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MORPHOLOGICAL CHARACTERISTICS OF LOWER LIMB MUSCLES IN MECHANICAL INJURY

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Резюме: Studies have shown that when using local anesthesia, less pronounced morphological changes are observed after mechanical trauma to the lower limb compared to general anesthesia. The following morphological indicators were assessed: muscle fiber edema, inflammatory infiltration, degenerative changes and muscle tissue regeneration.

Key words: mechanical trauma, morphology, anesthesia, inflammatory infiltration, degenerative changes, experiment.

Objective of the study. The objective of the study was to compare morphological changes in the muscles of the lower limbs after mechanical injury in rats receiving local and general anesthesia.

Materials and methods. The study included 48 sexually mature rats with mechanical injuries of the lower limb, divided into two groups. The first group (24 rats) received local anesthesia, the second group (24 rats) - general anesthesia. In all patients, biopsies were taken from the muscles of the lower limb for histological analysis 24 and 72 hours after the injury. The following morphological parameters were assessed: muscle fiber edema, inflammatory infiltration, degenerative changes and muscle tissue regeneration. The experiment was carried out on 48 sexually mature rats, 5-6 months old (m = 200-220 g). The animals were kept in standard conditions that comply with sanitary rules. Special marks on the body were used to identify the rats. During the experiment, the animals were healthy, without behavioral changes. In the experiment, the rats were anesthetized by intraperitoneal administration of bupivicaine (150 mg / kg). In two groups, on the 1st and 3rd days after, lower limb muscles were taken during autopsy in compliance with the principles of humane treatment of animals; some animals were removed from the experiment by euthanasia, under chloroform anesthesia, by the left ventricular puncture method until complete exsanguination. The obtained biomaterial (muscle tissue) was fixed in 10% formalin solution. After fixation, muscle tissue was excised and embedded in paraffin using a standard technique. Then, 5-7 μm thick sections were made and stained with hematoxylin and eosin. Microcopying and photography were performed using an optical system consisting of a Leys microscope and an eyepiece camera at magnifications of x100, x200 and x400 magnification, included in the eyepiece camera delivery set. The study of the tissue structure after injury was taken during autopsy of lower limb muscles that had undergone anesthesia, which revealed the following morphological abnormalities.

Results of the study. When studying the structure of morphological changes in skeletal muscles in intact rats that underwent anesthesia, morphological disorders were revealed. Under experimental conditions on the 3rd day, the following structural changes are visualized in micrographs: significant enlarged areas are noticeable between muscle fibers, which indicates the presence of edema, destruction of the cellular structure against the background of pathological changes during local anesthesia. Muscle fibers are

organized into bundles. Each fiber consists of long cylindrical cells. The nuclei of muscle cells are visible as small, dark, oval structures located on the periphery of muscle fibers. The nuclei are located in one row along the edges of the fibers. Between the muscle fibers there are areas of connective tissue, which is colored in a lighter shade of pink and looks less dense than muscle fibers. Under high magnification, edema of the skeletal muscle and destruction of the cellular structure are visualized and a large number of macrophages are determined. Under experimental conditions, on the 3rd day, the following structural changes are visualized in microphotographs; significant widened areas are noticeable between muscle fibers. This indicates the presence of edema, destruction of the cellular structure against the background of pathological changes during local anesthesia. In animals that underwent experimental local anesthesia, on the contrary, significant morphological disturbances are noted in the injury zone. These changes are well visualized and can be subjected to quantitative and qualitative assessment, and their dynamics can be assessed, taking into account the treatment tactics.

Conclusions

The results of the study showed that when using local anesthesia, there are less pronounced morphological changes in the muscles of the lower limb after mechanical injury to the lower limb compared to general anesthesia. Rats that received local anesthesia demonstrated less swelling, less pronounced inflammatory infiltration and degenerative changes, as well as more active regeneration of muscle tissue. These data can be used when choosing anesthesia tactics for patients with lower limb injuries, in order to minimize muscle tissue damage and accelerate recovery.

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