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Endoscopic hernioplasty for ventral hernias: rationale for surgical tactics and clinical effectiveness

Kurbaniyazov Z.B., Yuldashov P.A., Arziev I.A.
Samarkand State Medical Institute

Abstract: Minimally invasive laparoscopic techniques open up prospects in hernia surgery, which opens up new possibilities in the treatment of patients with ventral hernias*).*

Key words: endovideosurgical hernioplasty location and size of the hernia defect**.**

Relevance. Surgical treatment of hernias of the anterior abdominal wall has no alternatives to date, and the use of mesh prostheses has reduced the recurrence rate from 15-30% to 3-5% [2,3,6,10]. At the same time, traditional hernia repair is accompanied by quite significant trauma to the soft tissues in the area of the operation, which leads to severe pain during the immediate postoperative period and loss of ability to work for up to 1.5-2 months. [1,8,11]. Minimally invasive laparoscopic techniques open up prospects in hernia surgery, which opens up new possibilities in the treatment of patients with ventral hernias. Methods for intra-abdominal fixation of the prosthesis have emerged, which can almost completely eliminate wound complications and reduce treatment time [4,5,7,9,12,13].

Purpose of the study: to improve the quality of treatment of patients with ventral hernias by improving the technical aspects of endovideosurgical hernioplasty.

Material and methods. For the period from 2019 to 2021. 45 patients (14 men, 31 women, average age 51.4±6.2 years) underwent laparoscopic hernia alloplasty in the surgical departments of Clinic 1 of SamState Medical Institute. Ventral hernias were found in 26 patients in the midline of the abdomen, umbilical hernias in 15, and paraumbilical hernias in 4 patients. 65 patients (21 men and 44 women, average age 53.5±8.6 years) represented the comparison group; they were operated on using the open method. These groups did not differ statistically significantly in terms of body mass index, the presence of concomitant pathology, age composition, location and size of the hernia defect (Table 1).

According to the SWR classification developed by J. Chevrel and A. Rath (1999) [9]: in the main group in all observations R0, according to the width of the hernial orifice W1-38, W2-7.

The research methods complied with the clinical standards recommended by WHO and the Ministry of Health of the Republic of Uzbekistan: - assessment of general condition, identification of concomitant diseases and the degree of their compensation; - general clinical laboratory tests; - ultrasound examination, according to MSCT indications, endoscopic examinations.

Table 1.

Characteristics of the results research	Laparoscopic hernioplasty (n=45)	Open hernialloplasty (n=65)
Men/women	14/31	21/44
Average age (years)	51,4±6,2	53,5±8,6
Umbilical hernia	15	20

Paraumbilical hernia	4	11
Abdominal midline hernia	26	34
BMI	32,5±3,8	29,4±4,5

Laparoscopic prosthetic hernioplasty for ventral hernias was used by us in 45 patients, in the presence of small and medium hernias, with the corresponding sizes of the aponeurosis defect - up to 5 cm and from 5 to 10 cm.

Surgical intervention was performed according to standard techniques.

Stage I – insertion of the first trocar. Depending on the primary or postoperative hernia, the first trocar was inserted in two ways:

1. For patients with a primary ventral hernia, the standard method was used with the introduction of a Veresh needle, pneumoperitoneum was applied to a pressure of 12-14 mm Hg. Art., after removing the needle, a trocar was inserted into the abdominal cavity. Typically, entry into the free abdominal cavity was carried out using a special optical trocar "Visiport™" (Covidien) and then the abdominal cavity was inspected;

2. If there is a possibility of adhesions, patients with postoperative ventral hernias were treated with the Hassen technique, i.e. Using an incision 2-4 cm long, the abdominal wall was opened layer by layer, adhesions around the wound were separated under visual control, a trocar with an obturator was inserted through the incision, and the wound was sealed.

Stage II of the operation - after the introduction of the first trocar with optics and revision of the abdominal cavity, 2 or 3 working trocars were introduced. Trocar insertion sites were standardized and chosen where it was more convenient and safe. At the same time, we tried to observe the principle of interaction of two laparoscopic instruments at an angle to each other of at least 45°.

Stage III was adhesiolysis. The separation of adhesions between the hernial sac, the anterior abdominal wall and nearby organs was carried out using electrocoagulation.

Stage IV – identification of the aponeurosis defect, determination of the true size of the hernial orifice, selection of a mesh implant of the appropriate size.

Stage V – cutting out an implant whose perimeter dimensions are 5 cm larger than the size of the hernia defect and modeling a mesh implant (if necessary), marking the hernial orifice and points of fixation of ligatures, stitching the edges of the mesh implant with ligatures for its intra-abdominal straightening and pressing it to the anterior abdominal wall in front final fixation.

Stage VI. At the sixth stage of the operation, depending on the type of mesh implant, patients in the main group were divided into two subgroups. Subgroup 1 included 33 (73.3% of 45 patients who underwent laparoscopic prosthetic hernia repair) patients who used standard mesh polypropylene implants.

Subgroup 2 included 12 (26.7%) patients who received Physiomesh or Prosid (Ethicon) composite mesh implants.

In patients of the 1st subgroup, before the implant was inserted into the abdominal cavity, the peritoneum was opened, the hernial sac was isolated and a "pocket" was created in the preperitoneal space, the distance around the perimeter from the hernial orifice was 5-6 cm.

Next, a mesh implant rolled into a tube was inserted into the abdominal cavity through a trocar, unfolded and placed in the created preperitoneal "pocket". It was pressed against the anterior abdominal wall using ligatures tied along the edges of the implant.

The implant was sutured to the anterior abdominal wall using a modified Endo Close needle.

The disposable use and high cost of the Endo Close trocar puncture needle prompted us to develop a needle for reusable use. Unlike the prototype, the tip of the needle is armed with a hook

that captures and securely holds the thread when passing it through the fabric. A special notch on the cut of the needle prevents the thread from slipping when stitching the implant to the anterior abdominal wall. The special shape and grooved surface of the handle are designed for the most reliable and comfortable grip of the needle. The abdominal wall was pierced with a needle from the outside at a distance of 5-6 cm from the hernial orifice, and the puncture of the needle from the abdominal cavity was visually controlled using an endovideolaparoscope.

The use of composite mesh implants "Physiomesh" or "Prosid" (Ethicon) in 12 (26.7%) patients of the 2nd subgroup avoided the need to create a preperitoneal "pocket" before fixing the prosthesis to the anterior abdominal wall.

The Endo Close needle was used to make several punctures of the abdominal wall along the perimeter of the hernia defect. The threads were sequentially captured and brought out through one puncture onto the anterior abdominal wall. The threads were tied extracorporeally after they were completely removed.

Stage VII also varied depending on the type of implant used. Patients of subgroup 1 (n=33), where standard polypropylene meshes were used, required peritonization of the implant to prevent adhesions of the abdominal organs to the implant.

The use of a modified Endo Close needle was convenient for the surgeon and safer for the patient than intracorporeal suturing of the peritoneum.

Patients in subgroup 2 (n=12) where composite mesh implants were used did not require peritonization of the implant, i.e. this stage was absent in this subgroup.

The duration of laparoscopic hernioplasty averaged 61.5 ± 1.4 minutes, and in the 1st subgroup of the main group this figure was 71.6 ± 0.7 minutes, and in the 2nd subgroup 51.4 ± 0.6 minutes, which turned out to be less than with open hernioplasty – 104.5±3.6 minutes. ($p < 0.05$).

We associate the reduction in operation time with the laparoscopic method with the absence of the following stages, standard for open hernioplasty: 1) incision of the skin and subcutaneous tissue, 2) wide detachment of the subcutaneous tissue from the aponeurosis along the entire perimeter of the hernial orifice, 3) thorough hemostasis along the course of the hernial sac and hernial orifice, 4) manual fixation of the mesh using interrupted or continuous sutures, 5) layer-by-layer suturing of the skin wound.

Results and its discussion. Improvement of technical aspects has made it possible: - as a result of differentiated introduction of the first trocar, to eliminate such complications as perforation of the wall of a hollow organ; - by standardizing the insertion of working trocars, the technique of the operation was simplified; - due to fixation of the implant with a distance of 5-6 cm from the hernia orifice, recurrence of the hernia in the long-term postoperative period was minimized; - the use of a modified needle eliminated technical difficulties during fixation of the prosthesis and during peritonization of standard non-composite mesh implants, reducing this stage of the operation from 27.4 ± 0.5 to 12.6 ± 0.7 minutes ($P < 0.001$).

In the early postoperative period, wounds healed by primary intention in all patients; no recurrences of the hernia were noted during the follow-up period; the duration of hospital stay was 3.9 ± 1.8 days. In the second group of patients, the average length of hospital stay was 11.6±3.2 days, recurrent hernias occurred in 2 patients (3.1%), seromas formed in 5 patients (8.7%).

Long-term results were analyzed in 89 (76.1%) of 110 patients who underwent laparoscopic and laparotomic hernia alloplasty. To assess long-term results, patients underwent a thorough questionnaire, outpatient and inpatient examination. Long-term results were studied over a period of 1 to 3 years. Of 89 patients examined long-term, recurrence of the ventral hernia was noted in 7 (6.3%), while in the comparison group this figure was 9.2% (6 patients), and in the main group – 2.2% (1 patient) (Table 2).

table 2.

Characteristics of the results	Laparoscopic	Open hernialloplasty
research	hernioplasty (n=45)	(n=65)
Average operation time	114 min. (from 30 to 240)	130 min.
(min.)	3.9±1.8	(from 65 to 280)
Hospital stay	15 days (from 10 to 23)	11.6±3.2

The cause of relapse during laparoscopic prosthetic hernioplasty was the insufficient area of the prosthesis, which was selected without taking into account degenerative changes in the tissues of the abdominal wall. In an obese patient, in addition to the insufficient area of the prosthesis, the severity of the skin-fat "apron" was a contributing factor in the relapse of the disease, which displaced the implant downward. In case of severe "apron-like" abdominal deformity, the pathogenetic solution is to perform abdominoplasty.

An analysis of the quality of life of patients showed that the use of an algorithm and program for an integrated approach to choosing the optimal treatment tactics for ventral hernias made it possible to increase the proportion of "excellent and good" results from 78.1% (25 out of 32 who underwent open hernia repair) to 91.6% (33 of 36 patients who underwent laparoscopic hernioplasty) and reduce the rate of unsatisfactory outcomes from 9.4% to 2.8% (p=0.030). In general, when analyzing the results obtained, attention is drawn to significantly higher total indicators of physical and mental health indicators in patients after laparoscopic hernioplasty ($p < 0.05$).

Conclusions.

1. Endovideosurgical hernioplasty is methodologically sound and effective in the surgical treatment of small and medium-sized ventral hernias.
2. Improving the technical aspects of laparoscopic hernioplasty made it possible to reduce the average duration of the operation by 15.4 ± 0.5 minutes, the stage of fixation of the prosthesis from 27.4 ± 0.5 to 12.6 ± 0.7 minutes (P < 0.7 minutes).

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