

Actual Aspects of Treatment and Rehabilitation of Athletes with Back Pain

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Abstract

Dorsopathy is a group of diseases of the musculoskeletal system and connective tissue, the major symptom-complex of which is pain and functional syndrome in the trunk and limbs of non-visceral etiology.

Treatment and prophylaxis of spine degenerative-dystrophic changes leading to the development of dorsalgias is an important and complicated problem which should be investigated and solved by complex and targeted prophylactic measures that allow prevention of acute clinical conditions development and give the possibility for athletes to participate in training and competition activities.

On the basis of long-standing experimental and clinical investigations we have introduced the theory of degenerative-dystrophic spine changes and dorsalgias development. The theory is based on the conception that both hypokinesia and very intense prolonged muscle exertion can lead to changes in the metabolism of aminoacids and thiamin-dependent reactions of decarboxylation of alpha-acids (their predecessors), which can result in their configuration in musculoskeletal system tissues. Long-term increased stress on the intervertebral disc which has insufficient biochemical supply can cause microtraumas, autoimmune processes, and lead to degenerative-dystrophic processes and the development of pain syndrome (dorsalgias), the latter in its turn causes changes in metabolism and bioelectric activity of skeletal muscles. Our clinical observations have showed that the best treatment outcomes in such patients are registered when both a physician and a coach participate in organizing prophylaxis and rehabilitation considering physical and psychological state of a athletes.

In conclusion, it should be noted that prolonged intense exertion in sport can lead to changes in structure and functions of the musculoskeletal system which requires timely rehabilitation to achieve better outcomes.

Keywords: Back pain; Dorsopathy; Athletes; Treatment and rehabilitation

Nowadays back pain is one of the most common human sufferings which dominate among the reasons to see various medical professionals. Lumbosacral osteochondrosis in athletes is the most common degenerative spine disease registered mainly in athletes, gymnasts, acrobats, rowers and weightlifters.

Dorsopathy is a group of diseases of the musculoskeletal system and connective tissue, the major symptom-complex of which is pain and functional syndrome in the trunk and limbs of non-visceral etiology.

Dorsopathies include dorsalgias – a painful syndrome in various parts of the back and limbs of non-visceral etiology due to reflex, dystrophic and functional changes in the spine. There are primary and secondary dorsalgias. Primary dorsalgias occur due to dystrophic and functional changes in spine tissues with possible adjacent structures involvement [1].

The most common causes of primary dorsalgias are degenerative-dystrophic spine changes with the initial intervertebral disc involvement and subsequent development of deforming spondilosis. In the long run developing osteochondrosis can result in pulpal nucleus prolapse and the development of associated clinical symptoms. In practicing sport, due to discrepancy between physical exertion and capability of muscles and spine structures, prolapse can occur immediately together with the development of so-called lumbago which can result in training cessation for a long period of time [2,3].

Numerous studies show that specific factors of spondilogenic diseases are functional restrictions of passive mobility in the spine and so-called functional blockades. According to the neonatology data 80-90% of neonates undergo traumatic impact on their spine. Up to 90% of newborns have various leg length which results in 40-50% of twisted pelvis and finally in scoliosis.

Blockade of motion segments causes tonic tension of spine muscles surrounding facet joints and the formation of pathological functional

chains which support each other. Due to this fact the pulpal nucleus of intervertebral disc shifts to the posterior, anterior or lateral disc portion which can result in the impairment of trophism and metabolic processes, fibroblasts death and local aseptic inflammation with the release of serotonin, prostaglandins and other inflammation mediators leading to the reflex irritation of the muscle-ligament apparatus and the development of local fibrosis and dorsalgias.

However, despite the great number of investigations devoted to the problem under discussion, all causes and mechanisms of degenerative changes in the musculoskeletal system have not been identified yet [4].

The determination of key factors in these changes development at the molecular level seems the most effective approach to diagnostics, clinical manifestations and treatment of syndromes of peripheral nervous system impairment. Recently the impact of low-molecular bio-regulators of metabolism on the activity and functions of peripheral nervous system has been investigated. These are peptic substances which can affect various elements of metabolism and physiological processes in the body, particularly microcirculation both in the nerve trunk itself and in innervating tissues as well. It has been recently determined that degenerative-dystrophic processes in the connective tissues are systemic and develop as a result of misbalance between the processes of synthesis and catabolism of the main chondral tissue

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components. However, all factors which result in disc degeneration have not been identified yet. It is worth mentioning that pathogenesis of various parts of peripheral nervous system impairment should be addressed considering all unfavourable factors associated with the destructive processes in the intervertebral cartilage and pain syndrome causing changes in various system functions of the entire body.

Current theoretical, experimental and clinical data on the origin, course and consequences of pain syndrome have great importance for the syndrome effective eradication.

On the basis of long-standing experimental and clinical investigations we have introduced the theory of degenerative-dystrophic spine changes and dorsalgias development. The theory is based on the conception that both hypokinesia and very intense prolonged muscle exertion can lead to changes in the metabolism of aminoacids and thiamin-dependent reactions of decarboxylation of alpha-acids (their predecessors), which can result in their configuration in musculoskeletal system tissues [5]. Long-term increased stress on the intervertebral disc which has insufficient biochemical supply can cause microtraumas, autoimmune processes, and lead to degenerative-dystrophic processes and the development of pain syndrome (dorsalgias), the latter in its turn causes changes in metabolism and bioelectric activity of skeletal muscles.

All these conditions create difficulties in treatment and particularly in prophylaxis of these changes and medical conditions, since roentgenological and clinical changes are often undiagnosed or misinterpreted.

Our clinical observations have showed that the best treatment outcomes in such patients are registered when both a physician and a coach participate in organizing prophylaxis and rehabilitation considering physical and psychological state of a sportsman.

Without detailed description of pain syndrome medications it should be noted that the most perspective approach to the prevention of degenerative-dystrophic processes development in athletes is complex targeted metabolic (aminoacids) supply to the musculoskeletal system structures together with proper medical supervision and correct training process.

Thus, treatment and prophylaxis of spine degenerative-dystrophic changes leading to the development of dorsalgias is an important and complicated problem which should be investigated and solved by complex and targeted prophylactic measures that allow prevention of acute clinical conditions development and give the possibility for athletes to participate in training and competition activities.

An important feature of sport-related traumatism is the existence of vulnerable parts in the musculoskeletal system, the incidence of these traumas makes absolute majority in certain sports resulting in so-called "weak element" phenomenon in a particular sport activity.

Athletes of some specializations develop adaptive changes in the musculoskeletal system which is diagnosed by means of both visual and roentgenological investigations, as well as by magnetic resonance imaging (MRI) and nuclear magnetic resonance (NMR) and by other modern diagnostic means [6].

Spine state is of great importance for athletes because its structural changes in long-term and intense exertion can fall outside adaptive mechanisms and become pre-pathological or pathological conditions. Long-term intense specific physical activity can lead to both visual body posture impairment and to some structural changes diagnosed by roentgenological means. Thus, weightlifters most frequently

show marked lumbar lordosis. This creates favorable biomechanical conditions in power clean performance, increases spring function of the spine in sudden axial load in position with weight over the head. However, the development of excessive lordosis in the lumbar area leads to the impairment of natural distribution of static and dynamic load on the spine structures. This can be the cause of blockade of motion segments, pains and pathological changes diagnosed on the roentgenogram.

Correct diagnosis in this case is important not only for the election of adequate management but for the planning of further sport activity [7,8].

Below is described the case of patient management who was admitted to our hospital with severe spine trauma.

While playing football the sportsman experienced severe pain in the thoracic area of the spine which developed following unfortunate fall on his back pushed by the player.

The patient was transported to the Grodno Trauma Centre where he was performed lateral roentgenogram of the thoracic area of the spine which revealed wedge-shaped deformation of thoracic vertebral bodies Th₇, Th₈, Th₉ and the lowering of their height in the frontal part. Based on these findings compression fracture of these vertebral bodies was diagnosed.

The patient was admitted to hospital for consultation and determination of further treatment. Thoracic roentgenogram of the spine in two standard views was performed. It revealed:

- Increased thoracic kyphosis, mostly in the lower thoracic area;
- Slight wedge-shape of the vertebral bodies Th₇, Th₈, Th₉ with the decrease in their height in the frontal portion by less than $\frac{1}{4}$;
- Preservation of even trabecularity of the bone structure in these vertebral bodies;
- Moderate marked waviness and "porosity" of intervertebral disc endplates Th₆-Th₇, Th₇-Th₈; Th₈-Th₉;
- Incomplete consolidated upper-anterior apophysis of Th₈ vertebral body in the form of isolated triangular bone fragment without dislocation with well-defined regular dense external contour.

Considering the primary diagnosis the patient was hospitalized for further treatment by the functional therapeutic method. He was administered strict bed regimen with reclination of the affected vertebral bodies. MRI was performed to confirm the diagnosis of changes in the vertebrae. The MRI findings showed:

- Wedge-shaped Th₇, Th₈, Th₉ vertebral bodies;
- The heights of Th₇, Th₈, Th₉ vertebral bodies were 20-21-21 mm in the anterior areas and 24-25-25 mm in the posterior areas respectively;
- Bone marrow of the Th₇, Th₈, Th₉ vertebral bodies gave homogeneous isointense signal in T₁- and T₂-regimes.

Diagnosis

MRI findings proving any traumatic impairment (hematoma of vertebral bodies) were not found.

The comparison of roentgenological and MRI findings considering

clinical observations suggested the diagnosis of Sherman-Mau disease and severe contusion of the thoracic spine.

The obtained data gave the possibility to clarify the diagnosis and change the treatment plan radically. Bed regimen was discontinued and rehabilitation measures including wide spectrum drug-free methods (physiotherapy, massage, etc.) were started. A week later the patient was discharged and resumed his training activities. He was given proper recommendations for the prophylaxis of back pains.

Thus, correct diagnosis is of great importance for adequate treatment and favourable prognosis for further sport activities.

The improvement of the effectiveness of sport-related traumas treatment in sports activities is an important problem of sports medicine [1]. Prophylaxis of sport-related traumas and restoring treatment is based on close collaboration of a coach, sportsman and physician which is, unfortunately, neglected by some professionals. As a result, the effectiveness of treatment is diminished.

Finally, it should be mentioned that modern physiotherapy employs a wide range of devices and methods which can be used effectively for the treatment and prophylaxis of traumas in sports medicine.

The fact that early sport specialization can lead to degenerative-dystrophic changes in the spine is the subject of further investigations because in the number of cases we register roentgenological signs of spine osteochondrosis in juveniles who were not and are not engaged in any sport activities.

Below is an example of our case management, a sportsman K., Master of Sport in rowing. The patient's parents applied for medical assistance because their son had thoracic spine pains which did not respond to any conservative physiotherapeutic treatment. The child had been practicing rowing for about 6 years till then, for the previous two years the patient had trained twice a day. Before some important competitions during the elective trials he experienced pain in the thoracic spine which was increasing gradually. On examination there was marked hypertonus of the extensors in the thoracic spine and hyperkyphosis as well. The scope of movements in the cervical and lumbar areas of the spine was satisfactory. On palpation there was moderate pain syndrome at the level of Th₃-Th₇. Thoracic spine rountgenogram did not show any pathological changes. The diagnosis

was: vertebral thoracalgia, marked muscle-tonic syndrome, disturbance of VMS motor function in the thoracic spine.

Since the decision had been made on the patient's taking part in national championships and European championship, after complex conservative treatment manual therapy was performed considering clinical characteristics of the patient.

After the course of mobilization, postisometric relaxation and manipulations on the thoracic spine clinical manifestations decreased, paravertebral muscle tone and body posture returned to normal limits. The patient was given proper recommendations on exercising, motion regime and rehabilitation. Later the patient performed successfully at the competitions and won a prize at the European championship.

Our observations showed that manual therapy application is a pathogenetically warranted method of VMS blockade eradication, as well an effective means to relieve pain syndrome, muscle tension and restoration of motor function.

In conclusion, it should be noted that prolonged intense exertion in sport can lead to changes in structure and functions of the musculoskeletal system which requires timely rehabilitation to achieve better outcomes.

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