

## **Sonographic Verification of Strengthening of the Stabilizing Muscles of the Spine by the Dynamic-Directional Pad Dvectis in the Prevention of Back Pain**

Degenerative changes in the spine may cause which, sooner or later, have a common denominator, which is the lack of muscle stabilization, maintaining the correct position of the individual vertebrae. Insufficient muscular stabilization leads to excessive stress of the most vulnerable parts, i.e., the neck and the lumbar region, with exposure to unfavourable mechanical forces.

Back pain, which are very widespread and constantly on the rise, has a very individual character and course of progression. In most cases, it has either a functional (blockages) or structural (degeneration) basis. As already mentioned, a common feature of this problem is a group of stabilizing muscles – the deep stabilizing system of the spine – which can, in the case of correct function, mitigate the disease progression. Often we can see that the strengthening of these muscle groups leads to the disappearance of pain and complete restoration of active lifestyle.

### *Stabilization of the Spine Muscles*

Without supporting muscle stabilization, the spine would be unable to withstand the load of the upright posture and daily activities. The role of the muscle "corset" lies in maintaining a neutral position between the vertebrae. The greatest strain arises in the cervical and upper thoracic spine and lumbar and lower thoracic spine. These two parts are stabilized by many groups of muscles, which are collectively referred to as the deep stabilizing system of the spine.

One of the most important muscles that stabilize the spine are the transverse abdominal muscle and the deep back muscles. In patients with back pain, these often lack activation and have reduced muscle strength. Similarly, the mechanical forces that arise in this area are not sufficiently attenuated and are unnecessarily reflected on the individual vertebrae as a result of degenerative changes.

### *Function of the Stabilizing Muscles*

Works of some authors who deal with this issue clearly show that patients suffering from chronic back pain compared to a group of people of similar age have more weakened or atrophied muscles of the deep stabilization spinal system. These muscles are dominated by the transverse abdominal muscle and deep back muscles.

One of the current trends in rehabilitation and sports medicine is affecting the proper functional patterns or driving stereotypes of the muscles which are intended to stabilize not only the spine but also to maintain an erect posture. Together, these muscles are called postural, because they maintain an upright posture against the force of gravity.

In short, it is the aim of a variety of therapeutic methods to initiate proper functional patterns of movement and optimal posture along with strengthening of the stabilizing muscles. Strengthened muscles can, on one hand, withstand higher loads and, on the other hand, maintain sufficient muscle contraction longer before becoming fatigued. The biggest benefit, however, is that they can better protect the spine and vertebrae, thus providing an imaginary muscle corset. The spine is thus better protected from deepening of functional and degenerative changes. In this way, we can also influence the most acutely subjectively perceived symptom – pain.

### *How to Strengthen the Stabilizing Muscles of the Spine?*

From the above follows that improving fitness, performance, and interplay of the described muscles is one of the ways to limit the progression of degenerative changes with mitigation of the accompanying pain. At the same time, it is prevention or delaying of surgical treatment. Strengthening of the stabilizing muscles is, of course, also part of the treatment of herniated discs, one of the most common consequences of progressive degeneration of the spine, which can occur at a young age.

Many rehabilitation methods have been developed that focus on strengthening these muscles. One option is, therefore, a visit to the doctor who will prescribe outpatient rehabilitation, where you will be instructed on how to achieve the desired effect by a physiotherapist. The long-term condition, in this respect, is then regular, ideally daily, repetition of learned exercises to keep the stabilizing muscles in optimum condition. Passivity leads to regression, which doctors often confirm based on their clinical practice.

Alternatively, there is a novelty on the market – a dynamic-directional pad manufactured by the company Dvectis. By simply sitting on this pad, directional swinging movements are generated which constantly, on the basis of tiny movements, stimulate the abdomen, pelvic floor muscles, diaphragm, and other muscles stabilizing the spine.

Fig. 1: Sitting on the dynamic directional pad Dvectis leads to noticeable strengthening and stabilizing of the muscles and prevention or treatment of degenerative diseases of the spine.



It is a rehabilitative aid which is highly recommended for patients with pain in the cervical or lumbar spine. It is effective for those who wish to rehabilitate at home or to busy people who are used to sit at work. This method, in fact, ensures continuous rehabilitation. This products can also be beneficial for patients who have already completed ambulatory rehabilitation and need to maintain its long-term effect in the event they have a small perspective of independent, daily exercise. The effect can, of course, be expected in all those who regularly sit on the dynamic-directional pad Dvectis.

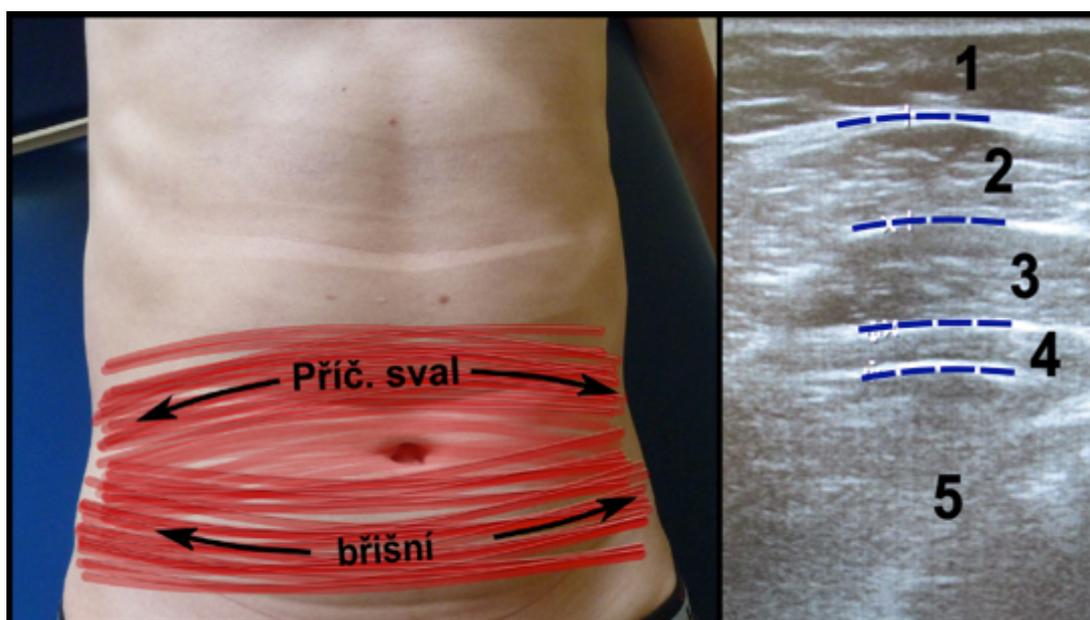
### *Personal Clinical Experience with Dvectis Pad*

My experience with the product is that its effect can be achieved with regular use within a few weeks. I check feedback and its positive effects by a set of muscle tests which can determine actual

muscle strength and the function of the stabilizing muscles of the spine. Another method is the use of ultrasound, which can very accurately show the thickness of the muscle layer examined.

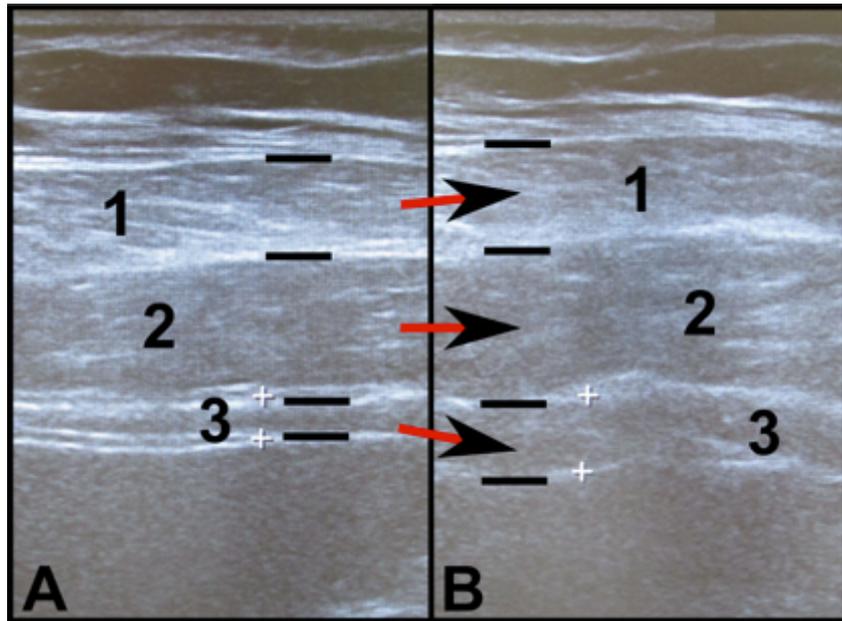
As shown in Figure 2, the abdominal wall consists of three layers of muscle. These are the external and internal abdominal oblique muscle and transverse abdominal muscle, respectively. Stabilization of the spine, to the largest extent, is performed by the deepest transverse abdominal muscle, and the remaining two have an additional effect.

Fig. 2: On the left, the position and course of the muscle fibres of the transverse abdominal muscle. On the right, the ultrasound view of the abdominal wall shows the subcutaneous tissue (1), the outer (2) and inner (3) abdominal oblique muscle, abdominal transverse muscle (4), and the abdominal cavity (5).



Patients who regularly sit on the dynamic directional pad Dvectis have reported retreat of subjective complaints after several weeks and muscle growth of the stabilizing muscles after several months, which can be verified through ultrasound. Figure 3 shows the thickness of the abdominal muscles at the start of the treatment (3A) and after four months of regular sitting on the pad, where there is visible strengthening of the muscles (3B).

Fig. 3: The patient before the treatment (A) was measured thickness of the outer (1), inner (2), and abdominal oblique muscle and the transverse abdominal muscle (3). After four months of sitting on the dynamic directional pad Dvectis, there was their visible enhancement (B 1-3).



Strengthening of the stabilizing muscles of the spine has the effect of improving their function and muscle strength, which leads to prevention and treatment of degenerative changes of the spine. The effect of the dynamic directional pad Dvectis after a few months of use can be verified by ultrasound, which clearly shows a consistent increase in muscle mass.

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