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Original Contribution

Prevalence of Lumbar Facet Joint Pain in Chronic Low Back Pain

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This prospective study was designed to determine the prevalence of lumbar facet joint pain in a consecutive series of patients with chronic low back pain treated at an interventional, multidisciplinary private pain management practice utilizing double diagnostic blocks, to determine the prevalence of false positive rate of uncontrolled facet joint blocks, and to determine the relationship of clinical features of responders and non-responders to double diagnostic blocks.

One hundred and twenty patients with low back pain with or without lower extremity pain were selected. The procedure consisted of diagnostic blocks using lidocaine and bupivacaine on separate occasions, usually two weeks apart. Each facet joint nerve was infiltrated with either 0.4 to 0.6 ml of 1% lidocaine (Xylocaine®) or 1% lidocaine (Xylocaine®) and 0.25% bupivacaine (Marcaine®). A definite response was defined as substantial with at least 75% relief of pain in the symptomatic area following local anesthetic block. Confirmatory blocks using bupivacaine 0.25% were performed at the same levels as the first injection if definite relief was obtained. The response to bupivacaine blocks which lasted longer than the lidocaine blocks was accepted as a positive response. All blocks were performed under fluoroscopic guidance.

Eighty-one patients (67.5%) reported a definite response to lidocaine blocks. Confirmatory blocks with bupivacaine were performed in all 81 patients with 54 patients, i.e. 45% of total sample or 66.6% of lidocaine positive group reporting definite response with a false positive rate of 41%. Prevalence and relationship of pain referral pattern in patients with and without facet joint pain confirmed by double blocks showed no significant correlation. We found no relationship between the history, physical findings, age, gender, trauma, duration of pain, and diagnostic blocks. However, history of previous surgery showed a negative correlation as only 29% of the patients after previous surgery were positive in contrast to 51% of the nonsurgical population.

The results of this study echo previous concerns of reliability of uncontrolled single blocks, history, and clinical features. This study demonstrated that the facet joint is a source of pain in 45% of the patients suffering with chronic low back pain in an interventional pain management setting in a private practice.

Keywords: Low Back Pain, Facet Joints, Double Blocks.

Facet joints, also known as zygapophysial joints, apophysial joints, or posterior intervertebral joints have been shown as being capable of being a source of low back pain and referred pain in the lower extremity in normal volunteers (1-4). These posterior paired joints are well innervated, by the medial branches of the dorsal rami (5). Each joint is innervated by two medial branch nerves (1, 5-7). It has also been shown that the facet joint mediated pain can be relieved by anesthestizing one or more of the lumbar facet joints (1, 4, 6-11). Lumbar facet joints were recognized as a potential source of back pain in 1911 by Goldthwait (12) and the term "facet syndrome" was coined by Ghormley (13) in 1933. Even though lumbar facet joints are believed to be an important source of low back pain in some quarters (1-4, 6-11, 14-29) the literature continues to attract some detractors (30-33). Lumbar facet joint pain cannot be diagnosed by clinical examination (1, 6, 10, 26, 27), by computerized tomography (CT) (29), or by single photon emission computed tomography (SPECT) (1, 28).

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Epidemiology and clinical significance of facet joint pain remains controversial for a variety of reasons: methodological flaws; diagnosis being made using single uncontrolled blocks; literature on the topic has been from only a few advocates (21, 38); and the only controlled studies published thus far with double blocks and false-positive rate of uncontrolled diagnostic blocks was by the same authors (1, 10, 11, 25-29). It is largely agreed that the blocks of a facet joint can be performed to test the hypothesis that the target joint is the source of a patients pain (1, 6, 14, 21). This hypothesis is tested by anesthetizing the target joint rather than provocation of pain from a joint because that is an unreliable criterion and the relief of pain is the essential criterion (1, 27). Facet joints can be anesthetized either with intra-articular injections of local anesthetic or by anesthetizing the medial branches of the

dorsal rami that innervate the target joint (1, 6-8, 10, 11, 14, 21, 25-29). If the pain is relieved, the joint may be considered to be the source of pain, however all the patient's pain need not be relieved, for it is possible that a patient may have several sources of pain (1). In the context of comparative local anesthetic blocks, a true-positive response is one in which the patient reports complete relief of pain for a shorter duration when a short-acting agent is used and for a longer duration when a long-acting agent is used (1). This type of response is termed concordant (1, 39) which confirms that the joint is the source of pain with a confidence level of 85% (1, 40). The ability and specificity of lumbar medial branch blocks to anesthetize facet joints has been demonstrated with a good face validity and a false-negative rate of only 8% secondary to uptake of the injectate into the vena comitans of the medial branch of the dorsal ramus (7, 8). However, a diagnosis cannot be rendered reliably on the basis of a single block, as the false-positive rate of uncontrolled diagnostic blocks has been shown to be as high as 38% (36).

Controlled diagnostic blocks are considered as the only means available of identifying facet joints as a source of low back pain (1, 6). A convenient alternative to placebo blocks, advocated in pain literature, is the use of a series of two local anesthetic blocks (6, 34-37), even though skeptics of controlled diagnostic blocks do exist (21, 38). While true-positive responses secured by performing controlled blocks is ideal, comparative local anesthetic blocks in which, on two separate occasions the same joint is anesthetized, but using local anesthetics with different duration of action, have been validated (39) and found to withstand the challenge of a placebo (40). Comparative local anesthetic blocks, may not be implementable for intra-articular blocks, for it is not known whether placement of the local anesthetic in a relatively avascular environment such as a joint space affects its expected duration of action (1). In addition, saline blocks may relieve pain (24), and the utility of medial branches to anesthetize facet joints is proven (8, 38). Controlled studies have shown that among patients with chronic low back pain for which no other cause is evident, the prevalence of lumbar facet joint pain may be as low as 15% (10) or as high as 40% (11). Utilizing a modified approach with intra-articular injection with bupivacaine and steroid as a screening block, followed by a bupivacaine medial branch block as the confirmatory block, 52% of patients were considered to have facet joint pain (21).

This study was designed to explore various issues of controversy and to demonstrate correlation or lack thereof with previous investigations. The issues explored included the prevalence of lumbar facet joint pain in a consecutive series of patients with chronic low back pain utilizing double diagnostic blocks, the prevalence of false-positive rate of uncontrolled facet joint blocks, and the relationship of clinical features of responders and non-responders to double diagnostic blocks.

METHODS

The study population consisted of 120 patients seen in 1998 at one private pain management practice in a non-university setting. Thirty-eight percent of the patients were drawn from the County of the practice location; whereas 62% were drawn from various other counties within the state and surrounding states. The patients were selected by one of the nurses from the pool of patients who had a chief complaint of low back pain. Every fourth patient was included in the study. All patients presented for pain management. During this study period 848 patients were evaluated of which 492 presented with a chief complaint of low back pain with or without lower extremity pain. The patients younger than 18 years or older than 90 years, those who exhibited neurological deficits, those who had pain for less than 6 months or had undergone neural blockade in the past, were excluded. Evaluation included completion of a standard questionnaire, history, physical examination, and evaluation of the results of all procedures and investigations.

The nature of the study and the potential hazards of the procedures were explained to all patients, all of whom consented to participate. Facet joints were investigated with diagnostic blocks using lidocaine 1.0% (Xylocaine®) initially followed by bupivacaine 0.25% (Marcaine®) usually two weeks apart. Following the lidocaine blocks other blocks required in the course of the patient's management, such as discography, sacroiliac joint blocks, and selective epidural injections were also carried out.

The blocks were performed on the ipsilateral side in patients with unilateral pain, or bilaterally in patients with bilateral or axial pain. The blocks were mainly performed at L3 through L5, but various other levels up to L1 were included if pain description and tenderness pointed to higher levels. Thirty-two percent of the patients were evaluated with unilateral blocks, 68% with bilateral blocks, 92% with levels from L3 to L5, 5% from L2 to L5, and 3% from L1 to L5.

The blocks were performed by one investigator in an operating room equipped with an image intensifier with the patients in the prone position. Intravenous access and mild sedation with midazolam was carried out. Under intermittent fluoroscopic visualization, the blocks were performed at each of the medial branches at L1 through L4 and L5 dorsal ramus, using a 22 gauge, 3.5" spinal needle

utilizing the technique described by Dreyfuss et al (8) utilizing the lower target point or a target point between the upper point and lower point. Each nerve was infiltrated with 0.4 to 0.6 ml of either 1% lidocaine or 0.25% bupivacaine.

Following the blocks, the patient was examined and painful movements were performed. A definite response was defined as substantial with at least 75% relief of pain in the symptomatic area following local anesthetic block.

Confirmatory blocks using bupivacaine 0.25% were performed at the same levels as the first injection if definite relief was obtained. Once again, the patients were evaluated with painful movements and were discharged with instructions to carry out their daily activities. The response to bupivacaine blocks was evaluated two weeks following the second injection which lasted longer than the duration of the lidocaine block. However, a minimum of three hours was accepted as a positive response. All the other responses were considered as negative.

Data was recorded on a database using Microsoft® Access®. SPSS® for Windows (Statistical Product and Service Solutions), Rel. 9.0. 1999, Chicago; SPSS Inc. was used to generate the frequency tables. The chi-squared statistic was used to determine the relationship between discrete variables. Fisher's exact test was used when expected frequencies were less than or equal to 5. Results were considered statistically significant if P value was less than 0.05.

RESULTS

There were 50 men and 70 women with an age of (mean ± SD) 47.1 ± 16.12 years and duration of pain of (mean ± SD) 74.8 ± 77.7 months. Mode of onset of low back pain was determined as traumatic in 64 (53%) of the patients and non-traumatic in 56 (47%) of the patients. Twenty-six percent of the patients presented a history of one or more surgical interventions on the lumbar spine. Twenty-two percent of patients reported a duration of pain of 1 year or less, whereas 28% reported 1 to 4 years, and 50% suffered pain for longer than 4 years. Forty-eight percent of patients reported back pain worse than leg pain, 10% reported only back pain, 28% reported back pain and leg pain being equal; whereas leg pain was worse than back pain in 14%. Overall, 32% of the patients reported unilateral pain in contrast to 68% of the patients who reported either axial or bilateral pain.

All patients underwent single blocks with lidocaine. Eighty-one or 67.5% of the patients reported a definite response to lidocaine blocks. Confirmatory blocks with bupivacaine were performed in all 81 patients with 54 patients i.e. 45% of total sample or 66.6% of lidocaine positive group reporting definite response with improvement in their pain.

For the purposes of calculation of prevalence among patients evaluated at an interventional, multidisciplinary private pain management practice, all the patients who withstood double blocks with definite response were considered as positive with a prevalence rate of facet joint pain in chronic low back pain of 45% (95% CL, 36%, 54%). For the purposes of calculating specificity, once the number of false-negative responses were determined, all remaining patients who had no response to lidocaine were assumed to be true-negative. Using the response to double blocks as the criterion standard, the specificity of lidocaine was found to be only 59% (95% CL, 47%, 71%); with resultant false-positive rate of 41% (95% CL, 29%, 53%) (Table 1).

Prevalence and relationship of pain referral pattern in patients with and without facet joint pain confirmed by double blocks showed no significant correlation (Table 2). Similarly, evaluation of the relationship between the history, physical findings, and diagnostic double blocks also showed no significant correlation to associate with pain of facet joint origin except for back pain with straight leg raising which showed negative correlation (p=0.0380) (Table 3). We also evaluated the influence of various factors on the prevalence of facet joint pain (Table 4). This evaluation showed no correlation with gender, age, mode of onset of pain, duration of pain, except for patients with a history of previous surgery who showed a negative correlation as only 29% of patients after previous surgery were positive in contrast to 51% of nonsurgical population (p=0.0380).

The cardinal findings of the present study were a prevalence rate of facet joint pain of 45% in an interventional private pain management practice, false-positive rate of 41% of single blocks, and inability to correlate historical or physical examination features to predict pain of facet joint origin.

Table 1. *Comparison of the results of single blocks (lidocaine) and double blocks (lidocaine and bupivacaine)*

Prevalence: 45% Sensitivity: 100% Specificity: 59% False Positive Rate: 41%		
Single Blocks	**Double Blocks**	
	Positive	Negative
Positive	54	27
Negative	0	39

Table 2. *Prevalence and relationship of pain referral pattern in patients with and without facet joint pain*

		Double Blocks		P Value
		Positive	Negative	
Buttock	Unilateral	40%	60%	0.409
	Bilateral	48%	52%	
Groin	Unilateral	46%	54%	0.674*
	Bilateral	33%	67%	
Thigh	Unilateral	44%	56%	0.966
	Bilateral	43%	57%	
Leg	Unilateral	36%	64%	0.501
	Bilateral	50%	50%	
Pain Ratio	Back pain only	58%	42%	0.205
	Back pain worse than leg pain	52%	48%	
	Back pain and leg pain equal	36%	64%	
	Leg pain worse than back pain	45%	55%	

P values were derived from the Chi-Squared Test
* - P value derived from Fisher's Exact Test

Table 3. *Relationship between the history, physical findings, and diagnostic double blocks*

Historical Features	P Value
Pain made better by sitting	0.3050
Pain made better by lying down	0.3850
Pain made worse by sitting	0.6330
Pain made worse by standing	0.7750
Pain made worse by walking	0.8140
Pain made worse by coughing	0.7820
Physical Findings	
Pain made worse by flexion	0.5670
Pain made worse by de-flexion	0.6580
Pain made worse by extension	0.4110
Pain made worse by ipsilateral flexion	0.5930
Pain made worse by contra lateral flexion	0.3620
Pain made worse by ipsilateral rotation	0.5930
Pain made worse by contra lateral rotation	0.3620
Back pain with straight leg raising	0.0380*
Sciatic tension with straight leg raising	0.2450

P values were derived from the Chi-Squared Test
* Indicates significant negative correlation

DISCUSSION

The prevalence of lumbar facet joint pain of 45% established in this study is more than the 15% reported by Schwarzer (10), determined in United States patients with non-diagnostic, non-invasive investigations and with the exclusion of post surgical patients. However, the data was similar to reports by Schwarzer et al (11) of 40% prevalence in a study of an Australian population with chronic low back pain. However, it was less than 52%, as reported with an alternate diagnostic approach (21). The criteria adopted for the diagnosis of lumbar facet joint pain in this study are as stringent as those adapted by Schwarzer et al (10, 11, 25-28) or in any other previous study (21,38). This study is the first to assess the prevalence of facet joint pain in a heterogenous population suffering with chronic low back pain in the United States in a multidisciplinary, private pain management practice in a non-university setting. This study was also in accordance with a previous report by Schwarzer et al (10, 11) and others (41); but not in accordance with those of earlier reports with regards to correlation of symptoms and signs observed in these patients (19, 42). The false positive rates of blocks of 41% in this study are similar to previous reports of 31% and 38% (21, 25).

The criticism we may face is that we have used 0.4 to 0.6 ml of local anesthetic with 1% lidocaine and 0.25% bupivacaine instead of the recommended volume of 0.5 ml and concentrations of 2% for lidocaine and 0.5% for bupivacaine (1). The milligram dosage of anesthetic in this study is less than recommended (1). In addition, higher volumes of 1 ml to 1.5 ml per level have been used by others (2, 13, 21, 29). We believe that the volumes used were appropriate in this study and also predict that this should not change the value of these results. The next criticism may be directed at the study population and sampling methodology utilized in this study. However, the study population was adequate with a total of 848 patients being evaluated for chronic pain during this period of which 492 patients presented with a chief complaint of low back pain with or without lower extremity pain. There

Table 4. *Influence of various factors on prevalence of facet joint pain*

		Demographic features	Double block positive	P value
Gender	Male	42% (50)	42%	0.5770
	Female	58% (70)	47%	
Age (years)	< = 65	82% (98)	45%	0.9620
	> 65	18% (22)	46%	
Mode of onset of the pain	Traumatic	53% (64)	45%	0.9410
	Non-Traumatic	47% (56)	45%	
Duration of pain (years)	< = 1	22% (26)	42%	0.5190
	1-4	28% (34)	38%	
	> 4	50% (60)	50%	
Previous surgery	Yes	26% (31)	29%	0.0380 *
	No	74% (89)	51%	

P values were derived from the Chi-Squared Test
* Indicates significant negative correlation

was no selection bias, as nurses assigned each fourth patient to the study group from the pool of patients presenting with chronic low back pain. No attempts were made to include or exclude patients based on any features other than the exclusion or inclusion criteria. Hence, barring all the inconveniences associated with patient discomfort, cost, etc, the methodology utilized in our study appears to be appropriate.

In summary, the results of this study echo previous concerns of reliability of uncontrolled single blocks, and history and clinical features. However, this study demonstrated that the facet joint is a source of pain in a significant number of patients (45%) suffering with chronic low back pain evaluated at a private pain management practice. This study also showed significantly less incidence of facet joint pain in postsurgical patients compared to nonsurgical patients.

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