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ABSTRACT

The method of laser osteoperforation developed experimentally was approved in 85 patients with chronic osteomyelitis of different forms. A diode laser was used in which wavelength was 970 nm and power – 30 W. Laser osteoperforation was performed transcutaneously in a contact way with a quartz light guide of 0, 4 mm diameter in the projection of bone destruction foci with formation of 2-20 holes. Normalization of temperature and blood indices as well as pain decrease, reduce of soft tissue tension and edema was observed in all the patients in the immediate days after surgery. As a rule, fistulae closed by 7-12 day. In case of chronic osteomyelitis persistent remission is noted during 2-5 years by the objective data (roentgenography, flowmetry, densitometry). Thus, the experience of laser osteoperforation clinical use demonstrates its high effectiveness in treatment of osteomyelitis different forms. The method is of little invasiveness and it allows to reduce the periods of treatment and rehabilitation to a great extent.

Key words: diode laser, osteomyelitis, morphology, roentgenography, densitometry, flowmetry.

INTRODUCTION

According to the WHO, osteomyelitis accounts for up to 6.5-7% in the general structure of diseases of the support and movement organs. [1,4,11,17]. It often develops after open fractures of tubular bones (10-22%), surgical treatment of closed fractures (2-7%), gunshot fractures (90%). [10,15]. In 18-24% of children with acute hematogenous osteomyelitis, a transition to the chronic stage is noted, and almost 10% develop disability. With the advances in surgical treatment, antibiotic therapy and the current resources for accurate diagnosis and differentiated approaches to each type of osteomyelitis, better results are being obtained in the treatment of this disease. After a careful literature review carried out by a multiprofessional team, some conclusions were made in order to guide

medical approach to different types of osteomyelitis, aiming to obtain better clinical outcomes and reducing the social costs of this disease. Acute and chronic osteomyelitis are discussed, with presentation of the general epidemiological concepts and the commonly used classification systems. The main guidelines for the clinical, laboratory and imaging diagnosis of infections are discussed, as well as the guidelines for surgical and antimicrobial treatments, and the role of hyperbaric oxygen as adjuvant therapy. [4, 11,16]. Until now, a unified surgical tactic has not been developed, which leads to many methods of surgical treatment [2, 5, 6]. The urgency of the problem of treating chronic osteomyelitis (CO) is determined by the significant prevalence of the disease due to the steady increase in injuries, as well as the severity and duration of the pathological process, the difficulties of prevention and treatment of this disease [3,7,13,16]. The pathomorphological basis of chronic osteomyelitis is a complex of ischemic, infectious-inflammatory and reparative changes in the bone and surrounding soft tissues. These structural and functional changes are determined by the characteristics of the causative agents of the infectious process, the nature and severity of inflammatory and proliferative processes in the affected area. [8,9,12,14].

The aim of this work was to determination morphological changes in bone and surrounding tissues in chronic osteomyelitis and comparing methods of treatment as laser osteoperforation and regional platelet concentration.

MATERIALS AND METHODS

The study was carried out on 85 patients, in which, under anesthesia with Zolityl-100 at a dosage of 8 μ / kg in aseptic conditions, CT was modeled by open osteotomy in the area of the distal metaepiphysis of the femur, followed by infection of the bone injury site with a culture of pathogenic Staphylococcus aureus (108 microbial bodies). All patients and volunteers who participated in the scientific and clinical research gave written voluntary informed consent to this, and the study was performed in accordance with the requirements of the Helsinki Declaration of the World Medical Association (in 2013 edition).

After the simulation of CT (31 days from the moment of introducing the pathogenic culture), surgical debridement of the focus was performed in all experimental groups, which consisted of removing sequesters, cleansing the walls of the bone cavity until the appearance of "blood dew". In the 1st experimental group, the treatment consisted of blasting the damaged area using 0.9% sodium chloride solution. In the 2nd experimental group, a platelet concentrate (TC) with a platelet concentration of 1 mln / μL was used for treatment. In the 3rd test group, the animals received a combined treatment, including the implementation of jet sanitation and the introduction of TC. In the control group, no treatment was carried out. The animals were taken out of the experiment under anesthesia for 14 days. Fragments of tissues in the CT zone were subjected to histological processing - they were fixed in 10% neutral formalin, decalcified, paraffin sections were made, stained with hematoxylin and eosin and according to Van Gieson. Based on the results of the morphological study, the nature and severity of

inflammation, the presence of foci of destruction were assessed, and reparative changes in the bone were also studied.

RESULTS AND ITS DISCUSSION

In all experimental groups, structural and functional changes were expressed in the presence of necrotic areas of bone tissue, but, in addition to destructive changes along the periphery of the osteomyelitis focus, there was a proliferative reaction in the form of the formation of granulation tissue with a numerous cellular component, represented by fibroblasts, osteoblasts. The outer sections of the granulation tissue are surrounded by a fibrous membrane. As a result of the inflammatory reaction and the accompanying acidosis, vascular obstruction occurred. In conditions of impaired blood supply, bone trabeculae die and become fragmented. The most significant areas of necrotic bone with the formation of sequesters were observed in the control group. In the 1st experimental group, the necrotic areas of the bone tissue were small, but some of them were freely located in the abscess cavity. In the 2nd test group, there was an accumulation of pus under the periosteum, in the marginal zone of damage, the activity of osteoblasts was increased, which indicated active processes of bone formation, there were dense sequesters, the formation of which can be explained by increased reparative processes in bone tissue associated with an increase in the activity of osteoblasts on the surface. old trabeculae. In the 3rd test group, elements of an inflammatory-destructive focus were determined in the study area: necrotic bone in the center of the focus contained fibrous-purulent inflammatory infiltrate in the vascular canals and interbeam spaces; the process of sequestration was observed with the formation of resorption cavities filled with granulation tissue. In some cases, bone fragments were fused with fibrocartilaginous tissue of a heterogeneous degree of maturity, in which macrophage-plasmacytic infiltrates were encountered.

Compared with other groups, there was a predominance of bone regenerates, which are elements of the bone membrane of the osteomyelitic focus, built from immature bone tissue. The outer surface of the capsule that delimits the CS focus is represented by dense fibrous connective tissue containing fibroblasts and collagen fibers of various thicknesses. In contrast to other experimental groups, the combined use of MC led to a change in the ratio of the cellular-fibrous component towards an increase in collagen fibers, the number of vessels was reduced.

CONCLUSION

The data obtained indicate morphofunctional rearrangements within the CO zone during selective and combined treatment with the use of MC. Stimulation of proliferative processes with this method of regional influence is most effective after blasting of the osteomyelitis focus, as evidenced by the increased activity of osteoblasts, leading to the formation of bone regenerates filling the bone defect.

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