

TRANSFORAMINAL NEEDLES

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[Pain Physician](#). 2011 May-Jun;14(3):285-93.

Improving the safety of transforaminal epidural steroid injections in the treatment of cervical radiculopathy.

[Kloth DS](#), [Calodney AK](#), [Derby R](#), [Lagattuta FP](#), [O'Neill C](#), [Yurth E](#), [Miller LE](#), [Block JE](#).

Source

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Abstract

BACKGROUND:

Unplanned vascular trespass occurs in 20% of cervical transforaminal epidural steroid injections (CTFESI) and rarely results in devastating neurologic complications. The Trucath Spinal Injection System is a novel integrated catheter and needle device that is specifically designed to minimize vascular trespass risk.

OBJECTIVE:

To compare the vascular trespass incidence with the Trucath Spinal Injection System versus standard spinal needles during CTFESI treatment in patients with cervical radiculopathy.

STUDY DESIGN:

Prospective, multicenter, nonrandomized safety trial.

SETTING:

Six tertiary spinal pain management centers in the United States.

METHODS:

We treated 290 patients (411 levels) with recalcitrant cervical radiculopathy using CTFESI; 129 patients (180 levels) were treated with the Trucath Spinal Injection System (Test group) and 161 patients (231 levels) were treated with standard spinal needles (Control group). All injections were administered via a transforaminal approach. Each site attained IRB approval for this study before any research was

performed. The primary study endpoint was vascular trespass per treated level. Secondary endpoints included nerve pain or paresthesia, injection accuracy, device performance measures, and procedural adverse events.

RESULTS:

Vascular trespass occurred more often (odds ratio (OR): 3.1, 95% Confidence Interval (CI): 1.8-5.4, $P < 0.001$) in Controls (26.8%, 62/231 levels) versus Test patients (10.6%, 19/180 levels). Radicular pain or paresthesia from device positioning was more frequent (OR: 21.1, 95% CI: 6.9-64.5, $P < 0.001$) in Controls (26.4%, 61/231) versus Test participants (1.7%, 3/179). Inadequate epidural flow was observed in 3.0% (7/231) of Controls and 5.6% (10/179) of Test participants (OR: 0.5, 95% CI: 0.2-1.4, $P = 0.22$). Based on subjective physician judgment (scale: 1-10), there were no differences between the Test and Control groups, respectively, for ease of use (mean 8.9 vs. 9.0), visualization under fluoroscopy (mean 9.2 vs. 9.0), and overall performance (mean 9.0 vs. 8.6). No additional adverse effects were reported in either treatment group in this clinical study.

LIMITATIONS:

The study did not randomly allocate the type of injection procedure to participants and no clinical outcomes beyond the initial treatment were collected.

CONCLUSIONS:

The Trucath Spinal Injection System demonstrated a statistically significant reduction in the rate of intravenous and intra-arterial trespass, procedural pain, and paresthesia, and has similar accuracy and performance versus standard spinal needles for CTFESI treatment of cervical radiculopathy.

[Pain Med.](#) 2011 Jun;12(6):864-70. doi: 10.1111/j.1526-4637.2011.01119.x. Epub 2011 May 3.

Epidural contrast flow patterns of transforaminal epidural steroid injections stratified by commonly used final needle-tip position.

[Desai MJ](#), [Shah B](#), [Sayal PK](#).

Source

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Abstract

OBJECTIVE:

To evaluate the relationship between commonly used final needle-tip positions and subsequent contrast flow and patient-reported pain relief in transforaminal epidural steroid injections (TFESIs).

DESIGN:

Retrospective cross-sectional study.

METHODS:

Medical records of subjects (N = 83) having undergone a TFESI between January 2008 and January 2009 were reviewed to compare TFESIs using the superior-anterior (SA) vs. the superior-posterior (SP) quadrant.

OUTCOME MEASURES:

Outcome measures included ventral and dorsal epidural contrast flow as well as near-to-complete pain relief as measured by numerical rating scale pain score pre- and post-procedure.

RESULTS:

SA TFESIs were associated with greater ventral epidural contrast flow as compared with SP TFESIs (100% vs 61.4%, $P < 0.001$). SA TFESIs with ventral epidural contrast flow were also associated with flow to a greater number of vertebral levels than SP TFESIs with ventral epidural contrast flow (41% vs 14.8%, $P < 0.001$). SP TFESIs were associated with greater dorsal epidural contrast flow than SA TFESIs (95.5% vs 43.6%, $P < 0.05$). SA TFESIs were also associated with a larger proportion of patients who achieved near-to-complete pain relief ($P < 0.05$) and greater reduction than SP TFESIs in post-procedure pain score relative to pre-procedure (3.3 vs 1.5, $P < 0.01$).

DISCUSSION:

The evolution of TFESIs must balance both safety and efficacy. The efficacy of SA TFESIs is demonstrated to be superior to that of SP TFESIs with regards to ventral epidural flow and patient-reported pain relief. Further efforts should focus on demonstrating efficacy while optimizing safety.

[Reg Anesth Pain Med](#). 2011 May-Jun;36(3):278-81.

Morphologic study of nerve root and types of needle used in transforaminal injections.

[Hernández-García JM](#), [Reina MA](#), [Prats-Galino A](#), [De Andrés JA](#).

Source

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Abstract

BACKGROUND:

The bevel type and location of the distal orifice of the needle may have relevance for potential complications occurring during transforaminal epidural injection.

METHODS:

We examined by scanning electron microscopy the structural aspects of spinal nerve root cuffs of 3 human cadavers, and 3 needle types used in transforaminal injections: 22-gauge Quincke spinal needles, 22-gauge blunt nerve block needles, and 20-gauge radiofrequency blunt needles. We made punctures in vitro in the spinal nerve root cuffs, and we studied the structures affected.

RESULTS:

There is fat tissue within the nerve root with irregular distribution. In needles with a round tip, the distal orifice maintained an extraneural location after puncture of the nerve root cuff. The length of the needle required to introduce the distal orifice completely inside the nerve root cuff was variable, depending on the type: shortest for a Quincke needle (1.8 mm), 4.1 mm for the Epimed, and longest for radiofrequency needles (5.7 mm).

CONCLUSIONS:

The layer of fat around nerve roots may prevent the contact of the needle tip with axons. The sharp needle tip entered the nerve root cuff more easily than the blunt tip in the cadaveric nerve root samples, measured in a qualitative manner. There is a need for clinical studies to ascertain if blunt needles may be safer than sharp needles for transforaminal injections.

[Spine \(Phila Pa 1976\)](#). 2011 Feb 1;36(3):E220-3.

Inadvertent injection of a cervical radicular artery using an atraumatic pencil-point needle.

[Smuck M](#), [Leung D](#).

Source

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Abstract

STUDY DESIGN:

Case report and review of the literature.

OBJECTIVE:

To report the first case of inadvertent injection of a cervical radicular artery using an atraumatic pencil-point needle.

SUMMARY OF BACKGROUND DATA:

Rare complications from cervical transforaminal epidural corticosteroid injection have resulted in infarction of the spinal cord and brain. The most often-hypothesized mechanism is inadvertent intra-arterial injection of particulate corticosteroids with a resulting embolus and infarction.

METHODS:

Retrospective review of a patient's history and fluoroscopic imaging.

RESULTS:

A 30-year-old man with a diagnosed cervical radiculopathy underwent a right C6-C7 transforaminal epidural corticosteroid injection, using a 25-gauge 3.5-inch Whitacre spinal needle. Simultaneous epidural and radicular artery spread were observed under live fluoroscopy. The patient suffered no complications from the procedure.

CONCLUSION:

This case demonstrates that the use of pencil-point (Whitacre) needles does not eliminate the risk of inadvertent arterial injection during cervical transforaminal epidurals. Further investigation is required to determine whether the incidence of inadvertent vascular injection is reduced with pencil-point needles compared with sharp-beveled needles

[AJNR Am J Neuroradiol](#). 2010 Nov;31(10):1831-6. Epub 2010 Aug 26.

CT-guided cervical selective nerve root block with a dorsal approach.

[Wolter T](#), [Knoeller S](#), [Berlis A](#), [Hader C](#).

Source

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Abstract

BACKGROUND AND PURPOSE:

Cervical transforaminal blocks are frequently performed to treat cervical radicular pain. These blocks are performed mostly under fluoroscopy, but a CT-guided technique has also been described. The aim of this study was to review the results of CT-guided CSNRB by using a dorsal approach, to describe the contrast patterns achieved with this injection technique, and to estimate the degree of specificity and sensitivity.

MATERIALS AND METHODS:

We used a CT-guided technique with a dorsal approach leading to a more extra- than transforaminal but a selective nerve root block as well. Of 53 blocks, we performed 38 for diagnostic and 15 for therapeutic indications. Pain relief was measured hourly on a VAS. The distribution of contrast and the angle of the trajectory of the injection needle were analyzed as well as the degree of pain relief.

RESULTS:

Contrast was found in the intraforaminal region in 8 (15%) blocks, extraforaminally in 40 (78%) blocks, and intraspinally in 3 (6%) blocks. The mean angle between the needle and the sagittal plane was 26.6° (range, from 1° to 50°). The mean distance between needle tip and nerve root was 4.43 mm (range, 0-20 mm). Twenty-six (68.4%) of the 38 diagnostic blocks led to a decrease in the pain rating of $>50\%$. There were no complications or unintended side effects, apart from occasional local puncture pain.

CONCLUSIONS:

We conclude that CT-guided CSNRBs using a dorsal approach are feasible and that they are sensitive and specific.

[Pain Med.](#) 2010 Oct;11(10):1511-5. doi: 10.1111/j.1526-4637.2010.00932.x. Epub 2010 Aug 23.

Interlaminar versus transforaminal epidural steroid injections for the treatment of symptomatic lumbar spinal stenosis.

[Smith CC](#), [Booker T](#), [Schaufele MK](#), [Weiss P](#).

Source

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Abstract

BACKGROUND:

Lumbar spinal stenosis is a common condition that causes axial low back pain, radicular pain, and neurogenic claudication. Epidural steroid injections are commonly used for the treatment of radicular symptoms and neurogenic claudication associated with symptomatic lumbar spinal stenosis. No prior study has evaluated whether transforaminal or interlaminar epidural steroid injections produce better clinical outcomes.

DESIGN:

Retrospective case control study.

METHODS:

For each technique, 19 patients were retrospectively identified who received their first fluoroscopically guided epidural steroid injection for radicular and neurogenic claudication symptoms caused by lumbar spinal stenosis over a 12-month interval. All patients had corresponding MRI findings and had failed previous non-invasive therapies. Outcomes included the visual analog scale (VAS, 0-10 scale) immediately before the injection, immediately after the injection, and upon follow up at 4-6 weeks. Surgery rates and number of repeat injections over a 3 year period were also analyzed. The patient groups were matched for age and level of stenosis on MRI.

RESULTS:

There was no statistically significant difference between the two groups in pre injection to follow up VAS scores ($P=0.919$). The difference between number of repeat injections between the interlaminar and transforaminal groups was not statistically significant (0.91-mean 2.47 and 2.58, respectively). Both the interlaminar and transforaminal groups experienced statistically significant improvement in VAS scores from before the injection to after the injection, and on follow up. Low numbers underwent surgery (11% in the interlaminar group vs 15% in the transforaminal group, not significant, $P=0.63$).

CONCLUSIONS:

In the current study, neither transforaminal nor interlaminar steroid injections resulted in superior short term pain improvement or fewer long term surgical interventions or repeat injections when compared with each other.

Fluoroscopically guided transforaminal epidural dry needling for lumbar spinal stenosis using a specially designed needle.

[Ahn K](#), [Jhun HJ](#), [Lim TK](#), [Lee YS](#).

Source

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Abstract

BACKGROUND:

This report describes the methodological approach and clinical application of a minimally invasive intervention to treat lumbar spinal stenosis (LSS).

METHODS:

Thirty-four patients with LSS underwent fluoroscopically guided transforaminal epidural dry needling using a specially designed flexed Round Needle. The needle was inserted 8-12 cm lateral to the midline at the level of the stenosis and advanced to a position between the anterior side of the facet joint and pedicle up to the outer-third of the pedicle. The needle was advanced medially and backed laterally within a few millimetres along the canal side of the inferior articular process between the facet joint and pedicle. The procedure was completed when a marked reduction in resistance was felt at the tip of the needle. The procedure was performed bilaterally at the level of the stenosis.

RESULTS:

The average follow-up period was 12.9 +/- 1.1 months. The visual analogue scale (VAS) pain score was reduced from 7.3 +/- 2.0 to 4.6 +/- 2.5 points, the Oswestry Disability Index (ODI) score decreased from 41.4 +/- 17.2 to 25.5 +/- 12.6% and the average self-rated improvement was 52.6 +/- 33.1%. The VAS scores indicated that 14 (41.2%) patients reported a "good" to "excellent" treatment response, while 11 (32.4%) had a "good" to "excellent" treatment response on the ODI and 22 (64.7%) had a "good" to "excellent" treatment response on the self-rated improvement scale.

CONCLUSIONS:

These results suggest that fluoroscopically guided transforaminal epidural dry needling is effective for managing LSS.

[Spine J.](#) 2010 May;10(5):367-71. Epub 2010 Feb 19.

Influence of needle type on the incidence of intravascular injection during transforaminal epidural injections: a comparison of short-bevel and long-bevel needles.

[Smuck M](#), [Yu AJ](#), [Tang CT](#), [Zemper E](#).

Source

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Abstract

BACKGROUND CONTEXT:

Vascular penetration and injection of corticosteroids into a vessel during lumbosacral transforaminal epidural injection is a suspected cause of myelopathy. Blunt needles have been suggested to avoid vascular penetration, but they are difficult to navigate. Another alternative to the standard long-bevel sharp needles is the short-bevel needles. Some have postulated that short-bevel needles are the best option for high-risk spine injections because they maintain navigation characteristics while potentially reducing the risk of complications. To date, no studies have been performed to either confirm or refute this.

PURPOSE:

The purpose of this study was to determine if there is a difference in the incidence of vascular penetration during lumbosacral transforaminal epidural injections between short-bevel and long-bevel needles.

STUDY DESIGN/SETTING:

This is a prospective, observational, in vivo study.

PATIENT SAMPLE:

The sample comprises patients receiving lumbosacral transforaminal epidural injections at a university-based outpatient spine center.

OUTCOME MEASURE:

The outcome measure was the incidence of vascular contrast patterns observed under live fluoroscopy.

METHODS:

One interventional spine physician recorded contrast patterns observed during 158 fluoroscopically guided lumbosacral transforaminal epidural injections under live fluoroscopy using two different types of needle tips.

RESULTS:

Vascular injections were observed in 22 of the 158 injections, for an overall incidence of 13.9%. The incidence of vascular injections in the short-bevel group was 15.6% (10/64) and in the long-bevel group was 12.8% (12/94). This difference was not statistically significant ($p=.6447$). A secondary analysis was performed to determine if the needle gauge influenced the incidence of vascular injections, and again, there were no statistical differences in the overall rates of vascular injection.

CONCLUSIONS:

In comparison with long-bevel needles, short-bevel needles do not reduce the risk of inadvertent vascular injection in lumbosacral transforaminal epidural injections.

[Spine \(Phila Pa 1976\)](#). 2009 Apr 1;34(7):731-9.

Complications of transforaminal cervical epidural steroid injections.

[Malhotra G](#), [Abbasi A](#), [Rhee M](#).

Source

Department of Physical Medicine and Rehabilitation, Veterans Affairs, East Orange, NJ.

Abstract

STUDY DESIGN:

A comprehensive literature review.

OBJECTIVES:

To review and critically evaluate the past literature focusing on incidence and clinical presentation of complications associated with transforaminal cervical epidural steroid injection (TFCESI) and techniques employed to avoid them. The overall goal is to

guide the direction of future research and improve clinical care by increasing awareness of complications and measures that may be undertaken to increase safety.

SUMMARY OF BACKGROUND DATA:

TFCESI is a component in the diagnosis and management of cervical radicular syndromes in patients who have failed conservative management. There has been much discussion and also controversy in the recent literature. Considerable attention has been paid to reports of catastrophic complications and proposed measures to avoid them.

METHODS:

Medical databases were searched for studies of TFCESI. The bibliographies of these articles were then searched as well. Thoracic and lumbar articles were discarded as were any non-transforaminal cervical procedures or those that did not involve injection into the epidural space. Particular attention was paid to serious neurologic sequelae after TFCESI and its mechanism, as well as techniques being employed to avoid complications.

RESULTS:

There are a limited number of studies looking at complications of TFCESI. One retrospective study reported an overall rate of complications of 1.64%. There are reports of serious neurologic sequelae in the literature including brain and spinal cord infarction due to embolic phenomenon of particulate steroids. Cadaveric dissection revealed ascending and deep cervical arterial branches entering the external opening of the posterior intervertebral foramen, the classic target site for TFCESI. Measures to avoid complications mentioned in the literature include the use of nonparticulate steroids, test dose of local anesthetic before injection of steroids, live fluoroscopy, digital subtraction, no to light sedation, use of true lateral view to supplement frontal and oblique views in fluoroscopy, use of blunt needles, and computed tomography guidance.

CONCLUSION:

The literature reveals a number of rare, potentially catastrophic neurologic sequelae including brain and spinal cord infarction. Most of these are thought to be due to intravascular uptake of particulate steroids. The true overall incidence remains obscure due to the lack of blinded controlled studies. Injectionists, referring physicians, and patients should be aware of the nature and potential consequences of these complications. Additionally, it is imperative for injectionists to standardize techniques to minimize complications, especially by using a test dose of local anesthetic before injection of preferably nonparticulate corticosteroid.

[Arch Phys Med Rehabil.](#) 2007 Dec;88(12):1730-3.

The S1 "Scotty dog": report of a technique for S1 transforaminal epidural steroid injection.

[Fish DE](#), [Lee PC](#), [Marcus DB](#).

Source

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Abstract

OBJECTIVE:

To report a technique for needle placement by using the bony landmark of the "Scotty dog" on an oblique view for epidural injection of corticosteroid into the S1 foramina.

DESIGN:

Brief report on a technique for S1 transforaminal epidural steroid injection.

SETTING:

Academic multispecialty spine center.

PARTICIPANTS:

Patients with L5 and S1 foraminal and paracentral disk herniation with concurrent L5-S1 radicular pain.

INTERVENTION:

Fluoroscopically guided, contrast-enhanced L5 and S1 transforaminal epidural steroid injections (ESIs).

MAIN OUTCOME MEASURES:

Not applicable.

RESULTS:

The L5-S1 foramina can be visualized with 1 oblique (and usually caudally tilted) fluoroscopic view. An S1 Scotty dog can be visualized as an anatomic landmark for the guidance of the needle tip into the S1 foramen. While performing simultaneous L5 and S1 transforaminal ESIs, 1 view can be used to guide both needles into the

foramen. Thus, the procedure can be completed in less time and potentially with less radiation exposure than if different views for each foramen were to be used.

CONCLUSIONS:

Classic description of the S1 spinal nerve block uses an anteroposterior approach to the foramen. Looking for an S1 Scotty dog facilitates predictable visualization of the foramen, medial needle placement with epidural flow of contrast, and simultaneous visualization for needle placement to the L5 foramen.

[Pain Physician](#). 2007 May;10(3):501-10.

Lumbar retrodiscal transforaminal injection.

[Jasper JF](#).

Source

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Abstract

BACKGROUND:

Spinal injections are commonly used to treat lumbar radiculitis and back pain. Delivery of medication to specific targeted pathology is considered important for a successful therapeutic outcome. A variety of routes of injection have been devised for epidural injection of corticosteroid.

OBJECTIVES:

The author demonstrates a variation of the transforaminal injection technique. The radiographic spread of contrast is described using a more oblique and ventral caudad approach in the epidural space "retrodiscal." It is suggested that the radiographic findings of this technique for discogenic causes of induced radiculitis and/or back pain may yield more precise targeting of putative pathologic sources of radiculopathy and back pain in selected patients.

METHODS:

In patients with disc pathology and radiculitis, the anatomy of the lumbar epidural space is reviewed for its potential effect on the flow of injectate. Contrast spread was documented for lumbar transforaminal injection using a needle placement more oblique and behind the disc rather than in the cranial portion. Comparison is made to a typical contrast spread of an infra-pedicular placed transforaminal injection.

RESULTS:

Retrodiscal contrast injection results in reliable coverage of the retrodiscal region, the exiting nerve at that foraminal level and the proximal portion of the transiting segmental neural sleeve.

CONCLUSIONS:

The radiographic findings demonstrate a difference between classic infra-pedicular versus retrodiscal transforaminal epidural contrast injection patterns, particularly at relatively low volumes. The clinical advantage of one technique versus the other should be established in randomized prospective studies.

[Pain Physician](#). 2006 Oct;9(4):327-32.

MRI images at a 45-degree angle through the cervical neural foramina: a technique for improved visualization.

[Goodman BS](#), [Geffen JF](#), [Mallempati S](#), [Noble BR](#).

Source

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Abstract

BACKGROUND:

Traditional MRI imaging of the cervical neural foramina (NF) generally utilizes sagittal and axial views to delineate pathology. These views may not fully delineate NF pathology. Enhanced imaging and visualization of this area would benefit all interventionalists. The spinal interventionalist, in particular, routinely utilizes approximately a 45-degree fluoroscopic en face view for placement of needles for a cervical transforaminal epidural. The interventionalist relies on axial MRI views to identify NF pathology that can be conceptually more difficult to analyze. Routine 45-degree oblique views through the NF, along with traditional axial views for correlation, more clearly demonstrate NF pathology.

CASES:

Two cases are presented in which the 45-degree oblique views more clearly demonstrate neural foramina pathology.

CONCLUSION:

These clinical cases demonstrate the clinical utility of the cervical spine MRI 45 degree oblique technique and show cervical NF pathology that is not as easily identified on routine axial and sagittal sequences. We advocate the routine acquisition and examination of 45-degree cuts to help spinal practitioners better delineate NF pathology.

[Pain Physician](#). 2004 Apr;7(2):211-5.

Epidurography contrast patterns with fluoroscopic guided lumbar transforaminal epidural injections: a prospective evaluation.

[Botwin K](#), [Natalicchio J](#), [Brown LA](#).

Source

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Abstract

BACKGROUND:

Lumbar transforaminal epidural injections have been utilized in the treatment of radicular pain with proven success. It was postulated that interlaminar epidural injections result in a dorsal flow of contrast while transforaminal epidural steroid injections showed good ventral flow limited to one single spinal motion segment. There have been no published studies evaluating epidurography/contrast patterns utilizing fluoroscopy.

OBJECTIVE:

To evaluate the pattern and spread of epidural contrast during fluoroscopically guided lumbar transforaminal epidural steroid injections.

DESIGN:

A prospective study of case series of 20 consecutive patients receiving lumbar transforaminal epidural injections.

METHODS:

Patients had either herniated nucleus pulposus or lumbar spinal stenosis. All patients received their injection by one of five physicians trained in this technique. Once the needle tip was felt to be in the anterior epidural space anteroposterior and a lateral

radiographs were obtained after a total of 2 mL of iopamidol (Isovue) contrast was injected. Epidurograms were reviewed by a physician trained in fluoroscopic injections. Patterns were recorded as unilateral, bilateral, dorsal or ventral. Ventral flow, both cephalad and caudal, and number of lumbar intervertebral levels of flow were recorded as well.

RESULTS:

Ventral contrast flow occurred in all 20 injections. Unilateral contrast flow was noted in all injections. The mean number of levels of flow of contrast cephalad and caudad from the injection site were 1.13 and 0.6 levels, respectively, but these differences were not statistically significant. There were no significant differences in contrast flow noted between patients with herniated nucleus pulposus or lumbar spinal stenosis. Vascular injection patterns were noted with 2 injections, which required repositioning of the needles.

CONCLUSION:

Contrast appeared ventrally and unilaterally in all injections. Dorsal flow occurred in 20% of these injections. No contrast flow crossed the midline. The observed contrast flow patterns should be studied clinically to determine whether they have any effect on clinical outcome. Intravascular injections were noted in 10% of cases.

[Spine \(Phila Pa 1976\)](#). 2000 Oct 15;25(20):2628-32.

Incidence of intravascular penetration in transforaminal lumbosacral epidural steroid injections.

[Furman MB](#), [O'Brien EM](#), [Zgleszewski TM](#).

Source

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Abstract

STUDY DESIGN:

A prospective, observational, human, in vivo study.

OBJECTIVES:

To evaluate the incidence of vascular penetration during fluoroscopically guided, contrast-enhanced, transforaminal lumbar epidural steroid injections (ESIs) and

determine whether a "flash" (blood in the needle hub) or aspiration of blood can be used to predict a vascular injection.

SUMMARY OF BACKGROUND DATA:

Incorrectly placed, intravascular lumbosacral spinal injections result in systemic medication flow that misses the desired target. No previous studies evaluate the incidence of vascular injections in transforaminal ESIs, nor the ability of flash to predict a vascular injection.

METHODS:

The incidence of flash or positive blood aspiration and the incidence of fluoroscopically confirmed vascular spread were prospectively observed in 670 patients treated with lumbosacral fluoroscopically guided transforaminal ESIs. Presence of a flash or positive aspiration was documented. Contrast was injected to determine whether the needle tip was intravascular.

RESULTS:

Seven hundred sixty-one transforaminal ESIs were included. The overall rate of intravascular injections was 11.2%. There was a statistically significant higher rate of intravascular injections (21.3%) noted with transforaminal ESIs performed at S1 (n = 178), compared with those at the lumbar levels (8.1%, n = 583). Using flash or positive blood aspirate to predict intravascular injections was 97.9% specific, but only 44.7% sensitive.

CONCLUSIONS:

There is a high incidence of intravascular injections in transforaminal ESIs that is significantly increased at S1. Using a flash or blood aspiration to predict an intravascular injection is not sensitive, and therefore a negative flash or aspiration is not reliable. Fluoroscopically guided procedures without contrast confirmation are instilling medications intravascularly and therefore not into the desired epidural location. This finding confirms the need for not only fluoroscopic guidance but also contrast injection instillation in lumbosacral transforaminal ESIs.