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Original Article

Radiofrequency and Methylprednisolone in Treatment of Lower Back Pain Caused by Facet Joint Syndrome: Comparison of the Outcomes

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Abstract

Introduction: In this trial we have discussed the outcomes of radiofrequency ablation and methylprednisolone treatment in cases diagnosed with facet syndrome; and effects of treatment modality on quality of life is evaluated by visual analogue scale and Oswestry Disability Index. **Materials and Methods:** This prospective, study was conducted with 100 patients with diagnosis of facet joint syndrome. Patients, benefited from diagnostic block, were separated into two groups, with 50 cases in each. In Group 1, 40 mg of methylprednisolone acetate were injected into each level. In Group 2, radiofrequency needle was used to apply RF to the facet joint. **Results:** Demographic characteristics of patients were similar ($P > 0.05$). VAS values of the patients in Group 1 were significantly lower than the values prior to treatment ($P < 0.05$). Similarly, VAS values of the patients in Group 2 were also significantly lower than the values prior to treatment ($P < 0.05$). When VAS scores of the patients in Group 2 at 3rd and 6th months were compared with scores of the patients in Group 1, significant differences were also observed ($P < 0.01$).ODI results of the patients in Group 1 were significantly lower than the values prior to treatment ($P < 0.05$). Additionally ODI scores of the patients in Group 1 on 9th and 12th months are recorded as significantly lower. **Conclusion:** We consider that the steroid injection should be used as the first choice of treatment before the RF methods to be used in patients with back pain, caused by facet articulation pathology, if there are no contraindications.

Keywords: *Facet joint, injection, low back pain, radiofrequency denervation*

Introduction

Lower back pain is one of the most prevalent muscle skeletal system problems, seen in adults. Even though disc herniation is accepted as the most common cause of lumbar pain depending on the population under investigation, it is estimated for facet syndrome to be responsible for 15–40% of the chronic pain cases.[1,2]

Lumbar facet syndrome is the mechanical instability of facet joints (apophyseal and zygapophyseal) caused by degenerative and traumatic reasons. The term of "facet syndrome" was first described in 1933 by Ghormley, who claimed that facet hypertrophy can lead to compression of the nerve roots and therefore result in lower back pain.[3] The pain originated from the deterioration of the facet joints differs from disc herniation pain and usually seen on lower back region, on sides of the loin, on hips, and upper parts of the thigh; but this kind of pain does not resemble sciatalgia as it spreads through dorsal side of the leg and reaches to the feet and toe.[4] Advanced deterioration of the facet joint can result an increase in the volume of the joint which is called as hypertrophy of the facet, and therefore can mimic lumbar disc hernias with sciatalgia like pain or cervical disc hernias.[5] In 1971, Rees indicated that chronic lumbar pain and sciatalgia can be treated by sectioning the posterior articular nerve which is called as aberrant nerve of Luchka, that innervates the zygapophyseal joint.[6,7] Treatment options for facet joint syndrome of our era can be classified as medical treatment, physiotherapy, invasive percutaneous interventions, and surgical methods. Invasive percutaneous interventions are spinal injections and radiofrequency thermo-coagulation (RFT). RFT is achieved by affecting the nerve fibers which are responsible for the pain, by rhizotomy with a radiofrequency probe. Although there are numerous publications regarding the syndrome and its clinical importance, there is still a debate on its diagnosis and treatment.

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In this trial, we have discussed the outcomes of radiofrequency ablation and methylprednisolone treatment in cases diagnosed with facet syndrome; and the reflection of choice of treatment modality on the quality of life is evaluated by visual analog scale (VAS) and Oswestry Disability Index (ODI).

Materials and Methods

A total of 100 patients with the diagnosis of facet joint syndrome, who attended outpatient clinics of Abant Izzet Baysal University Neurosurgery Department and Pain Clinics with lower back pain between the dates of January 2012 and August 2014, were evaluated in this prospective study [Table 1].

Patients who benefited from diagnostic block were separated into two groups with fifty cases in each and analyzed accordingly. The patient selected in these groups consecutively. After the appropriate site cleansing in prone position the facet joint was screened with scopia X-ray in 45° of angle. In patients from Group 1, facet joint was reached by a 22 gauge spinal needle. After confirmation with 0.5 mL of contrast (iohexol), 2.5 mL mixture of 0.25% bupivacaine (Marcaine-AstraZeneca) +40 mg of methylprednisolone acetate (Depo-Medrol-Eczacibasi) were injected into each level. In patients from Group 2, a 22 gauge 10 cm with 5 cm active end radiofrequency needle was used to reach the facet joint. After confirmation of the location with 0.5 mL of contrast matter, 50 Hz of sensorial and 2 Hz of motor stimuli responses were recorded. Pulsed RF (PRF), at 42°C in 120 s (2 shots of 45 V/s), with radiofrequency NT1100 generator (NeuroTherm) was applied. Verbal informed consent was obtained from the participants.

VAS and ODI outcomes of all cases were recorded and analyzed by a surgeon who was blinded to the study at months 0, 3, 6, 9, and 12. No complications were recorded whereas pain after injection occurred in four patients.

Visual *Analogue* scale

It is one of the most common methods to record the intensity of the pain. VAS is composed of a line, 10 cm in length which is drawn vertically or horizontally. On one end of the line "no pain" is written whereas "severe pain" is indicated at the other end. Patient marks his current sense of pain on the line. Being free of any language and ease of use are most important advantages of this test. Mean value from each patient is taken into account. VAS is a well-proofed and widely accepted test. It is reliable and easy to use.[8,9]

Oswestry Disability Index

This scale is first described by Fairbank *et al*.[10] in 1980, and it is very sensitive in evaluating the functional disability of patients with lower back pain. There are ten questions in the form with six options at each question which are valued from 0 to 5. The patient is asked to select the option which describes his situation best. The score is calculated as final score = (patient's score/possible maximum score) ×100. Upper limit for the score is 50 and also 1–10 means mild, 11–30 means moderate, 31–50 means severe functional disability.

Statistics analysis

Data analysis was performed with the Statistical Package for the Social Sciences (SPSS) statistical software (SPSS Inc., Chicago, IL, USA) version 15 for Windows. The data are shown as the mean ± standard deviation for continuous variables, the median (maximum-minimum) for ordinal variables, and the frequency with percent for categorical variables. A one-way analysis of variance (ANOVA) was used for comparison of parametric data. The ANOVA was used to assess the significant differences between groups, where appropriate. The Kruskal–Wallis test was employed to compare nonparametric data and to test the significant differences between median values. In case of multiple comparisons, the Bonferroni adjustment was used to control Type I errors and $P < 0.05$ were considered as significant.

Results

Demographic characteristics of the patients included in the study are shown in Table 2. Demographic characteristics of patients in Groups 1 and 2 were similar.

VAS score of the patients from Groups 1 and 2 are shown in Table 3. VAS values of the patients in Group 1, in 3rd, 6th, 9th, and 12th months were significantly lower than the values prior to treatment ($P < 0.05$, $P < 0.05$, $P < 0.05$, respectively). Similarly VAS values of the patients in Group 2 were also significantly lower than the values before

Table 1: Indication criteria

Lower back pain and sciatalgia, with normal neurological examination
Bilateral pain on facet articulations, in addition to lower back pain and sciatalgia
No gain from usual treatment methods
At least 3 months of duration for lower back pain and sciatalgia
Normal radiological findings; except stenosis of the joint space and degeneration of the joint
Benefited from diagnostic block with local anesthetic agent infiltration to the facets

Table 2: Demographic characteristics of the study population

Parameters	Group 1	Group 2	*P*
Age (Years)	43.1±8.35	47.4±11.1	0.125
Gender (%)			0.125
Male	34 (68)	40 (80.0)	
Female	16 (32)	10 (20.0)	
Length (m)	1.62±8.95	1.60±6.17	0.246
Weight (kg)	77.6±9.05	75.5±10.7	0.446

treatment regarding 3rd, 6th, 9th, and 12th months ($P < 0.05$, $P < 0.05$, $P < 0.05$, respectively). When VAS scores of the patients in Group 2 at 3rd and 6th months were compared with scores of the patients in Group 1, significant differences were also observed ($P < 0.01$, $P < 0.005$ respectively).

ODI results of patients in Groups 1 and 2 are shown in Table 4. ODI results of the patients in Group 1, in moths 3, 6, 9, and 12 were significantly lower than the values prior to treatment ($P < 0.05$, $P < 0.05$, $P < 0.05$ in order). In addition, ODI scores of the patients in Group 1 on 9th and 12th months are recorded as significantly lower than the values before treatment.

Discussion

In this study, 100 patients with the diagnosis of facet joint syndrome and treated with two different modalities, were included and 12 months of VAS and ODI results were obtained. Each of the two treatment modalities was thought to have positive effects on patients' quality of life parameters when the decreases in both VAS and ODI results were taken into account.

In practice, many of the cases with chronic lower back pain are thought to be related with facet joints.[11] Anatomical orientation of the facet joints denotes that the major function is to control the torsional forces and to stabilize them.[12] Posterior vertebral structures prevent the disc to get any damage from tears originated from axial rotations due to over-loading.[13] Since their resistance to flexional and extensional forces major function of the joints is to limit the torsional forces.

Table 3: Comparison of the visual analog scale scores in Groups 1 and 2

Groups	VAS 0	VAS 3	VAS 6	VAS 9	VAS 12
Group 1 medication	6.4±0.9	3.3±1*	3.3±0.9*	2.5±1*	3±1.5*
Group 2 radiofrequency	5.8±1	2.5±1β†	2.3±1.4†‡	2.7±0.9†	3±1.1†

Values expressed as mean±SD. *P<0.05 compared with group 1 VAS 0, β P<0.05 compared with group 1 VAS 3, †P<0.05 compared with group 2 VAS 0, ‡P<0.05 compared with group 1 VAS 6. VAS – Visual analog scale; SD – Standard deviation

Table 4: Comparison of the Oswestry Disability Index values in Groups 1 and 2

Groups	ODI 0	ODI 3	ODI 6	ODI 9	ODI 12
Group 1 medication	57.2±13.9	24.1±8.7*	24.8±9.5*	12.2±3.8*β	12.1±4.4*
Group 2 radiofrequency	58.5±13.1	18.9±5.7†β	14.9±7†¥	10.4±2.8†	17.2±6.4†

Values expressed as mean±SD. *P<0.05 compared with group 1 ODI 0, β P<0.05 compared with group 1 ODI 3, †P<0.05 compared with group 2 ODI 0, ¥P<0.05 compared with group 1 ODI 6, P<0.05 compared with group 2 ODI 12. ODI – Oswestry Disability Index; SD – Standard deviation

Facet joints play a significant role in radiating the forces on vertebral column and intervertebral disc.[14] Minor and major traumas, flexional and rotational stresses are blamed to be responsible for the degeneration of these joints.[14-16] Furthermore, we know that osteoarthritis and degeneration advance with increasing age. In the beginning synovial hypertrophy is seen related to the proliferation of the synovial cell population. Moreover, changes in the height and volume of the disc always end up with changes in the facet joints.[17] Intervertebral disc space is narrowed in degeneration and the forces on the joints increase; then clinical symptoms such as herniation, annular protrusion, and osteophytic changes starts to be visible.[18,19]

Treatment options for facet joint syndrome can be classified as medical treatment, physiotherapy, invasive percutaneous interventions and surgical methods.[20,21] Intraarticular facet joint injection with fluoroscopy should be considered if there is no adequate response to conservative treatment modalities. Long-term outcomes of the intraarticular steroids injection is reported as 18–63% in the literature. Steroid injection for lower back pain depending on facet articulation arthropathy is often performed to the intra-articular or dorsal medial division.[22-24] Carette *et al*. conducted a study on 97 patients using 20 mg of steroids, and compared the facet articulation blockage results with the placebo group; and achieved success in the treatment group after a follow-up period for 6 months.[22] In another study, 42 patients were evaluated. More than 50% of success was achieved in 31 patients, right after steroid injection to the facet articulation. However, this 50% success rate was decreased to 14 patients in the 3rd month. They pointed out that the facet articulation blockage, which was applied using 0.5 mL Bupivacaine and 0.5 mL Triamcinolone, was an efficient treatment in the medium term.[24] Similarly, Zomalheto *et al*. conducted a facet articulation blockage study by using a different steroid (cortivazol) and reported satisfaction rate in 53 (82.2%), 41 (64.06%), and 26 (40.62%) patients in the 1st, 3rd, and 6th month, respectively. The average VAS Scores of the group which had received steroid was found as 5.67 after 6 months, and they reported that the steroid injection was efficient in the medium term.[23] Our results from the group which we have used the facet articulation blockage with steroid injection also showed that the application is efficient in the medium (3–6 months) and the long-terms (1 year), which is also consistent with the literature. 20 mg of steroid and 1–1.5 mL of analgesic medication were used in the studies which were included in the discussion (Caretta, Gorbach, Zamalheto).

Although there are no reported long-term follow-up results in these studies, the reason for us to reach better outcomes may be related to our choice of dosing 2.5 mL Bupivacaine in volume and 40 mg methylprednisolone which might have more potent systemic effects.

Facet denervation with RF is the choice of treatment when there is a failure with other techniques. RF or PRF to the facet intra-articular or dorsal medial division, are used to control the pain stemming from the lumbar facet arthropathy.[25-27] Felix berjemo conducted a study using conventional RF for 80 C0, 90 s, on 86 patients and opened the 1 year follow-up findings to discussion. They found the start-up ODI value as 18.93 in average, and reported lower in the 3rd month as 8.8; in the 6th month as 9.66; and in the 12th month as 12.2. The patients were satisfied at a rate of 75.67%, and the back pains were relieved in 66% in 6 months; and 50% in 1 year.[27] In another study conducted on 81 patients, it was determined that the RF group was more efficient when compared to the control Group.[28] The PRF, which has been used in more recent times, causes less neuropathic pain because it is a more neuroprotective method than the conventional RF.[29] Since the PRF is more neuroprotective, many recent studies are focused on the use of PRF, and its comparison to the conventional RF.[26,27] Tekin *et al*. conducted a study and applied RF and PRF to the dorsal root medial division. The study was conducted on three groups each including twenty patients. They reported that although the conventional RF and PRF treatments ensured more decrease in VAS and ODI scores when compared with the placebo group, the PRF treatment was a less permanent treatment method when compared with the RF.[26] In another study, the RF and PRF results were compared in 26 patients, and 24.7% decrease in VAS scores in the RF group and 10.6% decrease in VAS scores in the PRF group were reported. They stated that the 3 months short-term follow-up periods were not sufficient and long-term follow-ups were necessary.[27] We determined the ODI and VAS scores to be lower in patients who received PRF in 3rd, 6th, 9th, and 12th months, which is consistent with the literature. Hashemi *et al*. conducted two studies and investigated the efficacy of the steroid and RF applications using PRF and 40 mg triamcinolone.[30] Although they determined lower values in the two patient groups which were followed with VAS and ODI scores for 6 months, they reported that the recovery in the PRF group was longer.[30] In the second study, the conventional RF was used for medial division block, and the methylprednisolone was used in the steroid group. Since they achieved similar results in both groups, they suggested that steroid should be used at the first place.[31] Mikeladze *et al*. conducted a study on 114 patients with cervical and lumbar facet articulation arthropathy, and determined that there was more than 50% decrease in the VAS scores after medial division blockage with PRF.[32]

Since the RF treatments are nonneuroprotective, we preferred to apply the PRF in intra-articular route. The facet intra-articular PRF treatment, we preferred in our study, gave similar results with the medial division blockages with RF and PRF in the literature. However, the ODI values in the 12th month, which were detected as being close to the values in the 3rd month after the application, suggesting that the application was more efficient in the medium term. The follow-up of the patients who received steroid was equally efficient with the PRF group. Although lower values were observed in the 3rd and 6th month follow-ups in the PRF group, the 1st year results were better in the steroid group.

Conclusion

We consider that the steroid injection should be used as the first choice of treatment before the RF methods to be used in patients with back pain which is caused by facet articulation pathology if there are no contraindications.

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Conflicts of interest

There are no conflicts of interest.

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