Indications for and benefits of lumbar facet joint block: analysis of 230 consecutive patients

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Object. The authors evaluated the effectiveness of using a facet joint block with local anesthetic agents and or steroid medication for the treatment of low-back pain in a medium-sized series of patients.

Methods. Over a period of 4 years, the authors performed 715 facet joint injections in 230 patients with variable-length histories of low-back pain. The main parameter for the success or failure of this treatment was the relief of the pain. For the first injection—mainly a diagnostic procedure—the authors used a local anesthetic (1 ml bupivacaine 1%). In cases of good response, betamethasone was injected in a second session to achieve a longer-lasting effect.

Long-lasting relief of the low-back pain and/or leg pain was reported by 43 patients (18.7%) during a mean follow-up period of 10 months. Thirty-five patients (15.2%) noticed a general improvement in their pain. Twenty-seven patients (11.7%) reported relief of low-back pain but not leg pain. Nine patients (3.9%) suffered no back pain but still leg pain. One hundred sixteen patients (50.4%), however, experienced no improvement of pain at all. In two cases the procedure had to be interrupted because of severe pain. There were no cases of infection or hematoma.

Conclusions. Lumbar facet joint block is a minimally invasive procedure to differentiate between facet joint pain and other causes of lower-back pain. The procedure seems to be useful for distinguishing between facet joint pain from postoperative pain due to inappropriate neural decompression after lumbar surgery. It can be also recommended as a possible midterm intervention for chronic low-back pain.

KEY WORDS • facet joint • low-back pain • lumbar spine • pseudoradicular pain

Typically hypertrophy and reactive remodeling of the articular processes are the degenerative changes seen in the lumbar facet joint in aging individuals.³⁴ These facet joints have a close topographic relationship to delicate neural and vascular structures of the spinal canal.³⁵ These degenerative changes are thought to cause low-back pain. Anatomically, the ipsilateral dorsal root ganglia supply the lumbar facet joint, segmentally and nonsegmentally.^{40,41} Some of the sensory fibers from the facet joint may pass through the paravertebral sympathetic trunk, reaching the L-1 and/or L-2 dorsal root ganglia. Therefore, facet joint pain originating from the lower lumbar levels may be distributed in L-1 and L-2 areas and is explained as “referred pain.” An extensive network of small nerve fibers and free encapsulated nerve endings exists in the lumbar facet joint capsule. Low-threshold and high-threshold mechanoreceptors fire when the facet joint capsule is stretched or is subjected to localized compressive forces.⁴⁰

The facet joint is subjected to high stress and strain² and may be affected by rheumatoid arthritis, ankylosing spondylitis, osteoarthritis, and, rarely, synovial cysts and infections. Microtrauma to the facet joint may also cause pain. The resulting tissue damage or inflammation is likely to cause release of the content of the joint in which high-

ly tissue-irritating properties affect the nerve endings in these joints,²⁶ resulting in low-back pain. This may be in the form of pain in the inguinal region or sometimes of radicular pain secondary to irritation of the adjacent lumbar nerve root.

The main symptoms involved in facet joint syndrome are low-back pain with pseudoradicular radiation. Degenerative changes in the facet joint often occur long before they can be revealed on plain radiographs of the spine; these changes can be demonstrated on CT or MR imaging of lumbar spine. The diagnosis of facet joint syndrome is based primarily on one of exclusion.^{5,7,8,12,16,17,19,20,23,25,29,41,43}

Usually, the treatment of facet joint syndrome is to denervate the joint. Because of the aforementioned reasons, facet joint block therapy with steroid and cryoanalgic agents is a routine procedure the goal of which is to reduce the inflammation, denervate the joint, and relieve the pain.²²

CLINICAL MATERIAL AND METHODS

The study comprises 230 patients treated between 1997 and 2001. The duration of symptoms ranged from 1 week to many years. There were 147 men (64%) and 83 women (36%) who ranged in age from 32 to 81 years (mean age 55 years). The total number of the facet joints receiving injections was 715. All patients attended followed up for

Abbreviations used in this paper: CT = computerized tomography; MR = magnetic resonance.

a period of 6 to 12 months (mean 10 months) after the last injection.

In 85 patients (37%), the injection was performed for the conservative treatment of facet joint hypertrophy associated with chronic low-back pain in which the patient suffered pseudoradicular pain and had not previously undergone surgery. Sixty-five patients (28%) suffered acute postoperative pseudoradicular pain, whereas 37 (16%) suffered from chronic postoperative pseudoradicular pain. The facet joint block was performed in 187 patients (81%) for the diagnosis and exclusion of facet joint disease associated pseudoradicular pain. There was a miscellaneous group of patients that included 28 (12%) only low-back pain and 15 (7%) in whom there was suspicion of segmental instability of a lumbar spinal segment.

For the injection we used a 22-gauge spinal needle (0.7 x 90 mm, 3.5 in). All injections were performed using fluoroscopy. After the needle was positioned, radiological documentation was performed. In six patients it was necessary to obtain arthrograms to determine the correct positioning of the needle because of the severe degenerative changes in the affected joints. The levels treated with blockade are shown in detail in Table 1. For the first injection, a local anesthetic was injected. In case of significant diminution of pain, a second injection was performed using betamethasone to include longer-lasting pain relief. All patients were ambulatory and underwent follow-up examination in the outpatient department.

The response to the facet block was analyzed according to a questionnaire given to the patient at the time of the injection; items included a self-rating assessment of the pain, duration, diurnal rhythm of the symptoms and frequency, subjective postinjection improvement and previous analgesic therapy, worsening of the symptoms over time, quality of life, and the pre- and postinjection degree of mobility.

In all patients, CT scans of the three lower lumbar segments were available. In choosing the most probable affected level, we depended mainly on the side of the pain and CT scanning in which bone-window sequences were obtained. Therefore, according to radiological changes revealed in the facet joints, in 107 patients (46.5%) the so-called main affected levels and side were infiltrated selectively.

After standard skin sterilization, the spinal cannula was introduced approximately 5 to 8 cm laterally from the spinous process in the level with the trunk rotated 30 to 45° to the contralateral side.

The injection was performed once in 84 cases, (36.5%) twice in 78 (33.9%), three times in 36 (15.7%) and more than three times in 32 cases (13.9%) (Table 1).

TABLE 1
Spinal levels treated with block

Level	Unilat (%)	Bilat (%)
L5-S1	59 (25.7)	44 (19.1)
L4-5	49 (21.3)	14 (6)
L3-4	12 (5.2)	
more levels	52 (22.6)	

RESULTS

Symptom Relief

In 14 patients, the joint could not be punctured because of calcification and partial ossification of the facet joint. In these cases, a pericapsular injection had to be performed. Long-lasting relief of the back and leg pain occurred in 43 patients (18.7%), in whom only two or three injections were required. The pain did not recur during the 12-month follow-up period. All of these 43 patients suffered from acute postoperative pain either after microdiscectomy or osseous decompression secondary to lumbar spinal canal stenosis. In 27 patients (11.7%) the radicular pain disappeared, but they still complained of back pain.

Nine patients (3.9%) reported that they had no longer experienced back pain but still suffered sciatica. Thirty-five patients (15.2%) reported only a partial improvement of the back and leg pain (Table 2).

One hundred sixteen patients (50.4%), however, reported no improvement of any symptom, despite correct positioning of the spinal cannula within the joint (Table 3).

Procedure-Related Complications

In eight patients (3.5%) the wrong level above or below the planned joint was inadvertently injected. After explaining this to the patient, the injection was repeated the next day. Six patients (2.6%) reported a transient increase of pain directly after the injection. Two patients (0.9%) suffered from transient radicular sensory changes. In three patients (1.3%), the dura mater was accidentally punctured, causing temporary paraplegia in one patient that resolved within 3 hours; the two others reported only headache, probably resulting from cerebrospinal fluid leakage, which resolved spontaneously after 48 hours. In two cases the injection was interrupted because the patient experienced severe pain. No infection or symptomatic hematomas were noted (Table 4).

DISCUSSION

In this study the group of patients that benefited from facet joint block contained mainly individuals with acute postoperative uncontrollable local and pseudoradicular pain. In these patients, because CT scanning excluded the possibilities of recurrent disc prolapse and insufficient de-

TABLE 2
Outcome according to patient-rated responses

Outcome Category	No. of Patients (%)	Criteria
excellent	43 (18.7)	complete relief of back & lower-extremity pain; no further analgesics necessary; no pain during follow up of 6-12 mos
good	27 (11.7)	disappearance of lower-extremity pain, but not low-back pain; mild analgesics used
fair	44 (19.1)	only partial relief of low-back pain and lower-extremity pain
poor	116 (50.4)	no relief, unable to work; strong analgesic used regularly

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TABLE 3
Summary of complications in 22 patients

Complications	No. of Patients	Reaction
wrong level injected	8	injection repeated
transient increase of pain	6	no specific therapy
puncture of subarachnoid space	3	no specific therapy
severe pain	2	interruption
transient hypesthesia	2	no therapy
transient paraplegia	1	no therapy

compression of the spinal canal after operation for spinal canal stenosis, only the operated level and side received selective injection. In 43 (66%) of 65 patients the facet joint block was successful in relieving pain directly and in maintaining this relief by follow up. Because most cases of acute back and leg pain improve within few weeks,^{1,42} it is uncertain whether the facet joint block induced long-lasting diminution of the pain or whether was related to the natural history of the disease. In these cases, the facet joint block served as a therapeutic procedure. The cause of pseudoradicular pain after microdiscectomy and osseous decompression in spinal stenosis is most likely the result of reduction of the medial facet joint with opening and release of contents of the joint. The contents of the joint cause irritation of the adjacent nerve root and therefore pain.^{26,36} Symptoms in these patients responded to facet joint injection.

In other patients, the indication was not clearcut. All injections were chosen by exclusion. It is a fact that the facet joint is rarely alone responsible for low-back pain. Provided other causes are excluded, there is an indication to perform a diagnostic facet joint injection,^{21,31,36} even in cases of radicular pain in the absence of nerve root compression. Typically, there is no relation in most of the cases between the extent of the scar tissue demonstrated on CT scans and the degree of pain experienced by the patient.³² In some cases of persistent postoperative pain, especially back pain, extensive back muscle injury may be a cause.¹⁸ This is especially the case following extensive and multisegmental laminectomy, as would be performed in multisegmental lumbar spinal canal stenosis. In these cases the lumbago predominates the symptomatology. These patients are not candidates for facet joint injections.

Despite the diversity of symptoms, it was possible in 121 patients (52.6%) to identify and treat by injection one level and side selectively. Unfortunately CT scans of the lumbar spine do not reveal early degenerative changes in the facet joint, and they were unable to demonstrate facet joint inflammation. Using sophisticated methods like single-photon emission CT scanning to identify the affected joint⁶ is expensive, time consuming, and in our opinion unnecessary.

On the other hand, if the clinical picture and the radiological features do not help to indicate the one level or side to be treated, it is necessary to inject the two or three lower levels bilaterally. The effect of multisegmental injections is questionable. Additionally, it was an unpleasant experience for 22.6% of the patients in this series.

There was no need for the infiltration of the skin with a local anesthetic. One predictor of an optimum position of the cannula is the fact that we cannot inject more than 1 ml into the joint. A periarticular injection is also helpful in some of the cases in which facet joint syndrome is suspected; however, the effect is short with a mean duration of 1 week (in 14 patients [6%] in this series) in contrast to an exact intraarticular injection that may yield 1 to 3 months of relief or longer. Despite great care in inserting the spinal needle, the first author (A.B.) punctured the dura in two of the first 10 cases, which can be explained as a learning curve.

Postoperative pseudoradicular pain may be minimized by making an intraoperative intraarticular injection of corticosteroid into the opened joint. Similar results can be obtained if one also coagulates the joint, although there is no long-term difference in the response between percutaneous facet joint coagulation and facet joint injection with corticosteroids.^{16,17}

All except two injections were performed using fluoroscopy. With this simple method it was possible to visualize the joint in 227 patients (99%) in the oblique position so that the spinal needle could be introduced. Only in three cases was an additional CT scan required to determine the exact localization of the cannula in the joint, because of obesity, scoliosis, and interbody cages, respectively. Performing the injection under fluoroscopy has many advantages including less exposure to radiation, the short duration of the procedure, and lower costs. A percutaneous blind injection of the facet joint is not recommended³⁴ and was practically not possible in this series, because the position of the cannula had to be corrected at least once in all the 715 joints injected.

TABLE 4
Summary of data in 116 patients in whom symptoms did not respond to facet joint injections

Signs & Symptoms	No. of Patients W/Out Response	CT or MR Finding	Conclusion	Pain Improvement
chronic back pain w/ or w/out radiation (>1 yr)	44	degenerative changes, no disc prolapse, no spinal canal stenosis	conservative therapy	none
chronic postdiscectomy syndrome	37	scar tissue & in 7 recurrent disc prolapse	7 reop	5 improved
spinal canal stenosis	29	spinal canal stenosis	laminotomy & osseous decompression	19 w/ good results, 2 w/ no improvement
acute pain after percutaneous nucleotomy	6	no disc prolapse, no signs of disc prolapse	wrong indication (nerve root injury?)	none

TABLE 5
Questionable responses to injection therapy in 28 patients

Indication	No. of Patients	CT or MR Finding	Level Injected	Comment
unspecific back pain	9	multisegmental lumbar facet joint degeneration	L3–4, L4–5, & L5–S1 bilaterally	very unpleasant, short improvement
pain after multiple disc ops (>4)	4	scar tissue, degenerative disc space	op level	no improvement
analgesic addiction after multiple disc ops	4	no recurrent disc prolapse	op level	no improvement
pain after percutaneous nucleotomy	4	protrusion, no neural compression	op level	2 no improvement, 1 op interrupted due to pain
extreme obesity w/ low-back pain	7	severe lumbar degenerative changes	L3–4, L4–5, & L5–S1 bilaterally	very unpleasant, 2 short improvement, 2 no improvement

In 28 patients the facet joint injections were performed as an additional attempt at pain therapy, because other alternatives were insufficient. In these patients, the response to the injection was questionable (Table 5).

In no case was a simultaneous facet joint and periradicular injection performed. The periradicular injection may perhaps be helpful in cases of suspected postoperative periradicular fibrosis and venous congestion in the lumbar root canal nerve root, which is thought to be one of the causes of low-back pain with radicular irritation.^{4,13}

Because the facet joint behaves similarly to a myofascial trigger point, the effect of a local anesthetic usually lasts longer than its pharmacological effect. In this series, however, there were 28 patients (12.2%) who reported alleviation of the symptoms, which we could not correlate with the effect of the facet joint injection; the indication was unclear. All of them reported marked diminution of symptoms many days after the first injection (local anesthetic) perhaps due to placebo effect. Although the lumbar facet joint as a source of low-back pain becomes more confusing the more clinical studies that are reported,^{5,9,10,14,17,19,25,33,36,38,39} the facet joint may be responsible for at least some degree of low-back pain with pseudoradicular and radicular radiation.^{2,3,7,8,11,12,15,17,21,24,26–28,30,37,43} Experimentally, a marked reduction of the nerve activity occurs in facet tissue injected with local anesthetic and corticosteroid agents.² Therefore, percutaneous facet joint injection aims to denervate the facet joint, from which the pain seems to originate.

CONCLUSIONS

The primary role of facet joint block should be diagnostic. It can also be used as an additional therapy for suspected facet joint syndrome in patients in whom symptoms fail to respond to conservative treatments of low-back pain.

Although our results for the symptomatic relief of pain have been roughly graded, we think it is mainly because of the nature of the disease. Our clinical impression is that this method is beneficial and warrants continuous application.

Finally, successful rehabilitation of the patients should be feasible due to prolonged pain relief provided by this treatment.

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