Cervical Medial Branch Block – Lateral Approach

4

Aaron K. Calodney and Varun K. Rimmalapudi

Equipment and Monitoring

- Standard ASA monitoring
- Fluoroscopy
- Sterile prep, and drape
- Skin local anesthesia prior to any needle larger than 25G (unless sedation is used)
- Coaxial view is always used to advance needle, unless otherwise specified
- CPR equipment and medications available
- For diagnostic block
  - 22–25G, 2 inch (50 mm)–3.5 inch (90 mm) needle, tip curved to facilitate steering
  - 0.3–0.5 ml local anesthetic/level
  - Nonionic contrast (optional)
- For RFA
  - This approach is only suitable for RFA if special cannulas are used, which create a larger lesion at their tips. For example Cooled RFA or Tripod cannulas

Anatomy

- Prevalence studies, physical exam, and pain referral maps can be utilized to choose levels. C2–3 and C5–6 levels are the most common causes of cervicogenic headache and neck pain, respectively
- At the C3 level, there is a superficial medial branch (third occipital nerve) that is located in close proximity to the C2/3 facet joint and serves to innervate that joint as well as the suboccipital area
- The deep medial branch of C3 (which is analogous to the medial branches of C4, C5, and C6) courses along the waist of the corresponding articular pillars and supplies the adjacent vertebral segments (for instance, the C4 and C5 medial branches supply the zygapophyseal joint of C4/5)
- The C5 medial branch is located in the waist of the articular pillar of C5. The C3, C4, and C6 medial branches are located slightly above the waist of the corresponding articular pillars, and variations exist
- The C7 vertebra has a prominent transverse process (TP), and the location of the medial branch at this level is variable. It can be found as far caudal as the TP/superior articular process (SAP) junction and as far rostral as the apex of the C7 SAP

Pros of Lateral Approach

- Shorter needle track and less patient discomfort than posterior approach for diagnostic blocks
- Easier patient positioning

Cons of Lateral Approach

- Vital structures (spinal cord) in needle trajectory.
- Parallel placement of an RF cannula to the medial branch nerve is not possible, technique is not suitable for RF ablation (unless special needles are used)

Structures to Keep in Mind and Possible Complications

- Vertebral artery (if needle is more anterior than appropriate target) → seizure, dissection, stroke
- Inadvertent intraarticular facet injection
- Inadvertent passage of needle though a facet joint → intrathecal, epidural medication administration, high spinal anesthesia, spinal cord injury, paralysis, death
- Injection of spinal nerve root → nerve damage, intrathecal injection
- Injection of a vascular structure that may be in contiguity with a radicular artery → spinal cord infarct
- Infection

A. K. Calodney (✉)
Member, World Institute of Pain
Precision Spine Care, Tyler, TX, USA

V. K. Rimmalapudi
Clearway Pain Solutions Institute, Pensacola, FL, USA

A. R. Stogicza et al. (eds.), *Interventional Pain*, https://doi.org/10.1007/978-3-030-31741-6_4

- Bleeding
- Postprocedure pain
- Vasovagal reaction
- Allergic reaction

Fluoroscopy Technique, Target Localization

- Supine or lateral decubitus patient position
- A true lateral view of the cervical spine must be obtained, making C-arm adjustments at each individual level if necessary
- In a true lateral, the distance between the posterior laminar line and the posterior aspect of the articular pillar must be at its greatest. The facet joints above and below the level of interest must be crisp. The disc spaces must be clear. The anterior and posterior tubercles on each side should form a superimposed curvilinear line located in the superior posterior quadrant of the vertebral body shadow (Fig. 4.1a, b)
- Traction at both shoulders may be necessary to obtain lateral radiographs of adequate quality at the lower cervical levels
- Target for TON is at the midpoint of C2–3 joint line (Fig. 4.2)
- Target for C3–6 is at the centroid of the articular pillar (Fig. 4.2)
- Target for C7 is near the apex of the SAP of the C7 (Fig. 4.2)

Procedure Steps

These procedures are preferably done in the supine position. Prone or lateral decubitus positioning can be utilized as well.

Third Occipital Nerve Block

- Obtain a true lateral view of the C2–3 joint
- Identify the midpoint of the C2–3 facet. Imagine a vertical line bisecting this joint. Injection of the TON is carried out at, just above, and just below the joint along this line
- Insert needle and make osseous contact in close proximity to the midpoint of the joint. (Fig. 4.3a) Inject 0.25 ml of contrast under live fluoroscopy and rule out intravascular or intraarticular spread
- Obtain a Posteroanterior (PA) view. The needle tip with contrast must be visualized at the lateral aspect of the articular pillars just lateral to the C2/3 joint (Fig. 4.3b)
- Once needle position is confirmed in 2 views and intravascular or intraarticular contrast spread is ruled out, inject 0.3 ml of local anesthetic
- Withdraw the needle and reposition it, making osseous contact just above the C2–3 joint and just below the joint along the aforementioned vertical bisector, and inject an additional 0.3 ml of local anesthetic at each of these points
- If the initial contrast injection shows a robust but contained pattern encompassing the injection sited described above, a "pragmatic" single injection technique can be carried out using 1 ml of injectate

C3–6 Medial Branch Block

- Obtain a true lateral view of the targeted level
- Insert needle and make osseous contact on the targeted articular pillar at the centroid of the articular pillar at the desired level (Fig. 4.4a, b)
- Inject 0.25 ml of contrast under live fluoroscopy and rule out intravascular or intraarticular spread
- Obtain a PA view. The needle tip with contrast must be visualized at the waist of the corresponding articular pillar (Fig. 4.5)
- Once needle position is confirmed in 2 views and intravascular or intraarticular contrast spread is ruled out, inject 0.3 ml of local anesthetic

C7 Medial Branch Block

- Obtain a true lateral view of the C6–7 level (Fig. 4.2)
- Insert needle and make osseous contact near the apex of the superior articular process of C7. Inject 0.25 ml of contrast under live fluoroscopy and rule out intravascular or intraarticular spread
- Obtain a PA view. The needle tip with contrast must be visualized near the apex of the SAP and not laterally on the TP
- Once needle position is confirmed in 2 views, and intravascular or intraarticular contrast spread is ruled out, inject 0.3 ml of local anesthetic
- In patients with a tall peaked C7 SAP, an additional aliquot of local anesthetic may be placed at the base of the SAP near the junction with the TP

Clinical Pearls

- A true lateral view is paramount in performing this injection, which is easiest to obtain with the patient in a supine position. Minimizing parallax is the key to obtaining satisfactory images. Not having a true lateral view can result in unsafe needle placement

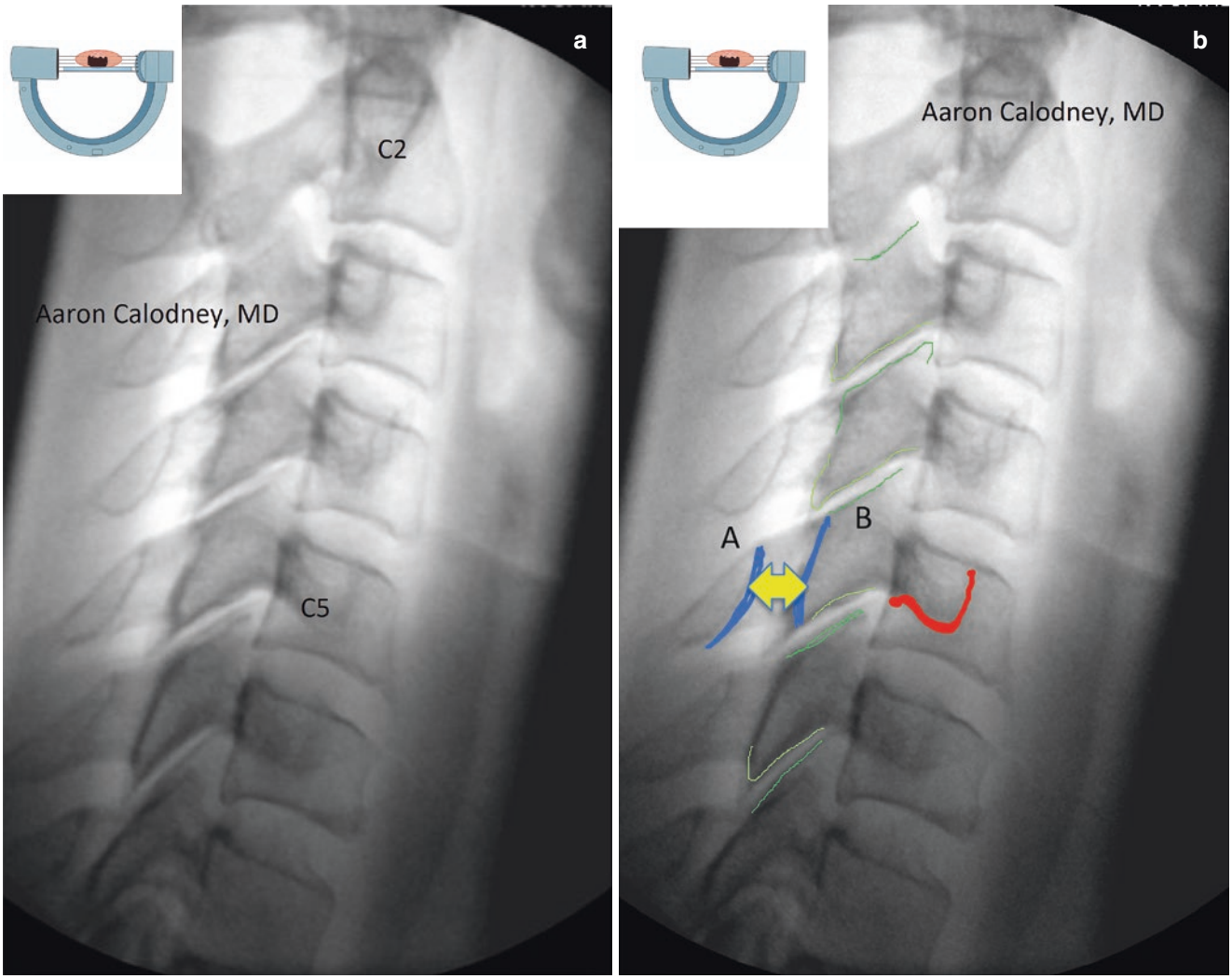

Fig. 4.1 True lateral image of the cervical spine. The distance between the posterior laminar line and the posterior aspect of the articular pillar must be at its greatest. The facet joints above and below the level of interest must be crisp. The disc spaces must be clear. The anterior and posterior tubercles on each side should form a superimposed curvilinear line located in the superior posterior quadrant of the vertebral body shadow. Red = anterior and posterior tubercles; blue = posterior laminar line and posterior aspect of the articular pillar; dark green = superior articular process; light green = inferior articular process. Native (**a**) and edited fluoroscopy images (**b**)

- The diagnostic (rather than therapeutic) nature of the medial branch blocks must be emphasized to the patient and family prior to the procedure
- Cervical facet joint pain is the single most common source of chronic neck pain after a whiplash injury to the neck and must be high on the differential in this group of patients
- Due to the poor predictive value of single diagnostic blocks, dual medial branch blocks may be performed to make the diagnosis of facet joint pain prior to proceeding to the definitive radiofrequency treatment
- An initial vascular spread pattern of contrast poses a higher risk of a "false-negative" diagnostic block at that level
- Adequately performed third occipital nerve blocks should cause numbness in the suboccipital skin in the cutaneous distribution of the TON

Unacceptable, Potentially Harmful Needle Placement on Exam

- Rough needle manipulation
- Not having a true lateral image
- Not checking PA view
- Needle through facet joint or compromised intraspinal space
- Needle too medial and potentially compromising spinal cord or foramen

Fig. 4.2 Lateral view of the C-spine. The target for TON, C3, C4, and C7 MBB is marked with a white circle (Native fluoroscopy image)

- Any proof of lack of understanding of cervical spinal anatomy (like placing the needle on the spinous process, and believing it is on target)

Unacceptable, But Not Harmful Needle Placement on Exam

- Unnecessarily large bore needle
- The procedure was abandoned after unsuccessful attempts, but it was clear that the examinee was cognizant of the safety aspects of the procedure, the needle did not compromise vital structures

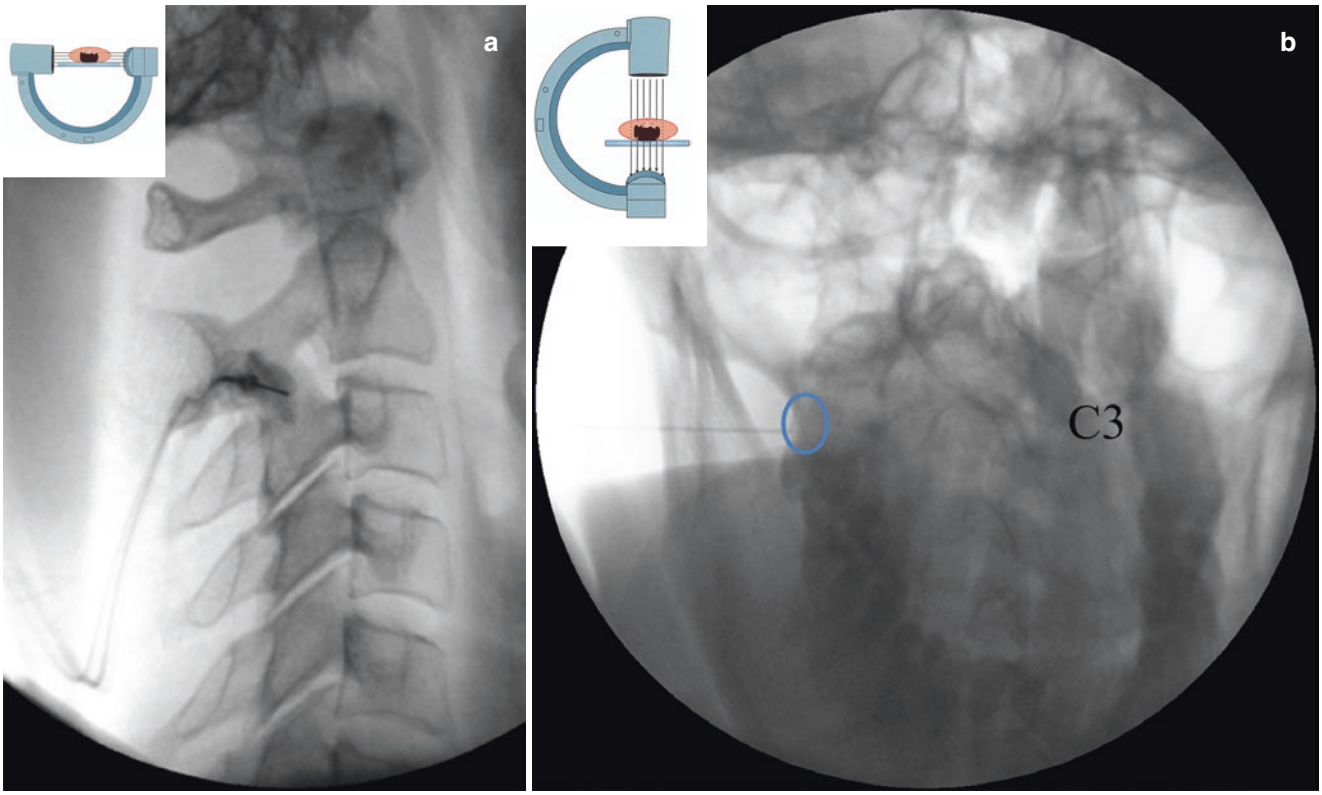

Fig. 4.3 Lateral (**a**) and PA fluoroscopy view (**b**) of the C-spine. Needle in place for TON block at the C2–3 joint line

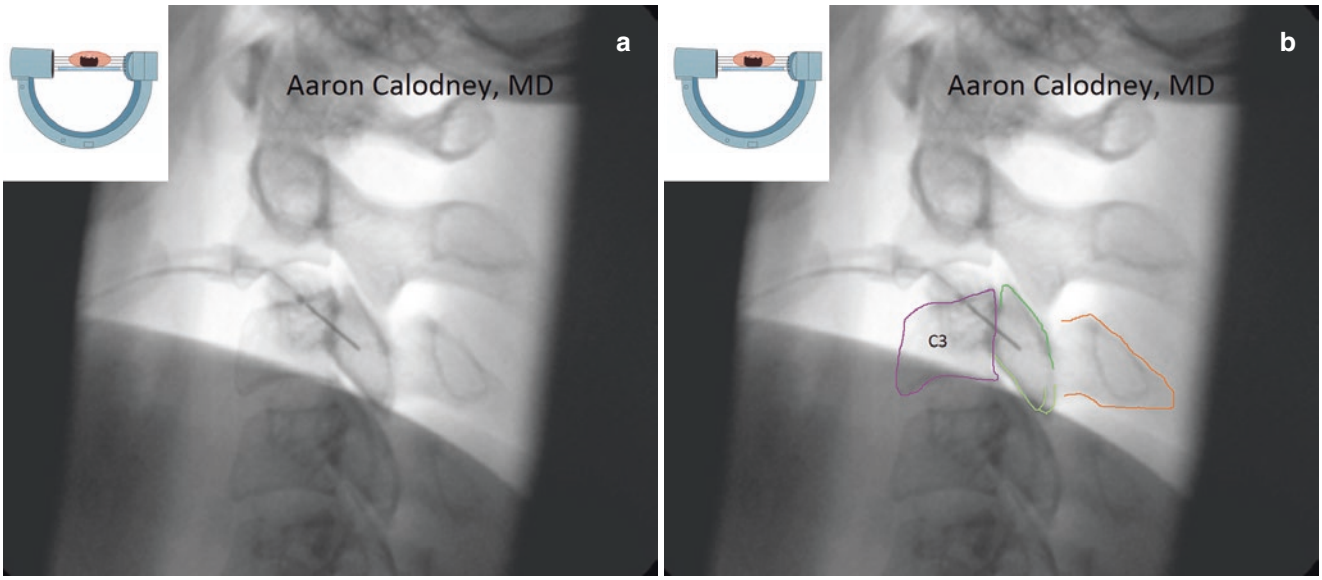

Fig. 4.4 Lateral view of the C-spine. Needle in place for C3 medial branch block at the centroid of the C3 joint articular pillar. Orange = spinous process and lamina; dark green = superior articular process; light green = inferior articular process; purple = vertebral body. Native (**a**) and edited fluoroscopy images (**b**)

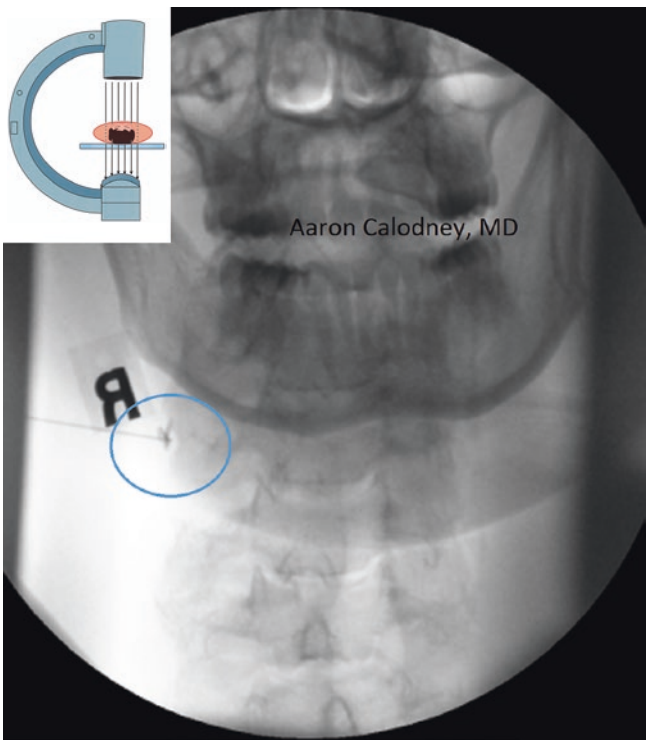

Fig. 4.5 PA view of the C-spine. Needle in place for C3 medial branch block at the centroid of the C3 joint articular pillar. Contrast shows no vascular uptake

Evidence

Table 4.1 Level of evidence and recommendations by the Benelux section of the World Institute of Pain
These recommendations are based on both a review of the literature in 2015 by an independent third party (Kleijnen Systematic Reviews LTD) and the previous published guidelines published in Pain Practice. The recent literature, the potential risk for complications, and the grade of invasiveness were considered when deciding to upgrade or downgrade the recommendation.

Indication	Procedure	Recommendation 2009	Grade 2015[2]	Recommendation 2018[3,4]
Cervical facet joint pain[1]	Therapeutic (repetitive) injections with local anesthetic with or without corticosteroid of the medial branch (cervical ramus medialis of the ramus dorsalis)	2B+	Moderate	Weak
Cervical facet joint pain[1]	Radiofrequency treatment (ablation) of the medial branch (cervical ramus medialis of the ramus dorsalis)	2C+	Low	Weak
Cervicogenic headache[5]	Radiofrequency treatment (ablation) of the medial branch (cervical ramus medialis of the ramus dorsalis)	2C+/–	Very low	Very weak
Whiplash associated disorder[6]	Radiofrequency treatment (ablation) of the medial branch (cervical ramus medialis of the ramus dorsalis)	2B+	Low	Moderate

[1]van Eerd M, Patijn J, Lataster A, Rosenquist RW, van Kleef M, Mekhail N, et al. 5. Cervical facet pain. Pain Pract. 2010;10:113–23
[2]Kleijnen Systematic Reviews Ltd.: Search and evaluation of the literature. 2015
[3]Huygen F, Kallewaard JW, van Tulder M, Van Boxem K, Vissers K, van Kleef M, et al. "Evidence-based interventional pain medicine according to clinical diagnoses": update 2018. Pain Pract. 2019;19:664–75
[4]https://www.anesthesiologie.nl/publicaties/praktische-richtlijnen-anesthesiologische-pijnbestrijding
[5]van Suijlekom H, Van Zundert J, Narouze S, van Kleef M, Mekhail N. 6. Cervicogenic headache. Pain Pract. 10:124–30
[6]van Suijlekom H, Mekhail N, Patel N, Van Zundert J, van Kleef M, Patijn J. 7. Whiplash-associated disorders. Pain Pract. 10:131–6

Table 4.2 Level of evidence based on the American Society of Interventional Pain Physicians (ASIPP) review of the literature

Cervical facet joint injections	Evidence
Diagnostic facet joint nerve blocks	Level II
Cervical facet joint nerve blocks	Level II
Cervical facet joint radiofrequency neurotomy	Level II

Manchikanti L, Schultz DM, Falco FJE, Singh V. Cervical facet joint interventions. In: Manchikanti L, Kaye AD, Falco FJE, Hirsch JA, editors. Essentials of interventional techniques in managing chronic pain. Springer International Publishing; 2018. p. 387–412.

Suggested Reading

Bogduk N. Practice guidelines: spinal diagnostic and treatment procedures. San Francisco: International Spine Intervention Society; 2013.

Manchikanti L, Pampati V, Kaye AD, Hirsch JA. Cost utility analysis of cervical therapeuticmedial branch blocks in managing chronic neck pain. Int J Med Sci. 2017;14(13):1307–16.

Engel A, Rappard G, King W, Kennedy DJ. Standards division of the international spine intervention society. The effectiveness and risks of fluoroscopically-guided cervical medial branch thermal radiofrequency neurotomy: a systematic review with comprehensive analysis of the published data. Pain Med. 2016;17(4):pme12928.

van Eerd M, Patijn J, Lataster A, Rosenquist RW, van Kleef M, Mekhail N, et al. Cervical facet pain. Pain Pract. 2010;10(2):113–23.

Falco FJE, Erhart S, Wargo BW, Bryce DA, Atluri S, Datta S, et al. Systematic review of diagnostic utility and therapeutic effectiveness of cervical facet joint interventions. Pain Physician. 2009;12(2):323–44.

The cervical MBB chapter was reviewed by Jianguo Cheng; Maarten Van Kleef; Andrea M. Trescot; Milan Stojanovic; Peter S. Staats; Agnes R. Stogicza; Andre M. Mansano