

traumatism. Mortality even in mild traumatic brain injury reaches 5–10%, while in severe injuries it ranges from 41 up to 85%. After performing comparative analysis, we can say that mortality has not decreased in last years despite of many researches in pathogenesis of primary and secondary injuries of the brain, development of modern diagnostic methods, treatment and rehabilitation of patients with STBI. The importance of the problem does not raise doubts as more than one third of injures people die on accident place before the arrival of emergency aid or during transportation to the hospital.

OBJECTIVE: reveal dominant causes of prehospital and hospital mortality in patients with severe traumatic brain injury.

MATERIALS AND METHODS. We have analyzed 362 medical cases of the patients with STBI admitted to Republic Center of Emergency Medicine in last 2 years. 80% was men and 20% was women. Glasgow coma score was 8 ± 3 . Among these patients 55 died in different periods after admission. Mortality was 15.2% and 73% of them were men.

In prehospital and hospital periods after getting trauma during the first day 12 patients died (21.8%), during the first week 25 patients died (45.4%) and in

later periods 18 patients died (32.7%).

RESULTS AND DISCUSSION. The cause of death in the first group patients (mean hospital stay duration was 18.7 ± 5.5 hours; GCS in admittance 5 ± 2) was cerebral edema because of brain contusion ($n=6$) with brain dislocation ($n=4$). In some cases edema was of destructive character and when brainstem was involved, the trauma was incompatible with life ($n=2$).

Mean hospital stay duration of patients of the second group was 45.6 ± 15.9 hours and GCS was 7 ± 3 . The morphology manifested with the initial stages of necrotized brain tissue resorption, occurrence of active vascular-mesenchymal and glial reaction to the injury and hemorrhage resorption.

In later posttraumatic periods of STBI (mean hospital stay duration – 249.6 ± 34.7 hours; SCG – 8 ± 3) morphological picture was diverse. It was progressive development of secondary infection resulted in cardiac-pulmonary failure (81%), rarely multiple organ failure (13%) and endotoxiosis (6%).

CONCLUSIONS. The outcome of treatment of patients with STBI substantially depends on degree and quality of medical aid in prehospital and hospital periods.

THE MECHANISMS OF BACK PAIN FORMATION AND PATHOGENETIC TREATMENT

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ABSTRACT. The author describes a new version of the pathogenesis of pain in the spine where the pain occurs during stimulation of bone receptors in conditions of circulatory disorders of bone tissue. The method for the recovery of the microcirculation is developed by interstitial electrostimulation. The complete elimination of back pain was proved in 90% of patients.

KEYWORDS: interstitial electrostimulation, back pain, pain pathogenesis, spinal osteochondrosis.

INTRODUCTION. Back pain is the most common complaint among adults. Thus, the duration of incapacity for work increases each year. This indicates

that the quality of treatment does not become better. The new methods of treatment are created, but they are based on the old approaches and are the analogues of existing ones. These methods do not create a significant improvement of quality care.

Modern radiation diagnosis often does not correspond to the clinical picture. However, pathophysiological and functional changes can be detected long before the appearance of pain. Reasons of pain appearance do not often associated with hernial protrusion.

Recent decades physiologists explored new important players in the pathogenesis of the disease. Previously it was believed that the source of pain was the compression of the nerves exiting the spine bone, then the tension of the muscles. Many believe that periosteum is the reason of the formation of reflexory pain syndrome. In recent years, a lot of data have been accumulated to argue that the source of pain is the bone itself with its osteoreceptors that belong to the sympathetic nervous system.

Pathogenesis of the nidus formation, both in spinal bone and trigger zones, can be represented by follows. The initial changes in degenerative diseases of the spine firstly happen in the bony tissue as a local osteoporosis with destruction of trabecula of bone, the stagnation of blood in the venous system and intraosseous pressure and increase. Bone tissue contains a lot of osteoreceptors and irritation of them occurs with poor blood circulation. They react to the decrease of the partial pressure of oxygen in the bone vessels. It is proved that the worse blood circulation in bones, the more pain intensity. Later, the changes cover the periosteum and the swelling occurs. Pathology in vertebral bone progresses slowly, often it takes over the years. Pain manifestations are localized in bones, causing pain on palpation. An important clinical feature of process progression is the involvement of muscles. The secondary reflex tension arises and muscular-tonic syndrome develops. The irritation of osteoreceptors increases progressively, and then through a sinuvertebral nerve it affect the spinal nerves. The process of pain spread on periphery is performed by sclerotomic part of the nerve, to vertebrae symptomatic nerves. As a result, it breaks the trophism of bones in the limbs in the affected area of the sclerotome, which causes structural changes and additional pain.

Poor blood circulation in the bones is the initial link both for dystrophic phenomena in the intervertebral discs and for all the joints. As it is known, the nutrition of hyaline cartilage takes place by diffusion from the bone tissue of the vertebral bodies. Even small disturbances of direct arterial blood supply of bone leads to a drastic reduction of diffusion process of nutrients in the cartilage matrix. Interruption of this nutrition is the basis for the emergence of biochemical abnormalities, and degenerative phenomena in the intervertebral discs.

We have revealed with the help of a needle-radiography and polarography that metabolic processes in the limb bones depend on the intensity of pain syndrome in spinal bone. Severe pain weakens blood circulation and microcirculation in the bones in the area of innervation of the vertebral nerve of the. Poor circulation is an important factor in the occurrence of bone pain.

According to the described pathogenesis, treatment should be aimed at improving the circulation in bone tissue. Attempts to apply the known medicines for cardiovascular therapy did not give a significant effect. This happened due to the slow perfusion of drugs into the bone, which lead to greater concentration of them in the soft tissues than in bone. The second reason for the insufficient effect was a weak response of the vascular wall of bone blood vessels on antispasmodic drugs.

Physiotherapy treatment according to the known data is also ineffective. The skin is a barrier to the pas-

sage of the different types of energy within the body. Thus, the electric current is attenuated by skin cover in 200–500 times. The weakened current does not reach the bone. The bone is covered with endplates with a high resistance. Therefore, the current bypasses the bone through the conductive paths.

Thus, the interruption of circulatory in bone tissue is an important pathogenetic link. Therefore, the aim of our work was to develop an effective method of treatment based on this pathogenesis.

METHODS OF TREATMENT. We have found experimentally that the electric current improves blood circulation in bone and is a good stimulus for bone receptors. In order to the electric current can reach the bone, a metallic conductor in the form of needle was used. Sterile needle is applied to the acantha of the affected spine bone and make a special electrical current. Current characteristics were developed taking into account the parameters of natural bioelectric current flowing through the nerves. Therefore, the developed electric current is close to the physiological characteristics. This is a low frequency and complex modulated pulse current. The new method of treatment is called as interstitial electrostimulation. The equipment provides interstitial electrical procedures. The procedure is painless and comfortable, and is used for adults and children. The absence of complications allows to use the method in outpatient practice.

Special needle (disposable) is introduced to the depth of the skin prior to contact with the acantha of affected spinal bone, the passive electrode is placed on the affected limb. To current is transferred through the needle for 15–20 minutes. The sequential treatment of two spine bones is possible. Course of treatment depends on the number of involved spinal bones and pain points on the limb bones. Usually, the course consists of 4–6 procedures.

RESEARCH MATERIAL. 324 patients with spinal osteochondrosis of different localizations (cervical, thoracic and lumbar) were examined and treated. Each of these categories of patients was divided into 2 groups. One of these groups was the principal, where the treatment was carried out using the method of interstitial electrostimulation. The other group was a control group with a traditional modern complex treatment (medicinal physiotherapy, massage, stretching, reflexotherapy). Selection of patients was performed by method of envelopes. The results were comprehensively analyzed in groups. All the patients underwent clinical examination, radiography, computer tomography, rheography and polarography of spine, ultrasonic Doppler examination, electrometric study of pain, biomechanical study of the functions of the spine and limbs.

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