

Comparison of Processes in the Stimulation of the Spine-Stabilizing Muscles in Patients with Chronic Back Pain

Author: Dr. Martin Holinka, M.D.
Karvinska hornicka nemocnice a.s.
Poliklinika AD Landek s.r.o.

Back pain and Degenerative Changes of the Spine

Patients who come to the orthopaedic clinic with back pain are often significantly limited in their social and professional lives due to their illness. In most cases, the cause of these difficulties are degenerative changes in the spine, the accompanying symptom of which is pain. The intensity of the pain then may be a limiting factor for any working activity, and its continual presence can have very negative effects on their psychological well-being. Long-term intense pain that do not abate even at rest or during sleep can even lead to depression, which requires further treatment, especially if the conservative treatment has failed.

Advanced degenerative changes of the spine which lead to irritation of the nerve structures in the spinal canal can cause some of the most vexing pain patients may encounter. They are capable of gradually damaging, for example, even motor function, most often the legs. The treatment itself, after unsuccessful attempts to influence the course of the disease, then often becomes a cycle of analgesics and infusion therapies without much prospect of a positive change.

Besides the pain, patients may experience difficulties in walking, standing, lifting objects, but also in social life or sexual activity. Back pain in degenerative changes in the spine can literally ruin every aspect of life. Limitations in normal daily activities are often highly subjective and very individual for each person. There might be a very strong back pain even though there are only minor changes visible in the spine X-ray picture. Conversely, there might be non-significant pain despite presence of major changes shown by X-ray.

Monitoring the Development of Pain

To objectify the difficulties associated with such limitations in normal daily activities, a special questionnaire (OSWESTRY) was developed, which can track changes in the course of disease using scoring^{1,2}. It is also the world's most widespread and useful tool in the evaluation of treatment success. Besides pain intensity, the questionnaire also monitors difficulties in personal care, lifting objects, walking, sitting, standing, sleeping, sexual activity, social life, and travel. For each question, there are six different answers scored in ascending order. The higher the score, the greater the level of damage of the spine.

Examples of questions in the OSWESTRY questionnaire – Evaluation of the Severity of the Lumbar Spine Disease:

4. What difficulties do you experience when walking?

- a) The pain does not prevent me from walking any distance (0 points)
- a) The pain prevents me from walking a distance over 1.5 km (1 point)
- a) The pain prevents me from walking a distance over 400 m (2 points)

- a) The pain prevents me from walking a distance over 100 m (3 points)
- e) I can walk only with the assistance of a cane or crutches (4 points)
- d) I spend most of the time in the bed (5 points)

Leaving out the types of treatment of back pain which only cover the symptoms, i.e., analgesics and infusion therapy, or vice versa surgical treatment when all other methods have failed, there remains only one treatment option which addresses the causes of the disease. This can be achieved by affecting the stabilizing function of the spinal muscles. This concerns a few different groups of muscles which maintain the correct position of the spine during exercise and at the same time act as "shock absorbers" of most of the negative forces exerted on the vertebrae, intervertebral discs, and joints.

There are many practices that aim to both strengthen and optimize the interplay of various stabilizing muscles. The question is which of these practices are the most effective and most capable of helping in the treatment and prevention of degenerative changes of the spine. Nevertheless, influencing the difficulties in a worsening health status must go hand in hand with prevention of recurrence and long-term effect.

Comparison Study of the Treatment Effect

Under a study, which has been taking place from June 2014 and which compares the long-term effects of various procedures in the activation and strengthening of the stabilizing muscles of the spine, treatment feedback was examined using said OSWESTRY questionnaire. To improve the function of the spine stabilizing muscles, the following methods were selected. First, outpatient rehabilitation and exercises under the guidance of a physiotherapist. Second, separate exercises at home on a gymnastic ball for which the patient received a list of recommended exercises. Third, sitting on a dynamic directional pad Dvectis, which creates directional oscillating movements which preferentially stimulate the stabilizing muscles of the lumbar and cervical spine. This way, it is possible to eliminate the negative impact of sitting by a change from static to dynamic strain to the spine.

There were four groups of patients observed. The first group of 15 patients was sent to outpatient rehabilitation. The second group of 15 patients exercised on a gymnastic ball. The third group of 15 patients sat on a dynamic directional pad. The last group of 5 patients formed the control group, where their conditions was treated with conventional analgesics.

Each patient filled out the OSWESTRY questionnaire at the start of the study and then after 3 – 4 months. Changes in scoring were then compared and statistically analysed.

Results

After completing the questionnaire, patients could achieve a score of 0 – 100 %, which ranked them into one of the five levels of disease severity (I. 0 – 20 % slight difficulty, II. 21 – 40 % moderate difficulty, III. 41 – 60 % significant difficulty, IV. 61 – 80 % disability, V. 81 – 100 % bedridden). The higher the percentage, the worse the clinical symptoms of the patient.

Table 1 below shows the average values in percent at the baseline examination and follow-up examination after 3 – 4 months of strengthening the stabilizing muscles of the spine. In the control group then after 3 – 4 months of treatment by administering analgesics.

Table 1: Results showing the average values in the OSWESTRY questionnaires of four groups of patients

	Baseline examination (questionnaires average score)	Follow-up examination (questionnaires average score)	Change
Outpatient rehabilitation group	23.3 %	24.4 %	+1.1 %
Gymnastic ball group	30.0 %	27.6 %	-2.4 %
Dynamic-directional pad group	27.3 %	23.7 %	-3.6 %
Control group	35.5 %	37.6 %	+2.1 %

The first line of the table shows that the outpatient rehabilitation group achieved the score of 23.3 % at the baseline examination. After completing the rehabilitation, the average value deteriorated by 1.1 % to 24.4 %.

The group of patients who exercised on a gymnastic ball showed a 2.4 % improvement after 3 – 4 months of therapy, while the group who used a dynamic-directional pad improved by 3.6 %. On the other hand, the group of patients who received only analgesics deteriorated by 2.1 %.

Conclusion

The greatest effect in pain relief and improvement of limitation of normal daily activities, according to the questionnaire survey, was identified in those patients who regularly strengthened and stimulated their stabilizing muscles of the spine using a dynamic-directional pad. This group of patients manifested a reduction of difficulties of 3.6 %. At first glance, it may be a small change, however, we must realize that this is an average value, which means some patients experienced an improvement of up to 14 %, which in many cases resulted in the general improvement of the condition by one full degree of severity. Therefore, it was a significant improvement in quality of life.

The low therapeutic response in the group of patients who attended outpatient rehabilitation can be explained by the fact that although they experienced relief of pain immediately after therapy, the difficulties reappeared after its end. Outpatient rehabilitation itself without sufficient motivation for self-active approach to the disease has only a temporary effect and cannot resolve the condition in the long run. This can be confirmed by better results in the group of patients who practised on a gymnastic, who exercised regularly at home 3 – 5 times a week.

The patients who did not want to adopt a proactive approach and contented themselves only with medication did not experience improvement after 3 – 4 months. Conversely, the survey showed that their problems rather tended to deteriorate.

1. Fairbank JCT & Pynsent, PB (2000) The Oswestry Disability Index. Spine, 25(22):2940-2953.
2. Davidson M & Keating J (2001) A comparison of five low back disability questionnaires: reliability and responsiveness. Physical Therapy 2002;82:8-24.