Controversies in Spine Care

Cervical medial branch block progression to radiofrequency neurotomy: A retrospective clinical audit

David Sherwood, DO*, Evan Berlin, MD, Adam Epps, DO, James Gardner, MD, Byron J Schneider, MD

Department of Physical Medicine and Rehabilitation, Vanderbilt University Medical Center, Nashville, Tennessee, USA

A R T I C L E   I N F O

Keywords:
Neck pain
Facet
J-joint
Radiofrequency ablation
Neurotomy
Pain management
Spine

A B S T R A C T

Background: Chronic axial neck pain (CANP) due to zygapophysial joint arthropathy is best diagnosed via cervical medial branch block (MBB). However, the paradigm by which MBB is used to select patients for cervical radiofrequency neurotomy (RFN) is contested. Dual diagnostic cervical MBB with a minimum of ≥80% pain relief to diagnose cervical zygapophysial joint pain has been accepted by some Medicare Local Coverage Determinations as the method for selecting patients for cervical RFN. There are some who would argue that the utility of the dual diagnostic MBB and the ≥80% pain relief cut off lacks utility in clinical practice. The suspicion being those who progress from MBB1 to MBB2 will then flow from MBB2 to RFN without fail. Does clinical practice using dual diagnostic MBBs and using an ≥80% pain relief cut off reduce patient eligibility for cervical RFN after both MBB1 and MBB2?

Methods: A retrospective clinical audit was carried out at an academic institution spine center from January 1st to December 31st, 2019. Charts were selected based on Current Procedural Terminology codes for MBB, then included if the cervical medial branches were targeted. Charts were then reviewed for procedural progression.

Results: 21/51 (24%, 95% Confidence Interval 12-35%) patients progressed from MBB1 to MBB2. Of those 21 patients, 13 patients progressed from MBB2 to RFN (62%, 95% CI 41-83%). In total, 13/51 (14%, 95% CI 14-37%) patients who were initially suspected to have CANP due to zygapophysial joint pain progressed to RFN. Both MBB1 and MBB2 hindered the progression of 30/51 patients (59%, 95% CI 45-72%) and 8/21 patients (38%, 95% CI 17-59%), respectively.

Conclusion: Both MBB1 and MBB2 served to filter patients from progression to RFN using dual MBBs with an ≥80% pain relief cutoff.

Introduction

Acute neck pain is exceedingly common and has a favorable natural course.[1] However, chronic axial neck pain (CANP), defined as pain greater than 3 months without the presence of radicular or myelopathic symptoms, is less common.[2] However, all CANP is not the same. While we have yet to completely describe all the pathologic processes within CANP, some can be differentiated by thoughtful evaluation and intervention.[3] Based on the cohort examined and criteria for selection, zygapophysial joint (also known colloquially as the z-joint or facet joint) induced CANP prevalence is 25-60%, but with a consensus prevalence of 25-45%.[3-7] Moreover, with regards to prevalence, there is an understanding that likely 33% of asymptomatic patients will have findings as visualized by computed tomography (CT) scan consistent with non-painful cervical facet arthropathy.[8] To further complicate the issue, there are studies which differ with regards to the most prominently affected level and if symptomatic development is age related. [8-11]

What appears to be agreed upon however is that painful cervical zygapophysial arthropathy can be treated successfully with radiofrequency neurotomy (RFN) of the medial branches, assuming the patient’s pathology has been appropriately diagnosed. RFN is a validated and efficacious intervention to treat this population. [4,12,13]

Currently, the diagnosis of cervical zygapophysial joint pain is best achieved by medial branch block (MBB).[4,13] However, the paradigm through which the MBB is used to diagnose zygapophysial joint pain is contested given the false positive rate for a single cervical MBB is somewhere in the range of 27-63% with some data suggesting an alteration in these numbers based on the age of the patient.[4-7,11] There are some who would argue convincingly for single block paradigm, while others for a dual block paradigm, and even some for a no-block paradigm.[14]

For the uninitiated, dual diagnostic blocks refer to medial branch blocks at the same level, performed on two different encounters using an anesthetic only to assess relief from the injection. The anesthetic between MBB1 and MBB2 may be the same or different with regards to duration of action and speed of onset. Such a decision, whether to use

* Corresponding author at: David Sherwood, DO, 2201 Children's Way, Suite 1318, 7900 Lee's Summit Road, Nashville, TN 37212, Kansas City, MO, 64139, USA. E-mail: dh9988@gmail.com

https://doi.org/10.1016/j.xnsj.2021.100091
Received 5 October 2021; Received in revised form 27 October 2021; Accepted 27 October 2021
Available online 3 November 2021
2666-5484/© 2021 The Author(s). Published by Elsevier Ltd on behalf of North American Spine Society. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/)
the same or differing length of time anesthetics may affect the utility and prognostic value of the blocks. The specificity for dual diagnostic blocks to diagnose cervical zygapophysial pain may be 65%.13 Dual diagnostic MBB with a minimum of ≥80% pain relief to diagnose cervical zygapophysial joint pain has been accepted by the Spine Intervention Society (SIS) and some Medicare Local Coverage Determination’s (Medicare LCD) as the method for selecting those who may benefit most from RFN for the management of zygapophysial joint pain of the cervical spine.15,16 In theory, the use of this method serves to minimize the number of false positives, or those who may have alternative pain generators, from inappropriate progression to RFN. However, there are some who would argue that the utility of the controlled, diagnostic MBB and the ≥80% pain relief cut off lacks utility in clinical practice. The suspicion being that those that progress from MBB1 to MBB2 will then flow from MBB2 to RFN without fail. What has not ever been demonstrated is whether dual diagnostic MBB’s serve to filter patients for cervical RFN after both MBB1 and MBB2 in clinical practice free the selection rigors of prospective studies. Our study was a pragmatic retrospective protocol study that set out to challenge this suspicion.

Objective

Does clinical practice using dual diagnostic MBBs and using an ≥80% pain relief cut off reduce patient eligibility for cervical RFN after both MBB1 and MBB2?

Methods

Institutional Review Board (IRB) approval was obtained. Once approved, the medical record numbers of all the recipients of a medial branch block within a single department at a large academic institution from January 1st, 2019, to December 31st, 2019, were obtained using Current Procedural Terminology (CPT) codes. The four providers audited in this review were all fellowship trained physiatrists. The procedural technique for each provider was consistent with the guidelines set forth by the Spine Intervention Society for MBB of the Cervical Spine.15 1% or 2% lidocaine and .5% bupivacaine were used for MBB1 and MBB2, respectively. No more than .5 cc per unilateral level was used. To avoid false negatives, contrast was always used before the anesthetic was injected to assess for vascular uptake. Moreover, a minimum of 80% or greater pain relief was used to qualify as a successful MBB procedure per our retrospective protocol. The charts of these selected patients were individually reviewed by a team of five physicians using a predetermined set of inclusion and exclusion criteria.

Clinical practice cohort

As this was a pragmatic retrospective review of clinical practice, each provider was allowed to progress patients using a ≥50% pain relief cut off based on clinical judgement, as this was the insurance standard during the studied time period. Those which progressed via this method are to be made clear in the results section.

Inclusion and exclusion criteria

Inclusion Criteria:
1. First medial branch block was performed between January 1st, 2019, to December 31st, 2019 (if the second block or radiofrequency ablation was performed after the above dates, the patient was included as long as the first block was within the dates specified).
2. The procedure targeted the cervical medial branches, including: C3-C7 or the third occipital nerve.

Exclusion Criteria:
1. Patients received their first medial branch block before January 1, 2019.
2. The procedure targeted either the lumbar or thoracic spine medial branches.
3. The patient had previously received a medial branch block or ablation to the specified level. No patient is to be included who underwent a block previously at the same level.
4. The patient did not undergo medial branch block but underwent a procedure with the same CPT code (i.e. intra-articular zygapophysial injection)

Data collection methods

The researchers collected data on the patient’s demographics (age, sex), duration of pain, target nerve levels, pre-procedure pain, post-procedure pain, pain relief duration of the medial branch blocks, whether they proceeded to the second medical branch block, and if the patient proceeded to the radiofrequency neurotomy.

If the patient did not follow up after the first or second medial branch block, regardless of immediate post-procedure pain score, they were considered a failure to progress. Throughout the data collection process, the data was stored in password secured documents. When the data was shared between researchers, it was sent via encrypted emails with no patient identifiable information in accordance with the Health Insurance Portability and Privacy Act.

Results

There were a total of 51 patients who underwent a MBB and met our inclusion and exclusion criteria.

≥80% pain relief in both MBB1 and MBB2 Subgroup

21/51 patients (41%, 95% CI 28-55%) progressed from MBB1 to MBB2. Of those 21 patients, 13 patients (25%, 95% CI 14-37%) progressed from MBB2 to RFN. In total, 13/51 (25%, 95% CI 14-27%) of patients who were initially suspected to have CANP due to zygapophysial joint pain progressed to RFN. Using the ≥80% pain relief in both MBB1 and MBB2 paradigm, MBB1 and MBB2 hindered the progression of 30/51 patients and 8/21 patients, respectively. See Fig. 1.

| 51 Patients |
|---|
| MBB1 |
| 30 Did not progress |
| 21 Patients |
| MBB2 |
| 8 Did not progress |
| 13 Patients |

Fig. 1. Flow diagram visualizing the proportional flow of patients from the first medial branch block to the second medial branch block to the radiofrequency neurotomy in the ≥80% pain relief cohort
Clinical practice cohort

30/51 patients (59%, 95% CI 45-72%) progressed from MBB1 to MBB2. Of those 30 patients, 23 patients (77%, 95% CI 62-92%) progressed from MBB2 to RFN. In total, 23/51 patients (45%, 95% CI 31-59%) who were initially suspected to have CANP due to zygapophysial joint pain progressed to RFN. In our clinical practice audit, MBB1 and MBB2 hindered the progression of 21/51 patients (41%, 95% CI 28-55%) and 7/30 patients (23%, 95% CI 8-38%), respectively. See Fig. 2.

Discussion

In this retrospective review from January 1st, 2019, to December 31st, 2019, of practice habits reflective of SIS and Medicare LCD guidelines of dual diagnostic MBBs with an ≥80% pain relief criteria, both MBB1 and MBB2 served to filter patients from progression to RFN. Presumably, those filtered out after each respective MBB represent patients without zygapophysial joint mediated pain. Moreover, this practice held true using either a ≥80% or ≥50% pain relief in both MBB1 and MBB2. In both selection habits, patients failed to advance to RFN at both MBB1 and MBB2.

A phenomenon worth discussing is that of the nature of using statistical paradigms to objectify what is ultimately a subjective patient experience. In our best efforts to select the most appropriate patients for a given procedure to maximize outcomes without over utilization of resources, there are certain scenarios of patient selection we felt should be highlighted.

First, there was a common scenario in which a patient’s pain scores would reduce from a 7 to a 2, or a 4 to a 1. In both scenarios, a passive observer might deem these results successful. However, by use of the ≥80% pain relief criteria, both the 7 to 2 and 4 to a 1 patient’s would not have been deemed successful enough to further advance to the next stage as their pain relief is statistically 71% and 75%, respectively.

Second, certain patients had a MBB carried out with the expressed understanding that complete pain relief was not a realistic expectation. These patients included those with underlying medical co-morbidities which provided an inherent level of pain or alternative spinal pain generators which may not have been amenable to treatment. Thus, these patients had MBBs carried out with a pre-injection discussion regarding tapered expectations of how success is to be defined. These patients were found commonly in those patients who advanced in clinical practice using the ≥50% pain relief criteria but would otherwise have not advanced using a more rigorous ≥80% pain relief criteria.

Indeed, the above clinical scenarios represent challenges that physicians face when confined by more rigid and absolute criteria that insurers may use when determining coverage for a particular patient. Conversely, there are numerous legitimate reasons to provide RFN as a treatment only to those who are most likely to achieve success. More specifically, this entails providing RFN only to those with zygapophysial joint pain, which is the general aim of using various selection criteria for this procedure.

A reasonable middle ground should be achievable, allowing access to care while mitigating over treatment. While many of the authors of this paper endorse rigorous patient selection criteria for RFN, we also acknowledge the importance of allowing physicians to exercise their clinical judgement in the selection of their patients for RFN in situations wherein application of rigid selection criteria is likely to restrict a well-suitied patient from treatment otherwise.

There are fewer studies regarding the prevalence, false positive rate, and response to RFN with regards to cervical zygapophysial joint pain than lumbar zygapophysial joint pain. However, this study should help to establish community practice habits of physicians who provide these procedures by the given methods recommended by SIS and Medicare LCD. If you adhere to the controlled, diagnostic MBBs using an ≥80% pain relief criteria, patient progression should be filtered after both MBB1 and MBB2.

Limitations

The retrospective nature of the study is such that each encounter was the result of the physician’s discretion with regards to individual practice habits. Which is to say that, while the chart review was methodical and via a strict procedure, the methods by which each patient encounter occurred existed separate from the influence of this study. As such, the determination of ≥80% relief was at the discretion of the proceduralist. Patient reported pain diaries, clinical follow up evaluations, and immediate post-injection assessments may vary with regards to reported relief. Namely, while a patient’s pain scores may have represented a decline in pain from 8 to a 4, a separate assessment of their pain may have recorded their reported pain relief as 90%. Again, the decision for which metric to use for matriculation was ultimately at the discretion of the providers.

The most obvious limitation of this study is the lack of outcome data. However, our intention was not to develop a manuscript which would dictate care or provide insight on the validity of this paradigm for procedural selection, but rather to review our own clinical practice to assess whether the dual block paradigm had validity regarding matriculation at both blocks despite the anecdotal commentary that all patients who progress from MBB1 to MBB2 inevitably progress to RFN.
Conclusion

In this retrospective review from January 1st, 2019, to December 31st, 2019, of the practice habits of four fellowship trained spine providers using a patient selection criterion of dual cervical MBBs using an ≥80% pain relief criteria, both MBB1 and MBB2 served to filter patients from progression to cervical RFN. When applying a less rigorous ≥50% cutoff, again, both MBB1 and MBB2 served to filter patients from progression to RFN.

Informed Patient Consent

The authors declare that informed patient consent was taken from all the patients.

Declaration of Competing Interest

The authors declare no conflicts of interest.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

[1] Vasseljen O, Woodhouse A, Bjømgaard JH, Leivseth L. Natural course of acute neck and low back pain in the general population: The HUNT study. PAIN 2013;154(8):1237–44. doi:10.1016/j.pain.2013.03.032.

[2] Goode AP, Freburger J, Prevalence Carey T. Practice Patterns and Evidence for Chronic Neck Pain. Arthritis Care Res 2010;62(11):1594-601. doi:10.1002/acr.20270.

[3] April C, Bogduk N. The Prevalence of Cervical Zygapophysial Joint Pain; A First Approximation. Spine 1992;17(7):744-7.

[4] Burnham T, Conger A, Salazar F, et al. The Effectiveness of Cervical Mediobranch Radiofrequency Ablation for Chronic Facet Joint Syndrome in Patients Selected by a Practical Mediobranch Block Paradigm. Pain Med 2020;21(10):2071-6. doi:10.1093/pm/pnz358.

[5] Manchikanti L, Manchikanti KN, Pampati V, Brandon DE, Giordano J. The Prevalence of Joint-Facet Related Chronic Neck Pain in Posturgical and Non-posturgical Patients: a Comparative Evaluation. Pain Pract 2008;8(1):5-10. doi:10.1111/j.1533-2500.2007.00169.

[6] Manchikanti L, Boswell MV, Singh V, Pampati V, Damron KS, Beyer CD. Prevalence of facet joint pain in chronic spinal pain of cervical, thoracic, and lumbar regions. BMC Musculoskelet Disord 2004;5(1):15. doi:10.1186/1471-2474-5-15.

[7] Cohen SP, Strassels SA, Kurihara C, et al. Randomized Study Assessing the Accuracy of Cervical Facet Joint Nerve (Medial Branch) Blocks Using Different Injectate Volumes. Anesthesiology 2010;112(1):144-52. doi:10.1097/ALN.0b013e3181c26a82.

[8] Kim JH, Sharan A, Cho W, Emam M, Hagen M, Kim SY. The Prevalence of Asymptomatic Cervical and Lumbar Facet Arthritis: A Computed Tomography Study. Asian Spine J 2019;13(3):417–22. doi:10.3161/asj.2018.0238.

[9] Lee MJ, Riew KD. The prevalence cervical facet arthrosis: an osseous study in a cadaveric population. Spine J 2009;9(9):711–14. doi:10.1016/j.spinee.2009.04.016.

[10] Lord SM, Barnsley L, Wallis BJ, Bogduk N. Chronic Cervical Zygapophysial Joint Pain After Whiplash: A Placebo-Controlled Prevalence Study. Spine 1992;17(15):1757–44.

[11] Manchikanti L, Manchikanti KN, Cash KA, Singh V, Giordano J. Age-related prevalence of facet-joint involvement in chronic neck and low back pain. Pain Physician 2008;11(1):67-75.

[12] Sapir DA, Gorup JM. Radiofrequency Medial Branch Neurotomy in Litigant and Nonlitigant Patients With Cervical Whiplash: A Prospective Study. Spine 2001;26(12):268.

[13] MacVicar J, Borowczyk JM, MacVicar AM, Loughnan BM, Bogduk N. Cervical Medial Branch Radiofrequency Neurotomy in New Zealand. Pain Med 2012;13(5):e47–54. doi:10.1111/j.1526-4637.2012.01351.

[14] Cohen SP, Williams KA, Kurihara C, et al. Multicenter, randomized, comparative cost-effectiveness study comparing 0, 1, and 2 diagnostic medial branch (facet joint nerve) block treatment paradigms before lumbar facet radiofrequency desensitization. Anesthesiology 2010;113(2):395–405. doi:10.1097/ALN.0b013e3181e33ae5.

[15] Practice Guidelines - Spine Intervention Society. Accessed January 13, 2021. https://www.spineintervention.org/general/custom.asp?page=Guidelines

[16] Local Coverage Determination for Facet Joint Injections, Medial Branch Blocks, and Facet Joint Radiofrequency Neurotomy (L34832). Accessed January 13, 2021. https://www.cms.gov/medicare-coverage-database/details/lcd-details.aspx?LcdId=34832&ext=18&CoverageSelection=Both&ArticleType=All&PolicyType=Final&&=All&KeyWord=facet+joint+injection&KeyWordLookUp=Title&KeyWordSearchType=And&bc=gAAAAAgAAAAAAAA