

**RESULTS AND DISCUSSION.** Full management of vertebrogenic pain syndrome in is achieved in 85–90% of hospitalized patients and 92–95 % in ambulatory patients. Traditional methods of pain relief helped to manage pain syndrome in 36% and 39%. Remote results of treatment were studied. It is determined that the duration of remission for more than 3 times exceed the period of traditional complex treatment. Timing of treatment using interstitial electrostimulation are reduced by 2.5 times.

The application of intratissual electric stimulation helped to reduce the period of temporary incapacity up to  $11,2 \pm 2,4$  days, for the control group with traditional treatment –  $25,3 \pm 3,2$  days ( $p < 0,01$ ).

Relapses within 2 years after intratissual electric stimulation were observed in 5% of cases in the control group in 16–19% of patients. Complications of treatment were not observed. The method proved to be effective not only for elimination of referred pain, but also for the recovery of peripheral nerves.

The underlying mechanisms of therapeutic action are explored. 1. Overall reflex mechanism is implemented through the central nervous system and

promotes the development of opiatelike analogize substances. 2. Local action is to improve the blood circulation in bone tissue. Method of interstitial reography and polarography of bone tissue has proved that this effect leads to a local restoration of blood circulation and microcirculation in the affected vertebra and periosteum. 3. In this method, a new mechanism of action via peripheral nerves to the patient limb arises. We have proved that under physiological intratissual electric stimulation the current excites the nerve cell structures and restores impaired function as in nerve trunks so in synaptic connections.

**CONCLUSION.** Thus, an important basis of pain syndrome in the spine is the primary interruption of blood circulatory in bone tissue. Specially developed method of interstitial electric stimulation effectively improves blood circulation and microcirculation of the spine bones being a pathogenetic effect.

Elimination of pain syndrome at interstitial electric stimulation occurs over 90% of the cases, the term of remission increases by 3 times or more during the reduction of treatment period by 2,5 times. Complications were not observed.

## CIRCULATORY DISTURBANCES IN THE SPINAL CORD OF ADULTS (INNOVATIONS IN SPINAL ANGIONEUROLOGY)

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**OBJECTIVE.** To analyse features of anatomy and hemodynamics of spinal circulation (arterial and venous systems), pathogenesis of its disturbances and clinical picture. Develop classification principles and diagnostic algorithm for radiculomyeloischemia of cervical, thoracic and lumbosacral spinal cord segments, differential diagnosis criteria of vascular and demyelinating diseases of the spinal cord. Develop therapeutic strategy and tactics in the treatment of acute and chronic radiculomyeloischemia. Determine therapeutic effectiveness of some vasoactive and neurocytoprotective drugs (mostly arterial or venous spinal cord blood flow). To clarify the role and possibilities of biomarkers evaluation in terms of spinal cord ischemia.

**MATERIAL AND METHODS.** A large series of architectonics studies on arterial and venous systems of the

spinal cord was conducted. They were conducted at all levels using a latex mixture injected into the blood vessels and subsequent photographing. An experimental model of arterial and venous ischemia of thoracolumbosacral spinal segments was created. Ischemia was caused by ligation or compression of abdominal aorta and its branches (simulation of aorta and paraaortic area surgery) as well as compression of dural sac at the lower lumbar segments caused by balloon catheter during the experiment with cats (herniated disc simulation). Simultaneous blood filling at different levels of the spinal cord (cervical, lumbar enlargement and thoracic segments) in the presence of administration of vasoactive drugs (aminophylline, dibazol, nicotinic acid, etc.) was investigated using the original method of myelography.

A detailed study of the neurological status of patients with circulatory disturbances in the spinal cord was conducted. More than 1,000 patients participated in this study. Clinical picture features related to myeloischemia of various segments of the spinal cord were assessed. Natural model for clinical

research of myeloischemia of the bottom half of the spinal cord was identified. This model also referred to myeloischemia course in response to neurosurgical removal of low lumbar discal herniation and use of some vasoactive drugs increasing arterial blood flow or improving venous outflow from the thoracolumbosacral spinal segments. Role and possibilities of contrast myelography (mayodil and pneumomyelography), spinal selective arteriography and MRI of spine and spinal cord in radiculomyeloischemia diagnostics were assessed.

**RESULTS.** Study of anatomy and physiology of spinal cord vascular system allowed to review "classic" idea that the spinal cord was supplied by "anterior spinal artery" with a direct rostral-caudal bloodstream originating from intracranial vertebral artery branches (its anterior spinal branches) and moving in caudal direction along the spinal cord. Our experimental and clinical pathomorphological studies show that the anterior spinal artery is not a separate vessel. It is an anastomotic tract like cerebral arterial circle of the brain, exerted along the spinal cord. Blood pumps through several major radiculomedullary arteries (the most important are the artery of Adamkiewicz for lumbar enlargement and the artery of the cervical enlargement) which form the anterior spinal anastomotic tract. Directions of arterial blood flow at different segments of the spinal cord are contralateral. Magistral and loose types of blood flow to the spinal cord were shown for the first time (similar to the structure of the arterial, venous and nervous systems in the human limbs according to the definition of anatomist V.N. Shevkunenko). Pathogenic blood flow compensation syndrome in the cerebrospinal hemodynamic was identified for the first time (analogue of "steal" syndrome in the brain). Biphasic effect of vasoactive drug aminophylline on the spinal hemodynamics was demonstrated for the first time. Variants of myeloischemia clinical picture were studied for the first time. Their classification, based on ischemia territory in the context of spinal cord breadth and length, was proposed (transversal myeloischemia of the ventral half of the breadth (Preobrazhenskiy syndrome), transversal myeloischemia of the dorsal third of the breadth (Williamson syndrome), transversal myeloischemia of one-half of the spinal cord breadth (ischemic Brown–Sequard's syndrome), centromedullar ischemia (syringomyeloischemia), antero-cornual poliomyeloishemiya (ALS syndrome) Stanilovskiy–Tanon syndrome etc.). The classification also based on angio topical principle (anterior spinal artery and sulcal-commissural artery district, posterior spinal artery district and vasocorona district). Congestive radicular veins of cauda equina in case of diskal hernia were examined using MRI of

the spine for the first time. This allowed to monitor the effectiveness of venotonic drugs such as L-lysine aescinat. Chronization of spondylogenic back pain as a result of reduced endorphin levels in spinal fluid was explained for the first time. Also therapeutic efficacy of Cortexin polypeptide improving the production of endorphins in the brain stem was shown.

**CONCLUSION.** A new chapter in neuropathology, referred to peripheral vascular diseases of the spinal cord and its roots, was created.