

## Modern Approaches to the Treatment of Back Pain and Radiculopathy

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**Annotation:** Pain in the area of the cervical, thoracic or lumbar spine periodically occurs in almost every person of working age. The most common (about 90%) cause of back pain is a dysfunction of the muscular and articular-ligamentous apparatus of the spine. In the modern literature, this condition is referred to by the term "non-specific back pain" due to the fact that, regardless of the root cause that caused back pain, the pathogenetic mechanisms of the development of this disease are the same.

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Thus, in patients with medial herniated discs or Schmorl hernias, most often there are no symptoms of the disease or there is a non-specific back pain due to the faceted syndrome. Only lateral hernias that mechanically damage the nerve roots or cause secondary toxic and dysimmune processes are truly dangerous for the development of radiculopathy. You can suspect such a hernia if the pain from the back spreads to the arm or leg and is accompanied by weakness and sensitive disorders in the limb, symptoms of root tension. But such a hernia is not a "sentence to surgery". Modern medical technologies allow for the treatment of such conditions without surgery (by blockades) or, in extreme cases, by minimally invasive methods (laser vaporization, cold plasma ablation). With conservative therapy of radiculopathies, a typical situation is observed: against the background of treatment (or even without it), back pain disappears, although the hernia remains the same size and in the same place. Prospective observations of patients with compression radiculopathy show a significant reduction in hernias and disc sequestration (in 75-100% of cases) and compression of the neural contents (21-80%) after 14 months, even in the absence of therapy.

Modern classifications distinguish non-specific (benign self-resolving within 1 month) and specific (see "red flags") back pain, but the introduction of such collective terms in the clinical diagnosis, in our opinion, is impractical, because these concepts do not reflect the etiopathogenetic features of the disease in each individual patient and do not determine the direction of its treatment. The anatomical classification of spondylogenic pain syndromes is the most optimal for making a clinical diagnosis:

1. Spondylogenic cervicalgia – non-specific pain in the cervical spine (cervicobrachialgia - when radiating pain in the arm, cervicocranialgia - when radiating to the head).
2. Spondylogenic thoracalgia – non-specific pain in the thoracic spine.
3. Spondylogenic lumbalgia – non-specific pain in the lower back (lumboishialgia - when radiating to the leg).

The above-mentioned diagnoses are, in fact, as non-specific as the outdated term "osteochondrosis", so they require a clarifying extension: with musculotonic and / or myofascial syndrome ... of the muscles, with facet syndrome ... of the vertebrae (alternatively, with sacroiliac joint dysfunction), with compression radiculopathy ... of the root. Thus, a detailed clinical diagnosis of a patient with chronic back pain radiating to the right leg without signs of root compression may sound like "chronic spondylogenic right-sided lumboishialgia with musculotonic syndrome of the iliopsoas and middle gluteal muscles, facet syndrome L5-S1 and dysfunction of the right sacroiliac joint, astheno-depressive syndrome" and be encoded M54.4 (ICD-10). The diagnosis of neuroorthopedic syndromes allows not only to clarify the pathogenetic features of the disease (which is important for assessing the dynamics of the patient's condition during the following visits), but also to justify the expediency of the treatment methods used: non-steroidal anti-inflammatory drugs (NSAIDs) – for pain relief, muscle relaxants - to reduce the muscle-tonic syndrome, antidepressants - to increase the tone of the antinociceptive system, and therapeutic blockades (and / or radiofrequency denervation) - for local effects on the joint sources of pain.

After a clinical neurological and neuro-orthopedic examination, instrumental methods of investigation are necessary in some cases to clarify the sources of pain impulses and the mechanisms of pain development [2, 5-7]. For pain in the cervical and lumbar spine and extremities, imaging methods are of particular importance, the expediency of which is determined by the anamnestic features and the presence of changes in the neurological and somatic status of patients. In the vast majority of cases, acute and chronic back pain is a "benign" condition, and most patients do not need additional instrumental studies. However, the presence of distinct neurological and somatic disorders ("red flags") may require an urgent paraclinical examination. For example, weakness in the leg muscles, decreased sensitivity in the anogenital region according to the type of "saddle anesthesia", pelvic disorders indicate the presence of compression of the roots of the ponytail and require immediate magnetic resonance imaging (MRI) or computed tomography (CT) to resolve the need for urgent surgical intervention. The lack of communication of pain with movement, keeping her at night, a history of malignancy, HIV infection, use of immunosuppressants, unexplained weight loss, fever and night hyperhidrosis, patient age younger than 20 and older than 50 years require additional research

methods at the first appeal of the patient to avoid in the first place, infectious and neoplastic lesions of the spine. Below are the signs of serious pathology in back pain ("red flags"):

- the presence of a history of malignant neoplasm;
- \* keeping the pain at rest;
- significant trauma in the recent history (falling from a height, car accident, etc.);
- gratuitous weight loss;
- \* no improvement after 1 month. the optimal treatment;
- \* fever;
- \* soreness with palpation and percussion of the spine;
- a history of drug addiction, HIV infection, and the use of immunosuppressants;
- \* long-term use of corticosteroids;
- \* debut of pain over the age of 55 and under the age of 20;
- \* symptoms of spinal cord damage: sensory disorders on the trunk and in the extremities ("conductor sensitivity disorders"), weakness in the extremities, pelvic disorders;
- \* symptoms of damage to the roots of the ponytail (impaired sensitivity in the anogenital region, pelvic disorders, weakness in the legs) or individual cervical, lumbar and sacral roots (irradiation of pain in the arm or leg, combined with a decrease in strength and impaired sensitivity in the innervation zone of the corresponding root).

In all these cases, radiography of the corresponding parts of the spine in direct and lateral projections, general blood and urine analysis, and in case of suspected osteomyelitis, epidural abscess, spinal cord and root lesions, as well as in diagnostically questionable cases, MRI of the lumbosacral spine is required. If it is necessary to clarify the state of bone structures, in some cases, X-ray CT and spinal scintigraphy are indicated after radiography. If a malignant neoplasm of the prostate is suspected, it is necessary to examine the level of a specific prostate antigen. In the presence of a recent history of trauma (falling from a height, road accidents, etc.), as well as with prolonged use of corticosteroids and in patients older than 55 years, it is necessary to conduct radiography of the spine, and if it is not sufficiently informative and pain persists for more than 10 days, scintigraphy or CT of the spine to exclude compression and other traumatic fractures of the vertebrae. All patients with an intense pain syndrome lasting more than 1 month, as well as all patients with chronic back pain, are shown a single radiography of the spine in direct and lateral projections in order to exclude, first of all, tumor or infectious lesions of the spine, as well as osteoporosis. In case of chest pain, it is advisable for all patients to perform electrocardiography and lung radiography at the first treatment to exclude somatic pathology (ischemic heart disease, infectious and tumor lesions of the lungs and pleura, etc.) as the main cause of the pain syndrome.

When examining patients with obvious orthopedic defects in the form of severe scoliosis, spondylolisthesis, instability of the lumbar spine, asymmetry of the length of the legs, oblique and twisted pelvis, with pathology of the hip joints, it is not very difficult to determine the etiology of pain. But the exact identification of the sources of pain impulses, especially in chronic non-specific back pain, is very difficult. According to some leading researchers in this field, without the use of invasive diagnostic methods (discography, diagnostic blockades), it is possible in about 40% of patients with acute and sub acute back pain and in no more than 15% of cases of chronic musculoskeletal pain syndromes. On the one hand, this reflects the complexity of the structure of structures of the lumbar spine and associated difficulty of defining unoriginal structure, on the other – the loss of a primary role of peripheral sources of pain when it is chronic. Accordingly, the approach to the treatment of acute and chronic nonspecific back pain differs.

With acute back pain, it is necessary to quickly relieve the patient from excruciating pain in order to avoid chronic disease caused by the sensitization of the peripheral and central nervous systems, "bombarded" with pain impulses from inflamed muscles, ligaments, facet joints and other structures of the spine. This is achieved by using drugs for the symptomatic and pathogenetic treatment of pain (primarily NSAIDs and muscle relaxants), which is simply not available for etiotropic therapy, in which this requires a long period of time. To prevent the chronification of acute musculoskeletal back pain, it is necessary to start analgesic therapy as early as possible and limit the load on the affected spine by fixing it with special orthopedic aids (a corset, a reclinator, a Scants splint – depending on the affected part). Micro traumas in the process of rehabilitation can cause kinesiphobia (fear of movement), as well as accelerate the processes of chronification, disinheriting (sensitizing) the flow of afferent pain information to the corresponding parts of the spinal cord and brain.

With a single application, Movalis has a cumulative effect; the maximum concentration is reached after 3-5 days of administration. That is why for a faster therapeutic effect, it is advisable to carry out the so-called "step" therapy, which consists in intramuscular administration of 15 mg of Movalis in the first 3 days of treatment, and then transfers the patient to a tablet form of meloxicam of 15 mg for 20 days.

Additional feature quick pain relief was the emergence of a new oral form of the drug Movalis – suspension 15 mg (2 scoops), which compared to tablet form has improved pharmacokinetics – rapid absorption (Tmax 3-7 h) providing onset of action of the drug 30 min after administration, with the achievement of Cmax after 2 h, which makes it easier to stop an acute pain syndrome in cases when it is impossible to use injections. Thus, the new form of

meloxicam makes it possible for outpatient practitioners to use the suspension as an alternative to rapid tablet forms of NSAIDs, such as nimesulide, coxibs, etc.

Among the cardiovascular complications in the treatment of NSAIDs and coxibs, the most relevant for elderly patients are an increase in blood pressure, especially in the presence of arterial hypertension, as well as a decrease in the effectiveness of certain antihypertensive drugs (angiotensin converting enzyme inhibitors and beta-blockers). Along with an increase in blood pressure on the background of the use of NSAIDs and coxibs, signs of heart failure may appear or increase due to fluid retention, less pronounced when using selectively selective COX inhibitors-2. When conducting combination therapy, Movalis does not interact with other medications, including antihypertensive drugs, diuretics, cardiac glycosides and beta-blockers, which is important in the treatment of patients with concomitant diseases, but it should be borne in mind that when taking NSAIDs, it is necessary to more carefully monitor blood pressure in elderly patients.

It should be remembered that NSAIDs are especially effective in the early stages of back pain. It is at this early stage – the stage of acute and subacute pain – with the help of traditional NSAIDs, it is possible to influence the production of peripheral inflammatory mediators. In the future, when the central pathophysiological mechanisms of pain are involved, NSAID monotherapy will not be as effective. In Russia, the so-called "slow-acting symptom-modifying drugs" (SYSADOA), in particular, containing glucosamine and chondroitin sulfate, are widely used as the basic therapy for joint pathology (osteoarthritis, spondyloarthritis) in chronic pain. They have a moderate analgesic and anti-inflammatory effect, but do not have the side effects characteristic of NSAIDs. And so on. the mechanism of their anti-inflammatory action is not associated with the suppression of prostaglandin synthesis, but is due to the blocking of the nuclear factor kappa-B (NF-kB), which initiates the breakdown of cartilage tissue, the analgesic effect does not appear immediately, but after 4-6 weeks after the start of regular administration, with a moderate reduction in pain, so when the disease worsens, their combination with NSAIDs is used. The rationale for the use of SYSADOA is both the results of their long-term, safe and successful use in osteoarthritis (evidence level 1A), and the commonality of inflammatory and degenerative processes occurring in the joints of the extremities and intervertebral (facet) joints. SYSADOA therapy can significantly reduce the dosage of NSAIDs used gradually.

In case of muscle-tonic pain syndromes and chronic back pain, NSAIDs become insufficiently effective as monotherapy. They are simply not able to "calm" the disinhibited parts of the nervous system. To influence the pathogenetic mechanisms of chronic back pain (primarily muscle spasm), muscle relaxants (baclofen 10-30 mg/day, tizanidine 6-12 mg/day, tolperizone 150-450 mg/day) are used at the second stage of treatment. The main mechanism of

action of the above drugs is the inhibition of motor neuron excitation in response to pain stimuli and emotional discomfort.

Alpha-2-adrenomimetic tizanidine normalizes increased muscle tone by blocking the release of the excitatory neurotransmitter glutamate in the motor neurons of the anterior horn of the spinal cord, and also activates the descending antinociceptive effects of the blue spot of the brainstem. The sodium channel blocker tolperizone suppresses the reticulospinal disinhibiting effects on the gamma-motor neurons that regulate muscle tone. The activator of the gamma-aminobutyric acid receptors, baclofen, indirectly affects the calcium channels of motor and sensory neurons of the spinal cord, suppressing slow postsynaptic potentials that add up to pain impulses and increase muscle tone, as well as reducing the excitability of the neurons of the limbic system, and, accordingly, the anxiety of patients.

In the chronic course of the pain syndrome, psychotropic drugs from the category of antidepressants are used at the third stage of treatment of back pain. The frequent presence of depression in patients with chronic back pain led to the inclusion of antidepressants in the treatment standards, which were unexpectedly very effective in treating all types of chronic pain, regardless of the presence of comorbid depression. Moreover, it turned out that the analgesic effect of antidepressants develops much earlier than the timoleptic one, which prompted researchers to search for the mechanisms of action of this group of drugs in pain syndromes. It is believed that antidepressants increase the activity of the endogenous pain-suppressing (antinociceptive) system of the brain by increasing the concentration of key neurotransmitters of the antinociceptive system-serotonin and norepinephrine. The limiting factor in the use of tricyclic antidepressants in the treatment of chronic back pain is the presence of pronounced side effects (drowsiness, loss of coordination of movements, increased blood pressure, urinary retention, etc.) and withdrawal syndrome (the resumption of pain, the development of anxiety, psychomotor agitation, and even convulsive seizures when abruptly stopping taking these drugs). In this regard, it is safer to prescribe antidepressants from the group of selective serotonin reuptake inhibitors, such as escitalopram, which do not have the above side effects, with proven effectiveness in the treatment of chronic back pain and neuropathic pain in radiculopathy.

To activate regenerative processes in the peripheral nerves in radiculopathy, neurotropic complexes containing large doses of B vitamins (B1, B6, B12) are used. The use of vitamin B12 contributes not only to remyelination, but also to reducing the intensity of pain. Pyridoxine is involved in the synthesis of sphingosine – a structural element of the nerve fiber membrane and neurotransmitters (serotonin, norepinephrine). Thus, both neurotropic components increase the speed of nerve impulse conduction and improve its reparative properties. The pathogenetic effect of thiamine on the improvement of axoplasmic current and restoration of trophic function of the

neuron has been proven. Data on the effectiveness of antioxidants (thioctic acid preparations) in the pathogenetic treatment of sensitive and motor disorders in patients with radiculopathy were obtained.

Non-selective NSAIDs block the activity of both COX isoforms, which leads to a number of side effects that are associated with the inhibition of COX-1, primarily to damage to the gastrointestinal tract (gastrointestinal tract), and throughout it (stomatitis, esophagitis, gastritis, gastric and duodenal ulcers, enteritis, ulcerative colitis, proctitis). It should be noted that, being good analgesics, non-selective NSAIDs block visceral pain, and ulcerative lesions of the gastrointestinal tract in such patients are often asymptomatic, resulting in either bleeding or perforation of the ulcer with the subsequent development of peritonitis. The use of parenteral forms of non-selective NSAIDs (injections and suppositories) does not allow avoiding the above side effects, since this creates a high concentration of the drug in the blood serum, which is accompanied by a systemic effect on the body.

According to their purpose, blockades are divided into diagnostic, prognostic and therapeutic. With the help of diagnostic blockages, the diagnosis is clarified *ex juvantibus*. The purpose of prognostic blockade is to determine the effectiveness of treatment and to give the patient a temporary sense of what he will experience after high-frequency joint denervation or nerve destruction, and whether he will be able to tolerate sensitive and vegetative disorders that have arisen as a result of this exposure.

When conducting therapeutic blockades, a large arsenal of medications is used, which, on the one hand, is determined by the pharmacodynamics and mechanism of their action, on the other – by the etiopathogenetic features of the development of back pain (will be described in detail below). The drugs used are divided into 2 groups: basic (basic) and additional. Due to the wide spectrum of action, local anesthetics have found the greatest use as a base agent for these types of blockades. Recently, the most effective is ropivacaine, the advantages of which are low toxicity and a more pronounced analgesic effect. As the basic means for the treatment of joint syndrome, hyaluronic acid preparations are used.

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