Observational Study

Efficacy of Cervical Facet Joint Radiofrequency Ablation Using a Multitined Cannula, a Technical Note, and Observational Study

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Background: Chronic cervical facet joint pain is a leading cause of pain and disability. In patients nonresponsive to conservative treatment, cervical facet radiofrequency ablation (RFA) has shown to be efficacious. However, the conventional RFA technique can be cumbersome. A novel RFA technique with a multitined cannula allows for a lateral approach and represents an attractive alternative option for cervical facet RFA. It offers a potentially shorter, less cumbersome procedure, with consequently less x-ray exposure and patient discomfort than the conventional cervical RFA.

Objectives: To describe the novel RFA technique using the lateral approach with the multitined cannula at the cervical facet joints and to assess its efficacy in chronic cervical facet joint pain.

Study Design: This is a single-center observational study.

Setting: Interventional Pain Management Center, Switzerland.

Methods: The aim of this study is to describe the RFA technique using the lateral approach with the multitined cannula at the cervical facet joints and to assess its efficacy in chronic cervical facet joint pain. Eligible adult patients with chronic (> 3 months) cervical facet joint pain refractory to conservative treatment and confirmed by dual positive medial branch blocks, received a fluoroscopic-guided cervical facet RFA treatment using the multitined cannula. The primary outcome was pain relief. Secondary outcome measures included the proportion of patients reporting a ≥ 30% reduction of pain intensity 2 months after RFA, patient global impression of change (PGIC), need for pain medication, sleep quality, and patient satisfaction.

Results: We included 26 patients. The patients showed a clinically meaningful and significant pain relief at 2 months after cervical facet RFA (mean Numeric Rating Scale of 7.5 [1.9] at baseline to 4.2 [2.4]) and 58% of the patients reported ≥ 30% reduction of pain. An improvement on the PGIC was reported by 88.2% of the patients. No severe side effects or complications were observed.

Limitations: Key limitations of our study were the relatively small sample size, the lack of a control group, and a relatively short-term follow-up duration.

Conclusions: Our results suggest that cervical facet joint RFA using the novel technique with the multitined cannula results in significant pain reduction and improvement on the PGIC. While the conventional technique requires multiple ablations at each target level, the RFA with the multitined needle requires only a singular ablation, likely sparing time, radiation dose, discomfort, and costs. Our results merit consideration of replacement of the conventional technique with the novel technique using the multitined cannula. However, larger-scale clinical trials with an adequate long-term follow-up period are needed to prove the efficacy of RFA using the multitined cannula in cervical facet joint pain.

Key words: Neck pain, facet joint pain, cervical, radiofrequency, ablation, denervation, multitined cannula, lateral approach, observational study

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Chronic neck pain is a condition occurring commonly in the population with a 12-month prevalence from around 30% to 50% in adults and has become one of the leading causes of disability (1). In 26% to 70% of the patients with chronic neck pain, the cervical facet (also called zygapophyseal) joints are the source of pain (2-4). Symptoms like axial pain exacerbated by neck movements, limited neck mobility, and signs like cervical paraspinal tenderness are only weakly associated with cervical facet joint pain (5), and anamnesis and physical examination are unreliable for diagnosis (6-8). Furthermore, studies (9-14) have demonstrated that plain x-ray, computerized tomography, and magnetic resonance imaging (MRI) findings are not useful for diagnosing cervical facet joint pain. Facet joint pathology on imaging frequently occurs in asymptomatic patients and there is a poor correlation between facet joint pathology on imaging and neck pain. The only valid method for diagnosis of cervical facet joint pain is with local anesthetic diagnostic blocks of the medial branches derived from the dorsal rami of the cervical spinal nerve roots, as nociception of the cervical facet joints is conducted through these branches (6,7,15).

For patients suffering from neck pain, it is recommended to start with a conservative treatment, like medication (e.g., [topical] nonsteroidal anti-inflammatory drugs, and muscle relaxants) (16), physiotherapy, or transcutaneous electric nerve stimulation (17). When conservative treatment fails, it is advised to proceed with medial branch blocks (MBBs). To decrease the likelihood of false-positive results, comparative MBBs are advised, i.e., performing 2 blocks on separate occasions (6). Pain relief following dual comparative MBBs is selecting patients for treatment of radiofrequency ablation (RFA) of the corresponding medial branches (6,7). Cervical facet RFA is a minimally invasive percutaneous procedure, using a targeted application of a high-frequency alternating current of circa 500 kHz that flows from needle tip into the surrounding tissue, including the medial branch, leading to ionic agitation (17,18). The ionic agitation results in heat generation causing the coagulation of the medial branch nerves.

Cervical facet RFA has level II evidence in the treatment of chronic cervical facet joint pain, but only has limited evidence for cervicogenic headache (19), and is known to carry only minor risks (20). However, technical skills of the operator, the RFA technique, and equipment are critical to responsive outcomes. The best-proven technique, described by Bogduk et al (21), and recommended by the Spinal Intervention Society (SIS), requires the fluoroscopic-guided cannula placement parallel to the nerve, using a posterior and slight posterior oblique approach, creating multiple overlapping RFA lesions along each target nerve (22). However, this technique can be cumbersome and laborious.

A novel technique with a multitined cannula represents an attractive alternative option for cervical facet RFA. Once the needle is positioned, 3 tines are deployed from the tip (Fig. 1), increasing the cannula's active area, and thus leading to the coagulation of a greater area (23,24). With this cannula a lateral approach can be used, positioning the cannula perpendicular to the articular pillar. The novel RFA technique requires only a single-needle pass and a singular ablation. Therefore, it offers a potentially shorter, less cumbersome procedure, with consequently less x-ray exposure and less patient discomfort than the conventional cervical RFA.

The aim of this study is to describe the novel RFA technique using the lateral approach with the multitined cannula at the cervical facet joints and to assess its efficacy in chronic cervical facet joint pain.

Methods

Approval to conduct the analysis of our prospectively maintained cohort of patients who were treated in our pain management center with cervical facet RFA between September 2018 and February 2022 was granted by the Research Ethics Committee of the Canton Ticino, Switzerland (CE 4024). All patients provided written informed consent prior to secondary analysis on a prospective cohort. Details of the design and study protocol were registered on ClinicalTrials.gov (reference number: NCT05353465).

Patients

To be considered eligible, patients needed to be at least 18 years or older and suffering from chronic mechanical neck pain without radicular symptoms or neurologic upper extremity symptoms, lasting for at least 3 months, despite conservative treatment. Reporting at least 50% pain relief on dual concordant MBBs was used as a diagnostic criterion for cervical facet joint pain, resulting in the indication for RFA. According to standard practice, patients did not receive RFA in case of local or systemic infection, coagulopathy, or the impossibility to stop anticoagulants, and in case they had

a cardiac pacemaker, automatic defibrillator, or were pregnant. Patients who were previously treated with cervical facet RFA and patients of whom no patient-reported outcome measurements (PROMs) at follow-up were available were excluded.

The Diagnostic MBB

The MBB procedure was performed with the patient in the lateral decubitus position, with the painful side above and with the head positioned on a small cushion. The C-arm was positioned in a lateral projection for a true lateral view, with the left and right articular pillars aligned directly over one another. The facet levels targeted were chosen based on a combination of referred pain patterns (25,26), physical examination (e.g., paraspinal tenderness to palpation under fluoroscopy), and MRI. The diagnostic MBBs were performed with a 27-G needle (27-G, 40-mm, 1½ inch, grey hypodermic needle; B. Braun Melsungen AG, Germany). The technical procedures for MBBs were performed according to the SIS Practice Guidelines (22). In short, for the C3 deep to C6 deep medial branch nerves, the needle was advanced aligned with the x-ray beam using the "tunnel view" technique, ensuring with intermittent lateral radiographs that the needle tip was directed to the periosteum at the target point. The target point was at the intersection of the 2 diagonals of the parallelogram-like shape of the articular pillar, also called the centroid of the articular pillar. For the C7 medial branch nerve, the needle tip was positioned at the apex of the C7 superior articular process. The third occipital nerve, supplying the C2/C3 facet joint, was blocked by injections at 3 sites: just above the C2/C3 joint; over the joint space; and just below the joint (Fig. 2). At each of the above-described target points, 0.3 mL of 0.5% bupivacaine was injected.

After the MBB procedure, patients were instructed to maintain a written pain diary every 30 minutes for 3 hours containing the serial 11-point Numeric Rating Scale (NRS-11), whereby zero stands for no pain at all and 10 for the worst imaginable pain (22). After compiling this questionnaire, the spine interventionalist verified the response to the diagnostic MBBs also verbally with the patient. The MBBs were defined to be positive in case of ≥ 50% concordant pain relief.

The RFA of the Cervical Facet Joints With the Multitined Cannula

The RFA procedure was likewise performed with the patient in the lateral decubitus position with the painful side up and the C-arm projected laterally. The injection point was marked on the skin with fluoroscopic guidance, and the overlying skin and soft tissue were anesthetized with 1-2 mL of 1% preservative-free lidocaine with a 25-G needle (25-G, 40-mm, 1½ inch, grey hypodermic needle; B. Braun Melsungen AG, Germany). The multitined cannula 18-G, 3-tined, 50-mm with a 5-mm active uninsulated tip (Diros OWL RF Trident Cannula, DTR-018/54/5, Diros Technology Inc., Markham, ON, Canada) was advanced perpendicular to the pillar surface under fluoroscopic guidance until contact with the periosteum at the above-mentioned target point for the MBB. The final position of the cannula was adjusted and confirmed with lateral and anterior-posterior views. According

Fig. 1. *An image of the 18-G multitined RF cannula with the 3 tines deployed, separated by 120°. Tine extrusion and retraction is achieved by rotation of the grey collar on the hub of the cannula.*
RF, radiofrequency.

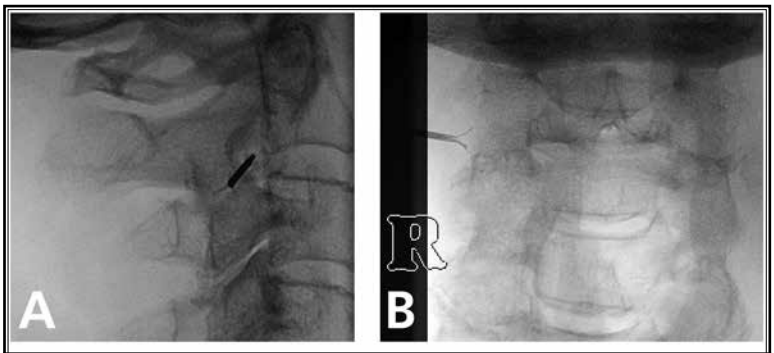

Fig. 2. *Fluoroscopic view RFA of the right C2/C3 cervical facet joint with the needle tip and its deployed tines of the cannula at the middle target point on the joint capsule, targeting the third occipital nerve over the C2/C3 joint space. The lateral view (A), and anteroposterior view (B) are shown.*
RFA, radiofrequency ablation.

to the SIS Practice Guidelines (22), no sensory or motor stimulation was performed. An additional injection of 1 mL of 1% lidocaine was injected through the cannula to reduce thermal pain. The RF cannula was connected to the RF generator (Abbott Medical, Plano, TX), with the grounding pad placed on the patient's thigh. The 3 tines were deployed by manipulation of the handle (Fig. 1). After new fluoroscopic control, monopolar lesions were performed by ramping temperature up to 80 °C and maintaining this temperature for 90 seconds (27).

If the patient complained of local pain at the site of the electrode during the delivery of the thermal lesion, the RFA was temporarily interrupted and an additional 1 mL of 1% lidocaine was injected through the cannula. In case of other symptoms, the position of the RFA probe was checked and adjusted if incorrect. Supplemental local anesthesia was administered and the RFA was resumed. One spine interventionalist (EK) performed all procedures. She had 10 years of experience in performing fluoroscopic-guided neuraxial procedures.

Outcome Measures

The primary outcome for this study was change in pain intensity between baseline and 2 months after the cervical facet RFA. Pre-RFA and post-RFA pain intensity was measured with the 11-point NRS-11. We considered a 2-point reduction in pain as a clinically meaningful benefit based on the Methods, Measurement, and Pain Assessment in Clinical Trials guidelines (28). As exploratory analysis, we computed the mean (standard deviation [SD]) decrease in the NRS-11 stratified by the number of ablated facet joints. Additionally, the proportion of patients reporting a ≥ 30% reduction of pain intensity 2 months after RFA was assessed. Other secondary outcomes included the patient global impression of change (PGIC), the need for pain medication, sleep quality, and patient satisfaction at 2 months follow-up. The PGIC consists of a 7-point Likert scale. In addition to the outcome measures, other demographic and clinical variables recorded for analysis were age, gender, baseline pain intensity, duration of pain, prior cervical spine surgery, existing posterior spinal instrumentation at the ablated levels, laterality, and number of levels treated.

Patients were provided with the telephone number of our Pain Management Center and were reminded to contact our center to report any severe side effects or complications. Given the fact that cervical MBB and RFA treatments often lead to transient side effects, like postprocedural dizziness and ataxia, precautions against falling were taken and patients were instructed not to drive motor vehicles until the effects had worn off (29). A follow-up visit was planned after 2 months.

Statistical Analysis

The sample size has been determined pragmatically. To eliminate the probability of selection bias, all patients eligible for the study from the hospital's patient charts were included in the cohort. Depending on type, patient characteristics were summarized as mean and SD or as count and percentage. Missing pain intensity scores were imputed using stochastic regression imputation. The paired-sample t test with a null hypothesis of no difference between baseline and pain posttreatment was used to test the difference between mean baseline and posttreatment NRS-11 scores. The distribution of pain scores was assessed using histograms. The type-I error rate for all analyses was set to 0.05. Treatment success was defined as having scored either "minimally improved," "much improved," or "very much improved" on the PGIC and were reported as count and percentage. The analyses were performed in Microsoft Excel (Microsoft Corporation, Redmond, WA) and R version 4.0.4 (R Foundation for Statistical Computing, Vienna, AT).

Results

Demographic Characteristics

We screened 30 patients who underwent a cervical spine RFA with the multitined cannula between September 2018 and February 2022. Four patients were excluded, 3 because they did not give informed consent to have their data analyzed for this study, and one of whom no PROMs were available in the hospital's patient chart. Therefore, 26 patients were eligible for inclusion (Fig. 3). Baseline characteristics of the included patients are shown in Table 1.

Cervical Facet RFA Characteristics

Cervical facet RFA characteristics are shown in Table 2. Twenty-two (84.6%) patients had multiple levels ablated, and 12 (46.2%) of the 26 RFA procedures were performed on the right side.

Primary Outcome Measure

The pain intensity decreased clinically meaningful and statistically significant from a mean NRS-11 of 7.5 (SD = 1.9) at baseline to a mean NRS-11 of 4.2 (2.4) at 2

months follow-up (Fig. 4) (Table 1). The pre-RFA NRS-11 decreased, compared to post-RFA NRS-11, in average by 3.3 (95% confidence interval [CI], 2.5-4.2, $P < 0.001$). At 2 months follow-up, 58% (15/26) of the patients reported ≥ 30% reduction of pain. The mean decrease in pain intensity on the NRS-11 in patients with 1 ablated facet joint was 3.4, 3.2 in patients with 2 ablated facet joints, and 3.7 in patients with 3 ablated joints. An imputation of 10 (38.5%) post-RFA NRS-11 was done prior to the statistical analyses.

Secondary Outcome Measures

Figure 5 shows the distribution of PGIC scores. At 2 months follow-up, 88.2% of the patients who completed the PGIC reported an improvement on the PGIC, 64.7% of patients scored at least "much improved." The need for pain medication, sleep quality, and patient satisfaction at 2 months follow-up, in comparison to baseline, are shown in Table 3. No serious side effects or complications related to the RFA treatment were reported.

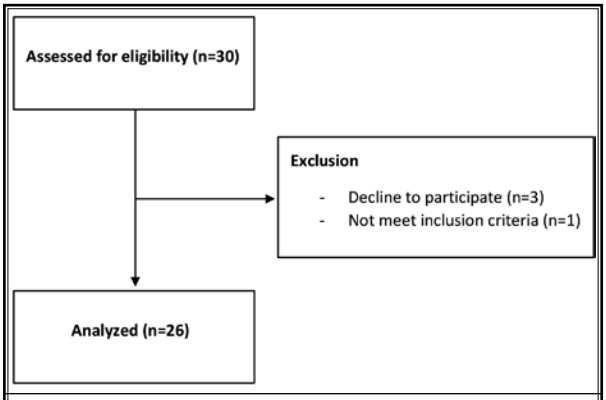

Fig. 3. *Patient enrolment flow chart.*

Table 1. *Baseline characteristics of patients.*

Gender (n = 26): n; %;	Women: 17; 65.4% Men: 9; 34.6%
Age (y) (n = 26): mean; SD	61.8; 13.7
Duration of Pain (n = 15): n; %	≥ 2 y: 7; 46.7% ≥ 1 y: 7; 46.7% ≥ 3 mo: 1; 6.7%
Baseline Pain (NRS-11, n = 26): mean; SD	7.5; 1.9
Prior Cervical Spine Surgery (n = 26): n; %	6; 23.1%
Existing Posterior Spinal Instrumentation at the Ablated Levels (n = 26): n; %	0; 0%

Abbreviations: NRS-11, Numeric Rating Scale; SD, standard deviation; y, years; mo, month(s); n, number.

Table 2. *Cervical facet RFA characteristics.*

Body Side (n = 26): n; %	Right: 12; 46.2% Left: 14; 53.8%
Ablations Per Level (n = 26): n; %	C2-C3: 12; 22.6% C3-C4: 10; 18.9% C4-C5: 9; 17.0% C5-C6: 13; 24.5% C6-C7: 9; 17.0%
Number of Patients per Number of Ablated Facet Joints (n = 26): n; %	1 facet joint: 4; 15.4% 2 facet joints: 17; 65.4% 3 facet joints: 5; 19.2%

Abbreviation: n, number.

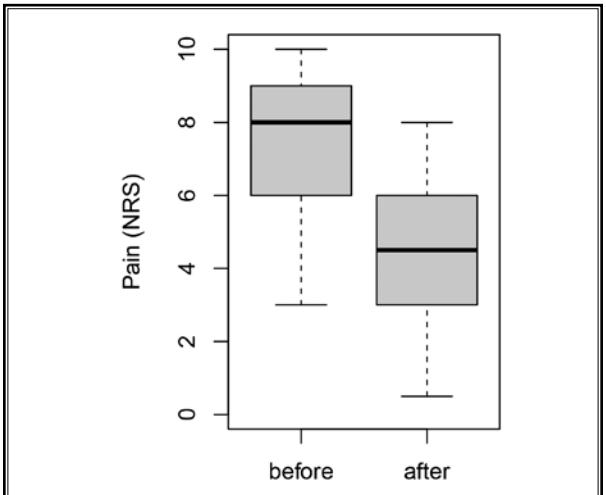

Fig. 4. *Change in pain intensity (NRS-11) from pre- to post-RFA treatment.*
NRS-11, numeric rating scale; RFA, radiofrequency ablation.

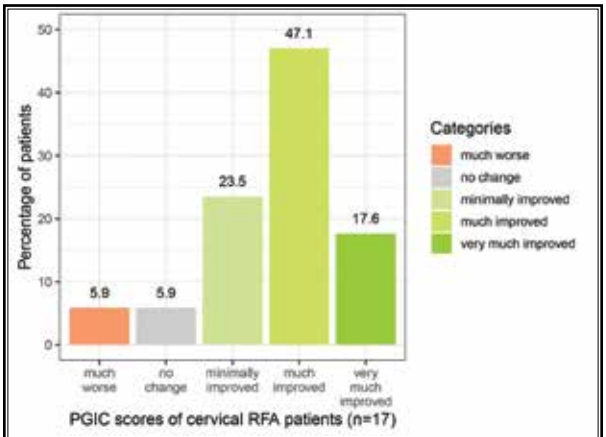

Fig. 5. *PGIC scores 2 months after cervical facet RFA in percentage of patients.*
PGIC, global impression of change; RFA, radiofrequency ablation.

Table 3. *Need for pain medication, sleep quality, and patient satisfaction 2 months after cervical facet RFA treatment.*

Need for Pain Medication (n = 10): n; %	Stopped the use: 3; 30.0% Decreased the use: 5; 50.0% No change in use: 2; 20% Increased the use: 0; 0%
Sleep Quality (n = 10): n; %	Improved: 6; 60.0% No change: 4; 40.0% Worsened: 0; 0%
Patient Satisfaction (n = 9): n; %	Satisfied: 8; 88.9% Not satisfied: 1; 11.1%

Abbreviation: RFA, radiofrequency ablation.

In several patients, the follow-up visit after 2 months was performed by telephone call instead of a face-to-face visit, as follow-up was in the period of the COVID-19 pandemic. For some of these patients, NRS-11 pain ratings were missing in the patients' charts and often also other outcome data were missing.

Discussion

This is the first study assessing prospectively maintained outcomes of a cohort of patients who underwent cervical facet RFA with a lateral approach using the multitined cannula in the treatment of chronic cervical facet joint pain. The patients showed a clinically meaningful and statistically significant pain relief at 2 months after cervical facet RFA, and 58% of the patients reported ≥ 30% reduction of pain. These results are similar to the results of the double-blind randomized controlled trial of van Eerd et al (29) comparing cervical facet RFA (using the conventional technique) combined with bupivacaine to bupivacaine injection alone. Van Eerd et al (29) reported a pain reduction of ≥ 30% in 61.1% of their patients at 3 months follow-up. Additionally, a systematic review of Engel et al (30), based on explanatory and observational studies, showed a success rate of 63%, 95% CI: 57% to 69% at 6 months follow-up. The RFA treatment in our study led to an improvement on the PGIC in 88.2% of the patients, to a significant reduction in the use of pain medication, and a significant improvement in sleep quality, and patient satisfaction.

We performed a stratified analyses per number of facet joints for the primary outcome. Results didn't seem to depend on the number of facet joints treated with RFA. However, considering the small sample size, the conclusions are explorative at best. The mechanism of action of RFA of the medial branches is believed to be the interruption of the transmission of the pain signal from the facet joint to the spinal dorsal horn, eliminating perception of pain originating from the facet joints (20,29). The cervical medial branches, except for the C3 superficial medial branch (also called third occipital nerve), have small diameters (≤ 1 mm) and are most frequently displaced about 1-2 mm from the bone (17,31). The nerve branches have variable courses relative to the bony anatomic targets. Due to these anatomic challenges, a larger lesion area improves the chance to target the cervical medial branches, adequately coagulating the nerve. There is indeed evidence that larger lesions may improve RFA outcomes and increase duration of pain relief (17). Furthermore, the C3-C6 medial branch nerves run around the anterolateral and lateral surfaces of the rounded profile of the articular pillar. Therefore, traditionally at least 2 ablations per nerve are needed in order to obtain effective lesions parallel to the target nerve on each of these surfaces (24,32). This requires 2 technically challenging trajectories, one posterior approach (i.e., parasagittal to the pillar surface), and one slight posterior oblique approach (i.e., oblique to the pillar surface), creating multiple overlapping RFA lesions. In comparison to this conventional technique, the lateral approach used in our study requires less soft tissue penetration, which likely leads to a reduction in procedure time as well as in an improvement of patient comfort and satisfaction.

The lateral approach for cervical facet RFA is a familiar approach for most spine interventionalists as it is like the approach for the cervical MBB. It is an easier acquired skill for beginner spine interventionalists than the conventional cervical facet RFA approach. The 3 tines of the cannula are flexible and conform to periosteum upon deployment. The pyramid-like configuration of the deployed tines results in a 3-dimensional pear-shaped lesion of which the maximum diameter is circa 10 mm, in case of a cannula with a 5-mm active uninsulated tip. This leads to a larger cross-sectional footprint to ablate the nerve in comparison to the conventional technique with a conventional cannula. The maximum diameter occurs circa 2 mm above the bony articular surface, close to the position of the medial branch nerve, and the bulbous base of the lesion is less sensitive to angulation changes between the cannula and the nerve, as shown by in vivo experiments by Finlayson et al (24). Furthermore, the flexible tines are able to adapt better to surface irregularities caused by osteophytes. Therefore, the lesion shape is more likely to encompass the medial branch nerve than the lesion shape created by the conventional cannula (24).

While the conventional technique requires multiple ablations at each target level, the RFA with the

multitined needle requires only a singular ablation, sparing time, radiation dose, discomfort, and costs. In our patients only, the third occipital nerve was ablated at multiple sites. However, considering the greater lesion size created by the multitined cannula (24), a singular ablation over the C2-C3 joint space might be sufficiently effective even for the third occipital nerve.

The lateral approach with the multitined cannula is additionally likely to be safer than the conventional posterior approach. With the lateral approach, the cannula is positioned perpendicularly on top of the periosteum; whereas, with the posterior approach, the cannula is advanced parallel to the periosteum with no bony endpoint to prevent advancement to the cervical nerve roots. The RFA lesion shape produced by a conventional monopolar electrode is elliptical along the length of the RFA cannula's bare tip, extending proximally and distally beyond it. Therefore, the lesion with this cannula is longer than the articular pillar anterior-posterior diameter, placing the cervical nerve root at risk of coagulation (17). However, impeccable fluoroscopic use properly aligning the articular pillars directly over one another removing parallax for a true lateral view remains important during this technique. This can be difficult, especially for inexperienced spine interventionalists. Furthermore, to confirm that the tip of the cannula is against the bony pillar surface, an anterior-posterior view should be obtained as a safety measure.

In our study, the MBB and RF procedures were performed with the patient in the lateral decubitus position with the shoulders drawn down and placed on a headrest. However, the lateral approach can also be performed with the patient in the supine position (17). Clear fluoroscopic visualization of the lower cervical facet joints using fluoroscopy can be challenging with the patient in the lateral decubitus position due to the patient's shoulders shadow obscuring the target, particularly in obese patients and in patients with broad shoulders. In the supine position, shoulders can be drawn down more easily and the supine position is additionally likely to be more comfortable for the patient.

Deng et al (33) recently published an observational study, comparing RFA of the lumbosacral facet joints using the conventional approach with a conventional cannula vs the novel approach with the multitined cannula. The patients underwent the 2 procedures on separate occasions at the same facet joints. Patients and physicians were not blinded to the applied procedural technique. The results of this study suggested that there were no significant differences in the change in pain and physical function outcomes at 3 months follow-up between the 2 techniques. Additionally, their results suggested that the multitined cannula required a significantly shorter procedural duration and less-absorbed radiation doses. In line with these results, we expect that procedural duration and radiation exposure required for cervical facet RFA with the multitined needle are significantly less than as required for cervical facet RFA with the conventional technique.

Our study has several limitations. First, the relatively small sample size and the lack of a control group. However, these patients have had chronic pain with a median duration of pain ≥ 1 year and < 2 years, so we do not expect any influence of natural course to confound our results. Furthermore, trials for invasive therapies with (sham) control groups are confronted with numerous challenges, including difficulties enrolling sufficient number of patients and follow-up long term, and costs, and are thus not always feasible (20,34). Additionally, blinding and effectively masking patients to RFA is also problematic making trials with sham controls ethically challenging and less desirable (20). Our study evaluates a "real world" patient sample and was not industry sponsored.

Second, our study outcome measurements lacked a validated function scale, and in more than half of the patients the outcomes "need for pain medication, sleep quality, and patient satisfaction" were missing. This has likely been a consequence of the less-effective follow-up due to the COVID-19 pandemic. Although the percentages of missing NRS-11 pain ratings and PGIC ratings were significantly lower, our study results may have been influenced by selection bias, as patients not responding well to treatment might not be motivated to fill out the questionnaires.

Third, our study, like the study of Deng et al (33) for lumbosacral RFA, assessed only a short-term follow-up interval. It has been shown that the duration of pain relief after conventional cervical facet RFA ranges from 6 to 14 months (17), as the medial branch nerves recover over time. When the pain returns, RFA treatment can be repeated.

Fourth, we did not perform sensory or motor stimulation before RFA in our study patients. Although the omission of sensory or motor stimulation before RFA is in accordance with the SIS Practice Guidelines (22), which recommend to confirm the correct positioning of the RFA cannula by a true lateral and anterior-posterior fluoroscopic view, as previously described, it

is still controversial. The American Academy of Pain Medicine and the American Society of Interventional Pain Physicians recommend electrical sensory and motor stimulation to confirm the proximity of the RFA cannula to the cervical medial branch and to avoid lesioning of spinal nerves, the ventral ramus, or other structures (17). Especially in the presence of advanced degenerative changes that limit fluoroscopic visualization of the facet joints, and anatomic variations in the locations, the medial branch nerves, or other surrounding structures, sensory and motor stimulation can guide appropriate needle placement.

Strengths of this study included the same experienced spine interventionalist performing all procedures, and stringent patient-selection criteria. Dual positive MBBs were required as a diagnostic criterion for RFA. The criterion of dual diagnostic MBBs reduces the risk of the false-positive results in clinical trials that aim to show efficacy and may increase the responsive rate for the treatment of the cervical facet RFA (7). On the other hand, the use of dual blocks in clinical settings automatically results in more false-negative blocks denying some patients the benefit of a RFA treatment, and increases patient inconveniences, costs, and risk exposure (17).

Conclusions

Our results suggest that cervical spine RFA using the novel lateral approach and the multitined cannula results in significant improvements in pain and PGIC. The novel cervical facet RFA technique is relatively simply to perform and our results merit consideration of replacement of the conventional posterior technique with the lateral approach using the multitined cannula. However, larger-scale (randomized controlled) clinical trials with an adequate long-term follow-up period are needed to prove the efficacy of cervical facet RFA using the lateral approach and the multitined cannula in cervical facet joint pain. Ideal lesion time, radiation exposure, patient comfort, patient position, and procedural time should also be assessed.

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