Retrospective Review

What is the Correlation Between Facet Joint Radiofrequency Outcome and Response to Comparative Medial Branch Blocks?

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Background: Facet joint pain is a common cause of low back pain. There are no physical exam findings that provide a reliable diagnosis. Diagnosis is made by medial branch block injections (MBB). Once the source of pain has been determined, radiofrequency neurotomy (RFN) can be performed. Previous studies have shown that RFN reduces level of pain and improves function. No study has tried to correlate MBB results with outcomes after RFN.

Objectives: (1) Estimate percentage decrease in pain, decrease in analgesic use, and increase in activity tolerance after facet joint radiofrequency neurotomy (2) Determine correlation between percentage pain relief or duration of pain relief after MBB and RFN outcomes.

Study Design: Retrospective review of patients undergoing RFN, who had ≥ 70% pain relief on 2 sets of MBB with 0.5 – 1 mL of 2% lidocaine (MBB 1) and 0.75% bupivacaine (MBB 2). IRB approval was obtained before data collection began.

Setting: All patients undergoing RFN between 12/06-1/10 at University Spine and Pain clinics.

Methods: Subgroup analysis was performed based on response to MBB, a)100% pain relief and <100% pain relief after MBB 1 and 2 and a) those with > 8 hours and ≤ 8 hours pain relief after MBB 1 and 2. Correlational analysis was conducted to determine the correlation between a) percent pain relief after MBB1 and 2 and percent change in pain after RFN and b) duration of pain relief after MBB 1 and 2 and percent change in pain relief after RFN. Outcome measures: Pain intensity, disability index, analgesic use, and patient perception of benefit.

Results: Mean improvement of Disability scores at 3 months was 12.63 (P = 0.001), percent pain relief was 47.68% (P = 0.001). Patients with 100% pain relief after MBB 1 had greater improvement of disability scores (P = 0.008). Those with > 8 hours pain relief after MBB 1 had greater reduction in pain (P = 0.014). Pearson correlation analysis showed no correlation between percent pain relief or duration of pain relief after MBB and percent pain relief after RFN.

Limitations: This was a small observational study with short-term follow up.

Conclusion: Patients had improved disability scores and decreased pain after RFN. No correlation was seen between results on MBB and pain relief after RFN. It is still unclear how many medial branch blocks are needed and the criteria for MBB results before proceeding to RFN.

Key words: Facet, medial branch blocks, radiofrequency ablation, chronic low back pain, interventional spine procedures, functional improvement

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Chronic persistent low back and neck pain occurs in 25% to 60% of patients, one year or longer after the initial episode (1,2). It is estimated that 33% to 65% of patients with chronic neck pain and 17% to 44% of patients with chronic low back pain have facet joint pain (3-10). Facet joints are a common cause of chronic neck and back pain (7-11). Patients with facet joint pain report axial pain, aggravated by movements or activity. Pain is usually referred distally from the affected facet joints. Facet joint pain provocation studies in volunteers and patients demonstrated distinctive pain referral patterns (12-14), however due to significant overlap from adjacent facet joints and other pain generating sources such as the discs, pain arising from facet joints is indistinguishable from other pain generating structures, especially in the thoracic and lumbar spine (15-17). Various clinical tests for facet joint pain have been described (18-21), but none of these can reliably diagnose or distinguish facet joint pain from other sources of pain in the affected region or localize pain to a specific facet joint level (6,20,22-26). A biological marker or surrogate for facet joint pain does not exist. Imaging studies are able to demonstrate with exquisite detail facet joint morphology, but facet joint abnormalities seldom equate with facet joint pain (27-30).

The diagnosis of facet joint pain is established by facet joint block or facet nerve blocks (31-33). The underlying principle for these tests is that local anesthetic block of the affected joint or its nerve supply (medial branch blocks [MBB]) will lead to pain relief and pain-free movement of the affected joint. A negative test will exclude the joint as source of pain, while a positive test will increase the likelihood that the joint tested is the source of pain (33). Single blocks, however, result in high false positive rates varying from 27% to 63% in various studies (5,8-11,34,35). Double controlled local anesthetic blocks are recommended and have a specificity of 88% and sensitivity of 54% resulting in few false positive diagnoses, but a high false negative rate. Relaxing the diagnostic criteria to include all patients with reproducible relief, irrespective of duration, increases sensitivity to 100% but lowers specificity to 65% (36,37). The prevalence of facet joint pain based on double controlled blocks is estimated to range from 16% to 44% in patients with chronic low back pain and 33% to 65% in patients with chronic neck pain (4-7,9-11,24).

MBB are also employed to select patients most likely to benefit from radiofrequency neurotomy (RFN), a nerve ablative procedure to treat facet joint pain. Clinical trials that employed dual controlled or placebo controlled MBB to select patients for RFN reported successful outcomes in 60% to 74% of patients with chronic neck pain and 53% to 87% patients with chronic low back pain (28-41). However, no study determined the correlation between MBB responses and RFN outcomes, specifically whether patients with concordant analgesic responses to dual controlled MBB have superior RFN outcomes as compared to those without concordant analgesic response.

The purpose of this study is to: (1) estimate percentage pain relief, decrease in analgesic use, and increase in activity tolerance after facet joint RFN in patients with chronic neck and back pain; (2) study the correlation between degree and duration of analgesic responses after MBB with RFN treatment outcomes at 3 months follow-up.

Methods

Study Design

Retrospective chart review of all patients with chronic neck or low back pain who were treated with facet joint RFN between December 2006 and January 2010. The study was approved by the University Health Sciences IRB Office.

Study Setting

The study was conducted at a large university hospital in the Midwest in the United States. Patients were recruited from the University Hospital Pain and Spine Clinics.

Data Extraction

Medical records of patients who were treated with RFN for chronic neck or low back pain were reviewed and the following data were extracted: age, gender, duration of pain, location of pain, clinical and imaging abnormalities, MBB levels and sides, analgesic response to MBB (percentage decrease in pain and duration of pain decrease), RFN level and sides, pain relief and duration of pain relief at regularly scheduled follow-up clinic visits, changes in neck disability index (NDI) and Oswestry Disability Index (ODI), and analgesic use before and after RFN.

Diagnosis of Facet Joint Pain

A physician with fellowship training and extensive experience performed the MBB (NS) using standard

technique in an ambulatory surgery center. The target levels for MBB were determined by palpation for paraspinal tenderness and fluoroscopic correlation (18). Spinal needles were placed at target sites, needle position and avascular injection confirmed with contrast, followed by instillation of 0.5 mL (for cervical MBB) or 1 mL (for lumbar MBB) of 2% lidocaine or 0.75% bupivacaine. MBB were performed at 2 levels for one facet joint. MBB were performed at 3 levels when 2 facet joints were involved on the same side, for instance left L3-L4 medial branch and L5 dorsal ramus blocks were performed for left L4-5 and L5-S1 facet joints. For the C2/3 facet joint, the third occipital nerve was blocked at 3 target points (31,42). A midlevel provider independently evaluated each patient before and after the MBB and obtained pain intensity ratings and checked range of motion. Patients completed an hourly pain rating (in a position that usually provoked pain) for 8 hours and then daily pain ratings for 2 weeks. Pain diaries were reviewed by the treating physician and confirmatory MBB with bupivacaine (MBB2) were scheduled if there was positive analgesic response to the first MBB with lidocaine. According to our routine clinical practice, all patients were informed that 2 different local anesthetic drugs were employed for the first and second MBB, and no information was provided regarding the specific agent used, any expected pain relief, or onset and duration of pain relief after MBB. For this study, positive analgesic response was defined as 70% or greater pain reduction within 30 minutes of the MBB and lasting from one to 8 hours after the procedure. Percentage pain relief was calculated by the formula ([pre-treatment pain intensity - post treatment pain intensity ÷ pre-treatment pain intensity] X 100). Those who obtained 70% or greater reduction in pain with both sets of MBB (i.e., MBB1 and MBB2) underwent RFN of target nerves (28,40,43).

Treatment of Facet Joint Pain

RFN was performed at preselected levels by a single physician (NS) with extensive experience in RFN. Insulated 18 gauge radiofrequency probes with 10 mm exposed tips were placed on target nerves and multiple lesions created at 80 degrees Celsius for 105 seconds (Kimberly-Clark Radiofrequency Generator, Roswell, Ga). In the cervical spine, radiofrequency nerve ablation was performed by both sagittal and oblique approaches (28,43), while in the lumbar spine radiofrequency probes were positioned parallel to the course of the target nerves by an inferiorly declined oblique approach (40,44,45).

Follow Up Visits and Outcome Assessments

Pain intensity ratings (0 to 10 numeric pain rating scale) and NDI (for neck pain) or ODI scores (for low back pain) were collecting before and after RFN. Patients were scheduled for follow-up visits at 4 weeks, 3, 6, 9, and 12 months after RFN. Outcomes evaluated at each clinic visit included ODI or NDI, Brief Pain Inventory, pain on 0 – 10 numeric pain rating scale and percentage pain relief, change in analgesic medication intake, and patient perception of benefit. The patient perception of benefit was determined by asking patients to provide an estimate of overall percent change in their condition after RFN when compared to their status before RFN. Follow-ups were performed by the treating physician (SCH) or midlevel provider at the spine or pain clinics. Pain diaries were reviewed by a physician, in conjunction with pain diaries from all other procedures, and no RFN follow-ups were scheduled with the provider who performed the MBB and RFN.

Statistical Analysis

T-tests and Fisher Exact tests were used for categorical data, and Wilcoxon Rank sum tests (Mann-Whitney U) for non-parametric data. A subgroup analysis was performed, based on analgesic response to MBB in those (a) who obtained 100% pain reduction and those who obtained > 70% but < 100% pain reduction on MBB1 and MBB2, (b) those with 8 hours or less of pain reduction and those with > 8 hours pain reduction after MBB1 and MBB2. Correlation analysis was performed to determine correlation between (a) percent pain reduction after MBB1 and MBB2 and percent pain relief after RFN and (b) duration of pain reduction after MBB1 and MBB2 and percent pain relief after RFN.

Results

Demographics

A total of 112 patients with positive analgesic responses to double controlled MBB were treated with RFN between December 2006 and January 2010. Of the 112 patients, 50 patients had complete data at 3 months follow-up visit and this data was analyzed. Data for the 6 and 12 months visits were incomplete or missing and therefore not included in this analysis.

Table 1 shows the demographic characteristics of this population. The mean (SD) age was 51.2 years (12.4), 56% were women, mean (SD) body weight 86.5 kg (23.3), and the median duration of pain was 5 years

(range 1 – 40 years). Mean baseline pain on 0 – 10 numeric pain scale was 5.26 (range 3 – 8). Twelve patients had coexisting depression (24%) and 3 (6%) had anxiety disorder. Other comorbid medical conditions were migraine headaches, bipolar disorder, spinal cord injury, prostate cancer, hypertension, coronary artery disease, atrial fibrillation, and Parkinson's disease. MRI studies showed degenerative facet disease in 22 patients and degenerative disc disease in 33 patients. Fourteen patients underwent cervical RFN and 36 patients received lumbar RFN. There were 4 patients who required repeat RFN for recurrence of pain after a previously successful RFN (3 lumbar and one cervical).

RFN Outcomes

Table 2 shows outcomes at 3 months after RFN. Mean pain relief was 47.7% (33.40) ($P < 0.001$) which was clinically significant and meaningful. Disability Index represents percentage scores for ODI and NDI. Mean disability score at baseline was 43.1% (18.0) and at 3 months was 31.0% (18.3), a statistically significant mean decrease of 12.6 (16.6) ($P < 0.001$). Disability sub scores for standing and walking improved and approached significance but were not statistically significant. Opioid analgesic consumption decreased in 41% of patients at the 3 month follow-up, but did not reach statistical significance. Overall, patients perceived 53.2% (31.5%) improvement at 3 months compared to baseline ($P < 0.001$). Unfortunately, due to the small numbers in this study, we were unable to compare cervical and lumbar results.

All 4 patients with repeat RFN, reported pain relief after the repeat RFN; 3 patients experienced greater than 50% pain relief and one patient reported less than 20% pain relief. There was > 50% decrease in disability scores in all 4 patients.

Table 1. *Demographics and clinical characteristics of study patients.*

Patient Characteristics	Value (n = 50)
Age (yr)	51.2 (12.4)
Weight (kg)	86.5 (23.3)
Gender – Female	28 (56%)
Pain Duration (yr)	5 (1 – 40)
Psychiatric Disorder	--
Depression	12 (24%)
Anxiety	3 (6%)
RFN Laterality	--
Bilateral	29 (58%)
Right	15 (30%)
Left	6 (12%)
RFN Region	--
Lumbar spine	36 (72%)
Cervical spine	14 (28%)

Reported as mean (SD), median (range), or frequency (%)

RFN Outcomes and Analgesic Response to MBB1 and MBB2 (Tables 3 and 4):

Subgroup analysis was performed based on analgesic responses to MBB (MBB1and MBB2): (a) 100% pain reduction (complete responders) vs. < 100% pain reduction (partial responders) and (b) ≤ 8 hours pain reduction (short duration relief) vs. > 8 hours pain reduction (prolonged relief) after MBB. RFN outcomes (percentage pain relief, disability scores, perceived improvement, and decrease in analgesic use) were compared in these subgroups. (Note 4 patients who had MBB1 were lost to follow-up before MBB2 was performed which accounts for different N values in Tables 3 and 4).

Complete Responders vs. Partial Responders

There were no statistically significant differences in pain relief, perceived improvement, and decrease in analgesics use after RFN between complete (100% pain relief) and partial responders (< 100% pain relief) (both for MBB1 and MBB2) (Tables 3 and 4). A statistically sig-

Table 2. *Decrease in pain, disability index, and analgesic use at 3 month follow-up.*

Measurement	Baseline (n = 50)	3 Months (n = 38)	Difference	*P*-value^
Disability Index %	43.1 (18.0)	31.0 (18.3)	-12.6 (16.6)	< 0.001
Pain relief - %	--	47.7 (33.4)	--	< 0.001
Perceived Improvement - %	--	53.2 (31.5)	--	< 0.001
Analgesic use Reduced	--	16 (41.0%)	--	0.337

Disability Index = combined ODI and NDI

^ *P*-value for ODI is from paired t-test over time, pain drop, and perceived pain drop, *P*-values are from single t-tests against a null hypothesis value of 25%, and medication reduced *P*-value is from a single proportion test against a null hypothesis of 50%

nificant reduction in disability ratings was observed in complete responders (mean 16.2 ±17.5, *P* = 0.008) with MBB1 (Table 3) but not with MBB2 (Table 4). Complete responders had significantly higher disability scores at baseline than the partial responders (Table 3) (*P* = 0.017).

Short Duration Relief Vs. Prolonged Relief

Short duration relief subgroup after MBB1 (≤ 8 hours pain reduction) had significantly higher baseline disability scores than the prolonged relief subgroup (> 8 hours pain reduction). Disability scores remained significantly different between short duration and prolonged pain relief groups at 3 month follow-up of MBB1 (Table 3), however there was no difference between groups in disability scores at 3 months follow-up post MBB2 (Table 4). There was no statistically significant difference in disability score reduction from baseline between the short duration and prolonged relief subgroups at 3 months follow-up for either MBB1 or MBB2 (Table 3 and 4). Percentage pain relief and patient perceived improvement were statistically better for the prolonged subgroup (> 8 hours) as compared to the short duration (< 8 hours) relief subgroup after MBB1 (Table 3). There were no statistically significant differences in decrease in analgesic use observed between those with short duration relief (≤ 8 hours) and prolonged relief (> 8 hours) (Table 3) for MBB1. There was no statistically significant difference in any outcome after MBB2 when comparing short versus long duration response (Table 4).

We compared RFN outcomes in 33 patients with concordant responses (80% to 100% analgesic response after both MBB1 and MBB2) with 11 patients who had discrepant responses (only one of the 2 MBB provided ≥ 80% analgesic response). There were no statistically significant differences in RFN outcomes (decrease in pain and disability scores) between the 2 groups (Table 5).

Correlation of RFN Outcomes with Diagnostic MBB

Pearson Correlation analysis revealed no significant correlation between percentage pain reduction (analgesic response) after diagnostic MBB and percentage relief in low back pain or neck pain at 3 months after RFN (Fig. 1). Fig. 2 shows a regression model of log of duration of pain relief (hours) with diagnostic MBB and percent decrease in low back pain or neck pain at 3 months after RFN. Neither percentage pain reduction

Table 3. *Comparison of MBB 1 analgesic response with RFNneurotomy outcome at 3 months.*

RFN Outcomes	MBB Analgesic response	Baseline	3 Months	Difference	N^
Disability Index (ODI & NDI)	100% Pain reduction	46.8 (17.4)	32.0 (18.9)	-16.2 (17.5)	34 / 26 / 26
	< 100% Pain reduction	33.7 (15.8)*	27.6 (18.0)	-3.1(10.5)**	14 / 11 /11
	> 8 hrs Pain reduction	32.5 (20.2)	16.8 (11.4)	-15.4 (24.3)	12 / 8 / 8
	≤ 8 hrs Pain reduction	46.5 (15.7)*	34.5 (18.3)**	-11.5 (14.4)	36 / 29 / 29
Pain Relief - %	100% Pain reduction	--	49.7 (31.9)	--	27
	< 100% Pain reduction	--	42.0 (40.2)	--	10
	> 8 hrs Pain reduction	--	73.9 (18.6)	--	8
	≤ 8 hrs Pain reduction	--	40.4 (33.8)*	--	29
Perceived Improvement - %	100% Pain reduction	--	58.2 (29.7)	--	22
	< 100% Pain reduction	--	40.1 (35.7)	--	9
	> 8 hrs Pain reduction	--	76.7 (20.2)	--	9
	≤ 8 hrs Pain reduction	--	43.2 (31.2)*	--	22
Decrease in analgesics use	100% Pain reduction	--	12 (44.4%)	--	27
	< 100% Pain reduction	--	3 (27.3%)	--	11
	> 8 hrs Pain reduction	--	4 (44.4%)	--	9
	≤ 8 hrs Pain reduction	--	11 (37.9%)	--	29

MBB – Medial Branch Block.
^ Sample size at each time point respectively or for 3 months only.
* indicates a significant difference between MBB result groups with $P < 0.05$.
** indicates a significant difference between MBB result groups with $P < 0.01$.

Table 4. *Comparison of MBB 2 analgesic response with RFNneurotomy outcome at 3 months.*

RFN Outcomes	MBB Analgesic response	Baseline	3 Months	Difference	N^
Disability Index (ODI & NDI)	100% Pain reduction	40.9 (17.2)	25.3 (13.1)	-16.3 (20.4)	26 / 18 / 18
	< 100% Pain reduction	42.9 (15.7)	30.9 (15.5)	-10.1 (12.1)	18 / 15 / 15
	> 8 hrs Pain reduction	39.7 (20.4)	27.2 (12.4)	-14.0 (22.7)	17 / 12 /12
	≤ 8 hrs Pain reduction	43.0 (13.7)	28.2 (15.5)	-13.1 (13.7)	27 / 21 /21
Pain Relief - %	100% Pain reduction	--	58.5 (33.9)	--	19
	< 100% Pain reduction	--	41.5 (31.2)	--	14
	> 8 hrs Pain reduction	--	53.8 (25.5)	--	12
	≤ 8 hrs Pain reduction	--	49.8 (37.7)	--	21
Perceived Improvement - %	100% Pain reduction	--	65.6 (29.4)	--	16
	< 100% Pain reduction	--	42.1 (28.2)	--	12
	> 8 hrs Pain reduction	--	57.5 (30.3)	--	12
	≤ 8 hrs Pain reduction	--	54.1 (32.1)	--	16
Decrease in analgesic use	100% Pain reduction	--	9 (47.4%)	--	19
	< 100% Pain reduction	--	5 (33.3%)	--	15
	> 8 hrs Pain reduction	--	4 (30.8%)	--	13
	≤ 8 hrs Pain reduction	--	10 (47.6%)	--	21

MBB – Medial Branch Block
^ Sample size at each time point respectively, or for 3 months only.
* indicates a significant difference between MBB result groups with $P < 0.05$.
** indicates a significant difference between MBB result groups with $P < 0.01$.

Table 5. *RFN outcomes in groups with concordant vs. discrepant analgesic responses.*

RFN Outcomes	MBB Response		*P*-value
	Concordant (n = 33)	Discrepant (n = 11)	
Pain relief	53.1 (35.5)	44.4 (24.7)	0.469
Disability scores			
Baseline	39.9 (17.6)	47.2 (11.4)	0.127
3 Months	26.2 (13.5)	33.0 (16.2)	0.307
Difference	-12.9 (18.5)	-15.1 (13.2)	0.715

nor duration of analgesic response after diagnostic MBB correlated with significantly decreased pain at 3 months after RFN.

Discussion

MBB responses are employed to select patient who might respond to RFN, in that a positive response predicts a good chance of obtaining significant pain relief after percutaneous RFN. There are 2 studies that correlated MBB responses to RFN outcomes (46,47). In Cohen et al's study (47), there were no significant differences in RFN outcomes based on any MBB pain relief cutoff over 50%. Derby et al (46) found that double MBB protocol with a 70% cut off value for MBB pain relief had better correlation with favorable RFN outcomes as compared with single MBB protocol.

In this retrospective study, we compared percentage pain relief, decrease in disability ratings, and analgesic usage at 3 month follow-up after RFN with percentage pain reduction and duration of analgesia after MBB with lidocaine (MBB1) and bupivacaine (MBB2) and performed a correlation analysis to determine if positive results with either one MBB or both MBB correlated with good outcomes after RFN. We observed that RFN resulted in clinically significant pain relief, improved function as measured on disability scores, and decreased analgesic use at 3 month follow-up, but there was no correlation between percent pain reduction after MBB (either one or both) and pain relief at 3 month follow-up. Similarly no correlation was seen between duration of analgesic effect after MBB (either or both) and pain relief after RFN. These preliminary results suggest that MBB do not predict RFN outcomes. Neither the duration of analgesic response nor the degree of analgesic response (cut off values) predicts pain relief after RFN.

MBB are considered to have both diagnostic and prognostic utility. MBB test if a patients' pain is stemming from a facet joint and establish or exclude the

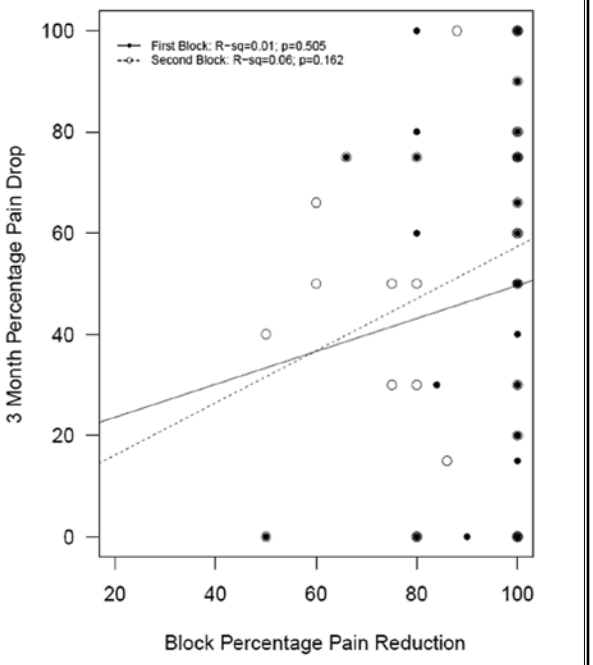

Fig. 1. *Pearson correlation analysis shows percentage of pain relief at 3 months after RFN (y-axis) and percentage of pain reduction after MBB (x-axis). Pain relief at 3 months after RFN does not correlate with percentage decrease in pain after MBB with lidocaine (filled circles), bupivacaine (empty circles), or both (empty and filled circles superimposed).*

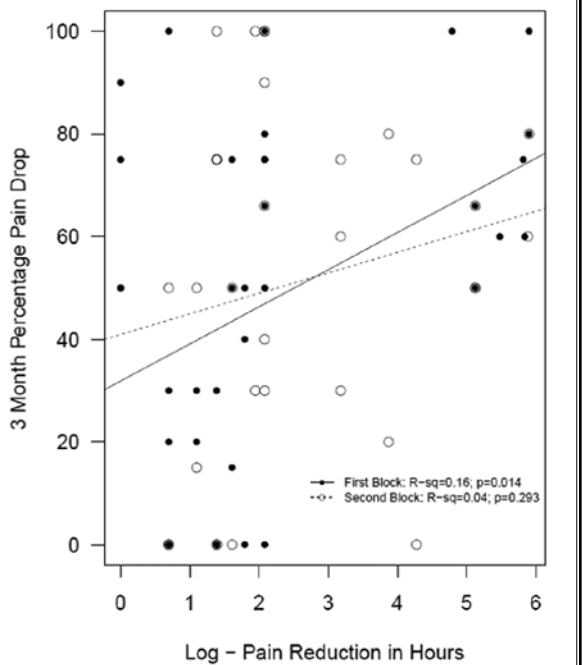

Fig. 2. *Pearson correlation analysis shows percentage of pain relief at 3 months after RFN (y-axis) and log of pain reduction in hours after MBB (x-axis). Pain relief at 3 months after RFN does not correlate with duration of analgesic response after MBB with lidocaine (filled circles), bupivacaine (empty circles), or both (empty and filled circles superimposed).*

diagnosis of facet joint pain. MBB also enable selection of patients who might respond to RFN. In absence of a reference standard, comparative local anesthetic blocks with lidocaine and bupivacaine are recommended to exclude a false positive response and maximize true positive responses. A positive response is defined as complete relief of pain in the targeted topographical region. Concordant response to controlled MBB, by definition, is long-lasting relief following bupivacaine but short-lasting relief following lidocaine (34). Discordant response is when pain relief following lidocaine is longer than following bupivacaine, but relief in neither instance is within expected duration of action of agent used (34). This diagnostic paradigm, while providing a strategy to treat spinal pain, ignores the complexity of chronic pain. In practice, facet joint pain rarely occurs in isolation and in the majority of patients follows or accompanies disc degenerative changes and secondary alterations in spinal biomechanics. It therefore follows that in patients with chronic spinal pain, there are multiple pain generators; facet joints being one of the many pain sources. Hence, complete relief of pain after MBB is inconsistent, unless there is interruption of nociceptive signals from other pain generators in the vicinity. In addition, in patients with chronic pain, such as whiplash injuries, central sensitization occurs and accentuates the overall pain experience (48-50). Complete pain relief (100% relief) after MBB is therefore not feasible in these patients, even if it were limited to the area of suggested "affected zone." Pain mapping studies in human volunteers and patients with chronic pain have revealed significant overlap of pain referral zones from adjacent facet joints and other pain generating structures such as the intervertebral discs, thereby limiting the ability of patients to identify or demarcate affected zone (15-17). Furthermore, in patients with central sensitization, a hyperalgesic pain response to sensory stimulation, such as needle insertion, can mask the local anesthetic effect (51-53). Finally, there is variable onset and duration of pain relief after local anesthetic injection, and often prolonged pain relief exceeding the expected duration of local anesthetic ac-

tion has been observed after diagnostic MBB (54), and was seen in this study also. The mechanisms underlying prolonged pain relief are not well known. Quantitative sensory testing in patients undergoing diagnostic MBB demonstrated altered sensory thresholds and conditioned pain modulation responses that suggest local anesthetic blocks modulate pain by affecting central sensory processing (55). Accordingly, we question the value of applying strict time based criteria to define MBB responses in chronic spinal pain.

While there is agreement that facet joint blocks or MBB are the only reliable method to identify a painful facet joint, there is no consensus on how best to implement the diagnostic protocol and how to select patients for RFN. There is controversy regarding the number of blocks needed prior to RFN: should these be 0, 1, 2, or 3? Bogduk (56) recommends a placebo control in addition to the dual controlled blocks as the only valid method to establish the diagnosis of lumbar facet joint pain. In contrast to this approach, Cohen et al (57) questions the utility and cost effectiveness of MBB prior to RFN. In a multicenter RCT, patients were randomized to undergo RFN based solely on clinical criteria, or > 50% pain relief after single or double MBB. Successful outcomes at 3 months follow-up were seen in 22% with 2 successful MBB, 16% with one successful MBB, and 33% without any MBB (57). This study concluded that RFN without a diagnostic block was the most cost effective treatment paradigm (57).

The second controversy relates to what constitutes a positive block. There is no consensus on the ideal cutoff to designate a block as positive. While near complete pain relief (> 80%) after low volume blocks increases true positives, it screens out false negatives and those with multiple pain generators who cannot get a complete analgesic response. Previous studies have found no difference in RF outcomes between cutoff values of 50% and 80% (46,47,58). While those with < 50% cutoff mark after MBB have a poorer outcome after RFN, no difference in outcome based on any MBB pain relief cutoff over 50% has been observed (47,58). In Cohen et al's study (57), there was no statistically significant difference between percentage pain reduction obtained from single diagnostic blocks among those who had a successful RFN and those who failed RFN.

A limitation of our study is that it is a retrospective uncontrolled study. Despite being retrospective, all data collection was similar to a prospective double blinded study. Other limitations include short follow-up interval of 3 months and small study size due to drop outs/incomplete data at 6 and 12 months that did not permit analysis of RFN outcomes at long-term follow-up. While a 3 months follow-up is insufficient to determine long-term efficacy of RFN, the purpose of this study was to correlate results of MBB to RFN outcomes and 3 month follow-up data is adequate for this purpose.

This study demonstrated improvement in pain scores and disability indices after RFN similar to previous studies. However, local anesthetic analgesic responses did not correlate with RFN outcomes suggesting that the current diagnostic criteria for selecting patients for RFN based on MBB responses are less than optimal. Prospective multicenter clinical trials are needed to determine optimal selection criteria for facet RFN.

Conclusion

In this retrospective study patients with facet joint pain diagnosed with comparative controlled MBB underwent RFN and treatment outcomes at 3 months follow-up were correlated with degree and duration of analgesic responses to 2 sets of MBB. Although patients had good pain relief, there was no correlation of outcome with degree or duration of analgesic responses to MBB with either lidocaine or bupivacaine. These results suggest the current diagnostic criteria (concordant analgesic responses) are unreliable in predicting RFN outcomes.

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