study provides Class I medical evidence supporting the ability of a strongly positive response to a diagnostic facet injection to predict outcome following lumbar fusion. Furthermore, no extensive statistical analysis failed to demonstrate any correlations were found between a successful facet block and the results of any of the conservative care measures.

North, et al. retropsectively studied their patients with lumbar facet blocks and RF denervation. An outside observer assessed outcomes in 82 patients with a mean follow-up time of 3.2 years. Of the 82 patients in their review, 42 had positive diagnostic facet block with greater than a 50% reduction in back pain. These patients were treated with RF ablation. Of these, 45% reported at least 50% relief of pain on a VAS at last follow up. Of the 40 patients in whom pain relief failed from facet injections and thus did not undergo ablation after facet block, 13% improved at least 50% at last follow up. This retrospective study provides Class III medical evidence supporting the use of RF ablation of facets in patients with chronic low-back pain selected by diagnostic facet injections.

Other authors have assessed the value of facet blocks for predicting outcome following lumbar fusion. Esses and Moro retrospectively studied a cohort of 296 patients who underwent diagnostic facet blocks between 1980 and 1989 to investigate the source of their chronic back pain. Of these 296 patients, 126 could be contacted and responded to a questionnaire. Patients were classified into groups: those who had undergone lumbar spinal fusion and those who had continued with nonsurgical care. An extensive statistical analysis failed to demonstrate any correlation between a successful facet block and the results of subsequent lumbar spinal fusion. Furthermore, no correlations were found between a successful facet block and the results of any of the conservative care measures the nonoperative patients received. This paper provides
Class III medical evidence indicating that facet joint injections should not be used as a diagnostic tool to determine the need for or potential benefit of lumbar spinal fusion. Jackson\(^2\) studied a group of 31 patients who were treated with attempted lumbar spinal fusion after facet injections. Twenty-one of the patients responded favorably to the diagnostic injections and 10 did not. As a group, all 31 patients had significantly improved on pain and function scores after the surgery, but there was no difference in outcome between the 26 patients who responded to the facet injections and the 10 who did not. Jackson concluded that facet injections were not predictive of outcome following lumbar spinal fusion for back pain. This paper also provides Class III medical evidence indicating that facet injections are not useful for predicting outcome following attempted lumbar spinal fusion surgery.

Lovely and Rastogi\(^3\) evaluated 91 patients with chronic back pain lasting for more than 6 months. All had been treated with at least 3 months of aggressive conservative care and who reportedly were improved with a subsequent trial of lumbar bracing. All 91 patients underwent facet blocks with marcaine. A positive response was defined as relief of pain greater than 70% at 6 hours after injection. Blocks were repeated, and to be considered a surgical candidate, a patient had to respond to a block with greater than 70% pain relief on three separate occasions. Twenty-eight patients with a mean duration of 6.1 years of back pain were ultimately selected for lumbar spinal fusion. Pain relief following surgery in these 28 patients was measured by patient satisfaction score and functional improvement was determined with the use of the Prolo functional outcome score. A successful fusion was achieved in 23 of 28 patients, of whom 95% rated their results as good or excellent. The five patients with pseudarthrosis all had a poor outcome by their own estimates and Prolo scores. This study did not include an appropriate control group and therefore provides Class III medical evidence supporting the use of facet injections as a diagnostic tool to predict outcome following successful lumbar fusion surgery.

Several authors have investigated facet injections as a treatment for chronic low-back pain.\(^9,30,38,43\) Jackson, et al.,\(^3\) performed facet injections in 454 patients with low-back pain thought to originate in the facet joint. Three hundred ninety patients completed a protocol in which 127 clinical variables were studied. After analysis of all of these variables, the authors were unable to identify a clinical facet syndrome. They concluded that the facet joints were not the primary source of back pain in the great majority of patients studied (> 90%). Only 30 (7.7%) of the patients selected for injection based on clinical criteria had complete relief of their symptoms (assessed within 4 hours of injection). This compares with 22 (5%) similarly selected patients whose symptoms were made worse with injection. This report provides Class III medical evidence that facet injections are not an effective treatment for patients with low-back pain, even if the patients fulfill clinical criteria for a "facet syndrome." Lilius, et al.,\(^3\) reported their results in 109 patients with unilateral low-back pain (mean duration 13.4 months) who they randomly assigned to one of two groups. Group I received a facet injection of methylprednisolone into the same joints, and Group II received an injection of saline into the same joints. These patients were followed for 6 months with pain VAS scores, measures of back mobility and function, and the MPQ. After 1 month and 3 months, none of the outcome measures differed between the two groups. At 6 months, the steroid group reported more improvement but also had undergone more concurrent interventions. There was no statistical difference between the two groups from the 1st to the 6th month. This paper provides Class I medical evidence that injection of steroids into the facet joint is not an effective treatment for low-back pain, even among patients selected based on a prior favorable response to an anesthetic facet joint injection. Marks, et al.,\(^4\) randomized 84 patients with refractory back pain into either a facet block group with anesthetic only or a group treated with anesthetic and a steroid injection into the facet. There was no difference in the immediate response to the injection and at 1 month the steroid group had a marginally improved response to the injection as measured by a VAS. By 3 months, however, only two patients continued to experience any relief. The authors concluded that neither injection with steroid and anesthetic nor anesthetic alone was a satisfactory treatment for chronic back pain. Evidentiary Table 2 summarizes the reviewed literature on facet joint injections.

The Use of Local Lumbar Injections (TPIs) in the Treatment of Chronic Low-Back Pain due to Degenerative Disease of the Lumbar Spine

The existence of myofascial TPs as a source of low-back pain has been studied by Simons and Travell.\(^63,66\) According to these authors, an active myofascial TP is diagnosed by focal tenderness on palpation, by a restricted stretch ROM, and by a local twitch response on needle stimulation. These authors have stated that treatment by TPI can result in long-term relief of low-back pain, but "only if mechanical and systemic perpetuating factors are corrected."\(^74\) Many reviews of the conservative treatment of chronic low-back pain reference TPIs as a potential treatment modality, with varying degrees of enthusiasm.\(^1,14,19,39,44,62,70\) Five RCTs in which TPIs were investigated as treatment for low-back pain were identified.\(^11,22,25,50,67\)
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Hameroff, et al.,\textsuperscript{25} randomized 15 patients into three TPI groups in a double-blind fashion. Group 1 received bupivacaine, Group 2 received etidocaine, and Group 3 received a saline control injection. A subjective assessment of pain in six categories was used as the outcome measure and was obtained 15 minutes, 24 hours, and 7 days after injection. Trigger point injections with an anesthetic were more effective for pain relief than the control injection of saline. Sorne, et al.,\textsuperscript{26} prospectively investigated 30 patients with back pain of at least 1 month’s duration and randomized them into two treatment groups in a double-blind fashion. Group I received an injection of methylprednisolone with lignocaine and Group II received an injection of isotonic saline. Outcome measures were a VAS, spinal ROM, and patient self-assessment. Significant decreases in VAS scores and patients’ self-assessed level of pain were reported in the steroid and anesthetic group only. There was no change in spinal ROM in either group. Garvey, et al.,\textsuperscript{27} performed a prospective, randomized, double-blind evaluation of 63 patients with low-back pain who had been treated conservatively for at least 4 weeks without improvement. Patients were randomized into one of four groups. Patients in Group I were treated with a TPI with lidocaine, those in Group II were treated with a TPI with lidocaine and a steroid, patients in Group III were treated with dry needling of the TP, and those in Group IV were treated with acupressure and vapocoolant spray. Sixty-three percent of the patients reported a decrease in pain based on a VAS with dry needling compared with 42% with a drug injection, a difference that was not statistically significant (p < 0.09). The authors concluded that TPIs appear to have some value in treating low-back pain, but that injection of a drug is not necessarily a component of that treatment. Finally, Collee, et al.,\textsuperscript{11} randomly injected 41 patients with either 0.5% lignocaine or an equivalent amount of saline as a control in a 2-week-long study. Patients and treating doctors were blinded as to treatment. Outcome measures were a pain score and a pain-intensity score (VAS) administered 2 weeks following the procedure. Fifty-two percent of the patients in the lignocaine group were improved at 2 weeks compared with 30% of the patients treated with saline (p < 0.05). A subgroup analysis revealed that these effects were identified in patients treated by a rheumatology group but not in patients treated by a family practice group. These studies on TPIs were all performed in patients with the relatively acute onset of low-back pain who were selected based on the presence of TPs and who were assessed shortly after injection. As such, they provide only Class III medical evidence suggesting that TPIs may be an effective short-term treatment for selected patients with low-back pain. Evidentiary Table 3 summarizes the reviewed literature on TPIs.

Summary

In summary, there is no meaningful evidence in the medical literature that the use of epidural injections is of any long-term value in the treatment of patients with chronic low-back pain. The literature does indicate that the use of lumbar epidural injections can provide short-term relief in selected patients with chronic low-back pain.

There is evidence that suggests that facet joint injections can be used to predict outcome after RF ablation of a facet joint. The predictive ability of facet joint injections does not appear to apply to lumbar fusion surgery. No evidence exists to support the effectiveness of facet injections in the treatment of patients with chronic low-back pain. There is conflicting evidence suggesting that the use of local TPIs can be effective for the short-term relief of low-back pain. There are no data to suggest that TPIs with either steroids or anesthetics alone provide lasting benefit for patients suffering from chronic low-back pain.

Key Directions for Future Research

The effectiveness of ESIs for the treatment of chronic back pain should be addressed through a randomized clinical trial comparing the clinically most common injection technique using steroids combined with anesthetic to an appropriate control group. Given the positive effect noted in the TP studies with needle stimulation, needle placement alone may be a viable control group.

The diagnostic utility of facet injections in predicting therapeutic outcomes for RF ablation appears promising. The lack of a predictive effect for lumbar fusion surgery is problematic. The relationship between RF and lumbar fusion surgery in terms of mechanism of pain relief represents a fertile field for further clinical and basic science research.

The fact that needle placement alone provides a beneficial effect in some patients treated with TPIs is fascinating. Further research into the mechanism of pain relief in these patients is warranted.

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