

## SCIENTIFIC WORK REVIEW

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### INJURIES OF LOINS PART OF SPINAL CORD IN SPORTS

#### Summary

*This work presents injuries of loins part of spinal cord in sports activities. In other words, it etiologically presents possibilities which induce damages, with special focus on sports which more than others bring to injury of loins part of spinal cord. Symptoms, diagnostics and therapy are also pointed out, noting that these injuries may become even more serious and stop athletes from practising sports, or even cause serious invalidity.*

**Key words:** *sports injuries, spinal cord, pain, lumbago, discopathy, discus hernia, kyphosis, spondylolisthesis, prevention, diagnostics, therapy.*

#### 1. INTRODUCTION

All sport activities burden the spinal cord, especially loins part. This burden causes microtraumas of all structures which are the most frequently shown in soft parts, especially discuses. These microtraumas usually add more traumas when the previous one is not treated. Cumulative damage causes the changes we call discopathy, spondylosis, spondylarthrosis or spondylolysis. The final part of discopathy is discus hernia.

In this segment of spine there are many more congenital defects such as spina bifida, sacralisation, lumbarisation and hemivertebrae, which are less resilient to outer injuries.

#### 2. THEME ANALYSIS

The main subjective sign of all these changes is pain of the small of the back known as lumbago and lumbalgia. The objective sign is emphasized by muscle spasm, lowered lordosis, pain and pressure when stretching. It hurts less if one lay down, and hurts more with every physical activity. Sometimes in subcutaneous tissue one can feel small knots size of a pea or a bean (Virchow's node). That is prominence or Nucleus pulposus Prolaps into spinal canal. Nucleus pulposus as a part of discus articularis is in the center of everything. It lays in a closed space between cover plates of adjacent vertebrae and fibrous ring which surrounds it. It is a kind of a buffer for adjacent vertebrae bodies. In time, burdened by body weight, it loses water and becomes lower.

That is why elder people are not as high as they used to be when they were young. There is no sport which will not cause discus damages. However, it mostly happens in sports such as twrowing (discus, javelin, shot-putting, hammer), tennis, golf, American football, baseball. Especially risky sports are: yoga, wrestling, gymnastics, kick-boxing, in other words, sports which include sudden rotative move of the spinal cord. The discus absorbs all burden when one moves. Fibrous fibers deform and become partly destroyed, so the fibrous discus becomes thinner, vertebrae come closer to each other or lay directly one on another, and related segment of long ligaments becomes relatively longer. Rotation or leaning of the vertebrae edges causes its friction. That is when reactive processes accelerate, the edges of growths called osteophytes in the beginning are horizontal, and later they grow along ligaments and may bridge the intervertebral spaces. This process is called spondylosis. Lowering inter-corporal space causes disorder of relative relations in small joints. Their processes become relatively longer, the capsule more loose, and their sliding when one moves becomes stronger. That causes the damage of cartilage and later vertebral artrosis. All that is now called spondyloartrosis. Most of these processes do not have clinical signs or are disproportional to the loss of discus height and most of osteophytes. Usual signs are pain, limited movements and muscle spasms. Since lumbosacral joint (joint L5-S1) is the most burdened, its changes are the most visible ones.

## **2.1. DISCUS HERNIA**

Discus hernia is a pathological process which happens when nucleus pulposus is pressed from all sides penetrates into partly or totally ruptured anulus fibrosus. When anulus fibrosus is not totally broken then nucleus pulposus throws out its thinned parts into spinal canal thus creating protrusion, and in case if anulus fibrosus totally breaks, nucleus pulposus enters the spinal canal. Total prolapse or prominence of discus happens in lateral-dorsal direction where nerve roots are coming out; then they contact, press and squeeze the discus. That is how radioculopathy, well-known sign of discus hernia, is being created. If it protrudes backwards centrally, then it may press both roots of that segment, even the medulla itself, depending on the size. It should be emphasized that two hernias may exist, at two levels, mostly on L5-S1 joint, then L4-S1 and L4-L5 joints, but also in other loins and frequently the neck segments. The process takes a long time, it is rarely fast, and it creates of the root paralysis. Discomforts include lumbalgia, lumboschialgia and paresis of the root, mostly peroneus nerve. Diagnosis is made after neurologic examination, myelography, CT and MR.

In case of falling out (usually of the peroneus), surgical therapy is needed. However, starting practising sports after neurological fall out is treated and the pain starts, should be gradual. If pain comes back, one should consult neurologist or repeat diagnostics. First aid is practically not needed. When an athlete has an acute pain, he should stop playing, and he should lay down on a firm surface and be given a NSAID. If discomforts disappear in a week, the athlete should slowly continue the activities after a week without any pains.

## **2.2. SPONDYLOLISIS**

Spondylolysis is a pathological process which happens on the curve of vertebra, congenital defect or osteolysis, caused by different reasons during a lifetime. It is mostly osteodystrophy process. Sliding of upper vertebra (spondylolisthesis) happens later on in case of burden. It may happen in every segment of the spine, but it is most often in lumbar vertebra L5 towards

S1 or L4 towards L5 vertebra. Around 5-8 % of population suffer from this disease. It happens more often in those who physically work hard, spondylolysis is as equally often but spondylolisthesis is more often in these professions. In women athletes, Wise discovered around 11% of spondylolisthesis, while in women at the same age who do not practise sports, he did not find any. Half of spondylolisthesis did not have any symptoms. When found hyperlordosis „shortened loins spine“, sliding will be clinically suspected and in case of antelexion, one will feel stairs in disease location. Profile radiography determines diagnosis. The sliding level is determined according to relation of adjacent vertebrae, in other words, from sliding towards lower vertebra. If sliding is less than  $\frac{1}{4}$  diameter, then it is the first degree, up to half is the second degree, more than half up to  $\frac{3}{4}$  is the third, and if sliding is complete, in other words, until the end of lower ring's than it is the fourth degree. These athletes should stop practising sports which heavily burden the spinal cord so as sports which include jumping. The decision about the treatment and practising sports again should definitely be made by orthopedist. In any case without surgical therapy or after, it would be good to do some stretching exercises, muscle strengthening and NSAID.

### 2.3. KYPHOSIS

Kyphosis are different kinds of distortion of the spine profile. Due to biomechanical reasons tall people so as very skinny have bigger back curve. When old, especially women and skinny men develop kyphosis. Sometimes there are congenital causes of kyphosis (hemivertebra). Kyphosis also happens in systematic diseases such as Bechterev disease, Parkinson's disease, multiple sclerosis, spine infection, chondrodystrophia, rheumatism, metabolic disorder, osteoporosis and osteomalacia. Kyphosis is sometime caused by osteolytic traumatic changes in the spinal cord (morbus Calve, Shoermann).

Juvenile kyphosis is of special significance from sports aspect. It happens during the period of rapid growth, when most of young people start to practice sports. Diagnosis is being determined when total distortion overcomes 50 degrees, and at least three vertebrae are infected when the height lowers more than 5 degrees. Clinically it is shown as big hump, always fixed and round, unlike infective or traumatic humps which are sharp.

It is classified as growth disorder, in other words it is apophysis of vertebra bodies. These conditions are rare. Treatments are complicated, and mostly unsuccessful and it is orthopedic, with different orthosis. Speaking of sports activity, sports which burden the spinal cord should be banned: cycling, certain kinds of gymnastic exercises, weight lifting, athletic throwing disciplines etc. Kyphosis happens in cyclists due to their spine position, thus happens neck lordosis and pectoral kyphosis. It is called the cyclist's hump. It also happens in basketball players due to spine position when playing. When the growth stops, juvenile spine becomes stable but the cyclists' spine may become worse and in time may cause heavy spondylolysis. Physical therapy which corrects bad postural habits is important in this process but it takes a long time. There is no difference between physical therapy and corrective gymnastics in this area.

### 2.4. LUMBAGO

Lumbago or lumbalgia is a symbol of pain in loins part of the spine; 80-90% of people during their life have this pain. After headache, it is the most often location of the pain. It can be caused by many conditions and diseases. Erected position of a man made this region which carries the whole body vulnerable. If pain exists only in muscles, their grapple or nerves in

lumbal region, then it is a case of primal lumbago. This also includes often muscle stretching in this region, but symptomatic lumbalgia happens most often. It is probably caused by irradiation of the pain along the nerve, biochemical changes of muscles, static deformations and overburdening. Overburdening is probably more often cause than someone would think. It is not only the case of excessive work load and sports activities but in most of the cases overburdening caused by excessive body weight. Also, there are distant causes of lumbalgia such as urogenital and digestive tract diseases, changes in spinal chord and system diseases. If lumbalgia discomforts are related to changes in bone system of the spine, then we call them vertebrogenic. They are the most often lumbalgias, about 90%. Out of them 4/5 are discopathic discomforts and sacralization. Rheumatic diseases are followed by lumbalgia due to myopathy. Infective diseases cause temporary lumbalgias. Irregular sexual activities could relate to lumbalgia. Sudden activities of people who are not prepared often cause lumbalgia. This includes wrestling, gymnastics, tennis, cycling activities and cycling itself. Sudden movements, especially rotating ones, cause sudden hyperflexion of axial burdening, as well as rotations which heavily burden the discs, especially small joints. That is how small distortions are created and they occasionally cause arthrosis. Local diagnosis shows muscle spasms, straightened lordosis, pain when pressured, and pain when making a movement. Diagnosis is set by excluding serious diseases which in their composition have these kinds of discomforts. Then, RTG, CT, MRI, myelography and electromyography are being done. The treatment which is already described is mostly symptomatic.

Practising sports should start a week after painless period. If discomforts appear again, then more intensive therapy should be done, and also orthopedist, physical therapist and neurologist should be consulted.

### **3. PREVENTIVE MEASURES**

Elasticity and back strengthening exercises is imperative in order to stabilize the spine and prevent injuries and damages.

Stretching exercises and muscle strengthening stabilize and increase movements scope in cervical thoracic and lumbar regions.

In order to stabilize and strengthen thoracic and lumbar spine, it is necessary to strengthen back and abdominal muscles.

Besides strengthening back and abdominal muscles which is one of the main elements in prevention of lower back pain, it is necessary to take care of the pelvis position and upper leg with recommendation to bring the pelvis in neutral position. In weight lifters, the pressure on the spine dramatically increases and paravertebral muscles are burdened. That is why the weight lifters during the initial phase of lifting the weight should take a deep breath, and strongly breathe out in the end of lifting process. Beside suggested measures in order to prevent the pain and damages in loins part of the spinal cord, there are numerous procedures which may be used as a prevention and are part of every day life.

### **4. CONCLUSION**

Almost all sports activities burden the spinal cord, especially the loins part.

These burdens cause microtraumas in the structures of the region and they accumulate. What is characteristic is that the most of them are not healing, but accumulate. This creates

changes we call discopathy, spondylosis, spondylarthrosis or spondylolysis. The final outcome is discus hernia. Thus it is necessary to know the symptoms of damages. The first sign is pain in lower back. Based on that, the simplest to the most complicated diagnosis procedures is being done. Diagnostic and therapeutic procedures include neurologist, orthopedist and physical therapist, and if needed some other experts. The rehabilitation treatment must be complete. Any disregard of certain treatment will discredit the healing process. The scope of healing is extremely wide, from some conservative ways to operations. Thus, aforementioned preventive measures are one of the main procedure in order to decrease the damage of the loins part of the spine in sports activities. The treatment must be completely done in accordance with its diagnostic and therapeutic demands.

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