Short Communication

Morphological evaluation of biocompatibility of a propylene-based fluoroplastic prosthesis during hernioplasty

Abstract

The presented article gives an experimental substantiation of the use of a mesh endoprosthesis consisting of polypropylene mesh and polytetrafluoroethylene, the reaction of the surrounding tissues around the prosthesis at different stages of wound healing is shown.

Keywords: hernia, plasty, prosthesis, inflammation, reaction

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Introduction

Restoration of the anatomical integrity of the abdominal wall is the main idea in the history of abdominal hernias. A variety of hernioplasty techniques, does not prevent the occurrence of postoperative complications.[1,2] However, when repairing abdominal defects of the anterior abdominal wall, there are a number of problems associated with tissue tension.[3] The search for new polymeric prosthetic materials is ongoing to improve surgical techniques.[1,4] Mesh prostheses made of polypropylene are easy to modify, sterilizable and relatively inexpensive, but in the postoperative period, patients may experience discomfort in the surgical wound area, reduced mobility of the anterior abdominal wall, as well as reduction in the size of the prosthesis and occurrence of recurrent hernias.[4,5] Therefore, research on the development of new modified prostheses devoid of the above drawbacks is constantly being conducted. In the Republic of Belarus, a prosthesis consisting of polypropylene mesh and polytetrafluoroethylene with characteristics corresponding to the standards of durability in hernioplasty has been developed.

The aim of the work

It is to study the reaction of soft tissues of the anterior abdominal wall during plastic replacement using new polypropylene-based fluoroplastic prosthesis.

Material and methods

Experimental investigation was carried out on 20 white mongrel male rats weighing 250-300 g, under ether mask anesthesia after dissection of the anterior abdominal wall tissues a 5x10 mm rectus abdominis defect was made and filled with the studied prosthesis. Fixation was carried out with the help of knotty sutures. The wound was sutured layer by layer. Histological examination of the preparations was performed on the 7th, 14th, 21st, 30th days.

Results

Assessment of the surrounding tissues around the prosthesis, in the early stages of the process, demonstrated swelling and hyperemia, which could not be observed in the long-term after implantation. There were no adhesions in the abdominal cavity. On the seventh day the surrounding tissues of the prosthesis showed signs of aseptic inflammation. Microcirculatory veins in the tissue surrounding the graft were enlarged; there were signs of blood stasis in the lumen. There was a new formation of capillaries and fibroblasts and procollagen fibers were detected. On the 14th day after implantation of the composite prosthesis, there was practically no full-bloodedness and edema. Weakly pronounced neutrophil-cell infiltration was preserved. More pronounced sclerotic changes in the surrounding tissues accompanied by an increase in fibroblasts, procollagen and collagen fibers were observed. Signs of capillaries growth in the form of thin outgrowths were detected. This testifies about fusion of prosthesis with soft tissues. By the end of 21 days the number of giant multinucleated cells participating in phagocytosis of synthetic material elements increased. The formation of a thin connective tissue capsule with full-blood capillary-type vessels was noted around the implant. Thirty days after the surgery, there was practically no inflammatory reaction. In three observations the prosthesis was permeated with mature connective tissue, and in two cases the presence of immature connective tissue scar in the prosthesis area was noted.

Discussion

In the course of our study aseptic inflammation was noted around the implant in the early period after prosthesis implantation, with a gradual decrease in the distant period. The formation of the tissue vascular bed was also fixed after implantation of the endoprostheses. From the first days we observed the formation of the young connective tissue with the subsequent replacement of 2/3 of the implant area by 30 days after prosthesis implantation, which ensured its good fixation in the surrounding tissues.

Conclusion

The absence of the postoperative complications during the experiment makes it possible to judge about the biocompatibility of this type of prosthesis and allows recommending its wide application in the surgical practice.

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None

Conflicts of interest

The author declares no conflicts of interest.

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