THE MODERN STATE OF GERNIOALLOPLASTY OF THE ANTERIOR ABDOMINAL WALL (LITERATURE REVIEW)

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Abstract: *the article presents an overview of the scientific literature devoted to the evaluation of the functional condition of the anterior abdominal wall. The problems of abdominal hernia plasty with the help of prosthetic materials are described in detail. Modern herniology has faced the following problems with the use of implants: wound complications (postoperative hemorrhage, seroma, prolonged lymphorrhea, development of infection in the wound), contractions or migration of prostheses, formation of intestinal fistula.*
Keywords: *anterior abdominal wall, plastic hernia gates, prosthetic materials, complications.*

СОВРЕМЕННОЕ СОСТОЯНИЕ ГЕРНИОАЛЛОПЛАСТИКИ ПЕРЕДНЕЙ БРЮШНОЙ СТЕНКИ (ОБЗОР ЛИТЕРАТУРЫ)

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Аннотация: *в статье представлен обзор научной литературы, посвященной оценке функционального состояния передней брюшной стенки. Подробно описаны проблемы пластики брюшной грыжи с помощью протезных материалов. Современная герниология столкнулась со следующими проблемами применения имплантатов: осложнения раны (послеоперационные кровоизлияния, серома, длительная лимфорея, развитие инфекции в ране), сокращения или миграция протезов, образование кишечных свищей.*
Ключевые слова: *передняя брюшная стенка, пластика грыжевых ворот, протезные материалы, осложнения.*

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At present, polymeric materials are widely used in various surgical hospitals. The introduction of new endoprostheses, which possess great biocompatibility, low price, and ease of handling, was the impetus to change the methods of treating ventral hernias [4, 9]. These methods made it possible to perform abdominal hernia plastic surgery with maintaining normal anatomy without tension, which led to a reduction in typical postoperative complications associated with traditional surgery. Often the choice of these materials is carried out individually by the surgeon depending on the material price, availability and preferences of the operator. More and more frequent repeated treatment of patients who had previously performed plastic surgery using endoprostheses [2, 10]. Modern herniology faced the following problems of implant application: wound complications (postoperative hemorrhages, gray formation, prolonged lymphorrhea, development of infection in the wound), contractions or migration of nets, formation of intestinal fistula [12]. The discovery of the mechanisms of these manifestations, the justification of the surgeon's tactics in such cases, is important both in scientific and practical terms [16]. One of the most important criteria for selecting implant materials for hernioplasty is biocompatibility - the absence of a negative effect on the adaptive link of the immune system. The biocompatibility of the material is determined by the chemical inertness of its material (in polymers, by the presence of strong molecular bonds, in metals by the presence of a closed crystal lattice), and by the absence of an antigenic structure achieved by a decrease in molecular weight [11]. Numerous studies have shown that the most common materials have pronounced biocompatible properties. However, the results of abdominal wall endoprosthetics are cause for concern, as patients experience discomfort, impaired abdominal function, foreign body feeling, and pain in the implantation area [10]. This is due to the fact that the most significant drawback of any synthetic material that is used today is the manifestation of the local inflammatory process in response to the implantation of foreign material into the body. Therefore, the main cause of unsatisfactory outcomes of

endoprosthetics is the development of atrophic, degenerative and cicatricial changes in the tissues of the anterior abdominal wall in the zone of intervention associated with the presence of foreign bodies in the tissues, which can disrupt the normal course of the healing process [7]. In this case, synthetic materials that are used in herniology, unfortunately, do not meet the requirements of the "ideal" material. The integration of synthetic mesh materials in the abdominal wall tissue has been studied in sufficient detail today [5, 11]. However, the assessment of the degree of bioinertness of the prosthesis is carried out, basically, according to the data of experimental studies. Until now, there are no works clearly explaining the morphological structure of the reparative activity in tissues in endoplasty, the staging of the wound process and the conditions of wound healing with the use of synthetic prostheses are not taken into account. It is especially important to study endoprosthesis for biocompatibility and the possibility of influencing the slow regeneration of the patient's tissues [14]. Ignoring the immunological reactions of the body to endoprosthetics in the context of the course of the wound process makes it difficult to reliably estimate the results of treatment [6, 17]. Although the nature of the morphological reaction to the implantation of the endoprosthesis is universal, nevertheless, when the abdominal wall is being prosthetized for a hernia, the wound process is different from the usual flow of the laparotomic frame [10]. It is known that the course of the reparative process around the reticular endoprosthesis occurs through an elongated phase of inflammation with increased infiltration of all wound layers, and the phase of scar reorganization, as reported in publications, is characterized by necrobiotic changes in the surrounding tissues surrounding the endoprosthesis, uneven sprouting of the mesh with connective tissue of varying degrees of maturity and absence of this in some places of the implant [13]. However, in a number of cases the transition process remains incomplete, transforming into a persistent slow aseptic inflammation. The pathophysiological mechanism for maintaining persistent inflammation is the interaction of the tissues and the immune system of the organism with free radicals present on the surface of the synthetic material and serve as a generator of peroxidation reactions [7]. The speed and intensity of the reparative process is significantly different at the periphery and near the center of the endoprosthesis. It has been repeatedly revealed that - the netting of the mesh, that is, in the zone of direct attachment of the endoprosthesis to the abdominal wall, the rate of reparative processes is higher. In the center of the reticular endoprosthesis, the intensity of reparative processes is lower. The degree of expression of the tissue reaction and the rate of its development depends on the method of implantation. The calmest course of the reparative process was noted with intraperitoneal plastic; the most pronounced inflammation was seen in the aponeurotic arrangement of the mesh [13]. Extensive experience of domestic herniology revealed that for the successful implantation of stents should be considered as its isolation from the internal organs of the abdominal cavity, and subcutaneous tissue, so perfect - before peritoneal location of the prosthesis [3, 10]. Installing the implant, it should be delimited from the abdominal cavity, as in some studies noted that the most pronounced spa. An even process is noted with IPOM, even in comparison with the submaskul position and, if possible, from subcutaneous fat. It is advisable to place the implant between the flaps of the hernial sac, between the sheets of the aponeurosis, and replace the front sheet of the aponeurosis. In addition, there is evidence that the use of a hernial sac, a large omentum, peritoneum to isolate the endoprosthesis does not solve the problem of adhesive process in the area of the operation [13]. However, in one experimental study, it has been shown that with the intraperitoneal location of the endoprosthesis, the reparative process proceeds more calmly and slowly than in the subaphoneurotic or naponeurotic placement of the mesh [17]. In this case, the type of implanted endoprosthesis did not have a significant effect on the formation of adhesions [4]. With the intra-abdominal arrangement of braided nets from various materials, angiogenesis occurs identically - the vessels grow through the net [7]. In cases of intraperitoneal implantation of a solid endoprosthesis-plate, angiogenesis proceeds along the mesh surface from the periphery to the center, neoperitoneum is also formed, while the adhesion process is minimal [3, 11]. At the same time, it is noteworthy that after performing the "non-stretch plastic" with the help of a mesh prosthesis there is no tight contact of the synthetic fiber with the surrounding connective tissue capsule, which causes a displacement (luff) in relation to it, leading to a mechanical microtrauma with an alteration of the surrounding elements connective tissue, stimulating the development of loose loose connective tissue, the consequence of this and could be a recurrence of the hernia [9]. In addition, it is known that the indirect sign of the development of fibrosis at the site of implantation of the endoprosthesis is its deformation (shrinkage - "shrinking") under the influence of expanding coarse fibrous connective tissue [12]. Wrinkling is a real process that accompanies the implantation of synthetic nets with hernioplasty [13]. Analysis of macro preparations showed that the reduction in the area of materials occurred due to their contraction in the transverse and (or) longitudinal direction, as well as "dog bone effect" [8]. However, the nature of the wrinkling, its degree and dynamics have not yet been elucidated. And, although the specific reasons are not commented upon, the authors see an explanation for this in the regular wound contraction and tight tying fixing ligatures, as well as stapler clips causing bedsores in muscle-aponeurotic tissues [6]. The conducted planimetric study at various times (from 14 to 180 days) showed that all materials studied undergo deformations. Grids with a relatively high content of polypropylene undergo shrinkage by 30-50% of the original area, starting from 4 weeks after implantation [11]. Complete structural repair of connective tissue is observed on days 30-40, whereas with the

use of polypropylene material this does not occur up to 120 days, and in some cases around the elements of the grid the maturation of connective tissue proceeds with signs of necrotic inflammation [14].

Prosthetic hernioplasty is accompanied by the frequent formation of retention reactions, which is associated with a broad mobilization of the tissues of the anterior abdominal wall and the reaction of the organism to the mesh endoprosthesis. Severity of seroma depends on the method of endoprosthetics n [3]. Seroma - accumulation of fluid as a result of exudation in the thickness of tissues, in potential space or in the cavity after surgery [10]. This complication, which occurs after various surgical interventions, has acquired particular relevance in the era of plasty of abdominal hernia using polypropylene prostheses [13]. Postoperative formation of sulfur in herniology is a nonspecific inflammatory reaction to the prosthesis. The degree of inflammatory response is directly related to the severity of a surgical trauma, with the size and amount of foreign material, with the state of the macroorganism [15]. The situation is exacerbated by the presence of a dead space between the mesh and the surrounding tissues [1]. It is established that most often seromas are formed when the prosthesis contacts the subcutaneous fatty tissue. Thus, a more pronounced accumulation of fluid after inlay operations causes a tendency to form retention reactions [8]. However, with the aponeurotic(subcutaneous) location of the polypropylene mesh prosthesis there is always a threat of the formation of chronic fluid clusters (gray) in the subcutaneous tissue. In a certain percentage of cases, avoid contact with the prosthesis on time hernioplasty with subcutaneous tissue is not possible, so the problem of gray formation remains and requires its solution [7, 9]. At the same time, there is an opinion that it is difficult to find an objective criterion for determining the clinical significance of seromy, since neither its volume nor dimensions can be of fundamental importance. This is due to the fact that the amount of fluid is directly related only to the operating injury [13]. Seromas develop as a result of an inflammatory response to mechanical or chemical trauma of tissues as a result of surgery. Damage is caused by scissors, a scalpel, electrocoagulation, sewing apparatus, seams, as well as surgeon's fingers and retractors [14]. The presence of various foreign materials in the wound aggravates the situation and can even lead to their rejection as a result of an intense inflammatory reaction [17].

The use of active drainage in the first day reduces the amount of sulfur [11]. The determination of the level of chemokine CCL2 at the stages of treatment of a patient with hernia allows explaining the trends in the course of the postoperative period and can potentially be considered as a predictor of seromy [12]. The development of seroma can simulate an early relapse of a hernia, in which it is sometimes difficult to convince a patient. Although seroma, in effect, is a benign reaction, its consequences can be dramatic [10]. The presence of a mesh and wound infection can support the process of gray formation for many weeks [15].

The development of the latter is most often associated with the very fact of the introduction of a synthetic material into the human body, which must also be strengthened (fixed), that is, the method of allogernioplasty itself implies the need for additional materials to fix the implant (staples, screw retainers) affects the frequency and severity of inflammatory reactions [17]. The emergence of new implants in the practice of surgeons, which, thanks to the structure of the weave, has an increased adhesion to the tissues or has in their structure "hooks" for fixation to the tissues in the surgical zone. The use of such implants made it possible to ensure a stable flat implant placement when carrying out fox-free hernioplasty at all stages of the operation, fixing the implant to the tissues over the entire surface area of the implant, and abandoning the need to introduce additional fixation materials into the human body, which were often the cause of the patients' causalgia in the postoperative period [13].

However, according to the literature, the earliest and most pronounced fibrosis of soft tissues developed in experimental groups, which fixed polypropylene mesh with latex glue and polypropylene mesh with sulfacrylate glue [10]. Therefore, the most promising direction in the implementation of prosthetic hernioplastics is the use of absorbable fixatives and self-locking implants to the tissues, which provides an adequate tissue reaction.

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