



Cervical Epidural Steroid Injection

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Abstract

Cervical epidural steroid injections are most commonly used to treat cervical radiculopathy refractory to conservative treatment. Cervical radiculopathy is a chronic pain condition characterized by neck pain, paresthesia, or muscle weakness that can radiate to the shoulders, arms, and hands and is often caused by compression or inflammation of the cervical spinal cord nerve roots. The injection of corticosteroids via a transforaminal or interlaminar approach can improve this inflammation and reduce the pressure on the nerve roots.

Cervical epidural steroid injections are indicated for cervical herniated discs, degenerative disc disease, cervical spondylosis, or cervical spinal stenosis, with up to 50% of patients having significant relief after the procedure (Conger et al., *Pain Med*, 21(1):41–54, 2020). Contraindications include active infection, uncontrolled coagulopathy or bleedings disorders, and in many cases oral anticoagulants. Additionally, this procedure is contraindicated in patients with actively progressing neurological conditions and emergencies.

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Keys to Procedure

- Understand the relevant cervical spine anatomy on AP and contralateral oblique (CLO).
- Understand proper patient positioning to optimize epidural space.
- Be able to perform the hanging drop or loss of resistance technique.
- Understand the complications and corrective steps if encountered.

Anatomy Pearls

See Images [1.1](#), [1.2](#), [1.3](#), and [1.4](#).

Image 1.1 AP view with needle at C7-T1 interlaminar space

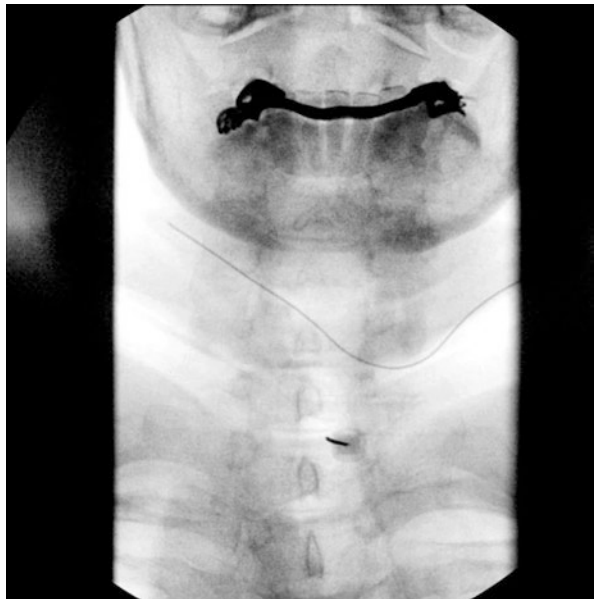


Image 1.2 Labeled AP image delineating the C7-T1 interlaminar space

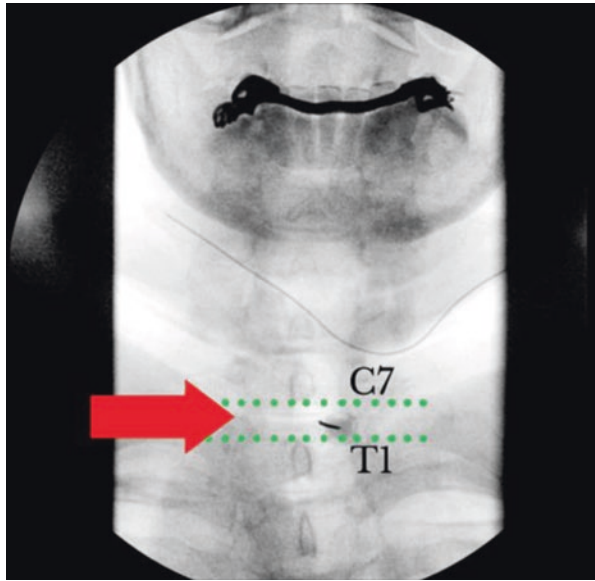


Image 1.3 CLO View of CESI

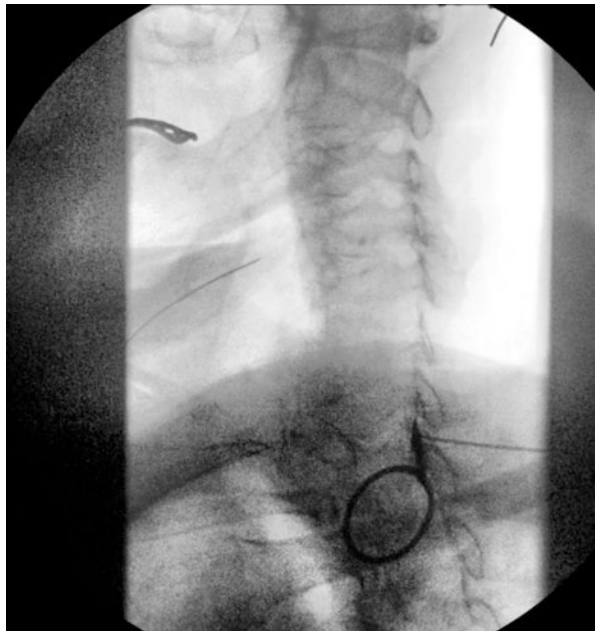
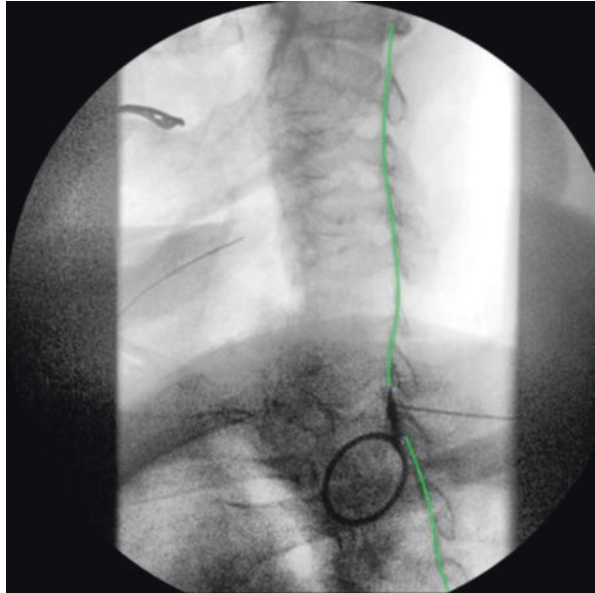


Image 1.4 CLO View with outline of ventral interlaminar line (green)



Supplies and Setup

- Sterile drape
- Chlorhexidine-based soap
- 20G Tuohy needle
- LOR syringe
- Lidocaine 1% for skin—5 mL
- Dexamethasone 10 mg—1 mL
- Isovue 300—3 mL (if no allergy)
- 25G 1.5" needle for skin local
- 18G 1.5" needle to draw up medications
- Extension tubing (3") for contrast
- 3 mL syringe with 25G 1.5" needle for skin local
- 5 mL syringe with extension tubing for contrast
- 3 mL syringe for injectate (Dexamethasone 10 mg)
- 3 mL slip-tip syringe for saline (if hanging drop technique).

Patient Positioning

- Prone using a small headrest under the forehead to allow airflow between table and patient and arms placed down at sides.

Pitt Pain Pearl

Increasing neck flexion can widen the interlaminar space in order to increase the size of the needle landing zone and plan trajectory

How to Perform the Procedure

1. Sterilely prep posterior neck and drape with sterile drape.
 2. Locate the anatomic landmarks for an approach to the C7-T1 interspace in AP view.
 3. Square off superior endplate of T1 and inferior endplate of C7 using caudal or cephalad tilt to optimize the C7-T1 interlaminar space.
 4. Place the needle directly in midline or just ipsilateral to midline on the painful side in the interlaminar space (Images 1.1 and 1.2).
 5. Anesthetize the skin at target entry site with Lidocaine 1% and insert Tuohy coaxial to the fluoroscopic beam.
 6. Initial Tuohy placement should be shallow “to achieve purchase in the posterior muscles of the neck.”
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7. Rotate the C-arm to the lateral or contralateral oblique (CLO) views (approximately 50° contralateral for CLO in cervical region) for further Tuohy advancement.
 8. Advance Tuohy with 15–20° of cranial angulation from the axial plane parallel to the spinous processes while visualizing the needle tip depth as it approaches the ventral interlaminar line (VILL) in the CLO view or the spinolaminar line in the lateral view (Image 1.3 and 1.4).
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9. Engage ligamentum flavum and perform hanging drop or LOR technique while advancing in 1–2 mm increments with intermittent CLO views as needed until epidural space is accessed
 - If LOR or hanging drop response are equivocal, consider checking placement with contrast.
 10. The final Tuohy position should be just ventral to VILL in CLO view (preferred) or just sublaminar in lateral view.
 11. Confirm appropriate Tuohy placement in cervical epidural space with 1 mL contrast and verify appropriate spread of contrast in AP and CLO (or lateral) views (Image 1.2).
 12. Administer 1.0 mL of dexamethasone 10 mg slowly.
 13. Withdraw Tuohy, clean area, apply adhesive dressing.

Checkpoints to Mastery

Beginner

- Make proper adjustments on AP x ray with C7-T1 endplates “squared off.”
- Locate the C7-T1 interspace and be able to point it out on fluoroscopic image.
- Insert Tuohy and obtain coaxial needle view within the C7-T1 interlaminar space.

Intermediate

- Make proper adjustments to C-arm and obtain CLO view.
- Identify the ventral interlaminar line (VILL).
- Direct needle parallel to spinous process until approaching VILL.

Advanced

- Engage the ligamentum flavum and appreciate resistance changed at the VILL on CLO.
- Perform hanging drop or loss of resistance technique.
- Confirm correct needle placement with contrast.

Pitt Pain Pearls and Pitfalls

- Review cervical MRI prior to the procedure to examine posterior epidural space dimensions.
- C7-T1 level is typically targeted since it has the largest posterior to anterior distance between the ligamentum flavum and dura/spinal cord.
- If the posterior epidural space is minimal to nonexistent at C7-T1, consider choosing the T1-T2 segment or C6-C7 and consider optimal patient positioning if targeting above C7-T1.
- CLO less than 45° from AP can mislead one to think the needle is deeper (more ventral) than it actually is.
- Conversely more oblique than 50° can make the needle seem more shallow (dorsal) than it actually is.
- Crossing midline can compromise CLO view.
- Take into account patient claustrophobia while placing sterile towels or drapes around head and history of vasovagal reactions.
- Be cognizant of location of ephedrine or other treatments for bradycardia/hypotension in clinic if required acutely during the procedure.
- Patients may require IV placement prior to first cervical epidural.

References

1. Conger A, Cushman DM, Speckman RA, Burnham T, Teramoto M, McCormick ZL. The effectiveness of fluoroscopically guided cervical transforaminal epidural steroid injection for the treatment of radicular pain; a systematic review and meta-analysis. *Pain Med.* 2020;21(1):41–54. <https://doi.org/10.1093/pm/pnz127>.

Further Reading

Atlas of image-guided intervention in regional anesthesia and pain medicine. 2nd ed. Rathmell.
Atlas of image-guided spinal procedures. 2nd ed. Furman.