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Treatment of spondyloarthritis (facet syndrome) by puncture techniques

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ABSTRACT

Objective. The aim of the study was to determine effectiveness of radiofrequency denervation of facet joints in combination with periarticular administration of local anaesthetics and steroids for elimination of pain in patients with low lumbar pain and predominantly spondyloarthritis.

Material and methods. 78 patients with lower lumbar pain syndrome and arcuate joints arthrosis as a leading clinical manifestation underwent radiofrequency denervation of facet joints and periarticular administration of local anaesthetic and steroid drug (main group). The control group involved 136 patients with lumbar pain and dominating spondylarthritis treated only by radiofrequency denervation of facet joints.

Results. Both in the early and late periods after treatment, reliable results were obtained in treatment of chronic lower lumbar pain caused mainly by arcuate joints damage both in the main and control groups. However, there was a significant difference between the main group and the control group in the early period (in three months after treatment), in favour of the main group. In the late period (in 1 year after treatment) a reliable treatment result was obtained both in the main and control groups, but there was no difference in the treatment results between these groups.

Conclusions. Periarticular administration of local anaesthetics and steroids is effective in the short term, and radiofrequency denervation of facet joints is effective in both the short and longer term.

Keywords: spondylarthrosis, radiofrequency denervation of the facet joints, periarticular blockades

INTRODUCTION

A clinical significance of spondyloarthritis was first mentioned in the early twentieth century [1,2]. With the development of the discogenic theory of back pain, less attention has been paid to concomitant spondyloarthritis. Spondyloarthritis was first reported as a cause of pain by J.E. Goldthweit [3]. Much interest to this pathology was paid in the 1970s because of successful treatment of back pain by denervation of the intervertebral joints. [4]. Thus, a concept of facet syndrome was established and a large number of researches on various methods of joint denervation, ways of selecting patients for this procedure and a comparative analysis of different treatments were developed [5,6,7,8]. In about 40% of cases, facet syndrome is the cause of chronic pain in the lower back; this amount is higher in the elderly population [9].

In the recent literature, much attention is paid to clinical manifestations and treatment methods of facet syndrome [10,11,12,13,14]. However, some researchers reject clinical significance of spondyloarthritis, and other authors assign it very nearly a major role in the genesis of lumbar pain [15,16]. Pain in persons suffering from spondylarthritis has a remitting course, and episodes of pain with each exacerbation tend to prolong. Over time, pain becomes constant. It is usually located at the lumbosacral region above the affected joints; it can irradiate to the buttocks and upper thighs. Facet pain is dull, but at maximum it can be radicular (pseudoradicular pain). A morning short-term pain is typical, it reduces after walking. The pain is stronger when stretching the spine, especially if combined with tilts or rotation towards pain side. Neurological disorders are absent. Palpation reveals muscle tension and

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soreness in the affected joints. Significant structural changes of the spine are considered to be the main cause of back pain, although no direct relations between the degree of morphological changes and pain is evidenced.

Non-steroidal anti-inflammatory drugs have the greatest evidence for effectiveness [17]. The studies of the effectiveness of radiofrequency denervation of facet joints, which were controlled by simulation techniques, have proved minor advantages of radiofrequency denervation. The authors do not agree on the effectiveness of facet joints radiofrequency denervation [18,19]. Some argue about the effectiveness of the method [20,21], while others deny it [22]. Hence, it leads to various clinical recommendations.

Blockade of the facet joint with an anaesthetic (with or without steroid) is not only of diagnostic significance. Facet joint injections are a common and safe method of back pain treatment in facet arthropathy. In the United States, this method is the 2nd among all interventions to relieve pain [23]. As interventional procedure, it has a very low risk of complications, including infectious or nerve trunks damage. However, other researchers do not recommend intra-articular facet injections [24].

Due to contradictory data on the effectiveness of interventional therapy, in routine clinical practice it is recommended to use invasive techniques only with accurate verification of the source of pain and in cases of pharmacotherapy failure.

MATERIALS AND METHODS

The early and long-term results of treatment of 78 patients (37 males and 41 females aged from 51 to 79 years) with lower lumbar pain syndrome were analysed (the main group); arthrosis of the facet joints was the main clinical sign. These patients underwent high-frequency denervation of the facet joints by RFG-1A/RFG-1B device (by Radionics) in combination with periarticular administration of local anaesthetics (2% lidocaine 8-10 ml) and steroid (betamethasone 1.0 ml).

The control group involved 136 patients (73 males and 63 females aged from 44 to 81 years old) with a lower lumbar pain and dominating spondyloarthritis. These patients underwent only radiofrequency denervation of the facet joints.

In all cases, the clinical and neurological manifestations of degenerative spinal damage were correlated with the imaging data of spondylography, MRI and CT of the lumbar spine.

Two methods of treatment of degenerative disorders of the spine with a predominant damage of the facet joints accompanied by chronic lower lumbar pain were compared: radiofrequency denervation of the facet joints in combination with periarticular administration of local anaesthetics and steroid (the main group) and radiofrequency denervation of facet joints only (the control group).

Assessment of pain is the basis of clinical examination of patients with degenerative damage of the spine. As this syndrome is purely subjective, the special pain evaluation scales and questionnaires were used. The pain Visual Analogue Scale (VAS) is a simple but demonstrative indicator of health and quality of life. Oswestry Disability Index was used to assess the quality of life in cases of spondyloarthritis; it allows minimizing the impact of other diseases on the results of the study and better assessing the impact of pain on the daily activities of the patients. Examination and evaluation by these questionnaires and scales were performed four times in both groups of patients: the first time before radiofrequency denervation, the second time after minimally invasive treatment, in 3 months and in 1 year after treatment. The results of treatment were analysed by assessment of the dynamics of pain decrease using the VAS, as well as of the functional state by the Oswestry Disability Index.

Radiofrequency denervation of the facet joints is performed under local anaesthesia in the position of the patient on the abdomen. Under the control of the electron-optical transducer (EOT), a puncture was performed around the affected intervertebral joints at specific points: target points of radiofrequency destruction. Under the control of the EOT the needle was inserted into the outer-lateral surface of the facet joint, in the area of anatomical localization of the medial branch of the posterior spinal nerve (primary dorsal branch). Then, the needle mandrel was replaced by an active electrode, which was connected to a radiofrequency generator producing a high-frequency pulse current, which was conveyed through the electrode to the target points of radiofrequency destruction. Radiofrequency destruction is a technologically high-frequency electric current from the active electrode to the passive plate with destruction of the tissue around the active electrode. An electric current passing through the tissue heats it. The intensity of tissue heating depends on its electrical resistance (impedance). As a result of thermal heating of the tissue the denaturation of proteins of nerve structures (nerve tissue enters a state of parabiosis) takes place immediately in the area close to the electrode. Destruction was carried out at a temperature of 70 degrees for up to 1 minute.

To identify the correct position of the needle, electrical stimulation of the facet nerves with a frequency of 50 Hz was performed. Patients usually experience tingling in the area of the relevant facet joint. Then the frequency is decreased to 2 Hz and the state of the limb muscles was evaluated. The ab-

sence of muscle contractions in the extremities proved a correct position of the electrode.

All patients of the main group underwent periarticular blockade with 2% lidocaine (up to 8-10 ml) and a steroid (betamethasone 1.0) into the damaged area before the surgery under the control of the EOT. A temporary decrease in the intensity or complete elimination of pain in the lumbar spine indicated that the generator of pain was the affected joint.

The duration of radiofrequency denervation of the facet joints did not exceed 30 minutes. In most cases, there were slight short-term tingling and tingling during the manipulation. After micro-intervention, patients felt well, no complications were evidenced. After the intervention, bed rest for one hour was recommended to the patients and they were discharged from the hospital two hours later.

Clinical features of the main and control groups of patients are presented in Table 1. According to clinical manifestations, the patients of the main and control groups were regarded as by pain in the lower back and/or corresponding sclerotomes, symptoms of paravertebral muscle tension at this level, limited movement in the absence of symptoms of tension or neurological dysfunctions. The duration of the disease ranged from 3 to 39 years.

TABLE 1. Clinical features of the main and control groups of patients

Clinical features and indicators	Main group n=78	Control group n=136
Males	37 (47.4±3.6%)	73 (53.7±3.1%)
Females	41 (52.6±3.6%)	63 (46.3±3.1 %)
Average age	63.1±2.8	66.2±2.3
Average disease duration (years)	12.4±2.6	16.4±2.1
Average duration of acute condition (months)	2.5±0.5	2.8±0.4
Average number of affected intervertebral joints	3.0±0.4	3.2±0.3
Average size of intervertebral protrusion (mm)	3.3±0.5	3.4±0.7
Spondylolisthesis	3 (3.8%)	6 (4.4%)
Spinal stenosis	3 (3.8%)	4 (2.9%)
Spondyloarthritis	136 (100%)	136 (100%)

There was no significant difference between the studied groups (Table 1). Preliminary selection of patients by sex, age, clinical course of the disease, anatomical and morphological changes of the spine was not performed.

The division of patients according to the level of damage of the intervertebral joints is presented in Table 2.

TABLE 2. Division of patients of the main and control groups according to the level of dominating damage of the functional spinal unit (FSU)

Level of FSU damage	Main group	Control group
L3-L4	6%	9%
L4-L5	63%	69%
L5-S1	55 %	52%

The attained data were statistically processed using the methods of parametric analysis of biometric indicators (according to the Student's T test, the differences were considered statistically significant at $p \leq 0.05$, a tendency at $0.1 > p > 0.05$, the differences were considered statistically insignificant at $p > 0.1$). The analysis of the results was performed using the X2 agreement criterion. The statistical analysis was performed on a personal computer using Microsoft Excel 2000, Microsoft Access 2000 of the Windows 98 operating system.

RESULTS

The duration of treatment, both by radiofrequency denervation of facet joints and by radiofrequency denervation of facet joints in combination with periarticular administration of local anaesthetics and steroids was 1 day.

Before the surgery, the average rate of pain in the main group according to the VAS was 7.7 points. Taking into account the results of treatment in the early postoperative period, the patients were divided into the following groups according to the VAS: excellent – no pain (58 patients), good – pain relieved to 2 points (12 patients); satisfactory – pain relieved to 4 points (8 patients); no unsatisfactory results. In 3 months after treatment (69 patients were examined), the patients were divided into the following groups according to the VAS: excellent – no pain (36 patients), good – pain relieved to 2 points (19 patients); satisfactory – pain relieved to 4 points (12 patients), unsatisfactory – pain relieved to 6 points and more (2 patients). In one year after treatment, 51 patients were examined. The patients were divided into the following groups according to the VAS: excellent – no pain (16 patients), good – pain relieved to 2 points (12 patients); satisfactory – pain relieved to 4 points (17 patients), unsatisfactory – pain relieved to 6 points and more (6 patients).

Before surgery, the average pain rate in the main group according to the Oswestry Disability Index was 45 points. Taking into account the results of treatment in the early postoperative period, the patients were divided into the following groups according to the Oswestry Disability Index: excellent – pain revealed to 5 points (60 patients), good – pain revealed to 15 points (16 patients); satisfactory – pain revealed to 25 points (2 patients), no unsatis-

factory results (pain revealed to 35 points). In 3 months after treatment (69 patients were examined), the patients were divided into the following groups according to the Oswestry Disability Index: excellent – pain revealed to 5 points (38 patients), good – pain revealed to 15 points (17 patients); satisfactory – pain revealed to 25 points (12 patients), unsatisfactory – pain revealed to 35 points (2 patients). In one year after treatment, 51 patients were examined. The patients were divided into the following groups according to the Oswestry Disability Index: excellent – pain revealed to 5 points (17 patients), good – pain revealed to 15 points (11 patients); satisfactory – pain revealed to 25 points (18 patients), unsatisfactory – pain revealed to 35 points (5 patients).

The assessment of average parameters of pain syndrome and functional state of patient follow-ups in the main and control groups are presented in Table 3 and Table 4, respectively.

TABLE 3. Average parameters of pain syndrome of the main and control groups of patients (according to VAS)

Groups of patients	Before treatment	After treatment	In 3 months	In one year
Main	7.7±0.24 (n=78)	1.7±0.26* (n=78)	2.2±0.14* (n=69)	4.3±0.26 (n=51)
Control	8.1`±0.16 (n=136)	2.8±0.22 (n=136)	3.9±0.24 (n=110)	4.2±0.34 (n=84)

Notes: * – p<0.05, significant difference of the results only immediately after treatment between the main and control group according to the VAS.

TABLE 4. Average parameters of functional state of the main and control groups of patients (according to the Oswestry Disability Index, points)

Groups of patients	Before treatment	After treatment	In 3 months	In one year
Main	45±0.5 (n=78)	11±0.8* (n=78)	18±0.9* (n=69)	31±0.7 (n=51)
Control	44±0.5 (n=136)	18±0.6 (n=136)	28±0.7 (n=110)	30±0.8 (n=84)

Notes: * – p<0.05, significant difference of the results only immediately after treatment between the main and control group according to the Oswestry Disability Index

As seen in the Tables 3 and 4, reliable results of treatment of lower lumbar pain syndrome caused by facet joints damage were attained in the main group as well as in the control groups immediately after treatment, in 3 months as well as in 1 year after it that proved the effectiveness of both treatment methods. However, there was a significant difference between the main and control groups immediately after treatment, as well as in 3 months after it both according to the Oswestry Disability Index and the pain Visual Analogue Scale that proved a higher efficiency of radiofrequency denervation of the facet joints in combination with periarticular administration of local anaesthetics and steroids. However in the late period (in 1 year after treatment) there was no significant difference between the main and control groups. In the long term, the results of treatment with both methods are similar.

Thus, both immediately after treatment and three months after it, a statistically significant outcomes of treatment of chronic lumbar pain syndromes caused mainly by arcuate joints damage were evidenced both in the main and control groups that proved effectiveness of both treatment methods. However, there was a significant difference between the main and control group both immediately after treatment and in 3 months after it, which proved a significantly higher efficiency of radiofrequency denervation of facet joints in combination with periarticular administration of local anaesthetics and steroids in the early postoperative period, while in the long term there is no significant difference between the two groups, that is between the method of radiofrequency denervation of facet joints in combination with periarticular administration of local anaesthetics and steroids and only the method of radiotherapy.

No complications were evidenced during or after the intervention.

CONCLUSIONS

The results obtained in the early and late periods after treatment have proved effectiveness and safety of both radiofrequency denervation of facet joints and radiofrequency denervation of facet joints in combination with periarticular administration of local anaesthetics and steroids in patients with lower lumbar pain syndrome and dominating spondyloarthritis. Periarticular administration of local anaesthetics and steroids is effective in the short term, and radiofrequency denervation of facet joints is effective in both the short and longer term. Significantly better results in the early period were obtained in the group of patients who underwent radiofrequency denervation of the facet joints in combination with periarticular administration of local anaesthetics and steroids. Both methods are recommended for implementation in the algorithm of facet syndrome treatment in cases of ineffectiveness of conservative treatment.

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