Physical Therapy Diagnosis of Lumbar Disc Herniation: Role and Function - an Overview

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Background: Disc hernia represents an intervertebral disk prolapse. The intervertebral disk provides stability in rest state and distributes the load of the spinal column on the move. Changes that lead to the occurrence of disc prolapse are desiccation, reduction of proteoglycan content, mucoid degeneration, and fibrosing tissue uptake. Predisposing factors of lumbar pain are heavy physical tasks with lifting loads over twenty pounds, especially professional use of heavy tools.

Objective: The aims of this article is the review of diagnostics and physical therapy of lumbar disc herniation at levels L4/L5 and L5/S1.

Methods: Authors used descriptive method for review lumbar disc herniation including diagnostic procedures and physical therapy based on scientific literature stored in medical databases PubMed, Scopus, Hinari, etc.

Results: The most common area of the spine to experience a herniated disk is the low back, just below the waist level. Herniated disks also commonly occur in the neck.

Conclusion: Rehabilitation is a delicate problem and requires long-term treatment and multidisciplinary cooperation, and is carried out in accordance with the principles of diagnostic and physical therapy of lumbar disc herniation depending on level of damaged and level of causes of lumbar disc herniation. The majority of herniated disks do not require surgery, and respond best to physical therapy. Physical therapists design personalized treatment programs to help people with herniated disks regain normal movement, reduce pain, and get back to their regular activities.

Keywords: Lumbar disc herniation, diagnostic, physical therapy.
nuity, we mean the prolapse of the disc fragment whose width of the “neck” is no less than any other dimension of the fragment, as opposed to extrusion. By sequestration, we mean the presence of free fragments of the intervertebral disk in the spinal canal, while migration implies that the extruded material is far from the level of herniation, either as a sequester or in continuity. About 65% of migrations are ascendant. There is also the possibility of transdural migration of the discus (4).

Lumbar discopathy in the broader sense, or lumbar disc herniation in the narrower sense, represent disease(s) that are exclusively characteristic of humans. One of the main reasons for this claim is that the human spinal column is insufficiently adapted to the conditions of the upright position of the body when standing and walking, which is not the case or characteristic of other species. Namely, this part of the vertebral column in humans consists of five lumbar vertebrae that are connected to each other by cinarthrotic joints, and a load of several tens of kilograms rests on them. Also, the lumbar part of the spinal column does not only have a passive role as a static carrier of the upper parts of the human body and possible loads, but it also has an active role as a spring for bringing these parts of the body into the most diverse relations of ante, retro and lateroflexion. The listed reasons provide the lumbar part of the spine, that is, its construction, separate characteristics, and one of the main ones is the inequality of the front and back lengths of the vertebral bodies, which arise due to the unequal loading of their upper surfaces during the developmental period. Also, body movements such as lifting the head, standing up and walking during the first and subsequent years of development of the human organism, lead to ventral bending of the lumbar spine, the degree of which depends on several elements, which cause this by their resistance (4-10).

These reasons, and a number of others that will be discussed in this paper significantly affect the time and speed of the development of pathological changes in this part of the spine, the degree of these changes and the severity of the consequences, which sooner or later disable the human body for normal physiological activity (11-20).

2. ANATOMY AND PHYSIOLOGY OF LUMBAR DISC HERNIATIONS

We have already mentioned that the lumbar part of the spine consists of five vertebrae whose bodies are connected to each other by the ligament longitudinalum commune ventrale, which extends from the base of the skull to the middle vertebral part of the sacral bone. This ligament forms a strong fibrous tissue, and is firmly attached to the front surfaces of the vertebral bodies, so that it can slide freely over the front sides of the annulus fibrosus. The second ligament - the longitudinal dorsal ligament is somewhat thinner than the first one, and extends from the inner edge of the foramen magnum occipitale and the upper edge of the back side of the adas, over the back sides of all the vertebral bodies, thus building the front wall of the spinal canal. It is loosely attached to the vertebral bodies, but, on the other hand, it is firmly attached to the outer lamella of the back of the annulus fibrosus, in a relatively wide area, thereby strengthening it, except in the dorsolateral parts. In this manner, the spinal canal in which the spinal cord and peripheral nerves as its offshoots are located are significantly protected. In addition to these two ligaments, stability and elasticity of the spine are maintained by other structures, among which the annulus fibrosus, which forms a synarthrotic joint between the vertebral bodies, plays a very important role. Each annulus fibrosus consists of 10-12 concentrically arranged lamellae, which are woven from thin elastic and coarser collagen fibers. All fibers are interwoven and diagonally crossed, and their shape and size are adapted and firmly attached to the lower and upper surfaces of the body of two adjacent vertebrae, which achieves their high elasticity. The annulus fibrosus has no blood vessels, except for a short-term existence in the fetal development period, after which they disappear, mostly in the dorsofinal regions. These places are the locus minoris resistantiae for the later formation of rupture of the annulus fibrosus. Another reason for these ruptures is that the lamellae in the dorsal part are somewhat thinner and weaker than in the ventral part. And finally, ruptures in the middle of the annulus fibrosus on the dorsal side, truly exceptional, occur due to the above-mentioned reinforcement by the ligamentum longitudinale dorsum, which is centrally located small lenticular-shaped nucleus - nucletis pulposus, composed of a hydrophilic polysaccharide complex of chondroitin sulfate and hyaluronic acid. According to most authors, it is hyaluronic acid that is responsible for the integrity of the complex from which the nucleus pulposus is formed, i.e. depolarization in the complex of three-dimensional mesh-arranged thin elastic fibers with chondrocytes leads to the breaking of the connection between them, which is the basis of degenerative processes in the nucleus.

The upper and lower side of the nucleus seat are formed by a cartilaginous plate of hyaline cartilage up to 1 mm thick. On the intervertebral side of these plates, a thin layer of fibrocartilaginous cartilage forms a kind of bed for the nucleus pulposus, which during the process of its decalcification leads to the pressing of the nucleus into the vertebral bodies, which creates Schmorl’s recesses. The cartilaginous plate attaches to the epiphyseal ring about 3 mm wide, which essentially forms the edge of the vertebral body. In these places, the spongiosa of the vertebral body runs with its blood vessels to the cartilaginous plate. This is of great importance in the nutrition of the intracranial disc, considering that the disc itself is an avuncular body that is nourished by osmosis. In addition to the listed parts
or elements, the ligamenta ineracualia and ligamenta flava, which in the area of the lumbar spine can be between 2 and 7 mm thick, are largely responsible for the upright posture of the human body without effort and muscle fatigue. They are attached to the front surface of the upper vertebral arch with one end, and with the other to the rear elevation of the next lower vertebra. In a similar way, they form the back side of the spinal canal and together with the annulus fibrosusotn form a gutter in the imcvconebral opening through which the corresponding trees of peripheral nerves pass and exit 1 of the spinal canal.

An important role is also played by the ligaments - interspinousus and supraspinousus, the role of which is to connect two adjacent dark extensions of the vertebras. In that way, the creation of a large cavity between the vertebral bodies on the dorsal side is prevented in situations where the human body is in anteflexion in relation to the lower half of the body.

3. BIOMECHANICS OF LUMBAR SPINE FUNCTIONING

It is very important to know the biomechanics of the lumbar area for the origin, development, clinical picture of lumbar discopathy and understanding of their consequences. Therefore, we will devote some attention to the elucidation of this phenomenon.

A significant role in maintaining the normal morphological shape and unchanged physiological activity of the lumbar spine is played, in addition to the elements described above, by the strong flexor and extensor muscles of the trunk. Together with the intervertebral discs, they enable the vertebral bodies to move and maintain the elasticity of the spine. At the same time, the nucleus pulposus also plays a certain and important role, thanks to its practical incompressibility, like a buffer it absorbs all the forces that occur during movements. The pressure forces of the trunk also act on the nucleus pulposus under physiological conditions, so that in the interior of the anulus fibrosus there is a constant pressure of about 14.5 Kp per square centimeter. For this reason, the degree of mobility of the nucleus pulposus directly depends on its volume and the strength of the deep layers of the lamellar ring. During the flexion of the front surface of the vertebral bodies, according to the laws of physics, they come closer together, so the upper and lower surfaces of the two vertebral bodies form a sharp angle open to the back, as a result of which the nucleus pulposus is moved backwards, and in situations where the spine is in hyperextension, the effects reverse. In all situations, the nucleus pulposus exerts uniform pressure on the inner lamellae of the anulus fibrosus, regardless of the direction in which they move along the spine. The described rule only applies to conditions when the nucleus pulposus has not been physiologically altered.

Nucleus pulposus, as we have already described, has its own elasticity and incompressibility, which is directly proportional to its water binding capacity. Until the age of 40, this capacity ranges up to 80%, and then it begins to decrease, because the affinity of the protein polysaccharide complex for binding water in the nucleus pulposus decreases. Then the nucleus becomes smaller, it moves more easily in its bed, so in unfavorable conditions of anteflexion or torso torsion, its movement accelerates. Then, under great pressure, it hits the inner lamellae of the anulus fibrosus and splits them if they are not elastic enough.

For example, if a man 180 cm tall lifts a load weighing 45 Kp, and is bent forward at an angle of 75 degrees, then a load of about 700 Kp is transferred to the lumbar spine, not taking into account the weight of the trunk that m.m. errectores trunci should return to the upper position. It is not difficult to understand why it is very important to know everything described above well. This was the reason why we paid a little more attention to the description of the anatomical forms, as well as the physiological and biomechanical events of the lumbar spine. This is necessary for us in order to better understand the epipathogenesis of the occurrence of pathological disorders in the lumbar part of the human body 2, 3).

4. ETIOLOGY AND PATHOGENESIS OF LUMBAR DISCOPATHY

Lumboschialgia and lumbar discopathy were described as a clinical entity already in the 18th century and interpreted in different ways. The first description was given by Domenico Cotugnio in 1764, and a complete description of lumboschialgia as a consequence of subluxation of the lumbosacral part of the spine was given by Goldwait in 1911. In 1916, Elsberg cited extradural chondromas as the cause of lumboschialgia, and Sicard explained them as irritation of nerve roots in their intraspinal course, while Putti in 1927 supplemented this as irritation of nerve roots in interspinal openings due to arthrosis of intervertebral joints. A number of other authors (Ayers 1929, Williams 1932, Mixter and Bair 1934) concluded in their studies that the rupture of the intervertebral disc, or herniation of the nucleus pulposus, is the cause of lumboschialgia in most patients. The famous pathologists Wenzel in 1842 and Rokitanski in 1855 wrote about degenerative changes in the intervertebral discs, and Schmorl found degenerative disc changes during autopsies in 10% of those who died between the ages of 20 and 30, and in 90% of cases in those older than 60 years. Most authors describe the structural changes of the intervertebral discs already after the age of 25. The reason is simple, and we have already partially described it. Namely, the lumbar part of the spinal column, due to constant exposure to high static and dynamic loads, begins to take on degenerative changes in the intervertebral discs after the age of 25. For some people, these changes can occur earlier, and for others later, where hereditary factors and constitutional weakness of the disc structure
can play a significant role. The biochemical changes that we talked about in the previous part lead to macroscopic changes in the discussions, whereby the nucleus can become less gelatinous and fragile, and this leads to its sputtering and disintegration into more fragments. Fissures and larger cracks appear in the fibrous ring, through which the nucleus pulposus or its fragments penetrate and create a protrusion. In cases where the annulus bursts, for example with greater or lesser mechanical loads or after minimal trauma to the spine, individual fragments of the nucleus prolapse and prolapse or herniation of the nucleus occurs. This protrusion of the annulus causes pain in the lumbar region, which can persist for several months or years before a herniated disc occurs. Prolapse of the nucleus, as we have already said, most often occurs in the posterolateral part of the fibrous ring as at the locus minoris resistentiae, or where it is weakest and where the fibers of the longitudinal ligament are thin or missing. In doing so, the longitudinal ligament may be stretched and bulging, or it may rupture and the prolapsed part of the nucleus may be pushed out. Also, torn off parts of the fibrous ring can also form a prolapsed and displaced mass.

In Scheme 1, we see the phases of protrusion (a), prolapse without rupture of the posterior longitudinal ligament (b), prolapse with dissection of the posterior ligament (c), massive prolapse of the nucleus (d) and rupture of the ligament with protrusion of parts of the nucleus (e), which are the most common causes of pathological changes in the lumbar spine. However, the reason for disc lesions can be a biological factor and trauma, but the degree of degenerative changes in the disc determines the intensity of the trauma, which at a given moment causes or completes the rupture of the annulus. The nonnal disc is able to withstand high loads with very little deformation, acting like a shock absorber and stabilizer. In case of heavy loads on the spinal column, and if the disc is normal, the cartilage plate gives way first (prolapse of the nucleus into the vertebral body), then the vertebral body gives way (compression fracture), but not the annulus. Mechanical loading of the spinal column, which increases the pressure inside the disc, as we said, leads to prolapse and extrusion of the non-integrated nucleus. There are situations where, after a multi-year phase of permanent pain, the disease subsides, since degenerative changes also begin with fibrous changes in the disc. Namely, then fibrosis of the annulus and the remaining part of the nucleus occurs, fibrous ankylosis of the corresponding part of the spinal column occurs, which represents a practical cure. And finally, there is also a situation where the disc fibroses without rupture of the annulus and without the appearance of a disc herniation, which means without the occurrence of particular pain.

Disc fibrosis leads to a decrease in the vertical diameter of the disc and a narrowing of the intervertebral space. Secondary changes also occur on the edges of the vertebral bodies (osteophytosis), on the subchondral part of the bone (osteosclerosis) and on the intervertebral joint, which is exposed to greater load (narrowing of the joint space, osteophytosis, subchondral sclerosis). Extrusion of a part of the nucleus does not lead to narrowing of the intervertebral space because the entire nucleus makes up less than 1/4 of the volume of the disc. This is the reason why the radiological findings in the first attack of disc herniation are insufficient, that is, normal. The relatively rapid collapse of the discs before the appearance of fibrosis and sec-
ondary degenerative changes of the vertebral parts and the intervertebral joint leads to the upper vertebra sliding backwards due to the oblique position of the articular surfaces of the intervertebral joint. This leads to subluxation of the intervertebral joint, slight retrolisthesis of the upper vertebra, stretching of the joint capsule and deformation of the intervertebral opening. At the same time, its contents and the nerve root approach the front part of the subluxated joint.

In this situation, if the lumbar part of the spine is in the usual lordosis, a strong contraction of the erector muscles can lead to luxation of the intervertebral joint and compression of the spinal bent. This very often happens when a certain person lifts a load above the level of the pelvis with fully extended bents.

The most common degenerative disc changes and the most common disc herniations (in 90-95 % of cases) occur in the last two lumbar discs L4 and L5, rarely in the third - L3, and exceptionally in L2 and L1. Double localizations of hernias in L4 and L5 are also common. More significantly, it should be noted that almost all people over the age of 30 have more or less pronounced ruptures of the annulus of the last lumbar discs, then that people between the ages of 30 and 50 have extremely pronounced degenerative changes in the nucleus and fibrous ring. This reduces the resistance of the discus to mechanical loads, so this is also the reason why hemaion of the discus often occurs in this period. After the age of 50, the disc fibroses and the intervertebral space is covered with dense connective tissue and osteophytes, so it is then much more resistant to mechanical loads.

Schmorl’s hernia described before, or herniation of the nucleus through the lower or upper cartilaginous plate into the bone tissue, and on the front or lateral part of the disc, causes almost no symptoms. In contrast, dorsolateral herniation, which is the most common pathological phenomenon in the lumbar spine, leads to compression of the nerve sheath as it exits through the intervertebral opening. The L4 and L5 joints can be compressed by the herniation of two discs - one above and the other below their corresponding vertebra, i.e. herniation of the L4 - L5 disc causes compression of the fifth lumbar and herniation of the L5 - SI disc causes compression of the first sacral nerve. A smaller dorsomedial hernia, since it cannot pass through the last longitudinal ligament, does not cause problems, while a larger hernia splits the longitudinal ligament and compresses the cauda equina (2).

5. CLINICAL PICTURE OF LUMBAR DISCOPATHY

Sciatica, lumboschialgia, lumbargia... are very common diagnoses that are found in patients discharged from hospitals or during specialist examinations. The clinical picture in all these conditions is approximately the same with minor or major variations in severity. In the majority of patients, i.e. patients with lumbosciatica or sciatica occurs as a result of L4-L5 or L5-S1 disc herniation (in 90% of cases). Namely, the herniated disc L4-L5 presses on the fifth lumbar root - L5, and the herniated disc L5-S1 on the first sacral root, which causes pain in the sacrum and along the leg. As a result, reactive inflammation occurs in the pinched knee nerve - radiculitis, due to the pressure on the nerve itself, but also due to the biochemical stimulus that originates from the degeneratively changed parts of the nucleus pulposus and the fibrous annulus of the disc that make up the mass of the hernia. Therefore, the pressure on the nervous system and its secondary inflammation are the cause of pain (2).

Lumboschialgia symptoms and signs are caused by mechanical irritation or compression of nerve endings in the peripheral part of the fibrous annulus, peridiscal tissue, adjacent periosteum or longitudinal ligament, and irritation and compression of the sensitive and/or motor spinal root. In the first case, the vertebral type is better (lumbalgia), and in the second case, the radicular type is better (radiculalgia, sciatica). Radicular pain is caused not only by herniation of the disc, but also by mechanical or traumatic inflammation (radiculitis), peri-radicular edema, and sometimes osteophytosis, subluxation or luxation of the intervertebral joint. In the chronic stage, radicular pain is also caused by periradicular fibrosis and adhesions. Compression of sensitive nerve fibers leads to various sensory disorders (paresthesia, hypoesthesia, anesthesia), and compression of motor fibers leads to paresis or paralysis, most often of the fifth lumbar or first sacral spinal nerve.

The mechanical consequences of prolapse depend on its localization, size and consistency. It is usually round or stalked, unilateral or bilateral, descends through the intervertebral canal or extends along the longitudinal ligament, the size of several millimeters to one centimeter, etc. Disc herniation can appear as a protrusion where there is no rupture of the disc next to or through the posterior longitudinal ligament, and if there is a rupture, then the degenerated nucleus pulposus and parts of the fibrous annulus appear as a hanging, pinched or free prolapse squeezed into the spinal canal. Depending on whether it is a prolapse or various forms of disc prolapse, the clinical picture also depends on the volume of the hernia and its direction. It means that it varies a lot from one patient to another.

Sciatica as a result of disc herniation is most often unilateral with pain in one leg and caused by pressure on one spinal root. Bilateral radicular sciatica is rarely caused by disc herniation, and is more often caused by other diseases that can primarily or secondarily cause bilateral radicular compressive syndrome. A large disc herniation can cause bilateral sciatica due to pressure on the L5 and SI joints. According to the frequency, herniated discs of the lumbar spine occur more often in men than in women, and the ratio is 6:4 in favor of men. In 70% of affected persons of both sexes, they occur at the age of 30-50 years, and approximately 40%
of disc herniations, according to data from the literature, occur in the fourth decade of life. For the correct diagnosis and accurate localization of disc herniation, anamnesis plays a very important role. About 75% of patients in their anamnesis report occasional pains in the lower back, which vary in intensity from insidious to numbing pain, which indicates that even before the appearance of the hernia in these people, degenerative changes occurred in the disc. This enables the mass of the nucleus pulposus to mechanically irritate the surrounding tissue by reaching the superficial lamellae of the disc and stretching them. In a few patients, a herniated disc occurs suddenly, without any prior notice - during some sudden „inconvenient” movement or weight lifting. Sometimes it occurs without a clear reason as a sudden, brutal pain in the crotch - „it just cut me”, „as if something stabbed me with a knife”, etc. Shortly after that, the pain begins to spread to the leg, which can be of different intensity. However, a typical ischialgic rather sharp-, often accompanied by dysesthesias, a feeling of numbness, and sometimes muscle spasms. Sometimes the appearance of pain in the leg leads to the relief of pain in the crotch. As a rule, the pain is less when the body is in a lying position so that after a few days of lying still and applying analgesics and appropriate symptomatic therapy, the intensity of the pain decreases and it becomes tolerable.

In the case of L5-S1 disc herniation and pressure on the nerve root, the pain typically spreads along the posterolateral side of the thigh and the back of the lower leg towards the heel, and then behind the outer malleolus to the outer part of the foot and the little toe. The L4-L5 disc herniation presses on the L5 bone, which causes pain that spreads through the outer side of the thigh and the outer - front side of the lower leg, then in front of the external malleolus over the dorsum of the foot to the big toe. The foot does not always have to be affected by pain. Patients report increased pain during coughing, sneezing, defecation and laughing (in 50% of cases), which indicates a radicular origin of the pain. These actions lead to an increase in the pressure of the cerebrospinal fluid in the subarachnoid space, and thus the pressure on the nerve sheath already pressed by the hernia. About 50% of patients have dysesthesias, such as tingling, burning, electric current or numbness of the lower leg or foot. Sometimes the sense of touch can be so reduced that patients can no longer feel their toes or parts of their feet and describe it as „feeling numb”. Lumbar disc herniation in the acute stage is a frequent occurrence in patients with antalgic scoliosis, which is actually a spontaneous stance taken against pain, as a defense mechanism. In these patients, convexity scoliosis is most often on the side of the pain, i.e. the patient leans to the opposite side and leans on the healthy leg. Physiological lumbar lordosis is practically erased or even scoliosis occurs, so the patient is also bent forward. The accompanying symptom in these conditions is the rigidity of the paravertebral lumbar musculature, especially on the side of the scoliosis convexity (1, 2).

Movements of the spine become limited and are accompanied by pain. Extension (retroflexion) is blocked or significantly limited, especially in patients with obliterated lumbar lordosis or scoliosis. Flexion is usually possible but limited (Schober's sign is abbreviated). In the case of antalgic discrete scoliosis, an increase in the degree of this scoliosis is observed when the spine is flexed. Antalgic scoliosis is usually more pronounced and more common in L4 and L5 disc herniations. The inclination (lateroflexion) of the spine on the side of the convexity of scoliosis is limited or blocked, so if the movement is performed to a certain degree, then the lower part of the lumbar spine does not actually follow it. Intensification of pain when raising the leg extended at the knee in a patient in a lying position was first described by Laza Lazarević, and described in the literature by Dr. Forst, Laseg's student in 1881, so the Lazarević-Laseg sign is used to evaluate the radicular origin of sciatica. In hyperalgic sciatica, the pain intensifies as soon as the leg is raised by 25-30 degrees. A significant clinical sign is also a decrease in the superficial sensitivity to touch and pricking on the skin of certain areas when exposed to dysesthesias, which is a recognizable sign for determining the localization of a hernia. Sometimes pressure with the tip of a finger next to the spine between two dark appendages can lead to an increase in pain that then spreads to the leg. French authors describe this as a „bell” sign (2).

Motor lesions in disc herniations are rare or discrete. The reason for this is that the muscles are innervated from several spinal cords. However, if they occur, they usually occur later than the pain, that is, in the phase when the pain has already subsided due to damage to the sensitive fibers. The evaluation of the motor power of the leg can be done well if the patient is instructed to walk on its toes and heels, and the doctor observes it from behind. A more serious damage to the innervation of the muscles of the posterior box of the lower leg leads to the foot sinking with the heel towards the floor, partially or completely. This indicates that there is a motor impairment of the SI knee, that is, a L5-S1 disc herniation. The inability to walk on the heel indicates damage to the motor innervation of the extensors of the foot, or compression of the L5 spinal cord in the case of L4-L5 disc herniation. The weakened strength of the tendons on the dorsum of the foot is also noticeable - with weakened extensor strength, the tendons are not clearly outlined because the muscles cannot tighten them sufficiently due to their weak contraction. Patients with motor impairments can usually have a progression of impairments, and improper treatment may also require surgical intervention. In the end, the following should be emphasized: over 90% of disc herniations in the lumbar spine are located at the degenerate disc edge L4-L5 or L5-S1. The L3-L4 disc herniation that pushes and presses on the L4 spinal cord is reflected by weakness of knee extension due to quadri-
cells, and in the most severe damage, fibrous scars also occur. As the sensitive part of the nerve is made up of nerve fibers that have different thicknesses of myelin sheaths, it is understandable that the fibers that are the most sensitive, that is, have the thinnest myelin sheath, are damaged first by compression. Impulses for painful sensations are carried out by sensitive fibers B and C, and these fibers are deprived of or have a very thin myelin sheath, so this is the reason why pain occurs in these conditions. In places of compression, the so-called artificial synapses from which pain impulses originate, which inform the thalamus for the corresponding radicular territory. Through its specific connections, the thalamus informs the cortex of the parietal cortex, where the interpretation, integration and selection of incoming impulses is carried out, and the response represents a specific form of conscious perception - pain. Local changes in the nerve are the result of mechanical force and changes in the histological condition of the nerve, and this all leads to the appearance of an artificial synapse. In the peripheral nerves, there are also unmyelinated sympathetic nerve fibers in the area of whose innervation there are changes in the tone state of blood vessels, i.e. vasoconstriction, which in turn increases pain. Everything described above determines the performance of appropriate diagnostic manipulations during the examination to determine the degree of nerve damage in disc herniation.

Pain as an accompanying symptom is a sign used in numerous tests to assess the degree of nerve damage (Lazarević-Lase test, Bragard test, Neri test, Bone tov test, Naffziger test, etc.). Pain in the lumbar-sacral region, no matter what enological factor it is caused by, leads to a characteristic spasm of the muscles with the aim of reflex protection. Spasm of the muscles of the paravertebral box leads to scoliosis with concavity towards the affected side, which is always the rule, but on inspection in patients in such conditions, the so-called limping pelvis and flexion fixation of the lumbar-sacral spine. Pathological muscle excitability is caused by a lack of oxygen and a decrease in calcium ions, and the prolongation of pain and spasm in the muscles is a consequence of the increased amount of potassium in the extracellular fluid. Some authors think that pain also arises due to the creation of a special pain substance. Practice shows that increasing the spasm worsens the condition of the compressed and stretched nerve so that the circle of „revenge pain“ is closed, that is, the spasm of the paravertebral musculature actually maintains the symptoms of disc radiculopathy, because fixing the damaged part in an abnormal position increases venous congestion and reduces normal blood flow, increases inflammation of the protruding disc, causing stress on the surrounding ligaments and apophyseal joints. That is why the axiom „Dolor sedare divinum est“ is very important for the therapist, because in fact the most effective way to prevent pain is to relieve the patient’s spine by lying down. Furthermore, the therapist must strive by all known means to reduce the
spasm of the paravertebral musculature, the relaxation of which may eventually allow the nucleus to return to its original position. This can be a good condition for healing. Changes in sensitivity, which are most often in the form of hypoesthesia or paresthesia, can indicate to the neurologist the exact localization of the intervertebral disc. If the pain is felt in the lower half of the lower leg and foot and has a burning, stabbing or tearing character, i.e. in the form of numbness, tingling, tingling or pricking, the neurologist immediately thinks of L5 or SI knee compression. If these complaints are in the big toe and the inner side of the foot, it is a question of compression of the L5 tendon, while the outer side of the foot speaks of compression of the SI tendon.

Posterolateral herniation of the intervertebral disc can also damage the motor roots, which leads to weakness or complete loss of the muscles innervated by the fibers of the frozen kolen. Given that peripheral motor neurons are also trophic, the affected muscles lose their voluminousness, so patients feel as if their leg is „drying up”. This is a serious sign for the neurologist or physiotherapist to start quality treatment of the patient as soon as possible. Damage to the L3 and L4 tendons can lead to the rapid development of weakness and atrophy of the anterior thigh muscle, i.e. the quadriceps femoris muscle. In these patients, the patellar reflex is reduced or completely extinguished. Herniation of the disc between the L4 and L5 vertebrae can lead to freezing of the L5 motor root, so the extensor hallucis longus or tibialis anterior muscle is first affected by weakness or detachment. In the case of damage to the SI motor knee, which is a result of the herniation of the disc between L5 and the SI vertebra, the reflex of the iliac tendon is as a rule reduced or extinguished, while the muscle weakness is mainly expressed in the fibularis brevis muscle, although the gastrocnemius and l are not spared. When the peroneal muscle group is affected, the patient has a typical gait disorder with a hanging foot (rooster’s gait), whereby the patient cannot lift the affected foot off the floor when walking on the heels. If the patient’s SI motor root is fused, then the tibial musculature is motor weak, so the patient cannot push itself onto the top of the foot of the affected leg. And here, as soon as sawing is necessary or mouse treatment.

All neurological outbreaks due to disc herniation and, consequently, lumboschialgia in the acute phase require fast and efficient neurological treatment, and when the symptoms subside, it is necessary to proceed with physical therapy and rehabilitation, if the patient’s general condition requires it. However, it is always necessary to be careful not to cause iatrogenization and psychogenic superposition.

7. DIAGNOSTICS OF LUMBAR DISCOPATHY

The clinical assessment of disc herniations, lumbar discopathy and lumboschialgia in practice must be completed in all phases of the disease with appropriate diagnostic tests in order to calm down the acute phase of the disease as soon as possible and make it easier and faster to approach the rehabilitation of the patient’s condition and eventual return of the patient to a normal life.

The most sensitive test that therapists use to determine the level of disc herniation is myelography with water-soluble contrast agents. According to data from the literature, this test is in agreement with the surgical findings in 90% of cases. However, myelography is not a routine method and is used only in patients who are scheduled for surgery, and only exceptionally in the differential diagnosis of these diseases.

X-ray diagnostics are used for the routine diagnosis of disc herniation, then to rule out some other pathological conditions on this part of the spine, such as invasive processes such as tuberculosis, infectious spondylitis, cancer metastasis (especially prostate and breast), Paget’s disease of the bones, etc. lumbosacral spine as a routine procedure. The patient is always photographed in a standing position whenever its condition allows. Targeted recordings at the height of a certain disc are desirable, which can contribute to a high precision of clinical diagnosis. It is important to point out that the radiological finding cannot be interpreted outside the scope of the clinical picture, because in principle there is no correlation between the radiological and objective findings, and the subjective complaints of patients with disc herniation. A normal radiological finding does not rule out the existence of a disc herniation. Electromyography as a diagnostic procedure significantly helps in confirming the clinical diagnosis, it can be particularly useful in the diagnosis of biradicular lesions, and also in the monitoring of motor impairments. And finally, the third group of diagnostic tests that can help or supplement the clinical findings are laboratory tests, which in practice are usually normal if, in addition to disc herniation, radiculopathy or lumboschialgia, there is no other disease that can change or complicate them.

In the radiological processing of patients with disc herniation, it is necessary to take standard images of the lumbosacral part of the spine from the front and from the profile. In young patients, especially males, it is necessary to take a standard scan of the sacroiliac joints, in order to rule out possible changes in them. In addition to the standard anteroposterior scan of the L/S spine, a posteroanterial scan can also be taken.

Targeted recordings of L5-S1 intervertebral parts are performed under the control of scopy, and in this case the desired intervertebral space is exactly centered. Oblique images of the lumbar spine (left and right) are used to differentiate changes in the intervertebral joints with the aim of excluding the possibility of the presence of a congenital defect in the vertebral arches. The intervertebral joints are most clearly visible on these images. It is important to note that the magnitude of visible radiological changes does not go hand in hand with the severity of the pain described by the pa-
tient. There are situations where the changes in the vertebral disc are well expressed on the image, and they are painless, because no more degenerative changes occurred in the intervertebral disc that would be visible, and there were also no secondary degenerative changes in the nerve root and its surroundings. The reduction of the intervertebral disc on the radiographic image can range from discretely visible to pronounced, it can also be even, and more pronounced on the left or right, front or back, and as the only radiological change or associated with osteophytes as peridiscal osteophytosis. Peridiscal osteophytosis is most often localized in the anterolateral part of the disc and appears as bony beaks with sharp boundaries that begin a few millimeters above the vertebral body at the bottom of the interdisco-ligamentous space. They can be large (they have a cortical and spongy part) and in continuity with a part of a vertebra or opposite osteophyte, which in some cases join and bridge the disc (ossified lateral parts of the fibrous ring).

A common radiological finding is forward slippage of the lower lumbar vertebrae, when the entire vertebra slides forward and there are no changes in the bony arches. The changes are arthrodial and expressed in the intervertebral joint, so Nevman and Junghanus describe them as degenerative spondylolisthesis.

Another important diagnostic procedure in the diagnosis and control of lumbosacral discopathy therapy is electromyography, which was introduced into practice by Erb in 1868. He described it as an „electrical reaction” of the muscles. It actually represents the response of muscles to galvanic and Faraday stimuli, then chronaximetry, determination of the intensity curve, time and finally electromyography in the modern sense based on modern electronic devices. In 1929, Adrian and Bronk used concentric needle methods in the domain of this diagnosis, and in 1956, Simpson introduced the measurement of conduction speed through motor nerves, and in 1958, Gilliat and Sears extended the measurement to sensitive nerves as well. Today’s electromyography uses computers based on microprocessor technologies that enable the measurement of bioelectrical signals, the extraction of biogenic potentials, amplitude, frequency, time base, etc., which created the possibility to quickly and qualitatively obtain data on the objective pathological state of diseased muscles and nerves, as well as monitoring and prognosis healing.

Electromyography as a method helps the diagnostician and the therapist to evaluate the integrity of the motor unit by recording bioelectric potentials from muscle fibers, which in electromyography is called action potential. The test procedure itself can be performed with a needle or a surface electrode. They are more preferred in the use of needle electrodes, since they give more accurate results and with them it is possible to enter almost all muscles. Potentials in groups of muscle fibers are described as motor unit potentials and represent collective potentials originating from almost 30 fibers near the tip of the electrode (according to Buchtal 1960). Given that this paper considers muscles that are innervated from the lumbosacral plexus, it is necessary to point out that the motor units of these muscles contain significantly more fibers (for example, the gastrocnemius muscle contains up to 18,000 fibers).

In case of lumbosacral discopathy, the following electromyographic examination methods are used:

- classic electromyography;
- measurement of conduction velocities through nerves;
- measuring the duration of action potentials.

The essence of the electromyographic examination consists in first evaluating the insertional activity, which is a consequence of the mechanical stimulation of the muscle fibers, and in a denervated muscle it can last longer. After that, the so-called spontaneous activity, or data from a relaxed muscle is recorded. A healthy relaxed muscle has electrical silence, that is, there are no bioelectric potentials in it, while in the case of nerve denervation, fibrillation and positive denervation potentials appear in relaxed muscles. This phenomenon usually occurs around the 5th day after nerve damage, but is most intense 2-3 weeks after the injury. In addition to the described, fasciculations are also significant, which represent a further form from the group of spontaneous activities. Fasciculations are the result of insufficient contraction of a group of muscle fibers, and appear in peripheral motor neuron damage. True, fasciculations also appear in healthy people, as a benign form.

When it comes to measuring the conduction velocity through the segment that degenerates in the first days after the injury, the electromyographic findings are normal or slightly reduced, for example, in cases where there is partial damage to the nerve tree, such as in lumbar discopathy, the conduction velocity is normal. In cases of lumbosacral discopathy, the nerve most often affected is n. peroneus, whose fibers originate from the L4-S2 junctions of the lumbosacral plexus (normal conduction values for normal fibers of this nerve are above 40 m/sec). In addition to measuring conduction through motor fibers in lumbar discopathy, the speed of conduction is also measured through sensitive fibers n. peroneus and n. tibialis - the so-called is measured. Orthodromic conduction. When testing sensitive potentials, surface electrodes can also be used, but as they give low amplitudes of the evoked sensitive potential, the use of needle electrodes is preferred. Calculation of conduction speed through sensitive fibers n. ischiadicus are performed with a little more difficulty. Finally, we should also mention the calculation of the electromyographic potential through stimulation, or the evoked potential through stimulation, which implies the examination of the bioelectric potential from a muscle that is obtained by electrical stimulation of the associated nerve. In cases of protrusion of...
the intervertebral disc, motor fibers were damaged, the duration of the action potential was prolonged, so that in the reinnervation process it would be reduced and brought closer to normal.

It is important to note that during the electromyographic examination, optimal conditions for the examination and for the patient must be provided, that is, adequate temperature of the room and the muscles being examined must be provided, because cold extremities can give off false fibrillations and fasciculations. They arise as a result of external temperature and trophic vasomotor disorders, which leads to a slowing down of conduction through motor fibers.

The electromyographic method of diagnosing disc herniations and discopathy is an important method that facilitates the establishment of a correct diagnosis and the determination of adequate treatment for the therapist, although it also has its drawbacks, the biggest of which is the absence of isolated electromyographic abnormalities that are characteristic of a particular disease - the same or similar changes found in electromyography they can be found in various diseases. However, when it comes to intervertebral disc herniations (compressive neuropathies), repeated electromyographic examinations give the possibility to determine the success or failure of the applied therapy with greater certainty even before it can be assessed by the clinical examination itself (2).

8. DIFFERENTIAL DIAGNOSIS OF DISEASES WITH A MANIFEST IMAGE OF LUMBAR AND LUMBOSCHIALGIC SYNDROME

When describing the clinical picture of lumbar disc herniations and lumbar discopathies, we found that they are most often clinically manifested as lumbago, lumboschialgia, sciatica, however, in clinical practice, these diseases also present a number of other conditions that are not related to lumbar discopathy. All diseases related to anatomopathological processes or pathophysiological mechanisms in the tissues of the dynamic vertebral segment are called vertebral, and those whose seat is outside these tissues are called extravertebral. In this sense, the differential-diagnostic division of diseases and conditions related to the ovine segment of the body has been carried out in the literature. Degenerative processes, such as dysarthrosis, spondylosis and spondylarthrosis, are included in the first group of diseases for differential diagnosis.

The second group of diseases includes inflammatory processes, the seat of which is the anatomo-pathological process in the tissues of the spinal column, and also some of their clinical pictures are presented as lumbago and lumboschialgia - these are the following diseases: ankylosing spondylitis, specific spondylitis of tuberculous ethnology, others spondylitis and osteomyelitis.

And finally, there are a number of other diseases whose clinical picture partly coincides with the clinical picture of lumboschialgia, such as congenital malformations that eventually lead to lumbarization and saccralization, and consequently spondylothesis, then tumors primarily localized on the lumbar spine or metastases of cancer of the breast, kidney, prostate, lungs, thyroid gland, colon, female genital organs localized in this area, then traumatic changes manifested as unnoticed fractures, vertebral fractures, luxations and subluxations, dislocations of the sacroiliac joints, and finally osteopathies, osteoporosis, osteomalacia, fibrous osteitis, etc. About these diseases should be considered when diagnosing lumboschialgia (2, 3).

9. THERAPY OF LUMBAR DISCOPATHY

There are several forms of treatment for lumbar discopathy, or lumboischialgia:

- Conservative therapy;
- Medical-physical treatment;
- Physical therapy.

9.1. Conservative therapy of acute lumbar discopathy

Given that the most common cause of acute lumboschialgia is of discogenic origin, the basic principle is to opt for causal treatment. This means that acute lumboschialgia caused by disc prolapse should be solved by removing the prolapsed tissue and residual parts of the nucleus that can be squeezed out later. Surgical treatment of acute prolapse is usually not necessary and is usually recommended during the first 3 weeks, when the disease is treated conservatively, unless it is a case of compression of the cauda equina, in which case surgical intervention is necessary. The basic task of conservative treatment consists in preventing further migration of the nucleus, removing pain and eliminating inflammation and inflammatory edema in the nerve and its immediate surroundings. All this can be achieved if the spinal column is immobilized, appropriate analgesics and other anti-inflammatory drugs including steroids are generously applied. Immobilization of the spinal column is a very important act and is achieved by strictly lying the patient down. In this way, the migration of the nucleus is eliminated and the irritation of the nerve that is in intimate contact with the prolapsed nucleus is reduced. It is performed lying on a hard surface, with slightly flexed legs in the position that best suits the patient (dorsal, lateral, abdominal, etc.). In more severe cases, it is recommended to immobilize the patient in a plaster cast. The average length of bed rest is 3-4 weeks. An important problem is the relief of pain in the patient, why different analgesic preparations are used, parenterally or perorally. Medicines from the group of antirheumatic drugs are usually used with a different combination of analgesics, and in more severe cases with the addition of narcotics. The use of glucocorticoids in some patients effectively leads to improvement, or reduction of inflammation and edema. Recently, Depomedrol and Dexamethasone are most
commonly used.

The application of heat to the lumbosacral region is also recommended for some patients, although in some it worsens the pain, which probably depends on the presence of an inflammatory process in the nerve or its surroundings.

Furthermore, it is necessary to heal the patient’s muscle spasm, which occurs as a reflex protective phenomenon, i.e. the natural immobilization of the spinal column in the most favorable position, which is healed by the use of muscle relaxants. Finally, with strong and persistent pain, favorable effects are obtained by repeated paravertebral infiltration of spinal cords using novocaine or procaine or a mixture with glucocorticoids - nerve blockade.

Vitamin preparations from the B complex group should be added to all of this individually or in combination in order to recover the attacked or damaged myelin sheath of the nerve as quickly as possible.

9.2. Conservative therapy of chronic lumbar discopathy

Conservative treatment of chronic discopathy is performed in patients, after the treatment of the acute stage has been completed, with residual pain, muscle weakness and deformation of the spinal column and in whom attacks are repeated at different time intervals, and due to the discopathy, their ability to function is reduced, ability to work or are completely unable to work. These are patients who have manifest radiculitis or disc herniations with persistent subjective disturbances, but of a reversible nature, so conservative therapy can have a beneficial effect on them.

Unfortunately, conservative therapy is not effective in all discopathies. Certain disc diseases with accompanying neurological complications and cauda equina syndrome require immediate surgical intervention. The decision on this is made by the therapist himself during the clinical examination of the patient. As a rule, chronic discopathy due to chronic radiculitis can be treated with conservative therapy methods; acute or chronic discopathy with signs of compression, or rather progressive compression, should usually be treated surgically. This means that the tactics and method of treating patients is a complex act that requires the team activity of specialists from several specialties and is not as simple as it seems at first glance.

Conservative treatment of chronic discopathy in most cases is orthopedic and less medico-physical. In practice, complex medico-physical orthopedic treatment is most often carried out.

9.2.1. Medical and physical treatment

This type of treatment is carried out in cases of acute progression and chronic discopathy in cases where intense pain continues into this phase or in the case of recurrence of acute exacerbations. Some authors (Williams et al.) suggest that the patient be placed in the Fowler position during treatment with the spine, hips and knees flexed. In this position, muscle relaxation is achieved, the tension of the radix decreases and the intervertebral spaces open. Analgesics, antirheumatics, vitamin therapy are added to this, and in more severe cases, periradicular infiltrations (blockades). This is also joined by physical therapy in the form of diathermy, short waves, x-rays in anti-inflammatory doses, etc.

9.2.2. Orthopedic treatment

Orthopedic treatment includes several procedures: immobilization, manipulation, vertebral traction, corrections, static imbalance with the repair of muscle tone and strength.

Immobilization of the patient is achieved with a plaster corset and corsets made of different fabrics. These methods can be supplemented, so plaster corsets are used mainly during inpatient treatment, and corsets are used for outpatient treatment. Immobilization is achieved by removing the movement of the lumbosacral region, and supporting and relieving the lumbosacral part of the spine. Mandatory application of a plaster corset is required by the condition of acute hyperalgic disc herniation, as well as hyperalgic discal lumboschialgia resistant to narcotics, treated for several weeks (application according to De Sež). In certain situations, a plaster corset can lead to increased pain in discal lumboschialgia due to increased venous stasis caused by the corset, and in such cases the plaster is removed immediately. Corsets are used in the period of consolidation and in case of very painful lumboschialgia, if the pain does not subside after 2-4 weeks from the onset. You can also use adjustable belts or short corsets made of strong canvas with built-in metal strips - rails, which are placed vertically or from the side, but not from the back. Knight's corset from the pelvis to the lower part of the chest is used, or Taylor's corset with a double metal pelvic ring. The use of these corsets and middies should not be too long, as it can create limited mobility and muscle weakness.

9.2.3. Vertebral manipulations

Vertebral manipulations, which are called „vertebrotherapy” and heropraxy in the literature, are usually carried out by non-medical practitioners, as special hand maneuvers that lead to flexion, extension and lateral tilt of the spine. This type of treatment is even the official method of some medical houses. However, it happens that this type of manipulation can, in the presence of discs, increase pain and cause herniation of the second nucleus pulposus. The main goal of vertebral manipulations and tractions is to achieve the reposi- tion of protuberant masses, so many authors consider spinal manipulation for discs contraindicated. Opinions are divided about this type of treatment.

9.2.4. Tractions

Traction as a form of orthopedic treatment was created by experience. We are familiar with methods of hanging on a branch of „ushinudh” as well as stretching a patient with outstretched legs over the back of a healthy person, which are described in the literature.
as a method of treating patients with lumbosacral discopathy. Recently, this method of treatment has gained its theoretical and practical jurisdiction. It is a very simple treatment principle that consists of longitudinal stretching of the spinal column, whereby the protruded masses are returned to their place, and thus the anatomical relations in the intervertebral space are normalized. Lavernieux wrote about this at the De Seza Clinic and made a type of division of traction:

- stretching in bed according to the Varco method;
- underwater (vertical, horizontal and inclined) stretching according to the Molla method;
- stretching on distraction chairs and tables with the use of a manometer;
- localized stretching of certain parts of the spine by bringing the patient’s body into appropriate positions;
- stretching during active and passive therapeutic exercises according to the methods of Williams and Regan.

In practice, various combinations of orthopedic and physiatry treatment with fractions are often applied. For example, after an improvement is achieved with traction, then a plaster corset or mider is placed on the patient, or in the case of hyperalgic discal lumboschialgia, plaster immobilization is first performed and then traction. After that, the fraction is joined by various therapeutic exercises and other types of physical therapy.

### 9.2.5. Correction of static imbalance and repair of tone and strength of the paravertebral musculature

To correct static imbalance and repair the tone and strength of the paravertebral musculature, therapeutic exercises are used, which are essentially the most important procedures in the treatment of patients with discal lumboschialgia. With therapeutic exercises, relaxed muscles are strengthened and shortened ones are lengthened. These exercises are determined depending on muscle strength. During these exercises, special attention is paid to antagonist contractions. The length and intensity of the exercises must be such that they do not lead to increased pain. And if they appear or are present, the exercises are performed lying down with gentle movements. Special attention is paid to the abdominal muscles. In order to reduce pain, the intensity of the exercises should be increased, and in order to preserve the lumbar musculature, the exercises must be performed longer. Correction of the static disequilibrium of the spine due to its bending in the antero-posterior or lateral direction is performed with dosed and specially determined exercises and a cloth corset.

Literary data show that with conservative treatment of chronic discopathy, cure is achieved in 70% of cases, then improvement in 18% of cases, while favorable results are not obtained in 12% of cases. With surgical treatment, the results are satisfactory in 80% of cases, and unsatisfactory in 20% of cases. In the case of chemical nuclease, which has recently been more often performed by neurosurgeons and orthopedists, and which is based on the use of Chymopapain-proteolytic enzymes to remove the protruding intervertebral material without damaging the surrounding tissue (which is injected into the intervertebral discs by blockade), healing is achieved in 76% of cases, improvement in 15%, and unsatisfactory results in 9% of cases. The conclusion is that conservative treatment does not give worse results than the hitherto known types of disc herniation treatment. It is up to the therapist to evaluate in its choice which is the most effective method for that case at a given moment and in a given case.

### 10. PHYSICAL THERAPY OF LUMBAR DISCOPATHY

This method of treatment has been known for a very long time and is characterized by a long period of pronounced polypragmasy. Today's methods of physical therapy are done programmatically and are based on the pathophysiology and clinical picture of the disease and are in accordance with the individual reactivity of the diseased tissues and the psychosocial adaptability of the patient. Each physiotherapist must take into account the highly individual pathoanatomical substrate and reactivity of the patient, as well as the subjectivity of assessing the value of physical treatment methods for patients with disc herniation and lumboschialgia, because most of these treatment methods have only symptomatic effects.

Different authors have different opinions about these methods, but the complete complex of physical medicine methods in the treatment of lumbar disc diseases in the treatment is reduced to first rest, then diathermy, massage, stretching and strength exercises of the lumbar spine with postural correction (Ralston 1971, Nedvidek 1966, Filipan and Pintal 1973). It is true that there are differences in the indications for conservative and surgical treatment of disc herniation. But it is an indisputable fact that after a few years the results of surgical and conservative treatment are almost the same. A generally accepted axiom in the literature is De Sezov, who says “it is illusory to treat lumbar disc disease without a period of rest”. After this period of rest, which is 3-4 weeks in milder cases, and 6-8 weeks in more severe cases, exercises in bed are started, and depending on the patient’s condition, one of the following physical exercises is applied individually or in combination.

#### 10.1. Kinesiotherapy

Absolute rest in bed can leave harmful consequences such as muscle atrophy, reduced metabolism and psychological tension. That’s why the principle is used that “everything that doesn’t hurt” should be mobilized in bed, i.e. the upper extremities with active exercises and fat exercises, and the abdomen and lower extremities with isometric and possibly dynamic exercises. In the first days, pains occur even during slight contractions of trunk extensors, but they quickly subside and enable
contractions. In the 3rd and 4th week, the exercise program can be intensive 3-4 times a day for half an hour with isometric spine extensor exercises. The necessary relaxation is achieved with breathing exercises that accompany each session. Immediately after the patient's pain subsides, the application of modified Regan exercises begins, which consist in stretching the back of the upper leg, trunk extensors and strengthening the abdomen. If the patient is able to leave the bed, this must be done gradually, and we start with standing several times a day for a few minutes and walking around the room with the help of crutches and a cane, so that the process of fibrosis and consolidation of the scar is not disturbed by a sudden load. Therefore, the loading of the spine must be gradual until the symptoms subside, and then a regimen of dosed loading and a program of kinesitherapy with periods of rest are established as a permanent measure of metaphylaxis.

A more extensive program of kinesitherapy is indicated when the patient reaches the end of the subacute or chronic phase of the disease. Recently, the program of Regan-Tilllok exercises has been implemented as a treatment program in kinesitherapy of lumbar disc diseases. This program includes stretching of the hamstring, trunk extensors, strengthening the abdomen and correcting the tilt of the card. It gives particularly good results in the subacute phase. At the end of the subacute and chronic phase, this program is often modified. In practice, shortening of hip adductors and flexors is often observed, which limits the pelvic-femoral balance in the sagittal and frontal planes during movements, walking, daily and professional activities. If the pelvic-femoral range of motion is more limited, then the base on which the spine rests and moves is more rigid. The elasticity, balance and cushioning of the hips and card are then weaker and the load on the lower lumbar vertebrae increases. Bearing in mind the importance of the balance of the hips, cardia and lumbar spine for amortizing the load, stretching the hip flexors and adductors is considered a useful addition to the kinesitherapy program, which gives the impression that it has a favorable effect on the longer compensation of disc damage. Regan's program does not have trunk extensor strengthening exercises that stabilize and fix the spine, so in the final phase of treatment isometric extensor strength exercises are applied, forming the muscle core that should protect the structural damage.

It is a generally accepted opinion and attitude that patients with increased pain should not insist on this type of physical therapy program, until the pain is relieved to the extent that an optimal kinesitherapy program can be implemented.

10.2. Massage

Manual, vibration and underwater massage undeniably relax rigid trunk extensors and increase circulation in fibrotic musculature, so we gladly use them in preparation for exercises.

10.3. Hydrotherapy

Relaxation with exercises in the pool and bathtubs can be used in all phases of disc disease, except for the first days of the acute phase.

10.4. Thermotherapy

It is not indicated in the acute phase due to an increase in local hyperemia. In the chronic phase, microwaves, infrared rays and paraffin can be used as an introduction to kinesitherapy.

In recent times, these thermal procedures are suppressed by cryotherapy with better results, which are caused by reflex hyperemia after a period of vasoconstriction.

10.5. Phototherapy

Ultraviolet erythema on the surface of the skin corresponding to Hed's zones has a beneficial reflex effect on pain.

10.6. Sonotherapy

Ultrasound applications of low intensity up to 1/W per square centimeter, in addition to the liquefaction of the gel, has an analgesic and spasmolytic effect, especially in chronic forms. Even better effects are achieved with the new combined method of pulsed US and diadynamic currents (Sonodinator).

10.7. Electrotherapy

Some electrical procedures have historical significance today, and others show certain effects of symptomatic therapy that certainly have an analgesic effect. This primarily refers to the application of galvanic current (stable galvanization, double-stone baths, galvanic bath), diadynamic current and, more recently, low-frequency interference current. All these methods can be applied in all stages of the disease. The appearance of motor weakness is a signal for the application of the well-known principles of electro-kinesis therapy (electrical stimulation and exercises according to the muscle test).

In the summary of the exposed treatment methods, it can be said that absolute rest is absolutely indicated in the acute phase of the disease and in every relapse. In the subacute and chronic phase, the treatment program is formed by a combination of other available methods. In the postoperative treatment, the use of kinesitherapy with isometric strength exercises along with elasticity exercises and stretching of the pelvic femoral muscles is indicated.

It should be emphasized that increasingly common juvenile diseases of the lumbar disc, with more severe spinal and scarce radical symptoms, show resistance to all types of physical treatment. According to our experience, we consider only swimming and trunk strength exercises to be indicated, with occasional relief and relief from physical exertion.

10.8. Treatment of lumbar disc herniations with underwater extensions

Experience from practice shows that certain disc herniations are more or less resistant to conservative therapy, and it is also certain that the indication area
for surgical treatment is getting narrower. Therefore, many authors were looking for new and more efficient ways to treat these diseases. One such solution was the method of treatment using spinal traction. In the past, it was carried out by non-physicians and was strictly empirical in nature, and more recently, after experimental verification, it received its theoretical justification and practical application. In several of our centers, underwater extensions as a method of treating lumbar disc herniations have become an established method of their treatment. Jošje Lavernieux proved that traction-stretching with a force of 5-10 kp successfully leads to a reduction of lumbar lordosis, and the expansion of the intervertebral spaces by about 1.5 mm occurs if a force of 10-30 kp is applied, while with a force of 60 kp this expansion goes up to 2-3 mm. When expanding the intervertebral spaces, when pulling on the intervertebral discs, the stretching of the anulus fibrosus in the vertical direction is observed, perinuclear cracks appear in which the flattened nucleus pulposus disappears, between the thick fibers of the anulus fibrosus. After removing the traction, the state of discussions is established as before. Chaillé-Bert investigated another phenomenon - neuromusculoma irritability of the errectores muscles before and after traction, and during the experiment found reduced irritability during traction and a return to the previous state after its removal. The third author, Amman, examined the effect of traction, pressure, flexion and extension on the human spine and found that resistance to traction increases in the caudal direction, i.e. that only in the position of flexion can larger distances of the vertebral bodies be achieved. The result was that after the first traction, the reposition of the protruding discal masses can occur. All these tests helped other authors to develop and perfect the method of underwater extensions as a very effective way of treating lumbar disc herniations.

The procedure itself can be performed in several stages. Beforehand, it is necessary to determine the general state of health of each patient by X-ray, laboratory and orthopedic examination, which means to determine the exact diagnosis and to determine the localization of the pathological process and the degree of the lesion of the peripheral nerves. So, it is necessary to accurately determine the relationship of the protruding parts to the radix - who is placed laterally and who medially - discus or radix. Next, it is necessary to get an impression of the size of the protrusion and to detect or rule out signs of intermittent lumbar disc scoliosis. It is necessary to differentiate whether it is a hyperalgic disc herniation or a herniation with motor disturbances on the lower extremities, or to classify disc herniations with lumbar scoliosis from lumbar disc herniations without scoliosis. Disc herniations with scoliosis are divided into those with homolateral lumbar scoliosis, in which the scoliosis is on the painful side and toward the painful leg, and disc herniations with heterolateral lumbar scoliosis, in which the scoliosis is toward the healthy side and the non-painful leg. In the first case, the protruding disc is placed laterally in relation to the radix, which lies medially, and in the second case, the relationship is reversed. This division is important precisely because of how and how intensively to carry out the underwater extension by distributing the load on the healthy or diseased side in relation to scoliosis. Special treatment is carried out for the so-called intermittent scoliosis, in those that change the side of the bow sometimes to the healthy side and sometimes to the sick side. The intensity of pain in all these variants is the determining factor of the intensity and length of the exercise of underwater extensions, and in this sense the load is distributed towards the healthy or diseased side in relation to scoliosis. Namely, scoliosis is a reflex and defensive reaction to pain, so the intimate mechanism of the relationship between the protrusion and the radix in discs without scoliosis is entered through the pain. That’s why the circumduction test evaluates the increase or decrease of pain when bending to the healthy side. Even then, underwater traction is applied with better results in homolateral scoliosis.

In general, all disc herniations, except for hyperalgic ones, with motor disturbances in the legs and intermittent scoliosis, can be classified into two groups: a. disc herniations with heterolateral scoliosis, and without scoliosis with pain when the body leans on the affected side; and b. disc herniation with homolateral lumbar scoliosis, and without scoliosis, in which the inclination of the body towards the healthy side provoked stronger pain towards the diseased side. The majority of authors came to the conclusion that the most resistant to underwater extensions are disc herniations with scoliosis in terms of healing, but that patients from this group after underwater extensions have significant improvements after the procedures, but also the largest number of candidates for surgical interventions from this group. The general conclusion is that the effectiveness of underwater extensions interferes with the length of the disease and the severity of the disc protrusion, so disc herniations could be graded according to the effectiveness of underwater extensions, the length of the disease and the prognosis of healing: disc herniations without scoliosis are the easiest, disc herniations with intermittent scoliosis are more serious, and the most serious disc herniations with homo and heterolateral scoliosis.

The underwater extension method itself consists of the following: first, peloid is applied, and then underwater extension is performed in mineral radioactive water that flows from the source into the pool where the extension devices are installed. It flows through the pool in a constant flow with a temperature of around 38 degrees Celsius and 15 Mohs units of radioactivity. The extension frame is placed next to the bridge where the water vibrations and ripples are the greatest. A rubber belt is placed on the patient above the iliac crest, the weight specified in Kp is placed over the. The
patient rests its upper arms on the longitudinal bars of the frame, while the lower part of its body lies in the water. The stretching procedure takes 15-20 minutes. For the first two minutes, the patient hangs in a vertical position under a load without resting its feet on the floor, and then for 10 minutes performs movements of flexion and lateral rotations of the spine under load. This is followed by rest under the weight without movement and leaning on the floor in a 3-minute squat. The treatment starts with a load of 5 Kp and increases to 25-30 Kp, and lasts 20-25 days on average. At the end of the treatment, the optimal load should be 1/4 of the patient's body. Metal weights are placed around the belt and in the water, and the increase in load is individual and depends on the intensity of the pain present. Extensions are not interrupted even after the pain has stopped, and traction is performed with the weight of the body and the added load hanging on the patient. The patient performs movements with the spine in flexion and rotation in order to disengage the protrusion as easily as possible and push it into its right and natural place. After traction, the patient returns to the bed in a supine position. In the case of painful syndrome, the Williams position is the most suitable for the patient. During underwater extension, special attention should be paid to creating a symmetrical or asymmetrical arrangement on the healthy and diseased side. This method was introduced by Moli in 1953 in the Hungarian health resort of Heviz.

The use of underwater extension disproves the notion that hyperalgic disc herniations are resistant to conservative therapy and that they should be treated surgically as soon as possible. Hyperalgic disc herniations, that’s why there is evidence in the literature, can very often be permanently relieved only by ordinary orthopedic therapy in the form of classical immobilization. The treatment of lumbar disc herniations with underwater extension and peloid, as described here, is one of the most effective methods of conservative treatment, and that is why we have devoted so much attention to it in this work. This type of treatment is well tolerated by patients, the method is technically quite simple and easy to perform, and it is significant, leaving few intercurrent complications.

10.9. Pharmacopuncture

Pharmacopuncture is a relatively new and somewhat original method (Pharmakon-drug, puncture-injection), as its name suggests, it equally gives importance to the therapy, or, the drug itself (type of drug, dose and its pharmacological effect), as well as to the injection, i.e. the place and method of needles through which the drug is administered. It means that both of these components, pharmacological and punctural, that is, physical, work synergistically, so that the therapeutic mechanism of pharmacopuncture can be observed separately from both of these aspects. The puncture component represents the mechanism of reflexogenic stimulation therapy, according to some authors of deep reflexotherapy or mesotherapy, which originates from Eastern authors (acupuncture), and whose mechanism of reflexogenic stimulation therapy is the basis of medical massage as well as other physiatriy methods and certain homeopathic procedures. It is assumed that by holding the reference skin zone with subliminal or lympathic pain stimuli, the primary pain can be relieved, because the secondary neuron that goes from the spinal cord to the central nervous system is common and carries both stimuli (Abrahams' endogenous skin reflex or "referred pain" of Anglo-Saxon authors). This mechanism, whose origin lies in the ancient civilizations of the East, is used today as a modern acupuncture surgical anesthesia, which relieves the patient of pain by inserting several dozens of points on certain parts of the skin. Pharmacopuncture allows the application of a mixture of medicinal substances with needles to several injection sites simultaneously and through all the needles, or the successive application of individual medicines through the same needles. In the case of lumbar discopathy, glucocorticoids are often applied using the pharmacopuncture method as a very effective means of relieving pain and reducing inflammatory processes in the nerve itself or the tissues around the nerve, which are compressed. In addition to glucocorticoids, pharmacopuncture also often uses vitamin preparations and some other means in the treatment of disc herniation and discopathy. Like all other methods, pharmacopuncture has its drawbacks, the biggest of which is the complexity of the procedure, which requires a special expenditure of time as well as high expertise and trained therapists. However, in the therapy of lumbar discopathy, pharmacopuncture proved to be a very useful and efficient method (I).

10.10. Conservative treatment of lumbar discopathy using physical exercises

In the text so far, describing different methods and ways of conservative therapy in the treatment of disc herniation, discopathy and lumboschialgia, we mentioned that a considerable number of patients can recover quickly and easily with special physical exercises. The goal of these exercises is to reduce muscle spasm, which leads to decompression of the affected segment from which the lumbosacral nerves exit. Therefore, it is very important to make such a choice of exercises by means of which the lumbar part of the spinal column is brought from axial extension and lateral flexion, which in most cases is caused by a pathological condition, to maximum flexion with the effect of many muscle groups. At the same time, the abdominal musculature as a flexor and fixator of the spine as a whole plays a major role during exercise, precisely by reducing the inclination of the pelvis and maintaining the achieved position of the spine.

Applying exercises for pain in the lumbar spine area for many years, we are of the opinion that a good part of the exercises that are used in most of our institutions do not provide fast enough recovery. Some of them, es-
especially if they are not performed properly, even cause a worsening of the condition, which increases the fear and reluctance of patients towards exercises in general.

It is known that in order to treat these conditions, it is primarily aimed at reducing muscle spasm, and thus decompression of this segment. This requires a selection of exercises that bring the lumbar part of the spine from axial extension and lateral flexion, which in most cases causes a pathological condition, to maximum flexion, with the effect of many muscle groups. The abdominal musculature, as the primary flexor and fixator of the spine as a whole, plays a major role during exercise, precisely in reducing the inclination of the pelvis, as well as in maintaining the achieved position.

Namely, if in order to reduce spasm it is requested that the patient from the so-called Williams position raises the bent legs and pulls them towards the chest, which achieves additional minimum flexion of the spinal column and indirectly elongation of the paravertebral musculature, then the fact that strong hip flexors are the protagonists of this movement is often overlooked. Joining Th12 and 5 lumbar vertebrae (psoas) and the pelvis (m. iliaceus and m. rectus femoris - second head) these muscles can disrupt the achieved tilt of the pelvis. If we add to this the fact that due to the large mass of the lower extremities and the torque of the force of gravity in this position, the lumbar extensors are also included in the movement, as auxiliary fixators, it will be clear that the lumbar lordosis increases in a certain part of the amplitude, which increases the complaints of the patients (Figure 1).

That is why we recommend that, in order to prevent unwanted inclination of the card, movements of the lower extremities from the mentioned position are not given, until the patient is trained how to reduce the inclination of the pelvis and maintain that position. However, in order not to neglect the stretching of the paravertebral musculature, this same movement should be performed from the part of the amplitude that achieves the desired goal. For example, with the feet resting on the wall or bed rail, with the gluteal region as close as possible to the wall, impose such a position on the lower extremities, in which due to the reduced effect of gravity, the effect of the hip flexors is also reduced. The movement is performed without interference and should be extended until the pelvis is lifted from the base, which achieves maximum elongation of the lumbar part of the spine with the effect of the abdominal muscles (Figure 2).

However, since this exercise does not provide the patient with the opportunity to feel what he needs to do and prevent undesirable effects, he should train at the same time to maintain the reduction in inclination. This can be achieved in several ways. One of the positions of the so-called dorsal decubitus, with a gradual increase in the angle in the knee joint, hip, foot support on the ground, without movement of the lower extremities. This makes the starting position and control of the lumbar part of the spine more and more difficult.

Another option is to rest the entire lower legs on the bench in the same position. In order to make it more difficult to reduce the inclination and maintain it, move the bench until the legs are extended, which increases the angle in the hip joint, and thus makes it difficult to control the lumbar segment (Figure 3). Or the third possibility, rest the stretched legs with the feet on the wall with the largest possible angle between the legs and the surface on which the patient is lying, then gradually lower the legs and reduce the angle (Figure 4).

Especially for athletes and physical education teachers who were dealing with lumbar pain, and who also had strong musculature of the abdominal wall, the question arose: is the primary strength of these muscles or the control of movement due to their timely contraction. It was concluded that they also experience an increase in pain when raising the lower extremities, if they do not first fix the lumbar part of the spinal column, by voluntary contraction of the abdominal muscles.

Controlling the reaction of the lumbar part of the spine during this movement, it could be observed that by increasing the angle in the hip and knee, the optimal initial position can be determined, with the aim of reducing further pain intensification, i.e. hyperextension of the lumbar segment. In order to control, you should place your hand under the lumbar spine and thus feel the smallest reaction (Figure 5).

The Williams sit-up upper body raise is one of the exercises that is also often recommended. It is true that during this movement there is no pain in case of an undesirable effect of the hip flexors, but it cannot be accepted that the exercise is performed with the aim of strengthening the abdominal musculature. The reduced effect of gravity due to the position itself and the bent head towards the chest already reduce the activity of the abdominal muscles as a fixator, so that in the extension of lifting the shoulder girdle until lifting the shoulder blades off the ground, it would be the protagonist of the movement. (In the further movement and the longer part of the amplitude so far, the card is drawn towards the thighs, by the activity of the hip flexors. The effect of the exercise is more on strengthening the hip flexors, which should be ignored in these conditions, at least in those movements where the abdominal musculature is not engaged as a stabilizer pelvis (Figure 6).

It is true that this causes elongation of the paravertebral musculature, but this can also be achieved with other positions that are used and which are not recommended in the so-called Regan-Tillloson exercises.

The four-legged position, which is apparently contraindicated due to the possibility of twisting the lumbar part of the spine, offers the possibility of stretching not only the paravertebral musculature, but also the muscles of the back of the thigh as well as the two-jointed gastrocnemius muscle, which is a necessity in these patients.
Figures 1-15. Physical exercises which are suitable for patients with Lumbar Disc Herniation.
The vertebral column is unloaded on four support points, enabling it to be easily modeled with upward convexity. We didn’t have the chance to notice that the position worsened the situation. Namely, the axial extension imposed by lumbar syndrome does not decrease in this position.

Many movements that can be performed from this position act to stretch the entire kinetic chain of the back of the body. For example, bending the upper part of the body to full flexion is performed by the effect of gravity with the eccentric action of the extensors of the spinal column, and only in one part of the amplitude by the action of the abdominal muscles (Figure 12). If the hips are raised from this position until the knees are extended, this is mostly done by the action of the quadriceps muscle, which stretches the paravertebral musculature and the muscles of the back of the thigh. Depending on the support on the toes or the entire foot, it also affects the stretching of the gastrocnemius muscle and the entire back of the lower leg (Figure 8).

A sitting position with stretched legs can also be used for the same purpose. Bending of the trunk forward is done initially by the effect of gravity, and it can be enhanced by pulling the hands or by the action of the abdominal muscles in the part of the amplitude when the patient can no longer perform the movement (Figure 9).

The abdominal musculature as a flexor of the thoracic and lumbar parts of the spine in this position acts not only against the inelasticity of its antagonists, or the paravertebral musculature, but its effect also stretches the back of the thigh. This position can also be used with one or both legs bent, with external rotation of the upper leg, and by pushing them down with the hands, the muscles of the adductor region are stretched (Figure 10). With one knee bent and the other leg in abduction, forward bending and lateroflexion of the trunk stretches the quadratus lumborum (Figure 11).

From this position with reduced lumbar lordosis, with the back facing the wall, one should start with the axial extension of the neck and head and its pressure against the wall, with the simultaneous engagement of the abdominal muscles in maintaining the lumbar lordosis. This gradually leads to the engagement of the thoracic and lumbar extensors with static contractions, which in this position of reduced lumbar lordosis does not worsen the patient’s condition (Figure 12).

In a sitting position with bent knees, which reduces lumbar lordosis even more, by embracing the ankles, slowly extend the spine as a whole. Pulling with the hands against the resistance of the spine extensors, the exercise has a very strong effect on the muscles of the trunk as a whole, but does not worsen the patient’s condition (Figure 13).

And at the end, when the spasm is reduced or completely removed, you can move on to exercises in a lying position on your stomach, with previously learned control of the lumbar segment by contraction of the abdominal muscles (Figure 14). By practicing this not very natural movement, the patient tends to unconsciously tighten the abdominal musculature from a forward bend in a standing position, and only then straightens up to a normal standing position, due to the effect of the extensors of the spinal column. It seems that the patients remember this more easily, than that by springing the bent knees, they raise themselves to an upright position (Figure 15).

Not being able to show the entire complex of exercises, we would like to pay attention to the fact that the exercises must cover all the muscles of the pelvic girdle and lower extremities. Changes along the entire kinetic chain that are felt to a lesser or greater extent, if not treated at the same time, will lead to the fact that the reduced spasm of the paravertebral musculature, to which the greatest attention is paid, becomes potentiated again.

In addition, we are of the opinion that the deterioration of the condition in the form of tightening along the thigh or the entire leg, which is enhanced by some exercises, is not always a contraindication for continuing the exercises. These exercises are often avoided, which essentially prolongs the recovery time. Persistent daily stretching with repetition of the movement 50 times, even more, reduces tightness in the area of the distal muscles.

Occasional potentiation of pain caused by some exercises is also not a reason to discard that exercise, but perhaps to make it easier with some modification. This applies to those exercises that cause pain, which disappears when the exercise is stopped.

Summarizing the exercises presented, we would like to point out at the same time that the existing system of treating lumbosacral discopathy should not be eliminated. We believe that these exercises can only be a supplement to the existing treatment, that is, in certain cases, one of the means for speeding up recovery, which would otherwise certainly be somewhat longer if only by the classical method.

II. CONCLUSION

Lumbar discopathy belongs to a group of diseases that are exclusively characteristic of humans. The main reason why it is a disease exclusively of humans is the insufficient adaptation of the spinal column to the conditions of the upright position of the body when standing and walking. The lumbar part of the spine suffers more every day, now for several tens of days. Since the lumbar spine represents a static carrier of the head, torso, upper limbs and possible loads, and in addition, like a spring, brings the head and the upper half of the body towards the lower half in the most different positions, the load on this part of the spine, which sometimes doubles, sooner or later leads to abnormal change in its morphology and function. In addition, in each individual individually, anatomical features, physiological and biomechanical events in the lumbar spine...
determine the pathogenesis of pathological disorders in this complex part of the human body. The consequences, in the form of symptoms of lumbago, sciatica, lumbosciagia, etc., due to changes in the lumbosacral part of the spine, began to be written about in the second half of the 18th century, and thanks to modern radiological and electroniographic methods in this century, especially in recent decades, lumbar discopathy has been accepted as a clinical entity from all aspects. Neurologists, orthopedists and physiatrists, or physiotherapists paid the most attention to this pathological entity, considering that from the aspect of clinical manifestations both in acute and chronic conditions of this disease, the changes are the most interesting for treatment in their domain. Sciatica, as a clinical form, primarily occurs due to the pressure of a herniated disc on the spinal cords L5 (disc L4-L5) and S1 (disc L5-S1), most often as monoradicular and almost always unilateral. About 70% of patients with disc herniation are between 30 and 40 years old. The anamnesis is dominated by signs of sudden onset of pain in the crotch that soon or immediately spreads to the legs, increased pain during stool, sneezing, defecation and a feeling of numbness in the lower leg and foot. In the objective findings, the therapist often finds obliterated physiological lordosis, limited range of motion of the lumbar part of the spine, antalgic scoliosis and a positive Lazarevic-Laseg sign. Neurological changes are not clear and typical for all patients and vary depending on the severity and duration of the disease.

In the treatment of lumbar discopathy, different methods of rehabilitation of this disease are used. Conservative treatment of acute lumbar disc prolapse has its principles, which consist in preventing further migration of the nucleus pulposus, removing pain and eliminating inflammation and inflammatory edema in the nerve and its immediate surroundings. This can be achieved by adequate immobilization of the spinal column, generous use of analgesics and antirheumatic drugs, including glucocorticoids. In more complex cases, such as the appearance of symptoms and signs of cauda equina, it is sometimes necessary to intervene surgically. Conservative treatment of chronic lumbar discopathy is carried out after the treatment of the acute stage with residual pain, muscle weakness and deformations of the spinal column, and in patients with recurring attacks at different time intervals since the first attack, and finally in patients whose working ability is reduced due to discopathy or are unable to work. In these patients, medico-physical treatment is carried out as in acute conditions with the addition of physical therapy in the form of diathermy, short waves, especially X-rays in anti-inflammatory doses, etc. Orthopedic treatment includes procedures of immobilization, manipulation and vertebral traction, corrections, static imbalances with repair of muscle tone and strength. A particularly important role is played by physical treatment, which has been written about a lot in textbooks and other literature, and about which there are extraordinary experiences in our communities as well. This type of treatment includes lumbar spine relief procedures, kinesitherapy, spine fractions, manipulation, application of appropriate orthopedic devices, massage, hydrotherapy, thermotherapy, phototherapy, sonotherapy, electrotherapy, balneotherapy, pharmacocauterpuncture, application of underwater extensions, and appropriate exercises in conservative treatment. Lumbosacral discopathy. In this paper, the author discusses these procedures, which are very important in the daily work of physiotherapists, in detail, from the aspect of their advantages and disadvantages. Physical Therapy Guide to Herniated Disk.

A herniated disk occurs when the cushion-like cartilage (the disk) between the bones of the spine is torn, and the gelatin-like core of the disk leaks. Often mistakenly called a slipped disk, a herniated disk can be caused by sudden trauma or by long-term pressure on the spine. This condition most often affects people aged 30 to 50 years; men are twice as likely to be diagnosed as women. Repeated lifting, participating in weight-bearing sports, obesity, smoking, and poor posture are all risk factors for a herniated disk. The majority of herniated disks do not require surgery, and respond best to physical therapy. Physical therapists design personalized treatment programs to help people with herniated disks regain normal movement, reduce pain, and get back to their regular activities. Physical therapists are movement experts. They improve quality of life through hands-on care, patient education, and prescribed movement.

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