THE EFFECT OF CELLULAR THERAPY ON ANGIOGENESIS AND GRANULATION TISSUE IN EXPERIMENTAL PURULENT WOUNDS

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ABSTRACT

The problem of treating complications of purulent wounds has remained relevant for many years. Despite the introduction of new treatment methods and the improvement of existing ones in recent years, the level of purulent-inflammatory soft tissue diseases remains high. Our study focuses on new multi-component medications and the concept of local treatment for purulent wounds of the skin and soft tissues. This concept is aimed at implementing an individual approach in the treatment of experimental rats with purulent-inflammatory processes of the skin and soft tissues.

Objective: To observe the healing process of a purulent wound in the soft tissues of rats under experimental conditions using pathogenetic and pathomorphological studies of the results of treatment with fillalbin gel-like collagen.

Material and methods. Experimental studies were conducted on 170 sterile white male rats weighing 190–240 g, kept in the TDTU vivarium. In our proposed method (Ergashev U.Yu., Abdusalomov B.A. "Method of experimental modeling of purulent wounds." Rationalization proposal. Certificate No. 1394) manipulation was performed to create the model. We divided the experimental animals into 3 groups: Group 1 (control group) – creation of an experimental model of purulent soft tissue injury; Group 2 (comparison group) - conducting traditional complex treatment (Levomekol - "NIJFARM," Russia) against the background of creating an experimental model of a purulent wound; Group 3 (main group) - creating an experimental model of a purulent wound - was treated using traditional treatment and gel-like collagen with phyllalbin. Blood samples were taken from each group of rats on days 1, 3, 7, 10, 14, and 21 using the enzyme-linked immunosorbent assay (ELISA) method.

Results. Results of enzyme-linked immunosorbent assay. Among the cytokines involved in the regulation of angiogenesis, vascular endothelial growth factor plays an important role. Among the cytokines of this class (VEGF), the most studied peptide is VEGF-A. VEGF-A is a fundamental mediator of physiological and pathophysiological angiogenesis. In humans, VEGF-A consists of 165 amino acids, while in rats, its number is 1 less, i.e., VEGF-A164. Initially, VEGF was considered a factor that enhances the permeability of endothelial cells, but it was later proven to have a significant angiogenic effect, i.e., a significant effect on vascular

growth in normal and pathological conditions. In the blood of experimental animals, VEGF-A164 manifested with significant dynamic changes during the experiment. In the blood plasma of the control group rats, the VEGF-A value increased by 1.93 times ($p<0.001$) on the 3rd day of the experiment, indicating the onset of inflammation and angiogenesis. On the 7th day, it remained virtually unchanged and significantly exceeded the values of the intact group rats by 2.19 times ($p<0.001$). In the final days of the experiment, it did not differ from the indicators of the intact rats. We attributed this to the fact that the compensatory mechanism in the animals' bodies initially manifested as a slight increase in VEGF-A, and due to the absence of a stimulating factor, it equaled the values of intact rats. In the blood plasma of rats of the comparison group with purulent wounds, the level of VEGF-A increased by 1.76 times on the 3rd day of the experiment ($P<0.001$); On the 7th and 14th days, it was 2.18 ($P<0.001$) and 2.04 times ($P<0.001$) higher than the control group rats, respectively. We attributed this to the fact that the ointment (levomecol) applied to the wound defect of the animals in the comparison group had a positive effect on the reparative processes in the wound. It is known that VEGF-A can also manifest as an increase in its level in the blood as a primary marker against the background of ischemia in the animal body. The increase in its level (VEGF) in the control group rats may have been influenced not only by compensatory mechanisms but also by the state of ischemia on the wound surface against the background of purulent inflammation of the soft tissues. The level of VEGF-A in the blood plasma of experimental animals with purulent wound defects in the main group was significantly higher on the 3rd day of the experiment compared to the comparison group and the control group, by 1.91 ($P<0.001$) and 3.36 times ($P<0.001$), and by the 7th and 14th days by 1.52 ($P<0.001$) and 3.32 ($P<0.001$) times, respectively; 3.10 ($P<0.001$) and 6.33 ($P<0.001$) times, respectively. The increase in the level of VEGF-A in the blood of the control group animals and its value in the final days of the experiment, similar to that of intact rats, depends on the intensity of the injury. A statistically significant increase in the level of VEGF-A in the rats of the main group compared to the comparison and control groups was manifested by the effect of the gel-like collagen with filllabin used by us on the role of angiogenesis in the formation of new tissue by stimulating regenerative and reparative processes of wound healing.

Conclusion. It was established that in experimental rats, a purulent wound with both surgical and pathogenetic mechanisms was caused by placing an autocal suspension tampon under soft tissue with a special "bridge" to an open wound caused between the scapulae. During wound proliferation with biomedical cell liner material, high levels of tissue growth factor (VEGF-A) were observed in the main group of animals (5.41±0.67 pg/ml). This indicates that the gel-like collagen preparation containing the domestic alkaloid fillallabin, obtained through biomedical engineering, is an essential antiseptic for the healing of purulent wounds

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