

Features of repair processes and immune response of laboratory animals body to fluoroplast-4 implantation in experiment

Abstract

The paper analyzes the features of the reparative and immune response of the body during the replacement of subcutaneous soft tissue defects in the early postoperative period. The restoration of a muscle defect and links of the immune system was established.

Keywords: fluoroplastic, defect, immune response

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Introduction

The latest technologies, modern plastic and suture materials make it possible to achieve good results in the treatment of abdominal hernias. Synthetic materials have been used in herniology for over a hundred years, but the search for a material that meets the requirements of the “ideal” is still ongoing. The wound process is a complex complex of biological reactions that develop sequentially in the tissues of the wound in response to injury. Therefore, all efforts of medical science are directed to find measures to promote wound healing. The ease of use of a ready-made plastic material with the required qualities has led to the widespread use of synthetic implants. The use of synthetic prostheses is effective in critical situations when there is a question of saving a person's life. In addition, the disability of patients is reduced, the restoration of damaged tissue is qualitatively improved, and the healing processes are accelerated, which reduces the length of stay in the hospital and the cost of treatment.¹⁻³ Aim of the study. To study the effect of fluoroplast-4 on the indicators of specific and nonspecific resistance of the organism of laboratory animals during the replacement of subcutaneous soft tissue defects in the early postoperative period.

Materials and methods

The experiments were carried out on white laboratory rats weighing 250-300 g. Under ether mask anesthesia, a 5x5mm muscle defect was made on the postero-lateral surface of the thigh after dissection of the skin and subcutaneous tissue. The resected area of the muscle was filled with fibrous-porous fluoroplast-4, the wound was sutured in layers. The assessment of the immune status was carried out on days 3-7 and 14 after surgery.

Results

In the first 3-7 days after surgery, aseptic inflammation was observed, characterized by venous plethora, edema, leukocyte and histiocytic infiltration. The inflammatory infiltrate contained giant multinucleated cells of the foreign body type. Along with this, fibroblasts, procollagen and collagen fibers were determined. There was also a significant decrease in the absolute number of leukocytes with a significant simultaneous decrease in the percentage and absolute number of lymphocytes, as well as a decrease in the phagocytic

activity of neutrophils and the phagocytic index ($P < 0.05$), as well as a decrease ($P < 0.05$) in the total hemolytic activity of blood serum (CH50). Two weeks later, the formation of an outer capsule of young connective tissue, consisting of collagen fibers with fibroblasts located among them, is noted around the implants, as well as the presence of giant multinucleated cells of foreign bodies. Young connective tissue was also inside the cellular structure of the synthetic material. At the same time, in highly porous photoplast-4, the process of prosthesis germination with connective tissue elements was more pronounced. The restoration of the parameters of the immune system occurred on the 14th day of the experiment, with the exception of the preserved decrease in the phagocytic index ($P < 0.05$). In the control group of animals, the levels of immunity indicators corresponded to the level of generally accepted values. B-lymphocytes and circulating immune complexes are characterized by similar values in all groups when compared with controls. By the end of the month after the experiment, low-porous fluoroplastic-4 and high-porous fluoroplastic-4 were completely covered with a capsule of mature connective tissue. The number of giant cells of foreign bodies increased both inside the synthetic material and around the synthetic fibers. The relative area occupied by the connective tissue was significantly larger when using highly porous fluoroplastic-4.

Conclusion

The use of highly porous fluoroplastic-4 in the plastics of soft tissue defects is more preferable, since in the implantation zone, the processes of prosthesis germination prevail with the restoration of volume and contours in the muscle defect zone with the activation of the metabolic and functional activity of peripheral blood leukocytes, as well as the restoration of the immune system links. Perhaps, in the long term, this will allow determining an integral indicator that can provide comprehensive information about changes in the resistance system caused by the implant, and predict complications.

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None.

Conflicts of interest

The authors declare that there is no conflict of interest.

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