ASPECTS OF THE FORMATION OF CHRONIC PAIN IN PATIENTS WITH GUNSHOT WOUNDS TO THE NERVES OF THE EXTREMITIES

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Summary. The articles consider aspects of the formation of chronic pain in patients with gunshot wounds to the nerves of the extremities, features of their clinical and neurological manifestations, the need for timely diagnosis and treatment.

Keywords: post-traumatic gunshot neuropathy and plexopathy, chronic neuropathic pain syndrome, gunshot wounds of nerves and plexuses.

Introduction
Chronic pain is nowadays treated as an independent disease within the biopsychosocial concept, in which biological factors are given a large but not decisive role in the formation and maintenance of painful irritation. Psychological and social factors influence the assessment and perception of pain signals that shape behavioral responses. However, psychological factors and behavioral responses affect the biological, changing the production of hormones and neurotransmitters, the work of the autonomic and neuroendocrine systems, structural and biochemical processes in the brain. The study of neurobiological factors and processes that cause chronic pain attracts attention, because each of the pathophysiological mechanisms is potentially a target for pharmacotherapy, which at this stage led to the emergence of "mechanism-based pain therapy" [1]. Surgery is accompanied by technical difficulties, frequent complications, and in addition, nerve repair may be incomplete. However, there are a number of questions regarding the timing of the start, the duration of conservative therapy, the possibility of combining drug and non-drug treatments, as well as an objective assessment of the effectiveness of therapy [2]. Treatment of pain in patients with peripheral nerve damage is a difficult complex task due to the peculiarities of the pathogenesis and clinical course. According to various authors, pain of varying severity is diagnosed in 6-30% patients...
with peripheral nerve injury. Post-traumatic pain syndrome is defined as a complication of gunshot wounds, soft tissue injuries and fractures of the bones of the extremities, in which neurodystrophic disorders cause persistent intense pain, autonomic, vascular and trophic disorders, as well as osteoporosis [3]. The pathogenesis of the pain syndrome consists of changes in the activity of the sympathetic nervous system, irritation of peripheral nociceptors (nociceptive component) and damage to nerve conductors, which leads to a neuropathic component [4]. Autonomic dysfunction is the cause of persistent local circulatory disorders, which in the early stages of the disease are expressed in neurogenic vasoconstriction of vessels and dilatation of precapillary sphincters. In the next stage, which is characterized by functional exhaustion of the sympathetic nervous system, there is a neurogenic weakening of the tone of microvessels, especially venules. The developing vascular dystonia leads to disturbance of permeability of walls of capillaries. Microcirculatory disorders, tissue hypoxia and acidosis develop in the affected segment [5]. Timely leveling of pain is one of the most important tasks in the management of patients with damage to the nerves of the extremities, as chronic pain is the cause of maladaptation of patients, their disability, anxiety and depression.

**The purpose** of this study is to identify the features of the formation of chronic pain in patients with gunshot wounds of the extremities.

**Materials and methods**

In Kharkiv military clinical center from 2015 to 2020, we examined 64 people with neuropathies and plexopathies. By age, patients were distributed as follows: from 18 to 44 years - 39 patients (60.9%), from 44 to 59 years - 25 patients (39.1%). Group I included 35 wounded with post-traumatic gunshot neuropathy and plexopathies (13 bullet and 22 shrapnel wounds of the extremities), of which neuropathies - 29, plexopathies - 6. Group II - control group included 29 patients with compression-ischemic neuropathies and plexopathy without chronic neuropathic pain, neuropathies - 25, plexopathies - 4.

Patients underwent clinical and neurological examination, electroneuromyography, ultrasound. To objectify the assessment of pain, we used: visual analog scale (VAS). To determine the neuropathic nature of pain used a questionnaire DN4, pain scale LANSS.

**Results**

In group I, chronic neuropathic pain was diagnosed in 28 patients (81.4%). Among the examined patients in group I, damage to the nerves of the upper extremities was observed in 17 cases (48.6%), nerves of the lower extremities in 12 cases (34.3%), lesions of the humeral plexus in 6 cases (17.1%). The II group of patients with compression-ischemic neuropathies and plexopathies was also evaluated on scales and questionnaires to detect chronic neuropathic pain. Among the examined patients of group II nerves of the upper extremities were observed in 18 cases (62.1%), nerves of the lower extremities in 7 cases (24.1%), lesions of the humeral plexus in 4 cases (13.8%). Patients with neuropathic pain were excluded from the control group. In group I, the most pronounced pain syndrome according to VAS 8 ± 1.5 was observed in gunshot injuries of the median nerve and plexopathies of the upper extremities, with damage to the ulnar nerve pain...
syndrome according to VAS was 7 ± 1.7, radial nerve 6.5 ± 1.3. At gunshot injuries of the lower extremities the most expressed pain syndrome was observed at damage of sciatic and tibial nerves 7.97 ± 1.5.

At the closed damages of a nerve the degree of expressiveness of a pain syndrome was estimated in 7.9 ± 1.2 points on VAS, open damages 7.7 ± 1.3. After comprehensive treatment, pain reduction was observed: with open injuries by 3.1 points on the visual analog scale, closed injuries - by 2.7 points. More often when characterizing the pain syndrome among the complaints indicating the neuropathic mechanism of pain, patients emphasized the feeling of numbness, burning in the painful area, tingling, tingling sensation, pain of the type "electric shock". In the clinical picture of causalgia, painful sensations of the type of burning came to the fore, patients described this sensation as an affected limb immersed in boiling water, burning with fire, and there was a feeling of someone squeezing the limb. The intensity of the pain syndrome in severe cases was very high, in some cases the pain was exacerbated by irritation of the senses. The clinical picture of causalgia is characterized by increased pain when warming the injured limb and a decrease in its cooling "symptom of a wet cloth".

**Conclusion**

Chronic pain in patients with gunshot wounds to the extremities is an important medical problem, which is associated with multifactorial causes of pain, high percentage of disability, the presence of comorbid conditions, the need to consider all mechanisms of pain for comprehensive treatment of patients. One of such problems and the newest directions is an estimation of pain by means of scales and questionnaires that allows to control displays and dynamics of neuropathic pain, to appoint the corresponding complex therapy.

High prevalence of PNS injuries in peacetime and features during hostilities, long-term inpatient treatment in medical institutions of various profiles, often disability (more than 29%) of patients with limited ability to restore lost functions determine the medical and social significance of traumatic neuropathies. The gunshot wound of the PNS, received during the hostilities, is of significant importance for such psychoneurological disorders, as well as the longer duration of recovery of the functions of the injured limb and the social adaptation of the patients.

The study revealed a high percentage of 81.4% of patients with gunshot wounds of the extremities, which have a neuropathic nature of the pain syndrome. Due to the high percentage of patients with neuropathic pain in the structure of chronic pain, it is necessary to test and interview patients to identify and determine the severity, features and duration of pain in order to further adjust treatment, improve pain control and quality of life.

**Conflict of interest.** The authors declare the absence of a conflict of interest in the preparation of this article.

**Reference:**


