

Lumbar Transforaminal Epidural Steroid Injections

Review & Recommendation Statement

Evidentiary Tables

January 2013



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Review and Recommendation Statement: Evidence Work Group

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What are the prognostic indicators that predict which patients are likely to benefit from lumbar transforaminal epidural steroid injections (TFESI)?

Article (Alpha by Author)	Level of evidence	Description of study	Conclusion
Choi, S.J., et al., The use of magnetic resonance imaging to predict the clinical outcome of non-surgical treatment for lumbar intervertebral disc herniation. Korean J Radiol, 2007. 8(2): p. 156-63.	Level III Type of evidence prognostic	<input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective Study design: case control Stated objective of study: We wanted to investigate the relationship between the magnetic resonance (MR) findings and the clinical outcome after treatment with nonsurgical transforaminal epidural steroid injections (TFESI) for lumbar herniated intervertebral disc (HIVD) patients. Type of treatment(s): TFESI with triamcinolone 40 mg + 0.5% marcaine Total number of patients: 91 Number of patients in relevant subgroup(s): 91 Consecutively assigned? Yes Duration of follow-up: mean 2.7 months (range: 7 days -22 months) Validated outcome measures used (list): Five grade patient satisfaction, Numeric Rating Scale (NRS) Nonvalidated outcome measures used (list): Diagnosis made by: <input checked="" type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input checked="" type="checkbox"/> MRI <input checked="" type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input type="checkbox"/> Other:	<i>Critique of methodology:</i> <input type="checkbox"/> Nonconsecutive patients <input type="checkbox"/> Nonrandomized <input type="checkbox"/> Nonmasked reviewers <input type="checkbox"/> Nonmasked patients <input type="checkbox"/> No validated outcome measures used <input type="checkbox"/> Small sample size <input checked="" type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other: <i>Work group conclusions</i> Potential Level: III Downgraded Level: III <i>Conclusions relative to question</i> This paper provides evidence that: Many factors do not predict outcome with LTFESI such as presence of stenosis, size of HIVD, type of HIVD, hydration of HIVD. Unsatisfactory results were statistically more likely in subjects that had higher grade herniation (displacement and entrapment of nerve root rather than abutment) and subarticular location of disc herniation.

		<p>Results/subgroup analysis (relevant to question): Twenty-seven patients showed unsatisfactory results, and they had an average follow-up period of 2.7 months (range: 7 days - 22 months). These patients were comprised of 12 men and 15 women with a mean age of 41 years (range: 20-67 years). Of these 27 patients, 14 underwent subsequent surgical treatment with an average follow-up period of 1.67 months (range: 7 days - 9 months) after the injections. There was no significant difference between the responders and nonresponders in terms of the type, hydration and size of the HIVD, or an association with spinal stenosis ($p > 0.05$). However, the location of the HIVD and the grade of nerve root compression were different between the two groups ($p < 0.05$).</p> <p>Author conclusions (relative to question): There was no significant difference between the responders and nonresponders in terms of the type, hydration and size of the HIVD, or an association with spinal stenosis ($p > 0.05$). However, the location of the HIVD and the grade of nerve root compression were different between the two groups ($p < 0.05$).</p>	
<p>Cooper, G., et al., Effectiveness of transforaminal epidural steroid injections in patients with degenerative lumbar scoliotic stenosis and radiculopathy. Pain Physician, 2004, 7(3): p. 311-7.</p>	<p>Level IV</p> <p>Type of evidence prognostic</p>	<p><input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective</p> <p>Study design: case series</p> <p>Stated objective of study: To evaluate the effectiveness of TFESI for patients with degenerative lumbar scoliotic stenosis and radiculopathy.</p> <p>Type of treatment(s): TFESI (mean 1.3 TFESI/patient) with 80 mg of triamcinolone + 1.5 cc of 2% lidocaine</p> <p>Total number of patients: 52/61 Number of patients in relevant subgroup(s): 52</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up: 85.5 weeks (range: 20-152 weeks)</p> <p>Validated outcome measures used (list): Numeric Rating Scale (NRS), NASS Patient Satisfaction Index (PSI), adapted Stucki Outcome Questionnaire pain and function scores</p> <p>Nonvalidated outcome measures used (list):</p>	<p><i>Critique of methodology:</i></p> <p><input checked="" type="checkbox"/> Nonconsecutive patients <input type="checkbox"/> Nonrandomized <input type="checkbox"/> Nonmasked reviewers <input type="checkbox"/> Nonmasked patients <input type="checkbox"/> No validated outcome measures used <input type="checkbox"/> Small sample size <input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other:</p> <p><i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: Approximately 37% of patients with greater than 10 degrees of degenerative lumbar scoliosis with lumbar radiculopathy report successful outcomes from TFESI at one</p>

		<p>Diagnosis made by:</p> <p><input checked="" type="checkbox"/> Clinical exam/history</p> <p><input type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input checked="" type="checkbox"/> MRI</p> <p><input type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input checked="" type="checkbox"/> Other: x-ray scoliosis greater than 10 degrees</p> <p>Results/subgroup analysis (relevant to question): Successful post-injection outcomes were defined as: PSI of 1 or 2, greater than two point improvement on NRS, Summary Pain, and Summary Function Scores. A successful post-injection outcome occurred in 59.6% at one week, 55.8% at one month, 44.2% at three months, 37.2% at one year, 27.3% at two years (p<0.01 vs. no success). There was a statistically significant difference for patients with acute symptoms to experience higher success rates than those with symptoms greater than three months in duration.</p> <p>Author conclusions (relative to question): TFESIs appear to be an effective non-surgical option for patients with degenerative lumbar scoliotic stenosis and radiculopathy.</p>	<p>year after TFESI, with an average TFESI rate of 1.3 injections/patient. Successful outcomes are less likely in patients with protracted symptoms. In retrospective analysis, the degree of scoliotic curve, prior surgery, previous unsuccessful caudal injections, age, gender, level, side and type of insurance did not predict outcome. Subjects with more chronic symptoms tended to have worse outcome than those patients with acute symptoms (less than three months of pain prior to TFESI) except at the 24 month outcome period where statistical significance was shown.</p>
<p>Fish, D.E., E.P. Shirazi, and Q. Pham, The use of electromyography to predict functional outcome following transforaminal epidural spinal injections for lumbar radiculopathy. J Pain, 2008. 9(1): p. 64-70.</p>	<p>Level IV</p> <p>Type of evidence prognostic</p>	<p><input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective</p> <p>Study design: case control</p> <p>Stated objective of study: This study aimed to determine if electromyographic (EMG) diagnostic evaluation can predict functional outcome in patients undergoing TFESI.</p> <p>Type of treatment(s): TFESI</p> <p>Total number of patients: 39</p> <p>Number of patients in relevant subgroup(s): 39</p> <p>Consecutively assigned? Yes</p> <p>Duration of follow-up: 3.9 weeks</p> <p>Validated outcome measures used (list): Visual Rating Scale (VRS), Oswestry Disability Index (ODI)</p>	<p><i>Critique of methodology:</i></p> <p><input checked="" type="checkbox"/> Nonconsecutive patients</p> <p><input type="checkbox"/> Nonrandomized</p> <p><input type="checkbox"/> Nonmasked reviewers</p> <p><input type="checkbox"/> Nonmasked patients</p> <p><input type="checkbox"/> No validated outcome measures used</p> <p><input type="checkbox"/> Small sample size</p> <p><input type="checkbox"/> <80% follow-up</p> <p><input type="checkbox"/> Lacked subgroup analysis</p> <p><input checked="" type="checkbox"/> Diagnostic method not stated</p> <p><input checked="" type="checkbox"/> Other: Protocol for EMG diagnosis of radiculopathy not mentioned</p> <p><i>Work group conclusions</i></p> <p>Potential Level: III</p> <p>Downgraded Level: IV</p> <p><i>Conclusions relative to question</i></p>

		<p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by:</p> <p><input type="checkbox"/> Clinical exam/history</p> <p><input checked="" type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input checked="" type="checkbox"/> MRI</p> <p><input type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): Pretreatment ODI scores were not significantly different between groups showing positive (72.3 SD +/- 12.7) and negative (65.9 SD +/- 18.6, $P > .05$) EMG findings. There was significantly greater improvement of ODI for EMG positive radiculopathy (7.11 SD +/- 9.5) compared with negative EMG (3.2 SD +/- 17.4, $P < .05$). Positive radiculopathy subjects complained of more pain by VRS before ESI than subjects with negative EMG findings, 8.1 SD +/- 1.0 and 7.3 SD +/- 0.8, respectively, which was not significant ($P > .05$). VRS mean improvement was not significantly different in the positive EMG group (1.8 SD +/- 1.2) compared with a negative EMG (1.2 SD +/- 1.2, $P > .05$).</p> <p>Author conclusions (relative to question): The results appear to show that patients undergoing TFESI, who have a positive radiculopathy by EMG before injection, will have significant improvement in functional outcome by ODI but not with current pain intensity by VRS.</p>	<p>This paper provides evidence that: There was no significant difference between the EMG positive and negative groups in terms of pain difference but a mild difference was noted in functional status improvement in EMG positive grouped subjects undergoing TFESI. This study may not have external validity due to subjects having extremely high initial disability scores.</p>
<p>Kabatas, S., et al.,</p> <p>Transforaminal epidural steroid injection via a preganglionic approach for lumbar spinal stenosis and lumbar discogenic pain with</p>	<p>Level IV</p> <p>Type of evidence therapeutic</p>	<p><input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective</p> <p>Study design: case series</p> <p>Stated objective of study: Analyzed the efficacy of fluoroscopically-guided TFESI via a preganglionic approach in patients with foraminal stenosis due to lumbar spinal stenosis and lumbar discogenic pain with radiculopathy.</p> <p>Type of treatment(s): TFESI</p> <p>Total number of patients: 40</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/> Nonconsecutive patients</p> <p><input type="checkbox"/> Nonrandomized</p> <p><input type="checkbox"/> Nonmasked reviewers</p> <p><input type="checkbox"/> Nonmasked patients</p> <p><input type="checkbox"/> No validated outcome measures used</p> <p><input type="checkbox"/> Small sample size</p> <p><input type="checkbox"/> <80% follow-up</p> <p><input type="checkbox"/> Lacked subgroup analysis</p> <p><input type="checkbox"/> Diagnostic method not stated</p> <p><input type="checkbox"/> Other:</p>

<p>radiculopathy. Neurol India. 58(2): p. 248-52.</p>		<p>Number of patients in relevant subgroup(s): 40</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up: mean 9 months (range: 4-14 months)</p> <p>Validated outcome measures used (list): Visual Numeric Pain Scale (VNS) and North American Spine Society (NASS) patient satisfaction score</p> <p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by:</p> <p><input type="checkbox"/> Clinical exam/history</p> <p><input type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input type="checkbox"/> MRI</p> <p><input type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): When the VNS and NASS were evaluated with respect to the age of the patients, level numbers, gender, pre-procedure symptom duration and pre-procedure VNS, no significant differences were found. A reduction by 50% or more in VNS and NASS scores at short-term (one month) follow-up was 77.8% (N/n: 40/31); at mid-term (six months) follow-up was 67.2% (N/n: 40/27) and at long-term (twelve months) follow-up was 54.8%</p> <p>Author conclusions (relative to question): The age of the patient, gender, the level of injection, duration of symptoms or initial pain intensity do not predict the outcome.</p>	<p><i>Work group conclusions</i></p> <p>Potential Level: IV</p> <p>Downgraded Level: IV</p> <p><i>Conclusions relative to question</i></p> <p>This paper provides evidence that: the age of the patient, gender, the level of injection, duration of symptoms or initial pain intensity do not predict the outcome.</p>
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What is the reported efficacy of TFESI in the treatment of radicular pain from lumbar spinal stenosis and lumbar disc herniation?

Article (Alpha by Author)	Level of evidence	Description of study	Conclusion
Ackerman, W.E., 3rd and M. Ahmad, The efficacy of lumbar epidural steroid injections in patients with lumbar disc herniations. Anesth Analg, 2007. 104(5): p. 1217-22, tables of contents.	<p>Level IV</p> <p>Type of evidence therapeutic</p> <p>~~~~~</p> <p>Notes: Level II evidence regarding efficacy of injection approach; Level IV (case series) evidence regarding efficacy of LTFESI</p>	<p><input checked="" type="checkbox"/>Prospective <input type="checkbox"/>Retrospective</p> <p>Study design: comparative</p> <p>Stated objective of study: assess the efficacy of epidural steroid injection</p> <p>Type of treatment(s): Caudal, interlaminar, and transforaminal epidural steroid injections</p> <p>Total number of patients: 90 Number of patients in relevant subgroup(s): 30</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up: 24 weeks; 3 week, 12 week, 24 week</p> <p>Validated outcome measures used (list): VAS, Oswestry</p> <p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by: <input checked="" type="checkbox"/>Clinical exam/history <input type="checkbox"/>Electromyography <input type="checkbox"/>Myelogram <input checked="" type="checkbox"/>MRI <input type="checkbox"/>CT <input type="checkbox"/>CT/Myelogram <input type="checkbox"/>Other:</p> <p>Results/subgroup analysis (relevant to question): At 24 weeks from the initiation of this study, pain relief was as follows: Caudal: complete pain relief: 1/30, partial pain relief: 16/30, and no relief: 13/30; Interlaminar: complete pain relief: 3/30, partial pain relief: 15/30, and</p>	<p><i>Critique of methodology:</i></p> <p><input checked="" type="checkbox"/>Nonconsecutive patients <input type="checkbox"/>Nonrandomized <input checked="" type="checkbox"/>Nonmasked reviewers <input type="checkbox"/>Nonmasked patients <input type="checkbox"/>No validated outcome measures used <input type="checkbox"/>Small sample size <input type="checkbox"/><80% follow-up <input type="checkbox"/>Lacked subgroup analysis <input type="checkbox"/>Diagnostic method not stated <input type="checkbox"/>Other:</p> <p><i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: at 24 weeks after treatment, 30% of patients can expect complete relief after TFESI with a further 53% achieving partial relief. Although this paper is a Level II RCT by design, it provides Level IV case series evidence in addressing the efficacy question posed.</p>

		<p>no relief: 12/30; Transforaminal: complete pain relief: 9/30, partial pain relief: 16/30, and no relief: 5/30.</p> <p>Author conclusions (relative to question): Pain relief was significantly more effective with transforaminal injections.</p>	
<p>Ghahreman, A., R. Ferch, and N. Bogduk, The Efficacy of Transforaminal Injection of Steroids for the Treatment of Lumbar Radicular Pain. <i>Pain Medicine</i>. 11(8): p. 1149-1168.</p>	<p>Level I</p> <p>Type of evidence therapeutic</p>	<p><input checked="" type="checkbox"/>Prospective <input type="checkbox"/>Retrospective</p> <p>Study design: RCT</p> <p>Stated objective of study: Efficacy of TFESI for radicular pain.</p> <p>Type of treatment(s): triamcinolone</p> <p>Total number of patients: 150 Number of patients in relevant subgroup(s): 28</p> <p>Consecutively assigned? Yes</p> <p>Duration of follow-up: one year</p> <p>Validated outcome measures used (list): Visual Analog Scale (VAS), SF36 (version 1), Roland–Morris Disability Questionnaire (RMDQ), and the Patient-Specified Functional Outcome Instrument:</p> <p>Nonvalidated outcome measures used (list): other health care utilized for their radicular pain and work status</p> <p>Diagnosis made by:</p> <p><input type="checkbox"/>Clinical exam/history <input type="checkbox"/>Electromyography <input type="checkbox"/>Myelogram <input checked="" type="checkbox"/>MRI <input type="checkbox"/>CT <input type="checkbox"/>CT/Myelogram <input type="checkbox"/>Other:</p> <p>Results/subgroup analysis (relevant to question): A significantly greater proportion of patients treated with TFESI (54%) achieved relief of pain than did patients treated with transforaminal injection of local anesthetic (7%) or transforaminal injection of saline (19%), intramuscular steroids (21%) or</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/>Nonconsecutive patients <input type="checkbox"/>Nonrandomized <input type="checkbox"/>Nonmasked reviewers <input type="checkbox"/>Nonmasked patients <input type="checkbox"/>No validated outcome measures used <input type="checkbox"/>Small sample size <input type="checkbox"/><80% follow-up <input type="checkbox"/>Lacked subgroup analysis <input type="checkbox"/>Diagnostic method not stated <input type="checkbox"/>Other:</p> <p><i>Work group conclusions</i> Potential Level: I Downgraded Level: I</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: (1) TFESI provides greater than 50% relief of pain for 54% of patients at one month after treatment; (2) TFESI is significantly more often effective than sham treatments and other treatments, with a number needed to treat (NNT) of 3; (3) relief of pain is associated with restoration of function and virtual elimination of the need for other health care; (4) 25% of patients undergoing TFESI have relief that persists for at least 12 months, without repeat treatment; (5) TFESI substantially reduces the need for surgery; (duration of symptoms does not prejudice response to treatment).</p>

		<p>intramuscular saline (13%). Relief of pain was corroborated by significant improvements in function and disability, and reductions in use of other health care. Outcomes were equivalent for patients with acute or chronic radicular pain. Over time, the number of patients who maintained relief diminished. Only some maintained relief beyond 12 months. The proportions of patients doing so were not significantly different statistically between groups.</p> <p>Author conclusions (relative to question): TFESI is a viable alternative to surgery for lumbar radicular pain due to disc herniation. Its immediate yield is modest, but substantial, and is not simply a placebo effect. For long-term efficacy, proof beyond reasonable doubt would require prohibitively large studies.</p>	
<p>Karppinen J, Ohinmaa A, Malmivaara A et al. Cost effectiveness of periradicular infiltration for sciatica. Spine 2001; 26:2587-2595.</p>	<p>Level I</p> <p>Type of evidence therapeutic</p>	<p><input checked="" type="checkbox"/>Prospective <input type="checkbox"/>Retrospective</p> <p>Study design: RCT</p> <p>Stated objective of study: Describe the cost-effectiveness of periradicular infiltration with steroid in subgroups of patients with sciatica.</p> <p>Type of treatment(s): methylprednisolone-bupivacaine (TFESI); saline (NS)</p> <p>Total number of patients: 160 Number of patients in relevant subgroup(s): TFESI/NS; Bulges:18/11;Contained:24/26;Extrusions:38/43.</p> <p>Consecutively assigned? Yes</p> <p>Duration of follow-up: 12 months</p> <p>Validated outcome measures used (list): VAS (leg pain primary); ODI; Nottingham</p> <p>Nonvalidated outcome measures used (list): cost-effectiveness</p> <p>Diagnosis made by:</p> <p><input checked="" type="checkbox"/>Clinical exam/history <input type="checkbox"/>Electromyography <input type="checkbox"/>Myelogram <input checked="" type="checkbox"/>MRI <input type="checkbox"/>CT <input type="checkbox"/>CT/Myelogram</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/>Nonconsecutive patients <input type="checkbox"/>Nonrandomized <input type="checkbox"/>Nonmasked reviewers <input type="checkbox"/>Nonmasked patients <input type="checkbox"/>No validated outcome measures used <input type="checkbox"/>Small sample size <input type="checkbox"/><80% follow-up <input type="checkbox"/>Lacked subgroup analysis <input type="checkbox"/>Diagnostic method not stated <input type="checkbox"/>Other:</p> <p><i>Work group conclusions</i> Potential Level: I Downgraded Level: I</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: (1) at four weeks after treatment, LTFESI achieves significantly greater improvements in pain and disability than a credible sham treatment in patients with contained herniations, but not in patients with extrusions; and (2) for providing at least 75% relief of radicular pain, LTFESI is more often effective (0.44) than sham treatment (0.21) with an NNT of 5. However, this difference is not statistically significant because of the small sample sizes and low success rates</p>

		<input type="checkbox"/> Other: <p>Results/subgroup analysis (relevant to question): Bulges: treatment area under the curve (AUC) scores were similar. Contained: scores for leg pain were significantly better for LTFESI at two weeks and at four weeks. At six months leg pain, disability and Nottingham emotional scores were significantly better for saline. At one year treatment effects were 0. Extrusions: Leg pain was significantly better in the saline group at six months. At one year TFESI prevented operations for contained herniated intervertebral disc (HIVD) costing \$12,666 less per responder (>75% decrease in leg pain).</p> <p>Author conclusions (relative to question): TFESI for contained HIVD is superior to saline in terms of leg pain and medical costs, and possibly prevents operative treatment. For extrusions corticosteroid appears countereffective.</p>	encountered in the study.
<p>Lee, J.H., J. Moon, and S.H. Lee, Comparison of effectiveness according to different approaches of epidural steroid injection in lumbosacral herniated disk and spinal stenosis. J Back Musculoskelet Rehabil, 2009. 22(2): p. 83-9.</p>	<p>Level IV</p> <p>Type of evidence therapeutic approach; ~~~~~ Notes: comparative evidence regarding injection approach; Level IV (case series) evidence regarding efficacy of LTFESI</p>	<p><input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective</p> <p>Study design: comparative</p> <p>Stated objective of study: To compare the effectiveness of the translaminar, caudal, and transforaminal technique with small and large volume of injectate in the treatment of lumbosacral herniation of intervertebral disc (HIVD) or spinal stenosis (SS).</p> <p>Type of treatment(s): interlaminar epidural steroid injection (ILES), caudal epidural steroid injection, TFESI (large and small volume)</p> <p>Total number of patients: 54 caudal, 64 ILES, 115 TFESI (all) Number of patients in relevant subgroup(s): 115</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up: two months</p> <p>Validated outcome measures used (list): Patients were evaluated by VAS pain score, Patient Satisfaction Index (PSI), and Roland five-point pain score</p> <p>Nonvalidated outcome measures used (list):</p>	<p><i>Critique of methodology:</i></p> <p><input checked="" type="checkbox"/> Nonconsecutive patients <input type="checkbox"/> Nonrandomized <input type="checkbox"/> Nonmasked reviewers <input type="checkbox"/> Nonmasked patients <input type="checkbox"/> No validated outcome measures used <input type="checkbox"/> Small sample size <input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other:</p> <p><i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: LTFESI provides at least 50% relief at two months after treatment in 66% of patients with radicular pain due to disc herniations, and in 53% of patients with spinal stenosis. LTFESI is significantly more often effective than fluoroscopically-</p>

		<p>Diagnosis made by:</p> <p><input type="checkbox"/> Clinical exam/history</p> <p><input type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input type="checkbox"/> MRI</p> <p><input type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): A higher ratio of successful results was found in translaminar and transforaminal techniques than caudal technique in VAS in the HIVD group and in VAS and PSI in the SS group. Reduction of Roland score was maintained until two months in all techniques in HIVD and SS groups. In SS group, transforaminal groups showed more reduction of Roland score than caudal approach. No difference was found between small and large volume of transforaminal techniques.</p> <p>Author conclusions (relative to question): Translaminar and transforaminal approach were more effective than caudal approach in HIVD and SS groups. Effectiveness of transforaminal approach was especially more prominent in SS group as compared with HIVD group.</p>	<p>guided caudal injections, but is not significantly more often effective than fluoroscopically-guided interlaminar injection. Although this paper is a Level III study by design, it provides Level IV case series evidence in addressing the efficacy question posed.</p>
<p>Ng L, Chaudhary N, Sell P. The efficacy of corticosteroids in periradicular infiltration for chronic radicular pain: a randomized, double-blind, controlled trial. Spine (Phila Pa 1976). 2005 Apr 15;30(8):857-62</p>	<p>Level II</p> <p>Type of evidence therapeutic</p>	<p><input checked="" type="checkbox"/> Prospective <input type="checkbox"/> Retrospective</p> <p>Study design: RCT</p> <p>Stated objective of study: Determine the treatment effect of corticosteroids in periradicular infiltration for chronic radicular pain from herniated intervertebral disc (HIVD) and foraminal stenosis (FS). Examine prognostic factors in relation to outcome of the procedure.</p> <p>Type of treatment(s): bupivacaine +/- corticosteroid</p> <p>Total number of patients: 86 Number of patients in relevant subgroup(s): 43</p> <p>Consecutively assigned? Yes</p> <p>Duration of follow-up: 12 weeks</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/> Nonconsecutive patients</p> <p><input type="checkbox"/> Nonrandomized</p> <p><input type="checkbox"/> Nonmasked reviewers</p> <p><input type="checkbox"/> Nonmasked patients</p> <p><input type="checkbox"/> No validated outcome measures used</p> <p><input checked="" type="checkbox"/> Small sample size</p> <p><input type="checkbox"/> <80% follow-up</p> <p><input type="checkbox"/> Lacked subgroup analysis</p> <p><input type="checkbox"/> Diagnostic method not stated</p> <p><input checked="" type="checkbox"/> Other: insufficiently powered to be an equivalence study</p> <p><i>Work group conclusions</i></p> <p>Potential Level: I</p> <p>Downgraded Level: II</p>

		<p>Validated outcome measures used (list): VAS, ODI</p> <p>Nonvalidated outcome measures used (list): patient satisfaction, change in walking distance.</p> <p>Diagnosis made by:</p> <p><input checked="" type="checkbox"/> Clinical exam/history</p> <p><input type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input checked="" type="checkbox"/> MRI</p> <p><input type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): Intent-to-treat analysis did not demonstrate a statistically significant difference in ODI score between the two treatment groups. Authors reported that pathology (HIVD/FS) subgroup analysis did not demonstrate a statistically significant difference between the treatment groups, but did not report the results by pathology. The duration of symptoms had a statistically significant negative effect on ODI.</p> <p>Author conclusions (relative to question): Clinical improvement occurred in both groups of patients. Corticosteroid did not provide additional benefit.</p>	<p><i>Conclusions relative to question</i></p> <p>This paper provides evidence that: The authors failed to find a difference in outcome between bupivacaine with steroid versus bupivacaine alone, but the study had insufficient power to be an equivalence study.</p>
<p>Riew KD, Park JB, Cho YS, et al: Nerve root blocks in the treatment of lumbar radicular pain. A minimum five-year follow-up. J Bone Joint Surg Am 88:1722-1725, 2006</p>	<p>Level II</p> <p>Type of evidence therapeutic</p>	<p><input checked="" type="checkbox"/> Prospective <input type="checkbox"/> Retrospective</p> <p>Study design: comparative</p> <p>Stated objective of study: present five year follow-up data assessing the efficacy of nerve root blocks for the treatment of lumbar radiculopathy</p> <p>Type of treatment(s): bupivacaine; bupivacaine and betamethasone</p> <p>Total number of patients: 29</p> <p>Number of patients in relevant subgroup(s): bupivacaine (9); bupivacaine and betamethasone (12); lost to follow-up (8)</p> <p>Consecutively assigned? Yes</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/> Nonconsecutive patients</p> <p><input type="checkbox"/> Nonrandomized</p> <p><input checked="" type="checkbox"/> Nonmasked reviewers</p> <p><input checked="" type="checkbox"/> Nonmasked patients</p> <p><input type="checkbox"/> No validated outcome measures used</p> <p><input type="checkbox"/> Small sample size</p> <p><input checked="" type="checkbox"/> <80% follow-up</p> <p><input type="checkbox"/> Lacked subgroup analysis</p> <p><input type="checkbox"/> Diagnostic method not stated</p> <p><input type="checkbox"/> Other:</p> <p><i>Work group conclusions</i></p> <p>Potential Level: II</p> <p>Downgraded Level: II</p>

		<p>Duration of follow-up: mean 67 months</p> <p>Validated outcome measures used (list): NASS Low Back Pain Questionnaire</p> <p>Nonvalidated outcome measures used (list): surgery</p> <p>Diagnosis made by:</p> <p><input type="checkbox"/> Clinical exam/history</p> <p><input type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input type="checkbox"/> MRI</p> <p><input type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): Of the 21 patients available at five year follow-up, 17 avoided surgery and experienced a significant decrease in neurologic symptoms and back pain. Patients with foraminal stenosis (FS) had a significant decrease in neurologic symptoms and patients with herniated intervertebral disc (HIVD) had a significant decrease in back pain. There was a significant decrease in back pain in the HIVD subgroup treated with bupivacaine and betamethasone. Of the four patients who proceeded to surgery, three had FS and one had HIVD.</p> <p>Author conclusions (relative to question): The majority of patients with lumbar radicular pain that avoid surgery for at least one year after receiving a nerve root block of local anesthetic with or without corticosteroid will continue to avoid operative intervention for a minimum of five years. The majority of patients with lumbar radicular pain who avoid an operation for at least one year after receiving a nerve root injection with bupivacaine alone or in combination with betamethasone will continue to avoid operative intervention for a minimum of five years.</p>	<p><i>Conclusions relative to question</i></p> <p>This paper provides evidence that: LTFESI is more effective than transforaminal injection of bupivacaine for reducing the need for surgery five years after treatment</p>
<p>Riew KD, Yin Y, Gilula L et al.</p> <p>The effect of nerve-root injections on the need for operative</p>	<p>Level I</p> <p>Type of evidence therapeutic</p>	<p><input checked="" type="checkbox"/> Prospective <input type="checkbox"/> Retrospective</p> <p>Study design: RCT</p> <p>Stated objective of study: Determine the effectiveness of selective nerve root injections (SNRI) in obviating the need for an operation in patients with lumbar radicular pain who were otherwise considered to be patients facing</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/> Nonconsecutive patients</p> <p><input type="checkbox"/> Nonrandomized</p> <p><input type="checkbox"/> Nonmasked reviewers</p> <p><input type="checkbox"/> Nonmasked patients</p> <p><input type="checkbox"/> No validated outcome measures used</p> <p><input type="checkbox"/> Small sample size</p>

<p>treatment of lumbar radicular pain. J Bone Joint Surg 2000; 82A: 1589-1593.</p>		<p>surgery.</p> <p>Type of treatment(s): bupivacaine alone or bupivacaine with betamethasone</p> <p>Total number of patients: 55 Number of patients in relevant subgroup(s): bupivacaine with betamethasone (28); bupivacaine alone (27)</p> <p>Consecutively assigned? Yes</p> <p>Duration of follow-up: mean 23 months (range: 13-28 months)</p> <p>Validated outcome measures used (list): NASS Low Back Questionnaire; NRS</p> <p>Nonvalidated outcome measures used (list): surgery</p> <p>Diagnosis made by: <input checked="" type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input checked="" type="checkbox"/> MRI <input checked="" type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): Among patients with foraminal stenosis who avoided surgery there was a significant decrease in neurological symptoms and low back pain on final evaluation. Herniated intervertebral disc (HIVD) patients who avoided surgery showed a trend toward decreased back pain. Operative care occurred in 18/27 local anesthetic (LA) patients and 8/28 corticosteroid (CS) plus anesthetic patients.</p> <p>Author conclusions (relative to question): SNRI with CS are significantly more effective than those with LA alone in obviating the need for operative care for 13-28 months following the injections in operative candidates.</p>	<p><input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other:</p> <p><i>Work group conclusions</i> Potential Level: I Downgraded Level: I</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: LTFESI is more effective than transforaminal injection of bupivacaine for reducing the need for surgery at 12 months</p> <p><i>Critique of methodology:</i> <input type="checkbox"/> Nonconsecutive patients</p>
<p>Thomas E, Cyteval C,</p>	<p>Level IV</p>	<p><input checked="" type="checkbox"/> Prospective <input type="checkbox"/> Retrospective</p>	

<p>Abiad L, Picot MC, Taourel P, Blotman F. Efficacy of transforaminal versus interspinous corticosteroid injection in discal radiculalgia—a prospective, randomized, doubleblind study. Clin Rheumatol 2003;22:299-304.</p>	<p>Type of evidence therapeutic</p> <p>~~~~~</p> <p>Notes:</p> <p>Level I RCT addressing comparison of TFESI and ISESI</p> <p>Level IV case series data to address efficacy of TFESI without the comparison to ISESI</p>	<p>Study design: RCT</p> <p>Stated objective of study: Determine the first-line injection procedure to recommend for discal radiculalgia therapy.</p> <p>Type of treatment(s): TFESI/interspinous epidural steroid injection (ISESI) (blind ILESI)</p> <p>Total number of patients: 31</p> <p>Number of patients in relevant subgroup(s): TFESI (15), ISESI (16)</p> <p>Consecutively assigned? Yes</p> <p>Duration of follow-up: six months</p> <p>Validated outcome measures used (list): VAS; Roland Morris; Dallas Pain Questionnaire</p> <p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by:</p> <p><input checked="" type="checkbox"/> Clinical exam/history</p> <p><input type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input checked="" type="checkbox"/> MRI</p> <p><input checked="" type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): Compared to the ISESI group, the TFESI group had statistically significantly greater improvement in VAS at 30 days and six months, and daily activities, work and leisure activities, anxiety and depression, and Roland Morris scores at six months. The study does not provide data on success rates for TFESI compared with placebo control. The data imply a non-zero success rate.</p> <p>Author conclusions (relative to question): The efficacy of TFESI is greater than ISESI for the relief of lumbar radicular pain at 30 days and six months.</p>	<p><input type="checkbox"/> Nonrandomized</p> <p><input type="checkbox"/> Nonmasked reviewers</p> <p><input type="checkbox"/> Nonmasked patients</p> <p><input type="checkbox"/> No validated outcome measures used</p> <p><input checked="" type="checkbox"/> Small sample size</p> <p><input type="checkbox"/> <80% follow-up</p> <p><input type="checkbox"/> Lacked subgroup analysis</p> <p><input type="checkbox"/> Diagnostic method not stated</p> <p><input type="checkbox"/> Other:</p> <p><i>Work group conclusions</i></p> <p>Potential Level: IV</p> <p>Downgraded Level: IV</p> <p><i>Conclusions relative to question</i></p> <p>This paper provides evidence that: TFESI is more effective than interspinous ESI for reducing pain and improving disability at six months but does not provide data on success rates for TFESI compared with placebo control. The data imply a non-zero success rate. Although this paper is a Level I RCT by design, it provides Level IV case series evidence in addressing the efficacy question posed.</p> <p><i>Critique of methodology:</i></p> <p><input type="checkbox"/> Nonconsecutive patients</p>
<p>Vad, V.B., et al.,</p>	<p>Level II</p>	<p><input checked="" type="checkbox"/> Prospective <input type="checkbox"/> Retrospective</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/> Nonconsecutive patients</p>

<p>Transforaminal epidural steroid injections in lumbosacral radiculopathy: a prospective randomized study. Spine (Phila Pa 1976), 2002. 27(1): p. 11-6.</p>	<p>Type of evidence therapeutic</p>	<p>Study design: RCT</p> <p>Stated objective of study: Test the efficacy of lumbar TFESI.</p> <p>Type of treatment(s): LTFESI and paravertebral trigger point injections</p> <p>Total number of patients: 50 Number of patients in relevant subgroup(s): 25 LTFESI; 25 paravertebral trigger point injections</p> <p>Consecutively assigned? Yes</p> <p>Duration of follow-up: 16 months</p> <p>Validated outcome measures used (list): Patient Satisfaction score, Roland Morris LBP questionnaire, visual numeric pain scale</p> <p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input checked="" type="checkbox"/> MRI <input type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input type="checkbox"/> Other: <p>Results/subgroup analysis (relevant to question): After an average follow-up period of 16 months, the group receiving transforaminal epidural steroid injections had a success rate of 84%, as compared with 48% for the group receiving trigger-point injections.</p> <p>Author conclusions (relative to question): After an average follow-up period of 16 months, the group receiving transforaminal epidural steroid injections had a success rate of 84%, as compared with 48% for the group receiving trigger-point injections.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Nonrandomized <input checked="" type="checkbox"/> Nonmasked reviewers <input checked="" type="checkbox"/> Nonmasked patients <input type="checkbox"/> No validated outcome measures used <input type="checkbox"/> Small sample size <input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input checked="" type="checkbox"/> Other: quality of placebo control is compromised (eg, trigger point injections performed at office visit) <p><i>Work group conclusions</i> Potential Level: II Downgraded Level: II</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: LTFESI is more often effective (84%) than trigger point injections (48%) in providing at least 50% relief of radicular pain at 16 months.</p>
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What are the reported complications of lumbar TFESI?

Article (Alpha by Author)	Level of evidence	Description of study	Conclusion
Botwin, K.P., et al., Complications of fluoroscopically guided transforaminal lumbar epidural injections. Arch Phys Med Rehabil, 2000. 81(8): p. 1045-50.	Level IV Type of evidence therapeutic	<input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective Study design: case series Stated objective of study: To assess incidence of complications of fluoroscopically -guided LTFESI. Type of treatment(s): LTFESI Total number of patients: 207 patients/ 322 LTFESIs Number of patients in relevant subgroup(s): 165 LSS patients (259 LTFESIs); 42 HIVD patients (63 LTFESIs). Consecutively assigned? Yes Duration of follow-up: 1-3 weeks Validated outcome measures used (list): No Nonvalidated outcome measures used (list): telephone questionnaire, physician follow-up at 1-3 weeks. Diagnosis made by: <input checked="" type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input type="checkbox"/> MRI <input type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input type="checkbox"/> Other: Questionnaire Results/subgroup analysis (relevant to question): INCIDENCE (%) COMPLICATIONS PER TFESI LSS/HNP: Nonpositional headache resolved in 24 hrs: 2.7/4.8	<i>Critique of methodology:</i> <input type="checkbox"/> Nonconsecutive patients <input type="checkbox"/> Nonrandomized <input type="checkbox"/> Nonmasked reviewers <input type="checkbox"/> Nonmasked patients <input checked="" type="checkbox"/> No validated outcome measures used <input type="checkbox"/> Small sample size <input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other: <i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV <i>Conclusions relative to question</i> This paper provides evidence that: LTFESI for lumbar spinal stenosis or lumbar disc herniation carries a low risk of major complications. The adverse events would be characterized as transient side effects.

		<p>Increased back pain at TFESI site: 1.9/4.8 Facial flushing: 1.2/1.6 Increased radicular symptoms: 0.4/1.6 Vasovagal: 0.4/0.0 Rash: 0.4/0.0 Transient leg weakness: 0.4/0.0 Dizziness: 0.4/0.0 Increased blood sugar in IDDM: 0.4/0.0 Intraop HTN: 0.4/0.0 Nausea: 0.4/0.0 Table 2.</p> <p>Author conclusions (relative to question): The incidence of minor complications was 9.6% per injection. There were no major complications. All reactions resolved without morbidity.</p>	
<p>Cohen, S.P., et al., Inadvertent disk injection during transforaminal epidural steroid injection: Steps for prevention and management. Pain Medicine, 2008. 9(6): p. 688-694.</p>	<p>Level IV</p> <p>Type of evidence therapeutic</p>	<p><input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective</p> <p>Study design: case series</p> <p>Stated objective of study: Report two cases of disc injection during TFESI.</p> <p>Type of treatment(s): LTFESI</p> <p>Total number of patients: 2 Number of patients in relevant subgroup(s):</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up:</p> <p>Validated outcome measures used (list):</p> <p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by:</p> <p><input type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input type="checkbox"/> MRI <input type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input checked="" type="checkbox"/> Other: Fluoroscopy</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/> Nonconsecutive patients <input type="checkbox"/> Nonrandomized <input type="checkbox"/> Nonmasked reviewers <input type="checkbox"/> Nonmasked patients <input type="checkbox"/> No validated outcome measures used <input type="checkbox"/> Small sample size <input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other:</p> <p><i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: Intradiscal injection is a technical risk of LTFESI.</p>

		<p>Results/subgroup analysis (relevant to question): Two patients with inadvertent lumbar disc injection during performance of a fluoroscopically-guided TFESI.</p> <p>Author conclusions (relative to question): Intradiscal injection is a risk of TFESI and antibiotics should be given if it occurs.</p>	
<p>Finn, K.P. and J.L. Case, Disk entry: a complication of transforaminal epidural injection--a case report. Arch Phys Med Rehabil, 2005. 86(7): p. 1489-91.</p>	<p>Level IV</p> <p>Type of evidence therapeutic</p>	<p><input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective</p> <p>Study design: case series</p> <p>Stated objective of study: Report intradiscal injection during TFESI.</p> <p>Type of treatment(s): LTFESI</p> <p>Total number of patients: 1</p> <p>Number of patients in relevant subgroup(s):</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up:</p> <p>Validated outcome measures used (list):</p> <p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by:</p> <p><input type="checkbox"/> Clinical exam/history</p> <p><input type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input type="checkbox"/> MRI</p> <p><input type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input checked="" type="checkbox"/> Other: Fluoroscopy</p> <p>Results/subgroup analysis (relevant to question): Intradiscal injection is a risk of TFESI.</p> <p>Author conclusions (relative to question): Intradiscal injection is a risk of</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/> Nonconsecutive patients</p> <p><input type="checkbox"/> Nonrandomized</p> <p><input type="checkbox"/> Nonmasked reviewers</p> <p><input type="checkbox"/> Nonmasked patients</p> <p><input type="checkbox"/> No validated outcome measures used</p> <p><input type="checkbox"/> Small sample size</p> <p><input type="checkbox"/> <80% follow-up</p> <p><input type="checkbox"/> Lacked subgroup analysis</p> <p><input type="checkbox"/> Diagnostic method not stated</p> <p><input type="checkbox"/> Other:</p> <p><i>Work group conclusions</i></p> <p>Potential Level: IV</p> <p>Downgraded Level: IV</p> <p><i>Conclusions relative to question</i></p> <p>This paper provides evidence that: Intradiscal injection is a technical risk of LTFESI.</p>

		TFESI, and reinforces the need for fluoroscopy and contrast enhancement during interventional spinal procedures.	
<p>Furman, M.B., E.M. O'Brien, and T.M. Zgleszewski, Incidence of intravascular penetration in transforamina lumbosacral epidural steroid injections. Spine (Phila Pa 1976), 2000. 25(20): p. 2628-32.</p>	<p>Level IV</p> <p>Type of evidence therapeutic</p>	<p><input checked="" type="checkbox"/>Prospective <input type="checkbox"/>Retrospective</p> <p>Study design: case series</p> <p>Stated objective of study: 1) Evaluate the incidence of vascular penetration during lumbar TFESI, and 2) determine the predictive value of a positive flash or aspiration of blood.</p> <p>Type of treatment(s): LTFESI</p> <p>Total number of patients: 670 patients (761 injections) Number of patients in relevant subgroup(s): S1 178 injections; Lumbar 583 injections; Stenosis 164 patients; disc injury 597 patients</p> <p>Consecutively assigned? Yes</p> <p>Duration of follow-up:</p> <p>Validated outcome measures used (list):</p> <p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by:</p> <p><input type="checkbox"/>Clinical exam/history <input type="checkbox"/>Electromyography <input type="checkbox"/>Myelogram <input type="checkbox"/>MRI <input type="checkbox"/>CT <input type="checkbox"/>CT/Myelogram <input checked="" type="checkbox"/>Other: Fluoroscopy</p> <p>Results/subgroup analysis (relevant to question): Overall 11.2%. S1 (21.3%) vs. lumbar (8.1%) (p<0.001); stenosis (11.6%) vs. disc Injury (11.1%) - not significant. Flash or aspiration: 44.7% sensitive; 97.9% specific.</p> <p>Author conclusions (relative to question): Overall incidence 11.2% with greater risk at S1 compared to lumbar spine</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/>Nonconsecutive patients <input checked="" type="checkbox"/>Nonrandomized <input checked="" type="checkbox"/>Nonmasked reviewers <input checked="" type="checkbox"/>Nonmasked patients <input checked="" type="checkbox"/>No validated outcome measures used <input type="checkbox"/>Small sample size <input type="checkbox"/><80% follow-up <input type="checkbox"/>Lacked subgroup analysis <input type="checkbox"/>Diagnostic method not stated <input type="checkbox"/>Other:</p> <p><i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: Intravascular injection is a technical risk factor for LTFESI and may occur in 11.2% of patients with the greatest risk at S1. The use of a flash or blood aspiration is highly specific but poorly sensitive.</p>

<p>Gerszten, P.C., et al., Plasma disc decompression compared with fluoroscopy-guided transforaminal epidural steroid injections for symptomatic contained lumbar disc herniation: a prospective, randomized, controlled trial. J Neurosurg Spine. 12(4): p. 357-71.</p>	<p>Level IV</p> <p>Type of evidence therapeutic</p> <p>~~~~~</p> <p>Notes: Level II RCT For purpose of this question - prospective case series (level IV evidence)</p>	<p><input checked="" type="checkbox"/>Prospective <input type="checkbox"/>Retrospective</p> <p>Study design: RCT</p> <p>Stated objective of study: compare clinical outcomes through a two-year follow-up in patients who were treated using either plasma disc decompression (PDD) or the interventional standard-of-care regimen consisting of a series of fluoroscopy-guided TFESIs.</p> <p>Type of treatment(s): PDD vs LTFESI</p> <p>Total number of patients: 95 Number of patients in relevant subgroup(s): 45 PDD, 40 TFESI</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up: 6 months</p> <p>Validated outcome measures used (list): ODI, SF-36,</p> <p>Nonvalidated outcome measures used (list): patient satisfaction</p> <p>Diagnosis made by: <input checked="" type="checkbox"/>Clinical exam/history <input type="checkbox"/>Electromyography <input type="checkbox"/>Myelogram <input checked="" type="checkbox"/>MRI <input type="checkbox"/>CT <input type="checkbox"/>CT/Myelogram <input checked="" type="checkbox"/>Other: excluded sequestered or extruded disc herniations</p> <p>Results/subgroup analysis (relevant to question): Of the 40 patients receiving TFESI, 18% (7/40) of patients experienced 14 adverse events: injection site pain (2), radicular pain (5), back pain (4), light headedness (1), spasms (1) and acute LBP with spasms (1).</p> <p>Author conclusions (relative to question): N/A</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/>Nonconsecutive patients <input type="checkbox"/>Nonrandomized <input checked="" type="checkbox"/>Nonmasked reviewers <input checked="" type="checkbox"/>Nonmasked patients <input type="checkbox"/>No validated outcome measures used <input checked="" type="checkbox"/>Small sample size <input checked="" type="checkbox"/><80% follow-up <input type="checkbox"/>Lacked subgroup analysis <input type="checkbox"/>Diagnostic method not stated <input checked="" type="checkbox"/>Other: Financial bias</p> <p><i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: Side effects may include injection site pain, radicular pain, back pain, light headedness, spasm and acute low back pain and spasms. Although this paper is a randomized controlled trial, it provides Level IV case series evidence in addressing the complications question posed within this statement.</p>
<p>Gonzalez, P., et al., The</p>	<p>Level IV</p>	<p><input checked="" type="checkbox"/>Prospective <input type="checkbox"/>Retrospective</p>	<p><i>Critique of methodology:</i></p> <p><input checked="" type="checkbox"/>Nonconsecutive patients</p>

<p>effects of epidural betamethasone on blood glucose in patients with diabetes mellitus. PM R, 2009. 1(4): p. 340-5.</p>	<p>Type of evidence therapeutic</p>	<p>Study design: case series</p> <p>Stated objective of study: Study glucose effect of ESI in patients with diabetes mellitus.</p> <p>Type of treatment(s): Caudal ESI and LTFESI</p> <p>Total number of patients: 12 Number of patients in relevant subgroup(s): unknown</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up: three days</p> <p>Validated outcome measures used (list): blood glucose levels via glucometer</p> <p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input type="checkbox"/> MRI <input type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input type="checkbox"/> Other: <p>Results/subgroup analysis (relevant to question): The estimated mean glucose on preinjection days 1-4 was 130 mg/dL, with no change over the preinjection period. The glucose levels peaked on the evening of the injection (236 mg/dL), resulting in a statistically significant elevation of 106 mg/dL ($P = .0001$) over the baseline values. The elevation remained statistically significant until 2 days after the injection. The glucose elevation continued throughout the 3-day follow-up period, though these elevations were not statistically significant.</p> <p>Author conclusions (relative to question): Lumbosacral transforaminal and caudal epidural betamethasone injections are associated with statistically significant elevations in blood glucose levels in diabetic subjects. This effect peaked on the day of the injection and lasted approximately two days.</p>	<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Nonrandomized <input checked="" type="checkbox"/> Nonmasked reviewers <input checked="" type="checkbox"/> Nonmasked patients <input type="checkbox"/> No validated outcome measures used <input checked="" type="checkbox"/> Small sample size <input type="checkbox"/> <80% follow-up <input checked="" type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other: <p><i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: Elevated glucose level is a transient side effect in patients with diabetes mellitus.</p>
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Goodman, B.S., et al., Dural puncture and subdural injection: a complication of lumbar transforamina l epidural injections. Pain Physician, 2007. 10(5): p. 697-705.	Level IV Type of evidence therapeutic	<input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective Study design: case series Stated objective of study: Report dural puncture with TFESI. Type of treatment(s): LTFESI Total number of patients: 2 Number of patients in relevant subgroup(s): Consecutively assigned? No Duration of follow-up: Validated outcome measures used (list): Nonvalidated outcome measures used (list): Diagnosis made by: <input type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input type="checkbox"/> MRI <input type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input checked="" type="checkbox"/> Other: fluoro Results/subgroup analysis (relevant to question): Subdural injection is possible with TFESI. Author conclusions (relative to question): Subdural injection is possible with TFESI.	<i>Critique of methodology:</i> <input type="checkbox"/> Nonconsecutive patients <input type="checkbox"/> Nonrandomized <input type="checkbox"/> Nonmasked reviewers <input type="checkbox"/> Nonmasked patients <input type="checkbox"/> No validated outcome measures used <input type="checkbox"/> Small sample size <input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other: <i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV <i>Conclusions relative to question</i> This paper provides evidence that: Subdural injection is a technical risk of LTFESI.
Houten J, Errico T. Paraplegia after lumbosacral	Level IV Type of evidence	<input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective Study design: case series Stated objective of study: Report complications following LTFESI.	<i>Critique of methodology:</i> <input type="checkbox"/> Nonconsecutive patients <input type="checkbox"/> Nonrandomized <input type="checkbox"/> Nonmasked reviewers <input type="checkbox"/> Nonmasked patients

<p>nerve root block: Report of three cases. Spine J 2002;2:70–5.</p>	<p>therapeutic</p>	<p>Type of treatment(s): (1) Fluoroscopically-guided right L3-4 and L4-5 TFESI using 25 gauge spinal needles with marcaine and betamethasone; (2) CT-guided left TFESI at L3-4 using 20 gauge spinal needle with methylprednisolone acetate; (3) CT-guided left S1 TFESI using 22 gauge spinal needle with lidocaine and methylprednisolone acetate.</p> <p>Total number of patients: 3 Number of patients in relevant subgroup(s): 3</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up: one month, eight months, five years</p> <p>Validated outcome measures used (list): none</p> <p>Nonvalidated outcome measures used (list): complications</p> <p>Diagnosis made by: <input checked="" type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input checked="" type="checkbox"/> MRI <input type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): (1) Rapid lower extremity paraparesis with an L1 motor level and no sensory or sphincter deficits. Several hours post-injury an MRI showed distal thoracic spinal cord edema. One month follow-up showed lower extremity strength improved from 3/5 to 4/5, bilaterally. (2) Patient developed numbness and paralysis of the lower extremities with loss of sphincter function. MRI on evening of the injury showed edema of the distal spinal cord. No recovery of neurological function at eight months follow-up. (3) Patient developed bilateral lower extremity weakness and numbness. Neurological exam consistent with T10 sensory level, 0/5 motor exam, and loss of sphincter tone. MRI six hours after injury showed increased T2 signal of the lower thoracic spinal cord. Five year follow-up did not show recovery of neurologic function.</p> <p>Author conclusions (relative to question): Spinal cord injury can occur as a</p>	<p> <input type="checkbox"/> No validated outcome measures used <input type="checkbox"/> Small sample size <input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other: </p> <p><i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: Spinal cord injury can occur as a result of LTFESI.</p>
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		result of LTFESI.	
Huntoon M, Martin D. Paralysis after transforaminal epidural injection and previous spinal surgery. Reg Anesth Pain Med 2004;29:494–5.	<p>Level IV</p> <p>Type of evidence therapeutic</p>	<p><input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective</p> <p>Study design: case series</p> <p>Stated objective of study: Report spinal cord infarct following LTFESI.</p> <p>Type of treatment(s): Left L1 (attempted L2) LTFESI with 25 & 22 gauge spinal needles using bupivacaine and triamcinolone.</p> <p>Total number of patients: 1</p> <p>Number of patients in relevant subgroup(s):</p> <p>Consecutively assigned?</p> <p>Duration of follow-up:</p> <p>Validated outcome measures used (list):</p> <p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by:</p> <p><input checked="" type="checkbox"/> Clinical exam/history</p> <p><input type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input checked="" type="checkbox"/> MRI</p> <p><input type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): Paraplegia, T10 sensory level, and urinary incontinence. MRI 18 hours after the procedure showed an acute T11-12 spinal cord infarct. Four years after the injury patient has paraparesis and central neuropathic pain.</p> <p>Author conclusions (relative to question): The mechanism for this rare but devastating complication is the concurrence of two uncommon circumstances, the presence of an unusually low origin of the artery of Adamkiewicz and an undetected intraarterial penetration of the procedure</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/> Nonconsecutive patients</p> <p><input type="checkbox"/> Nonrandomized</p> <p><input type="checkbox"/> Nonmasked reviewers</p> <p><input type="checkbox"/> Nonmasked patients</p> <p><input type="checkbox"/> No validated outcome measures used</p> <p><input type="checkbox"/> Small sample size</p> <p><input type="checkbox"/> <80% follow-up</p> <p><input type="checkbox"/> Lacked subgroup analysis</p> <p><input type="checkbox"/> Diagnostic method not stated</p> <p><input type="checkbox"/> Other:</p> <p><i>Work group conclusions</i></p> <p>Potential Level: IV</p> <p>Downgraded Level: IV</p> <p><i>Conclusions relative to question</i></p> <p>This paper provides evidence that: Spinal cord injury can occur as a result of LTFESI.</p>

		needle.	
Kennedy, D.J., et al., Paraplegia following image-guided transforamina l lumbar spine epidural steroid injection: two case reports. Pain Med, 2009. 10(8): p. 1389-94.	Level IV Type of evidence therapeutic	<input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective Study design: case series Stated objective of study: Report paraplegia due to cord infarction following TFESI. Type of treatment(s): LTFESI Total number of patients: 2 Number of patients in relevant subgroup(s): Consecutively assigned? No Duration of follow-up: Validated outcome measures used (list): Nonvalidated outcome measures used (list): Diagnosis made by: <input type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input checked="" type="checkbox"/> MRI <input type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input type="checkbox"/> Other: Results/subgroup analysis (relevant to question): LTFESI resulted in cord infarction due to particulate embolization following vascular uptake. Author conclusions (relative to question): Cord infarction due to particulate embolization following vascular uptake can occur with LTFESI. Use low particulate steroid.	<i>Critique of methodology:</i> <input type="checkbox"/> Nonconsecutive patients <input type="checkbox"/> Nonrandomized <input type="checkbox"/> Nonmasked reviewers <input type="checkbox"/> Nonmasked patients <input type="checkbox"/> No validated outcome measures used <input type="checkbox"/> Small sample size <input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other: <i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV <i>Conclusions relative to question</i> This paper provides evidence that: Cord infarction due to particulate embolization following vascular uptake is a potential complication from LTFESI.
Nahm, F.S., et al., Risk of intravascular	Level IV	<input checked="" type="checkbox"/> Prospective <input type="checkbox"/> Retrospective Study design: case series	<i>Critique of methodology:</i> <input checked="" type="checkbox"/> Nonconsecutive patients <input checked="" type="checkbox"/> Nonrandomized

<p>injection in transforaminal epidural injections. Anaesthesia. 65(9): p. 917-921.</p>	<p>Type of evidence therapeutic</p>	<p>Stated objective of study: Evaluated the incidence and factors associated with intravascular injection during transforaminal epidural injection.</p> <p>Type of treatment(s): LTFESI</p> <p>Total number of patients: 1088 patients (2145 injections) Number of patients in relevant subgroup(s):</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up: Not stated</p> <p>Validated outcome measures used (list): None</p> <p>Nonvalidated outcome measures used (list): None</p> <p>Diagnosis made by:</p> <p><input type="checkbox"/> Clinical exam/history</p> <p><input type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input type="checkbox"/> MRI</p> <p><input type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): No clinical complications; vascular injection 10.5%.</p> <p>Author conclusions (relative to question): The level of injection was found to be associated with an increased risk of intravascular injection during TFESI with the highest incidence in cervical and sacral levels.</p>	<p><input checked="" type="checkbox"/> Nonmasked reviewers</p> <p><input checked="" type="checkbox"/> Nonmasked patients</p> <p><input checked="" type="checkbox"/> No validated outcome measures used</p> <p><input type="checkbox"/> Small sample size</p> <p><input type="checkbox"/> <80% follow-up</p> <p><input checked="" type="checkbox"/> Lacked subgroup analysis</p> <p><input type="checkbox"/> Diagnostic method not stated</p> <p><input type="checkbox"/> Other: No follow-up</p> <p><i>Work group conclusions</i></p> <p>Potential Level: IV</p> <p>Downgraded Level: IV</p> <p><i>Conclusions relative to question</i></p> <p>This paper provides evidence that: Vascular injection is a technical risk of LTFESI. The complication rate associated with LTFESI is less than 0.22% per injection.</p>
<p>Smuck, M., et al., Incidence of simultaneous epidural and vascular injection</p>	<p>Level IV</p> <p>Type of evidence therapeutic</p>	<p><input checked="" type="checkbox"/> Prospective <input type="checkbox"/> Retrospective</p> <p>Study design: case series</p> <p>Stated objective of study: The purpose of this study was to determine the incidence of simultaneous epidural and vascular injection during lumbosacral transforaminal epidural injections using live fluoroscopy during contrast</p>	<p><i>Critique of methodology:</i></p> <p><input checked="" type="checkbox"/> Nonconsecutive patients</p> <p><input checked="" type="checkbox"/> Nonrandomized</p> <p><input checked="" type="checkbox"/> Nonmasked reviewers</p> <p><input checked="" type="checkbox"/> Nonmasked patients</p> <p><input checked="" type="checkbox"/> No validated outcome measures used</p> <p><input checked="" type="checkbox"/> Small sample size</p>

<p>during lumbosacral transforamina l epidural injections. Spine J, 2007. 7(1): p. 79-82.</p>		<p>injections.</p> <p>Type of treatment(s): LTFESI</p> <p>Total number of patients: 103 patients (191 injections) Number of patients in relevant subgroup(s):</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up: Not stated</p> <p>Validated outcome measures used (list): None</p> <p>Nonvalidated outcome measures used (list): None</p> <p>Diagnosis made by:</p> <p><input type="checkbox"/> Clinical exam/history</p> <p><input type="checkbox"/> Electromyography</p> <p><input type="checkbox"/> Myelogram</p> <p><input type="checkbox"/> MRI</p> <p><input type="checkbox"/> CT</p> <p><input type="checkbox"/> CT/Myelogram</p> <p><input checked="" type="checkbox"/> Other: Not stated</p> <p>Results/subgroup analysis (relevant to question): No clinical complications reported. 13.1% vascular injection.</p> <p>Author conclusions (relative to question): Simultaneous epidural and vascular injection is twice as likely to occur as vascular injection alone. Use of intermittent fluoroscopy can miss the transient appearance of the vascular component of these injections. Live fluoroscopy is recommended during contrast injection for confirmation of lumbosacral TFESI.</p>	<p><input checked="" type="checkbox"/> <80% follow-up</p> <p><input checked="" type="checkbox"/> Lacked subgroup analysis</p> <p><input checked="" type="checkbox"/> Diagnostic method not stated</p> <p><input type="checkbox"/> Other:</p> <p><i>Work group conclusions</i></p> <p>Potential Level: IV</p> <p>Downgraded Level: IV</p> <p><i>Conclusions relative to question</i></p> <p>This paper provides evidence that: Vascular injection is a technical risk of LTFESI.</p>
<p>Somayaji HM, Saifuddin AM, Casey AF, Briggs TF. Spinal cord infarction following</p>	<p>Level IV</p> <p>Type of evidence therapeutic</p>	<p><input type="checkbox"/> Prospective <input checked="" type="checkbox"/> Retrospective</p> <p>Study design: case series</p> <p>Stated objective of study: Report a rare case of spinal cord infarction following therapeutic computed tomography-guided nerve root injection.</p>	<p><i>Critique of methodology:</i></p> <p><input type="checkbox"/> Nonconsecutive patients</p> <p><input type="checkbox"/> Nonrandomized</p> <p><input type="checkbox"/> Nonmasked reviewers</p> <p><input type="checkbox"/> Nonmasked patients</p> <p><input type="checkbox"/> No validated outcome measures used</p> <p><input type="checkbox"/> Small sample size</p>

therapeutic computed tomography- guided left L2 nerve root injection. Spine 2005;30:E106-8.		<p>Type of treatment(s): CT guided left L2-3 TF L2 ESI using a 21 gauge spinal needle with bupivacaine and triamcinolone.</p> <p>Total number of patients: 1 Number of patients in relevant subgroup(s):</p> <p>Consecutively assigned? No</p> <p>Duration of follow-up: 6 weeks</p> <p>Validated outcome measures used (list):</p> <p>Nonvalidated outcome measures used (list):</p> <p>Diagnosis made by:</p> <p><input checked="" type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input checked="" type="checkbox"/> MRI <input type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input type="checkbox"/> Other:</p> <p>Results/subgroup analysis (relevant to question): Neurological exam immediately after the procedure revealed complete sensory and motor loss below L1 and absence of lower extremity reflexes. MRI 48 hours post-injury showed increased signal of the distal thoracic spinal cord and conus medullaris consistent with acute infarction. Six week follow-up showed minimal improvement, and loss of bowel and bladder control.</p> <p>Author conclusions (relative to question): Spinal cord infarction, albeit rare, can occur following therapeutic computed tomography-guided ESI secondary to inadvertent intraarterial injection into low lying artery of Adamkiewicz.</p>	<p><input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other:</p> <p><i>Work group conclusions</i> Potential Level: IV Downgraded Level: IV</p> <p><i>Conclusions relative to question</i> This paper provides evidence that: Spinal cord injury can occur as a result of LTFESI.</p>
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What is the value (eg, cost per QALY) of TFESI in the treatment of lumbar radicular pain?

Article (Alpha by Author)	Level of evidence	Description of study	Conclusion
Karppinen J, Ohinmaa A, Malmivaara A et al. Cost effectiveness of periradicular infiltration for sciatica. Spine 2001; 26:2587- 2595.	Level I Type of evidence therapeutic	<input checked="" type="checkbox"/> Prospective <input type="checkbox"/> Retrospective Study design: RCT Stated objective of study: Describe the cost-effectiveness of periradicular infiltration with steroid in subgroups of patients with sciatica. Type of treatment(s): methylprednisolone-bupivacaine (TFESI); saline (NS) Total number of patients: 160 Number of patients in relevant subgroup(s): TFESI/NS; Bulges:18/11;Contained:24/26;Extrusions:38/43. Consecutively assigned? Yes Duration of follow-up: 12 months Validated outcome measures used (list): VAS (leg pain primary); ODI; Nottingham Nonvalidated outcome measures used (list): Cost-effectiveness Diagnosis made by: <input checked="" type="checkbox"/> Clinical exam/history <input type="checkbox"/> Electromyography <input type="checkbox"/> Myelogram <input checked="" type="checkbox"/> MRI <input type="checkbox"/> CT <input type="checkbox"/> CT/Myelogram <input type="checkbox"/> Other: Results/subgroup analysis (relevant to question): Bulges: treatment area under the curve (AUC) scores were similar. Contained: scores for leg pain were significantly better for LTFESI at two weeks and at four weeks. At six	<i>Critique of methodology:</i> <input type="checkbox"/> Nonconsecutive patients <input type="checkbox"/> Nonrandomized <input type="checkbox"/> Nonmasked reviewers <input type="checkbox"/> Nonmasked patients <input type="checkbox"/> No validated outcome measures used <input type="checkbox"/> Small sample size <input type="checkbox"/> <80% follow-up <input type="checkbox"/> Lacked subgroup analysis <input type="checkbox"/> Diagnostic method not stated <input type="checkbox"/> Other: <i>Work group conclusions</i> Potential Level: I Downgraded Level: I <i>Conclusions relative to question</i> This paper provides evidence that: (1) at four weeks after treatment, LTFESI achieves significantly greater improvements in pain and disability than a credible sham treatment in patients with contained herniations, but not in patients with extrusions; and (2) for providing at least 75% relief of radicular pain, LTFESI is more often effective (0.44) than sham treatment (0.21) with an NNT of 5. However, this difference is not statistically significant because of the small sample sizes and low success rates encountered in the study. Nevertheless TFESI is substantially and significantly more cost effective than sham treatment.

		<p>months leg pain, disability and Nottingham emotional scores were significantly better for saline. At one year treatment effects were 0. Extrusions: Leg pain was significantly better in the saline group at six months. At one year TFESI prevented operations for contained herniated intervertebral disc (HIVD) costing \$12,666 less per responder (>75% decrease in leg pain).</p> <p>Author conclusions (relative to question): TFESI for contained HIVD is superior to saline in terms of leg pain and medical costs, and possibly prevents operative treatment. For extrusions corticosteroid appears countereffective.</p>	
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