



Musculoskeletal Imaging and Intervention Section Procedures

Lumbar Transforaminal Epidural Steroid Injection

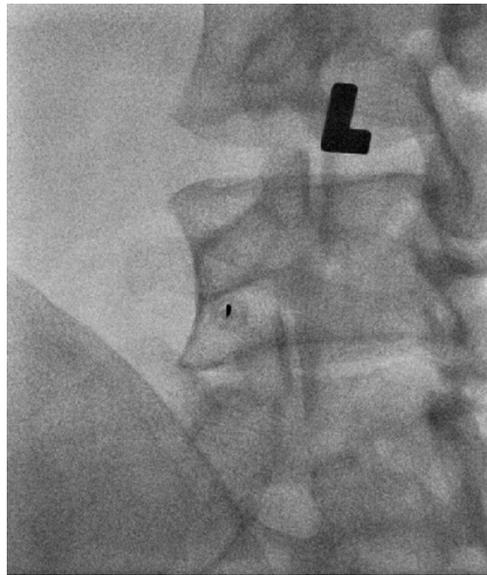
Prior to the procedure, review the patient's recent clinic notes, prior imaging (including any transitional anatomy), allergies and medications (particularly anticoagulants).

Materials

- 1% lidocaine buffered for local anesthesia (~10 ml)
- Iodinated contrast (~5 ml)
- Triamcinolone (Kenalog) 40 mg/ml or dexamethasone 10 mg/ml (2 ml)
- 1.0% preservative-free lidocaine (2 ml)

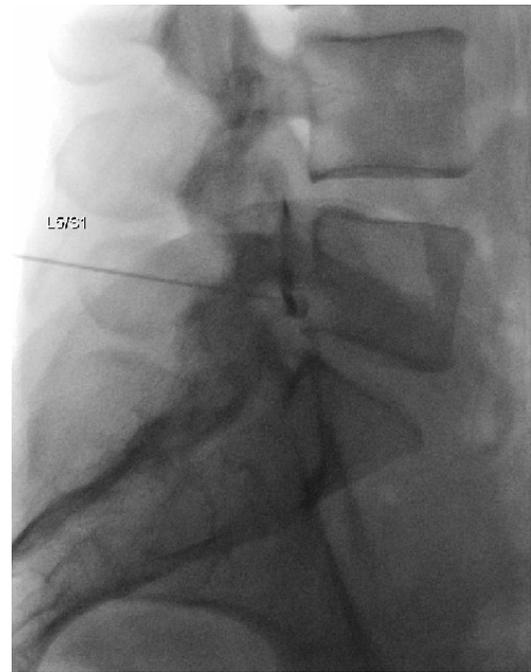
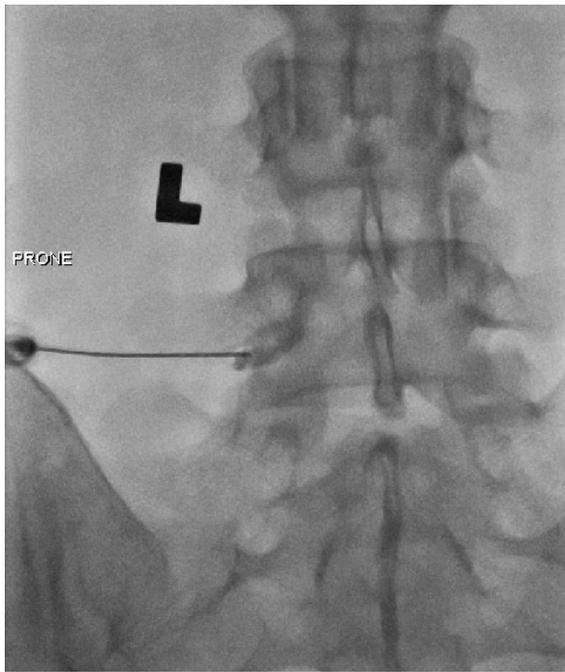
Technique

1. After obtaining written informed consent, perform a timeout.
2. Position the patient prone on the table with the targeted side away from you.
3. Obtain an AP scout that includes T12-S1 to show the anatomy and confirm your level/side.
4. Set up views:
 - A. AP view: Cone down and mag up get an AP view centered at the level you are treating, and tilt the I-I cranio-caudal to profile the inferior endplate. Oblique the tube left-right to center the spinous process of the upper vertebral body of your injection level. Save this as position 1.
 - B. Trajectory view: Rotate the I-I 25-30 (30+ for L5-S1) degrees toward the target side to outline the "scotty dog." Your target is just underneath the 6:00 position on the pedicle—so the main determinant of your angle is making sure you are far out enough to get the facet out of the way, medial to your injection target. You will bullseye your needle to this spot. Place a Kelly clamp on the patient's back over this spot and mark the skin. Save this as position 2.
 - C. Lateral view: Rotate the I-I 90 degrees from your AP (position 1) view. Ensure the pedicles and facets are lined up/overlapping. Save this as position 3.
5. Prep the area with Betadine (chlorhexidine is contraindicated in spine procedures due to risk of arachnoiditis) and sterile drapes. Draw up medications according to UW protocol (2 ml lido + 2 ml Kenalog below L2, replace Kenalog with dexamethasone for L2 and above). Numb the skin and soft tissues at your skin mark using the 30 Ga 0.5" then the 27 Ga 1.5" needle.
6. In trajectory view, place the 22 Ga 6" needle on the skin to confirm position. Advance the needle at that skin position along the anticipated path of the fluoroscopic beam with the goal of bulls-eying the needle to your chosen spot.

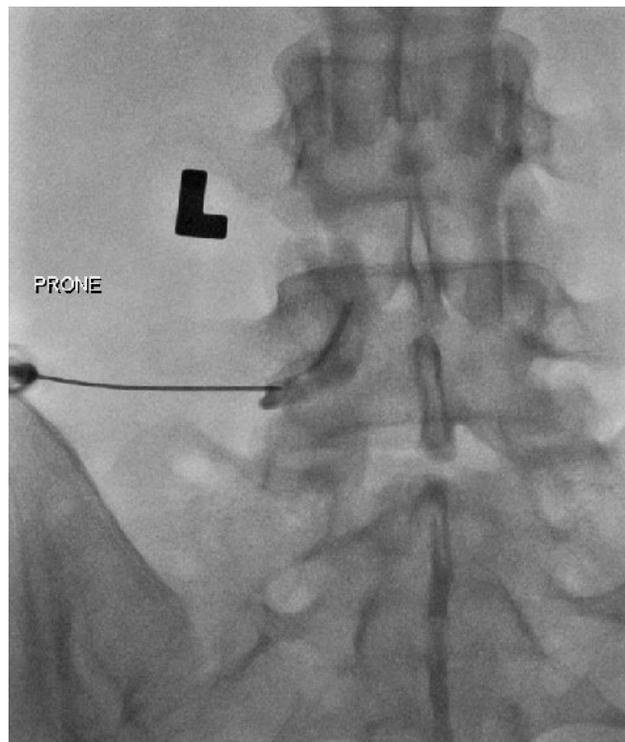


Trajectory image

7. Advance slowly, periodically confirming your bullseye trajectory. When you think you are close, change to your AP view (position 1).
 - A. If you are at the lateral margin of the vertebral body, check your lateral view (position 3). Confirm you are just posterior to or within the posterior 2/3 of the superior aspect of the neural foramen.
 - B. If you are not to the edge of the vertebral body on AP view, go back to advancing in trajectory until you are.
8. At this point, warn the patient that you are getting close and they should alert you if they feel radicular pain.
9. Advance very slowly, until you are just lateral to the 6:00 position of the pedicle (5:30 or 6:30) on the AP view and within the anterior 1/3 of the neural foramen on the lateral view.
10. Stop if:
 - A. The patient gets radicular symptoms (radicular symptoms are not the goal in a TF ESI, though they sometimes occur).
 - B. You reach the 5:30 or 6:30 position under the pedicle, or
 - C. You hit vertebral body.
11. At any of the above 3 stopping points, remove the stylet and check your position with a small injection of contrast while watching under fluoro in the AP view. You should see flow distally along the exiting nerve root and proximally into the epidural space. You should not see flow into a vessel or within CSF. Switch to your lateral view and confirm position in an identical manner.



12. After confirming epidural placement, inject your lidocaine/steroid mixture under fluoro to assure dilution of contrast by the treatment solution. Remove the needle, cleanse the skin (betadine is itchy), and place a band-aid.



Tips:

- Have the patient lie prone with the target side away from you. This way the I-I will not be in your face when you are working. If you are stuck doing bilateral injections, too bad.

- Err on the side of having the patient rotated slightly away from you if not completely flat. The I-I of the C-arm will rotate toward you for the lateral images, and cannot rotate past 90 degrees.
- Flip the image so that the patient's left is on your left to reflect prone positioning.
- When you are close to the neural foramen, it is nice to let the patient know they may get reproduction of their radicular symptoms soon.
- Rotate the notch so that it is medial prior to injection to maximize epidural flow.
- Kenalog may precipitate from solution and is embolic if injected intravascularly. Therefore, at L2 and above where the venous plexus is more robust, dexamethasone is used. Dex should also be considered in post-surgical areas that are likely highly vascularized.
- After steroid injection, remove the needle slowly. **Slowly hurts less.** Be compassionate!
- The procedure described is the traditional, supraneural approach to transforaminals. There is also an infra-neural approach that we do not use often here.

Write-up credit: Lara Mrak, MD