Retrospective Study

Effect of Opioid Use on Results of Interventional Back Pain Management on Patients With Suspected Facet-mediated Chronic Back Pain

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Background: Preoperative exposure to opioids has recently shown to be associated with poor outcomes after elective major surgery, but little is known as to how pretreatment opioid use affects results of interventional back pain management.

Objective: We aimed to determine the effect of pretreatment opioid use on outcomes after interventional pain management procedures on patients with chronic back pain.

Study Design: A retrospective study.

Setting: Department of Physical Medicine and Rehabilitation at Satakunta Central Hospital (Satasairaala), Finland.

Methods: A high-volume, single-center, quality register analysis was performed on patients who underwent interventional pain management for suspected facet-mediated chronic back pain as a part of a multidisciplinary pain management program. Chronic opioid use was defined as having a concurrent opioid prescription for 90 days.

Results: A total of 797 patients underwent an intervention during the study period from August 1, 2019 through December 31, 2020. Pretreatment opioid use was present in 262 patients (33%). Patients with chronic back pain using opioids reported significantly more pain and discomfort before treatment as well as lowered working ability. Facet joint medial branch blocks resulted in significant improvement for both groups directly after the treatment as well as at 2-hours follow-up. However, the nonopioid group reported significantly more improvement at 2-days follow-up as well as at one month follow-up compared to opioid users. Opioid users reported nearly the same pain level at one-month follow-up as they did before treatment.

Limitations: As a single-center analysis, these data may not be generalizable to other institutions. A retrospective study may include inevitable bias. The disease processes themselves may possibly predispose patients to different degrees of opoid use. Although we have identified preoperative opioid use as a risk factor for treatment failure, we were unable to determine the size of the association based on our statistical analysis and sample size. Pain intensity evaluation using the visual analog scale is inevitably subjective.

Conclusion: Pretreatment opioid use is associated with greater pain discomfort, impairment, and reduced functional ability, as well as poorer long-term effect of interventional back pain treatment at one-month follow-up. In our study, opioid users reported the same positive effects of facet joint nerve blocks immediately after the treatment and 2 hours after the treatment, but a significantly smaller effect at one-month follow-up. This could indicate that opioid use may diminish the effects of pain treatments by affecting relearning, behavioral changes, and central pain modulation. These findings may help providers understand the effect of pretreatment opioid use on patient care, and its implications on hospital and societal costs.

Key words: Opioids, interventional pain management, medial branch block, outcome

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Low back pain is one of the most common causes of chronic pain, disability, lost productivity, and costs. Back pain is among the top indications for prescription opioid therapy (1,2), and opioid use is associated with an approximately 25% rate of opioid misuse and 10% rate of opioid addiction (2,3). Prescription opioid sales have quadrupled in the past 2 decades (2). However, the prevalence and severity of pain has remained constant (4,5). Opioid analgesics play an integral role in the management of acute postsurgical pain, but these medications can also predispose its users to significant harm. Common side effects of opioid administration include tolerance, sedation, physical dependence, constipation, respiratory depression, and addiction (6). The complications of opioid use include immediate side effects that negatively affect postsurgical outcomes. The number of patients undergoing procedures who are on pretreatment opioids is increasing.

The Spine Patient Outcomes Research Trial found that opioid users had worse pain and quality of life measures at baseline (7). Preoperative opioid use has recently been associated with increased health care spending and worse outcomes after elective abdominal procedures (8-9) as well as cervical and spinal surgery (10-12). Needle-based interventions are commonly used for low-back pain treatment; interventions of the facet joints are the second most common procedure in interventional pain medicine (13). The effect of opioid use on patient care after interventional pain management procedures, however, is completely unknown.

In the current study, we investigated the effect of pretreatment opioid use on outcomes after interventional pain management procedures on patients with chronic back pain. We hypothesized that pretreatment opioid use would be associated with a worse pain outcome as measured by the visual analog scale (VAS). Furthermore, we hypothesized that pretreatment opioid use would be associated with a lowered health-related quality of life and working ability.

Methods

A retrospective cohort study was conducted for patients admitted to the Department of Physical Medicine and Rehabilitation at Satakunta Central Hospital (Satasairaala), Finland and who underwent an interventional pain treatment procedure at the unit. In this study, we included patients who underwent lumbar medial branch blocks with local anesthetics as a complement to multidisciplinary back-pain treatment. Medial branch blocks were performed in accordance with previously published standards and techniques (14).

Inclusion criteria were suspected facetogenic pain. Patients presenting predominantly axial low back pain, failure to respond to more conservative therapy (e.g., physical therapy, integrative therapy, and pharmacotherapy), and paraspinal tenderness were included for participation. Excluded from participation were patients with a known, specific etiology for low back pain (e.g., significant spinal stenosis), focal neurologic signs or symptoms, a positive response to previous spine interventions such as epidural steroids, or sacroiliac joint blocks for the current pain episode.

Of all 797 blocks, 262 (33%) were performed in current opioid users. The study period was from August 1, 2019 through December 31, 2020. Patient data were collected from the Quality Registry Database of the unit (THL/2182/5.09.00/2019), including use of medicine for pain before the treatment procedure. The database includes de-identified patient data. This study was approved by the Institutional Review Board (SATSHP/2115/13.01/2021). Data collected from Quality Registry Database include patient gender, age, and pain VAS score for back pain. We also used health-related quality of life questionnaires EuroQol-5D (EQ-5D) (15,16), EuroQol-Visual analog Scale (EQ-VAS) (15,16) and Oswestry Disability Index (17) as well as working ability estimation on the VAS scale 0-10 (18). Follow-up data of the Quality Registry Database were collected after one month by telephone interview by a nurse. Patients were asked to complete a pain diary 30 days after the treatment and send it back to the unit. Pretreatment opioid use was defined as having an active opioid prescription; chronic opioid use was defined as having an opioid prescription concurrent for 90 days. Other studies have identified 90 days as criteria for long-term opioid therapy (2,19,20).

All statistical analyses were carried out in the IBM Statistical Package for Social Sciences (SPSS.21 [IBM Corp.]). The Wilcoxon signed-rank test was applied to compare differences in treatment groups at baseline and follow-up. The α level for significance was set at $P < 0.05$. Between groups, data were examined using analysis of variances (ANOVAs). Demographic variables were compared using a t-test or χ^2 test for continuous and categorical variables, respectively. Statistical significance was defined as $P < 0.05$. Continuous variables were described as mean and SD where applicable, and compared using nonparametric tests.

Results

As shown in Table 1, opioid users report more pain, discomfort, and impairment before facet joint nerve blocks. Mean age was the same for both groups (62 years). Opioid users were more often men (40%) than in the nonusers group (33%). As shown in Fig. 1, both groups reported significant improvement of back pain immediately after the treatment as well as 2 hours after. However, at 2-days and one-month follow-up opioid users reported significantly lower improvement. Back pain VAS for opioid users at 2-days was 3.8 (SD = 2.2) compared to nonusers VAS 3.4 (SD = 2.4) (95% CI 81 to -0.05, $P = 0.03$). Pain VAS values at one-month follow-up for opioid users were 5.5 (SD = 2.7) and nonusers 4.4 (SD = 2.6) (95% CI -1.5 to -0.65, $P < 0.001$). Nonusers still reported significant improvement of back pain at follow-up one month later. Of nonusers, 38% reported an over 50% decrease of pain at follow-up compared to 20% of opioid users (odds ratio [OR] 0.62, relative risk [RR] 0.76, 95% CI 0.63 to 0.93, $P < 0.001$). Clinical significant reduction of pain (> 2) occurred for 84 patients who were opioid users (40%) and 229 (56%) for nonusers (OR 0.52, RR 1.4, 95% CI 1.17 to 1.58, $P \leq 0.001$).

Patients undergoing interventional pain management reported improvements for all variables (Table 2) at one-month follow-up. Opioid users did not report significant improvement of perceived health (EQ-VAS) and working ability (Table 2). EQ-VAS before treatment for opioid users was 41 and at follow-up 45 (95% CI -9.5 to 2.4, $P = 0.24$). Working ability VAS before intervention was 3.9 and at follow-up 4.4 (95% CI -1.08 to 0.12, $P = 0.12$).

Discussion

In our single-center analysis, we studied the implications of pretreatment opioid use on patient outcomes after lumbar medial branch blocks as a back-pain treatment. Our findings demonstrate that opioid users have diminished long-term effects of back pain treatments at one month follow-up. The nonopioid users were almost twice as likely to achieve a 50% reduction in pain. Opioid users had a lower quality of life and function despite using potent pain killers. The results of this investigation identify opioid use as an independent risk factor for treatment failure.

Despite evidence and recommendations (1), a high number of patients with chronic back pain are still being managed with long-term opioids (21). This is contributing to the large number of patients undergoing procedures with pain-related indications who are on pretreatment opioids. The negative impact of preoperative opioid use on surgical outcomes has been shown recently in the orthopedic literature. Exposure to opioids prior to surgery has been shown to adversely affect outcomes across multiple orthopedic procedures (22-28).

In addition to worse patient outcomes and increased resource utilization, active opioid users achieved suboptimal pain management after an operative intervention. In recent studies, the general surgery population also suffered suboptimal outcomes when

Table 1. *Pretreatment data for active opioid users and nonusers before lumbar facet joint nerve blocks. Oswestry Disability Index (ODI), Working Ability VAS, EQ-5D quality of life and general health (EQ VAS), pain VAS, age and gender (percent of men) values are presented for both groups.*

ODI	Opioid users	240	45.0	16.6	5.01 to 10,11	< 0.001
	Nonusers	502	37.4	15.4		
Working AbilityVAS	Opioid users	112	3.8	3.1	-1.77 to -0.36	= 0.003
	Nonusers	205	4.8	3.0		
EQ-5D-index	Opioid users	80	0.69	0.05	-0.06 to -0.03	< 0.001
	Nonusers	180	0.73	0.07		
EQ VAS	Opioid users	77	41.3	19.6	-15.4 to -4.49	< 0.001
	Nonusers	175	51,2	30,0		
Back pain VAS	Opioid users	239	6.9	2.2	-0.64 to 0.06	= 0.10
	Nonusers	465	6.6	2.1		
Age (mean) years	Opioid users	262	62.1	15.3	-2.33 to 1.99	= 0.88
	Nonusers	535	62.3	14.2		
Gender % men	Opioid users	106	40%			
	Nonusers	175	33%			= 0.03

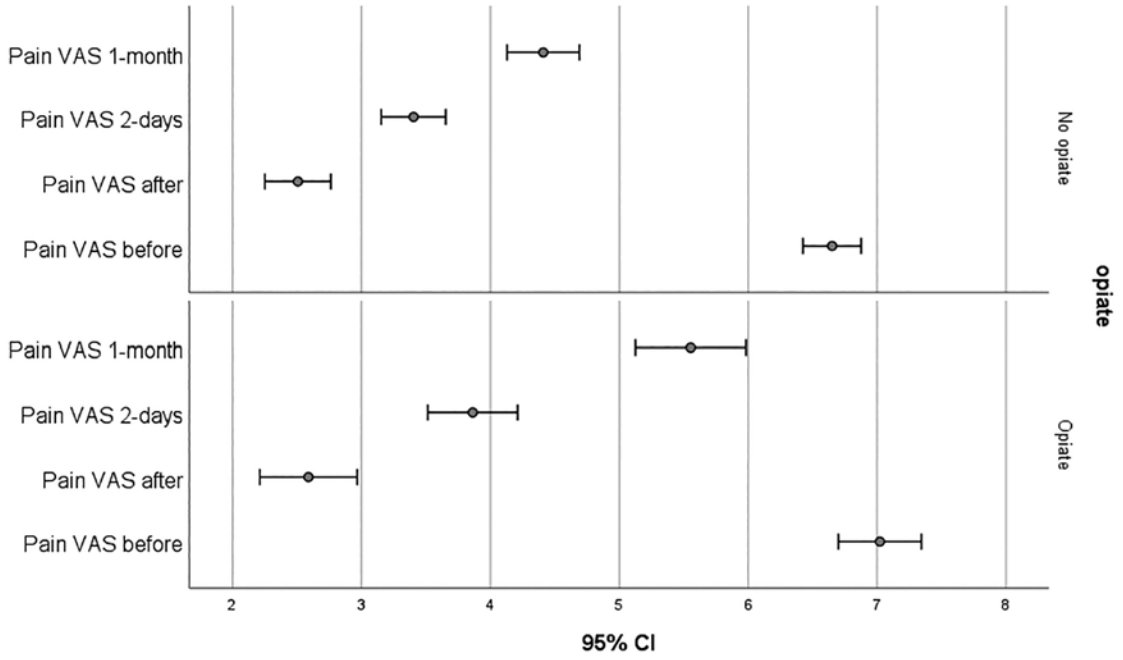

Fig. 1. *Back pain VAS for both groups who underwent lumbar medial branch blocks with local anesthetics. Pain VAS before treatment, directly after the blocks, 2 days after and at 1-month follow-up for opiate users and non-users.*

Table 2. *Results at follow-up after facet joint nerve blocks for active opioid users and nonusers. Oswestry Disability Index (ODI), working ability (VAS), Quality of life (EQ-5D), general health (EQ VAS) and back pain before intervention and one-month follow-up are compared for both groups.*

		n	Before Mean (SD)	One-month follow-up	95% CI	*P* value
ODI	Opioid users	177	46.3 (16.0)	40.6 (16.4)	3.88 to 7.64	< 0.001
	Nonusers	366	39.0 (15.5)	32.1 (24.9)	4.55 to 9.08	< 0.001
Working Ability	Opioid users	74	3.9 (3.1)	4.4 (3.2)	-1.08 to 0.12	= 0.12
	Nonusers	126	4.5 (3.1)	5.2 (3.3)	-1.04 to -4.26	< 0.001
EQ-5D-index	Opioid users	58	0.69 (0.05)	0.71 (0.07)	-0.03 to -0.01	= 0.003
	Nonusers	136	0.73 (0.06)	0.77 (0.09)	-0.05 to -0.03	< 0.001
EQ VAS	Opioid users	53	41 (19.8)	45 (22.7)	-9.5 to 2.4	= 0.24
	Nonusers	125	52 (21.1)	60 (20.3)	-11.4 to -4.3	< 0.001
Back pain VAS	Opioid users	212	6.9 (2.2)	5.5 (2.7)	1.03 to 1.87	< 0.001
	Nonusers	512	6.6 (2.1)	4.4 (2.6)	1.99 to 2.55	< 0.001

exposed to opioids prior to elective surgery (8-9). Preoperative opioid use was associated with greater hospital costs, higher readmission rates, and a prolonged hospital stay. Thus, previous authors have identified opioid use as a potentially modifiable risk factor to address in the outpatient setting prior to surgery (8, 23-28).

The precise mechanism of how opioid affects pain perception is not yet understood, but it is generally thought to result from neuroplastic changes in the peripheral and central nervous system that lead to

sensitization. Chronic opioid therapy can paradoxically sensitize patients to acute pain, a condition termed "opioid-induced hyperalgesia" (29,30). Opioid-induced hyperalgesia is defined as a state of nociceptive sensitization caused by exposure to opioids (31). The condition is characterized by a paradoxical response whereby a patient receiving opioids for the treatment of pain could actually become more sensitive to certain painful stimuli, demonstrating enhanced pain perception. The type of pain experienced might be the same as the underlying pain or might be different from the original underlying pain (31).

The baseline data in our retrospective study demonstrates a lower quality of life and function for opioid users before and one– month after the intervention. The nonopioid users had a better improvement in quality of life and function after treatment. However, opioid users had improvements in backpain, the Oswestry Disability Index, and EQ-5D index, but did not report improvements for working ability or general health. The effect on pain intensity was clinically insignificant.

With a growing number of active opioid users, it is important to understand the effect of active opioid use on outcomes after interventional pain treatment procedures. Our findings demonstrate diminished long-term results on back pain after medial branch blocks with local anesthetic for opioid users. These data provide insight into the effect of opioid use on rehabilitation and outcomes for patients with chronic back pain syndromes.

Our results must be considered with regard to several limitations:

- This study reflects an analysis of opioid prescriptions and use rather than the actual number of pills consumed
- The retrospective nature of data collection exposes it to reporting biases
- The disease processes themselves may possibly predispose patients to different degrees of opioid use
- As a single-center analysis, these data may not be generalizable to other institutions
- Although we have identified preoperative opioid use as a risk factor for treatment failure, we were unable to determine the size of the association based on our statistical analysis and sample size.

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