Cervical Facet Joint Injection and Medial Branch Blocks

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Introduction

Neck pain is a common cause of chronic pain and disability. It is the third most common chronic pain condition in the United States and fourth leading cause of disability worldwide. Neck pain is associated with several comorbidities, including back and joint pain, headache, and depression. The annual prevalence ranges between 15% and 50% with lifetime prevalence estimates as high as 67%. It occurs more frequently in women and prevalence peaks in middle age. Facet arthropathy accounts for 33–65% of total cases, more frequently at the mid- and low-cervical levels (C4–C7). While lumbar facet joint arthropathy has received much of the attention in the past, cervical facet joint pain is becoming increasingly identified and studied.

Despite the impressive achievement in modern-day high-resolution and three-dimensional imaging technology, imaging alone cannot meaningfully confirm or negate the presence or the absence of facet arthropathy as the cause of neck pain. The limitation of using imaging to identify the source of pain is especially problematic in multilevel spinal spondylosis, degenerative disc disease, or facet arthropathy where the pain generators are equivocal, or the presence of a spinal defect cannot explain the pain distribution and symptomatology.

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Background and Historical Perspective

First described in 1988, the most reliable way to diagnose a painful cervical facet joint is by injecting local anesthesia into the joint itself or the medial branch nerves that innervate the joint. Both methods have proven reliable; however, stronger research exists surrounding medial branch blocks for cervical facet pain. Regardless of technique, the main objective of either method is to provide pain relief of the affected joint and in doing so localize the joint as the source of the neck pain.

Innervation of the C4 through C7/T1 cervical facet joints involves the medial branches from the cervical dorsal rami. The C4 through C8 vertebral levels each receive dual facet joint innervation from the medial branch above and below the specific level. The medial branches of the C3 dorsal ramus are slightly different. The deep medial branch courses inferiorly to the C3–C4 facet joint in a fashion similar to other medial branches. However, the superficial medial branch of C3, also known as the third occipital nerve, takes a lateral course to the C2–C3 facet joint. Thus, pain from the C2–C3 facet joint can be blocked at the lateral aspect of the joint, and pain from the C3–C4 joint and lower can be blocked at the waist of the articular pillars above and below the joint.

Unfortunately, no particular signs or symptoms are significantly associated with cervical facet dysfunction. These patients will typically present with uni- or bilateral axial neck pain without radiation. If radiation is present, it rarely extends past the shoulder. The patient may describe limitations in neck extension and rotation. There is an absence of neurological symptoms. Pain may be reproducible with pressure over the facet joints.

Uses and Indications

Intra-articular cervical facet block (ICFB) and cervical medial branch block (CMBB) are considered when patients present with persistent (lasting longer than 3 months in duration), dis-

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abling neck pain, cervicogenic headache, or postlaminectomy pain syndrome recalcitrant to conservative management. These blocks are both diagnostic and therapeutic. The diagnostic value of the blocks lies in their selective, comparative, and reversible palliation directed at the suspected pain generator(s). The patients are instructed to observe relief from a specific symptom following blocks. The gold standard, a positive block, is considered with at least 80% pain relief lasting greater than 2 hours after lidocaine was injected followed by bupivacaine that provided 3 hours or longer of pain relief compared to lidocaine. This comparative two-step process using two distinct local anesthetics is crucial to reduce false positive block findings and enhance diagnostic accuracy. Although ICFB and CMBB are often intended as a confirmatory precursor to the more durable neurolysis techniques or even surgery, cervical diagnostic blocks, at times, can be therapeutic and long lasting in certain patient populations.

The decision to proceed with a diagnostic ICFB versus CMBB depends on many factors. The intra-articular approach may be preferred in the following situations:

1. When a facet synovial cyst is suspected to be a source of pain. The spinal synovial cyst can be drained followed by intra-articular injection.
2. When radiological evidence overwhelmingly supports one particular facet as the pain generator.

CMBB can be considered over intra-articular facet block in scenarios where:

1. The facet joint space is severely arthritic, obliterated, or fused.
2. The radiologic or clinical evidence to support the involvement of a particular facet joint is equivocal.
3. Rhizotomy or radiofrequency ablation is considered.
4. The patient has a high bleeding risk and concerns for hematoma formation exist. Although it has been reported, generally the chance of epidural hematoma development is meager; however, each facet joint space is contiguous with the epidural space. Therefore, epidural hematoma risk following intra-articular facet injection cannot be eliminated entirely.

Intra-articular Cervical Facet Block (ICFB)

Steps to perform the posterior method:

1. Place the patient in a prone, chin-tucked position with a pillow supporting the patient's chest and anterior shoulders. It is helpful to maintain depressed scapular position bilaterally by placing the patient's hands under the thighs in preparation for obtaining a lateral view.
2. Cleanse posterior neck up to the hairline and drape the surrounding area using strict sterile technique.
3. Under fluoroscopic guidance, obtain the anterior-posterior (AP) view before tilting the scope caudally to optimize superior and inferior articular process viewing and to remove parallax. Mark the skin entry point roughly two segments caudal to the lateral aspect of the target facet.
4. Anesthetize the skin and superficial tissue using 1% lidocaine.
5. Carefully advance the 22 or 25 gauge spinal needle in a cephalad and lateral direction toward the facet articulating interface. AP and lateral views are required to ensure that the needle trajectory (toward the articular pillar and the intra-articular space) is maintained.
6. Lateral view is used to ensure the needle tip stays within the posterior aspect of neural foramen.
7. Approximately 0.1–0.2 cc contrast can be injected to confirm intra-articular needle tip placement before introducing local anesthetic agent. This is elective and is based on the preference of the physician.

Steps to perform the lateral method:

1. The patient is positioned in the lateral decubitus position with the treatment side up and a pillow under the head.
2. Instruct the patient to maintain bilateral scapular depression to allow clear lateral fluoroscopic visualization.
3. The lateral neck is cleaned and draped sterilely.
4. Rotate the fluoroscope anteriorly and posteriorly to delineate the target facet joint as the image of the more proximal joint moves in the direction in which the fluoroscope is rotated. Square the target segment with parallax removed. Cephalad and caudal scope angulation may further enhance the image.
5. Once the optimal view is obtained, mark and anesthetize the skin and superficial tissue using 1% lidocaine.
6. Insert a 22 or 25 gauge spinal needle toward the target articular superior or inferior processes.
7. Small adjustments are made to manipulate the needle tip to "walk off" into the target joint space.
8. A small amount of contrast is used for intra-articular needle tip placement confirmation before injecting local anesthetic.

Cervical Medial Branch Blocks (CMBB)

Steps to perform the posterior method:

1. Place the patient in a prone, chin-tucked position with a pillow supporting the patient's chest and anterior shoulders. It is helpful to maintain depressed scapular position bilaterally by placing the patient's hands under the thighs in preparation for obtaining a lateral view.

Fig. 42.1 Anterior-posterior view of cervical medial branch blocks

Fig. 42.2 Lateral view of the posterior approach to cervical medial branch blocks. The needle tips are placed in the center of the articular pillars

2. Cleanse the posterior neck up to the hairline, and drape the surrounding area using strict sterile technique.
3. Direct the beam in the AP direction to visualize the posterior aspects of the articular pillar waists, and identify the target joint. A small ipsilateral oblique of the fluoroscope may enhance the needle trajectory view.
4. Center the image.
5. Mark and anesthetize the skin and superficial tissue using 1% lidocaine.
6. A 22 or 25 gauge spinal needle is used to puncture the skin and advanced toward the most concave portion of the target vertebral segment (the waist), located midway between the superior and inferior articular pillars, where medial branches are found (Fig. 42.1).
7. A lateral view is used to confirm and visualize the depth of the needle tip (Fig. 42.2).
8. Oblique the fluoroscope to circumvent the shoulders, and reestablish the needle tip position when targeting segments below C6.
9. A small amount of contrast can be used for further needle tip confirmation before injecting low volume (0.3 cc) local anesthetics.

Steps to perform the lateral method:

1. The patient is positioned in the lateral decubitus position with the treatment side up and a pillow under the head. Alternatively, the patient may be supine.
2. Prepare and drape the injection site using strict sterile technique.
3. Project the fluoroscopic beam laterally to bring the articular pillars (trapezoid shaped) into view.
4. The ipsilateral and contralateral articular pillars can be clearly delineated by manipulating the fluoroscope as the image of the more proximal joint moves in the direction in which the scope is rotated. Square and center the target segment with parallax removed. Cephalad and caudal angulation may further enhance the image quality.
5. Mark and anesthetize the skin.
6. Enter the neck from the posterolateral direction, and insert a 22 or 25 gauge spinal needle toward the center of trapezoidal area (Fig. 42.3).
7. The patient's shoulders may obscure lateral views below C6. An oblique fluoroscope view can be used to circumvent the shoulders and reestablish the needle tip position.
8. Once the needle tip directly contacts the articular pillar, an AP view is used to solidify the positioning of the needle tip abutting laterally against the articular process.
9. Maintain the needle trajectory directly at the C7 articular process to prevent C8 nerve root and vertebral artery injury when approaching the C7 medial branch.
10. A small amount of contrast can be used for further needle tip confirmation before injecting low volume (0.3 cc) local anesthetics.

Fig. 42.3 Cervical medial branch blocks using the lateral approach

Evidence for Efficacy

(Table 42.1.)

Pearls and Pitfalls

- Optimize intermittent biplanar fluoroscopic visualization and move the needle in small increments to ensure that the needle tip location is known at all times to minimize injury risks.
- Excessive medially directed needle trajectory during the posterior approach to ICFB may result in epidural or dural puncture and spinal cord injury.
- Similarly, violating the anterior joint capsule may result in injury to the dorsal root ganglion, radicular/vertebral artery, or spinal cord.
- Use the posterior approach when targeting lower joints to minimize pneumothorax and neurovascular risks.
- The posterior approach to ICFB is generally safer to perform, but the lateral method is technically more forgiving.
- The posterior method to ICFB is recommended in patients with large shoulders.

Table 42.1 Cervical medial branch blocks and cervical intra-articular cervical facet injection evidence

Reference	Study design	Intervention	Size	Outcomes measures	Results
Manchikanti et al. (2006, 2008, 2010)	Randomized, double-blind, active-control	Fluoroscopic-guided cervical medial branch block	120 participants evenly divided into (1) local anesthetics with steroid (LA+S) and (2) local anesthetics (LA) only groups	Neck Pain Disability Index, numeric pain scores, medication use and baseline functional status at baseline, 3, 6, and 12 months. Injections were administered when pain increased and functional capacity decreased by 50%, respectively	Significant pain improvement at 12 and 24 months: 85% of local anesthetics only group and 92% (at 12 months)/93% (at 24 months) of steroid plus local anesthetics group. Functional status improvement: 63% of LA group and 68% of LA+S group had >50% in Neck Disability Index improvement at 12 months. The improvement sustained at 24 months: 70% of LA group and 75% of LA+S group
Manchikanti et al. (2004)	Prospective, observational	Fluoroscopic-guided medial branch block	100 participants underwent medial branch block with local anesthetics only or local anesthetics with steroid. Option to repeat injections	Pain scores, Oswestry Disability Index, functional and psychological status at 3, 6, and 12 months	Significant improvement observed in pain relief (92% at 3 months, 82% at 6 months, 56% at 12 months) and in functional and psychological status
Barnsley et al. (1994)	Randomized double-blind, active-control	Fluoroscopic-guided cervical facet joint injection	41 individuals following whiplash (median injury duration: 39 months) underwent intra-articular facet injection with local anesthetics or steroid	Pain scores	Median pain relief greater than 50% in steroid and local anesthetics groups were 3 and 3.5 days, respectively. No significant differences detected

Table 42.1 (continued)

Reference	Study design	Intervention	Size	Outcomes measures	Results
Park and Kim (2012)	Randomized, active-control	Fluoroscopic-guided cervical facet joint injection	400 patients with chronic neck myofascial pain and cervical facet referred pain pattern were divided into facet joint injection with conservative management (Group 1) and conservative management only (Group 2) groups	Cervical range of motion (ROM), pain score and headache symptoms	Group 1 had increased cervical ROM, increased mean pain reduction, and decreased tension-type headaches compared with Group 2. Younger individuals in Group 1 also had longer pain relief

- Limit cervical facet injectate volumes to less than 1 cc, and deliver the injection at a slow rate to prevent facet joint capsule rupture.
- Steroid is not required for CMBB.
- There are four options for injectate:
  - 1% lidocaine
  - 2% lidocaine
  - 0.25% bupivacaine
  - 0.5% bupivacaine
- To minimize the likelihood of a false positive, the authors advocate using a smaller volume (0.3 cc) and higher local anesthetic concentration (2% lidocaine or 0.5% bupivacaine) during CMBB.
- The use of low injectate volumes during CMBB is particularly important from a diagnostic standpoint for cervical medial branch radiofrequency ablation preparation.
- Double comparative blocks (lidocaine and bupivacaine) are the gold standard method to diagnose facetogenic pain. The patient must also respond concordantly for a positive block. However, a diagnostic block is considered positive when a patient reports a 50% pain improvement.
- Instruct the patient to use a written pain diary to track block efficacy.

Recommended Reading

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