

Dvectis and Its Significance for Degenerative Lumbar Spine Disease

Spine conditions are the second most common cause of disease in the world due to the sedentary lifestyle, which is constantly on the rise. The first problems begin to appear after the 30th year of age, while after 60, we can identify X-ray degenerative changes already in the entire population (1). Currently, this is one of the major socio-economic problems (2).

The annual prevalence of back pain among the working age population is about 30 – 40 %, of which 5 – 10 % end up in working incapacity and another 5 – 10 % show signs of transition to chronicity. Another 1 % leads to permanent incapacity. The number of disability pensions awarded are from 50 % due to back pain. The reason for such a high incidence is the fact that spinal disease is caused by a full spectrum of potential causes (3).

Table: Most frequent diagnoses affecting the spine on the basis of degenerative changes and their causes

Diagnosis	Division	Citation
Disc herniation	central, paramedial, foraminal, extraforaminal	[4]
Spinal stenosis	central, lateral	[5]
Segmental instability	rotary, ventrolisthesis, retrolisthesis	[5]
Causes	Description	
Vertebrae	spondylophytes, osteoporosis, sclerosis	[2]
Intervertebral disc	ruptures, resorption	[4]
Intervertebral joints	damage to the cartilage, osteophytes, subluxation	[2]

Most affected are the most mobile segments of the spine, i.e., cervical and lumbar segments, especially C5 – C6 and L4 – S1 (6). Humans with their specific upright posture use the support function of the spine. This fundamentally changes the biomechanics of the anterior column formed by vertebral bodies, intervertebral discs, and longitudinal ligaments from pull to pressure. In an exactly opposite manner is affected the biomechanics of the posterior columns formed by joints of the vertebrae and their supporting structures, from the initial pull to pressure.

This further leads to stigmatization of the spine during prolonged sitting, obesity, and a higher probability of old age. Degenerative changes in the spine are thus largely caused by static load, unlike mostly dynamic load.

Fig. 1: A – X-ray picture of ventrolisthesis L4; B – MRI of disc herniation L3/L4

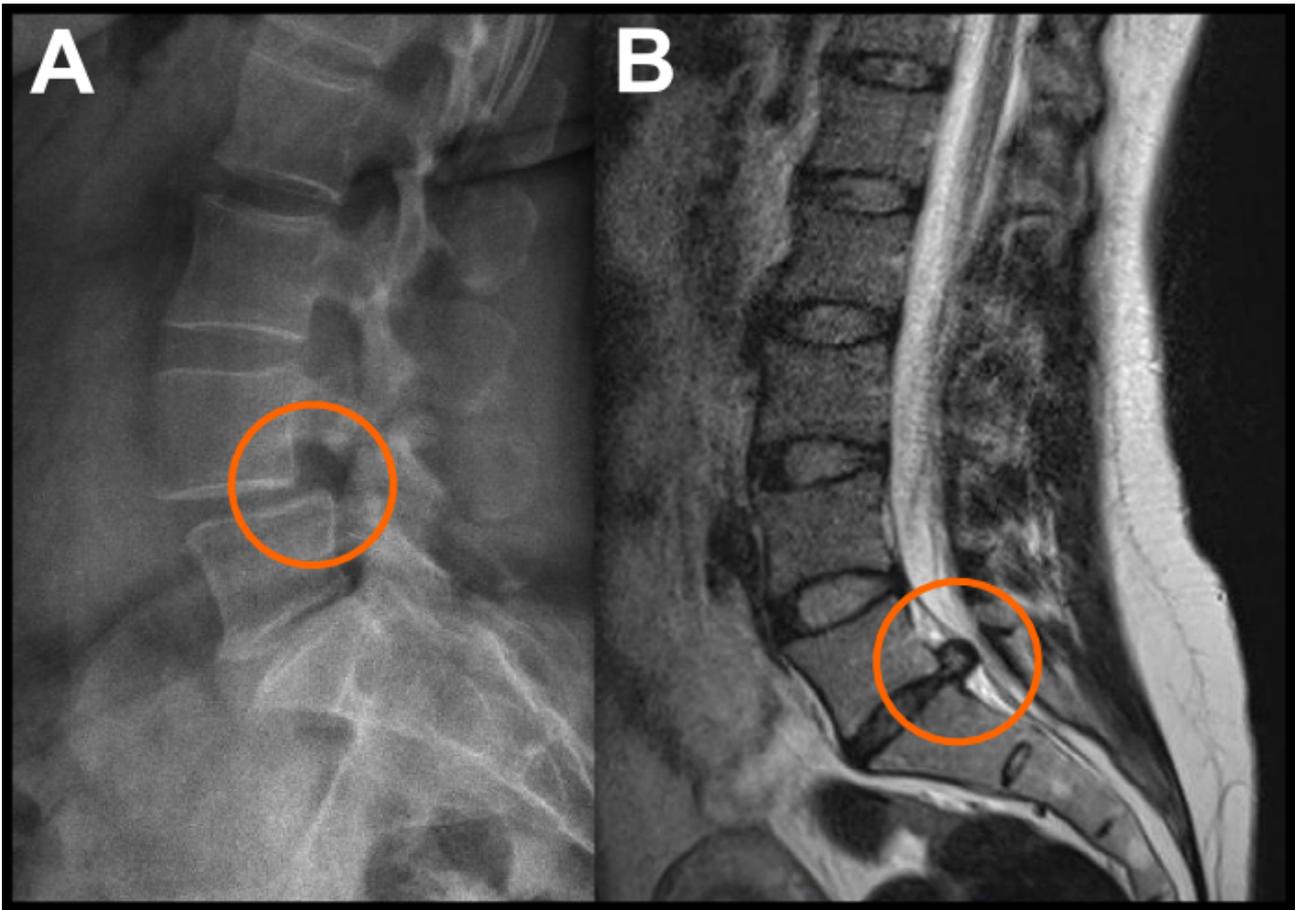


Fig. 1: A – X-ray picture of ventrolisthesis L4; B – MRI of disc herniation L5/S1

The median of the body normally lead through the tip of dent epistrofea, the centre of the endplate C7 and L5, and the femoral head. This physiological posture requires only minimal work of the postural muscles with a relaxed stance. Any deviation from this posture requires adaptation of the surrounding spine and is the basis of clinical symptoms.

To stabilize the spine in physiological posture is most contributed by the deep back muscles (postural), superficial back muscles (phasic), and oblique abdominal muscles (part of the deep stabilization system). The deep back muscles are located dorsally from the transverse processes and help, along with other muscles of the deep stabilization system, to maintain an erect position (7).

Disorders of the stabilizing function of muscles are the most common epigenetic factors causing back pain, including radicular syndromes. Unless the spine is sufficiently stabilized, there is long-term overloading of its parts; the spine segments are not sufficiently protected, and muscular decompensation develops (2).

Possibilities of Conservative and Surgical Treatment

In the case of acute symptoms, rest regime is the first choice with the use of analgesics, muscle relaxants, and psychopharmatic drugs with local application of corticosteroids. After remission of

the acute stage and during chronic course, this is followed by strengthening of the above muscle systems which are involved in the stabilization of the spine. To this end, it is possible to use rehabilitation treatments and physical therapy, such as soft techniques, modification of incorrect muscle stereotypes, manual traction, electrotherapy, etc.

In acute course of the disease with motor deficiency and progression or cauda equina syndrome, urgent surgical treatment is required. Similar procedure is used in case of failure or lack of response of conservative therapy in chronic course of the disease. At that point, the method of choice is surgical extraction of disc herniation, disc replacement, stabilization surgery in case of spondylophytes, and other invasive procedures. Surgical treatment, however, does not always bring about the expected relief for the patient (8).

Prevention and Conservative Treatment Using the Dynamic-Directional Pad

Strengthening of the abdominal, deep, and superficial back muscles is key for conservative treatment and prevention of degenerative diseases of the spine. The muscular system in this case is an important stabilizing element which protects the individual segments of the spine against overload and progression of existing pathology (9).

The dynamic-directional pad provides several significant benefits to patients. When sitting, it creates an unstable platform, which leads to minor movements and stimulation of the appropriate muscle groups. The dynamic-directional pad is designed to direct the forces which occur during its loading into the back and abdomen at certain angles to achieve maximum stimulation of the deep back and abdominal muscles (10).

Fig. 2: The use of the dynamic-directional pad is possible when sitting on any chair or sofa – at work or at home. Long-term sitting with the help of the pad does not lead to progression of the degenerative changes, but rather to activation of the muscle stabilizing system. Sitting, in this case, means constant rehabilitation.



Unlike outpatient rehabilitation, the therapy takes place whenever the patient sits on the dynamic-directional pad; there is no risk of recurrence of problems in case of insufficient exercise after the completion of outpatient treatment. Unlike a gymnastic ball, the pad is easier to use as it can be used on any chair, and there is no risk of injury, especially for elderly patients. In addition, a

gymnastic ball does not offer the directional component of the movement.

The effect of the dynamic-directional pad can be felt after a few minutes in the form of increased tension in the muscles, with the long-term effect occurring already after a few weeks of use. There is significant strengthening mostly of the deep paravertebral and oblique abdominal muscles, stabilization of individual segments of the spine, and decrease of clinical symptoms, such as pain and paraesthesia.

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