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Morphological justification of laparoscopic transabdominal preperitoneal (TAPP) operation for the inguinal hernia recurrence

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Abstract

Introduction. The frequency of the inguinal hernia of the repeated recurrences is up from 9,3 to 12%. In surgical treatment re-fixation of the mesh to the atrophied tissues of the inguinal canal is unreliable. The posterior access can be much more reliable for the patients, in which the mesh will be fixed to the unchanged muscular-aponeurotic tissues of the inguinal area.

Aim. To increase the efficiency of recurrent inguinal hernias surgical treatment by justification of using the TAPP surgical technology.

Materials and methods. An analysis was made in the clinic Kiev City Clinical Hospital No. 5. about surgical treatment of recurrent inguinal hernias in 105 patients. Surgical operations were also divided. The patients were divided into 2 groups, the first group (52), where the Liechtenstein's operation was repeated, and the second group of the patients (53) were confirmed by TAPP (patent No. 1299.1 from 26.11.18). A biopsy of the inguinal muscle aponeurotic tissues was made during surgery in both groups of the patients. Also morphological examination was made. For a final comparison of the morphological examination of inguinal tissues, a biopsy was performed in 20 patients who had an appendectomy.

Results and discussions. In I group to the remote period in 8 (16%) patients there were chronic inguinal pain and recurrence of hernia was observed in 4 (8%) patients. In II group long-term results were as follows, chronic inguinal pain was diagnosed in 2 (4%) patients, recurrence was observed in 1 (2%) patient. After making a morphological comparison of the three groups, it was found that in group I were signs of severe chronic inflammation with the formation of granulation of the tissue, scar tissue, destruction of elastic fibers, both in the tissue of the anterior abdominal wall and in the wall of the vascular component. The morphological picture of the II and III groups are similar, with weakly expressed chronic inflammatory infiltration, with savings of the elastic fibers and less degenerative changes.

Conclusion. The morphological reasoning of the use of improved TAPP was the absence of atrophic changes in the muscular-aponeurotic tissues of the inguinal region, while in Liechtenstein's second operation there was atrophy, scarring of inguinal tissues, so fixation of the mesh to such tissues can leads to recurrence.

Key words: recurrent inguinal hernia; TAPP; morphological justification

Introduction. The frequency of the inguinal hernia of the repeated recurrences is up from 9,3 to 12% [1, 2]. Open Liechtenstein's surgery is often used repeatedly as a treatment of the recurrences.

At the same time, this operation may have some technical difficulties associated with scar-atrophic changes in the muscular-aponeurotic tissues of the inguinal canal and can leads to the migration of the mesh and recurrence of the hernia [3].

In our opinion, the posterior access (with performing improved methods of transabdominal preperitoneal alloplasty (TAPP)) can be much more reliable for the patients,

in which the mesh will be fixed to the unchanged muscular-aponeurotic tissues of the inguinal area [4].

Aim. To increase the efficiency of recurrent inguinal hernias surgical treatment by justification of using the TAPP surgical technology.

Materials and methods. An analysis was made in the clinic the Department of Surgery and Proctology, on the basis of the Kiev City Clinical Hospital No. 5. about surgical treatment of recurrent inguinal hernias in 105 patients. The years of investigations and treatment of the different patients were from 2012 to 2019.

All of the patients were male. The age were from 24 to 76 years old (average 53.4 + 1.2). The recurrence were found after 6 months in 46 patients (43.8%), after 1 year in 40 patients (38.1%), after 2 months in 19 patients (18.1%). With help of the classification of Campanelli G. [5] patients were divided into the following ranks: R1 high, lateral hernia with a small hernia defects, 37 (35.2%), R2 low, medial hernia, with a small defect, 55 (52.3%), R3 the other hernias, with a great defect 13 (12.4%).

Surgical operations were also divided. The patients were divided into 2 groups, the first group (52), where the Liechtenstein's operation was repeated, and the second group of the patients (53) were confirmed by TAPP (patent No. 1299.1 from 26.11.18) [6]

A biopsy of the inguinal muscle aponeurotic tissues was made during surgery in both groups of the patients. Also morphological examination was made. For a final comparison of the morphological examination of inguinal tissues, a biopsy was performed in 20 patients who had an appendectomy. The biopsy material was sent for pathomorphological examination, which was conducted on the basis of the Department of Pathological and Topographic Anatomy of the Shupyk NMAPE.

Tissue fragments were fixed in a 10% solution of neutral buffered formalin for less than 24-36 hours. After fixation in formalin, standard wiring was performed and the material was embedded in paraffin.

From paraffin blocks on a rotary microtome HM 325 (ThermoShandon, England) were made serial histological sections 4-5 micrometers thick, which were then stained with hematoxylin and eosin, picrofuxin according to Van Gizon, and were established the difference of elastic fibers using Richard-Elastic Al , Subsidiary of Thermo Fisher Scientific) [7, 8].

Microscopic examination and photoarchiving were performed using light optical microscopes "ZEISS" (Germany) with a data processing system "AxioImager. A2" with 5x, 10x, 20x, 40x, 1.5 binocular nozzles and 10 eyepieces with ERc 5s camera.

For the first group, Liechtenstein's second operation was performed according to the classical methods.

For the second group, were performed the TAPP. Under general anesthesia, with help of Veresh needle a carboxypneumoperitoneum was applied. Laparoscopic operation of the hernia defects was performed.

An arcuate incision was made, the parietal peritoneum was cut over the hernia defect. The hernia sac was mobilized and isolated.

The main aim was to make a mobilization of the parietal peritoneum 3-4 cm above the edge of the hernia defect, after which the abdominal cavity was wound and placed with a wider lightweight polypropylene mesh 15X15 cm, in addition to the classic fixation. And fixed on the lower edge with sulfocrylate .

The results of operations were evaluated by taking into account postoperative complications and recurrences. And the results of morphological studies retrospectively served as an argument for the feasibility of using repeated TAPP in recurrent inguinal hernias.

Results and discussions. In the clinical part of the study, the results of surgical treatment of the patients with recurrent inguinal hernias were assessed by the number of early postoperative complications and the presence of chronic inguinal pain and recurrence in the remote period, after 6, 24 and 36 months. Thus, in group I (n = 50) seromas were observed in 7 (14%) patients, in 5 (10%) hematomas were common, in 2 (4%) cases there were festering of the postoperative wound.

In the remote period in 8 (16%) patients there were chronic inguinal pain, which was eliminated by conservative treatment, recurrence of hernia was observed in 4 (8%) patients. In patients of the second group (n = 50) in the early postoperative period seromas were observed in 3 (6%) cases, there were no suppurations of trocar wounds. Long-term results were as follows, chronic inguinal pain was diagnosed in 2 (4%) patients, recurrence was observed in 1 (2%) patient.

During the pathomorphological examination of the first group of the patients who undergo open Liechtenstein's surgery in the areas of scar tissue, inguinal ligament fragments, and remnants of the mesh was found - fibro-muscular tissue with manifestations of degenerative changes and focal limited lymphohiscytocytic granulation tissue and single multinucleated cells as foreign bodies. In the area around the remnants of the mesh was found large fragments of mature scar-transformed tissue that surrounded it. Elastic fibers in these areas were not visualized.

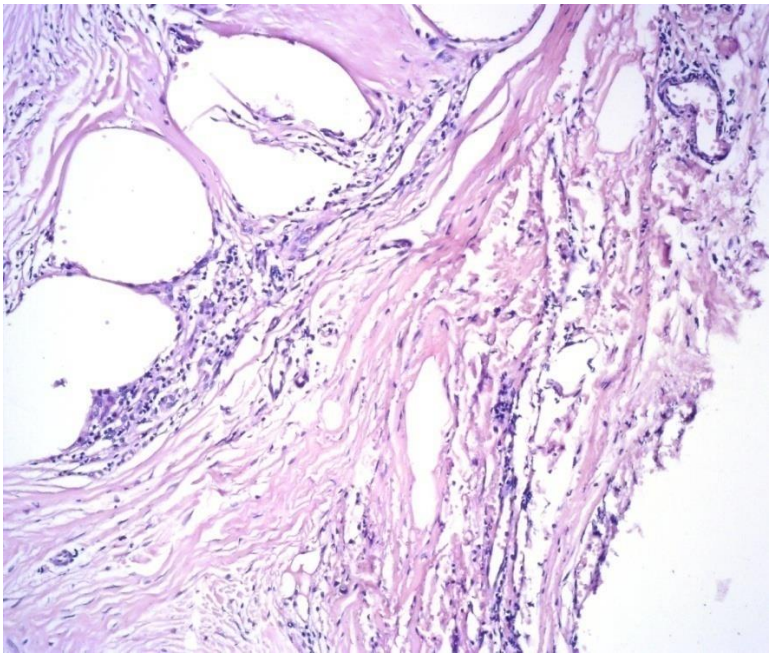

Fig. 1. First group
The tissue of the anterior abdominal wall.
Fibromuscular tissue with manifestations of dystrophic changes and focal lymphohistiocytic inflammatory infiltration. Hematoxylin and eosin coloring, x50

Fig. 2: First group
The tissue of the anterior abdominal wall.
Differentiation of fibrous tissue, which is mainly located around the transplant. Van Gizon coloring, x50

In the pathomorphological study of the second group of the patients who undergo laparoscopic surgery, preperitoneal allogeneic TAPP, was found that in the musculo-aponeurotic structures there were single lymphocytes and histiocytes in the vascular tissue fabrics.Structure of the studied tissues was saved. Formation of thin-walled vessels with the marginal position of erythrocytes, which runs between the bundles of compact connective tissue.

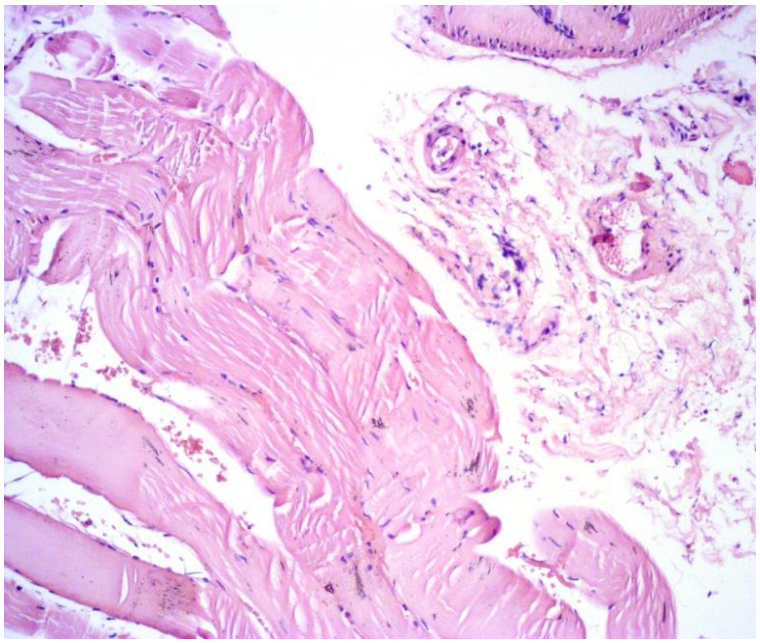

Fig. 3: Second group
The tissue of the anterior abdominal wall.
Fragment of fibromuscular tissue with single lymphoid cells, connective tissue. Hematoxylin and eosin coloring, x50

Van Gison coloring revealed that fibrous tissue appeared predominantly between the muscle tissue and replaced it in some areas. Among the connective tissue complexes, elastic fibers are visualized in the wall of vessels of medium caliber, which was confirmed by histochemical coloring of the elastic fibers.

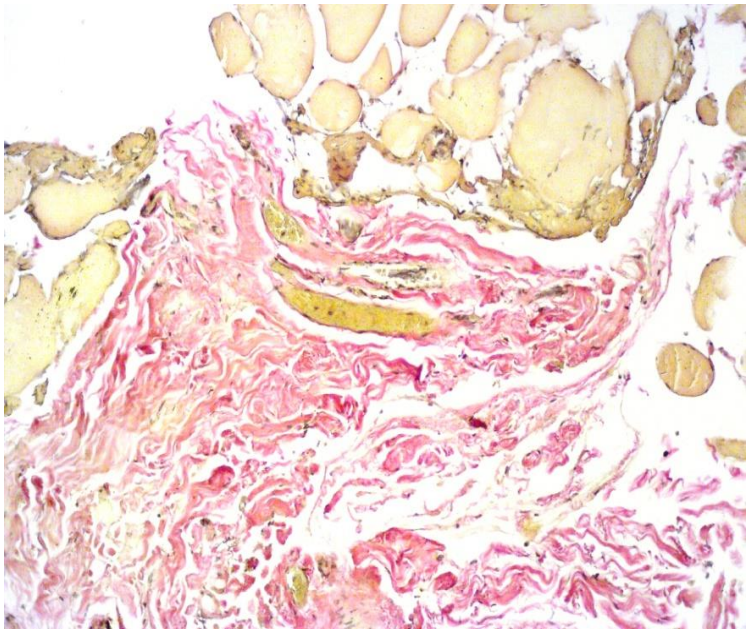

Fig. 4: Second group
The tissue of the anterior abdominal wall.
Differentiation of fibrous tissue between the muscle fibers.
Van Gizon coloring, x50

During the pathomorphological examination of the third control group of the patients who was undergo appendectomy, it was found that the morphological features were the same as in the second group of patients, as shown on the figures.

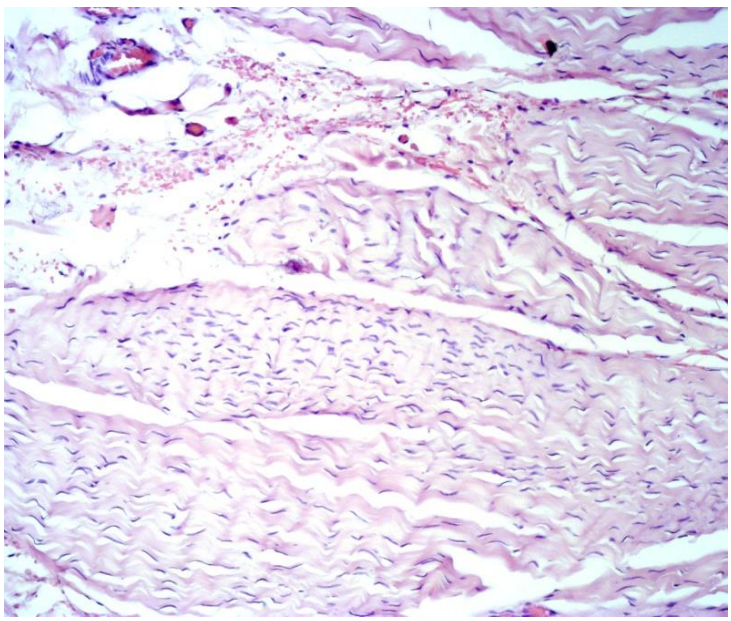

Fig. 5: Third group
The tissue of the anterior abdominal wall, represented by a decorated fibrous tissue with small hemorrhages. Hematoxylin and eosin coloring, x50.

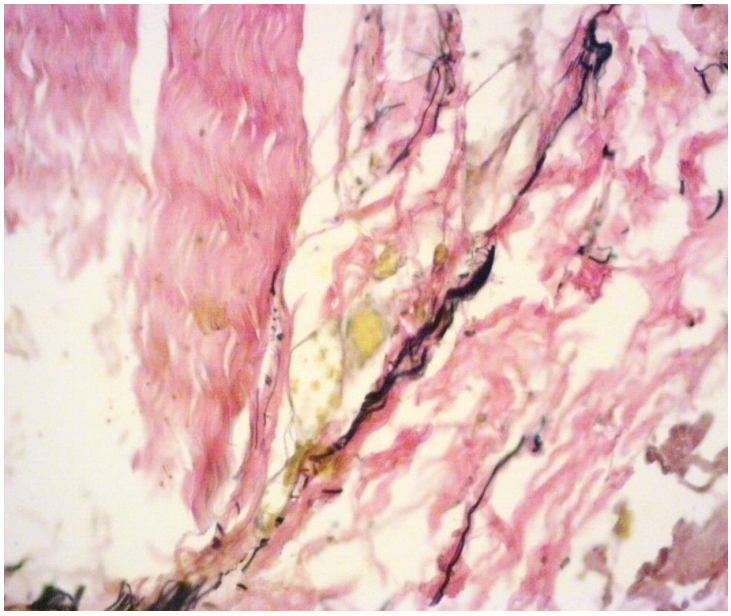

Fig. 6: Third group.
Anterior abdominal wall tissue, differentiation of elastic fibers between the fibrous tissue.
ElasticStainKit coloring, x200.

After making a morphological comparison of the three groups, it was found that in group I were signs of severe chronic inflammation with the formation of granulation of the tissue, scar tissue, destruction of elastic fibers, both in the tissue of the anterior abdominal wall and in the wall of the vascular component. The morphological picture of the II and III groups are similar, with weakly expressed chronic inflammatory infiltration, with savings of the elastic fibers and less degenerative changes. Which justifies the use of advanced TAPP techniques for recurrent inguinal hernias after Liechtenstein's surgery and proved by the results of the clinical part of the study, by reducing the frequency of recurrences.

Conclusion. The improved technique of the TAPP, which provides a wider coverage of the hernia defect with a light polypropylene mesh and additional fixation with glue on the lower edge - is more reliable and reduces the recurrence rate to 2%, compared to 8% when using the open Liechtensteins technique.

The morphological reasoning of the use of improved TAPP was the absence of atrophic changes in the muscular-aponeurotic tissues of the inguinal region, while in Liechtenstein's second operation there was atrophy, scarring of inguinal tissues, so fixation of the mesh to such tissues can leads to recurrence.

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