

## MODERN APPROACH TO THE CHOICE OF SURGICAL TREATMENT OF PATIENTS WITH VENTRAL HERNIAS

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**Abstract:** The results of treatment of 76 patients with postoperative ventral and recurrent hernias were studied, who underwent plastic surgery of the hernial defect using onlay and sublay methods, as well as using separation plastic surgery with restoration of normal topographic anatomy.

**Keywords:** Postoperative ventral hernia, surgical treatment, separation prosthetic plastic surgery.

## СОВРЕМЕННЫЙ ПОДХОД К ВЫБОРУ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ БОЛЬНЫХ С ВЕНТРАЛЬНЫМИ ГРЫЖАМИ

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**Аннотация:** Изучены результаты лечения 76 пациентов с послеоперационными вентральными и рецидивными грыжами, которым производилась пластика грыжевого дефекта с использованием onlay и sublay методов, а также с использованием сепарационной пластики с восстановлением нормальной топографической анатомии.

**Ключевые слова:** Послеоперационная вентральная грыжа, хирургическое лечение, сепарационная протезная пластика.

### RELEVANCE

Despite the fact that in recent years minimally invasive methods of surgical intervention in surgical diseases of the abdominal organs have been increasingly used, the incidence of postoperative hernias remains high. According to a number of authors, the incidence of postoperative ventral hernia (POVH) after laparotomy reaches up to 20% of cases. After emergency operations, the incidence of POVH ranges from 18.1 to 58.7% of cases, with a prevalence of median hernias.

Today, more and more attention is paid to the use of alloplasty for postoperative ventral hernias, which is why more in-depth research is needed in this area. First of all, this concerns issues regarding the choice of a particular method of plastic surgery and the prevention of complications from the postoperative wound.

It is worth noting that today there is no universal method of surgical intervention. Thus, with open methods of hernioplasty, the results of surgical treatment and the incidence of postoperative complications vary and depend on the location of the synthetic material in the tissues of the abdominal wall, the so-called "sublay", "inlay", "onlay" methods. In addition, the incidence of postoperative complications also depends on the size of the hernial orifice, the condition of local tissues and work with them.

**Purpose of the study.** To optimize the tactical and technical aspects of the use of anterior and posterior separation prosthetic hernioplasty in patients with postoperative ventral hernias.

**Material and methods of the study.** The results of treatment of 107 patients operated on at the Department of Surgery of the Faculty of Postgraduate Education of the Samarkand State Medical University from 2018 to 2022 were studied. In patients with postoperative ventral and

recurrent hernias, hernial defect plastic surgery was performed using onlay and sublay methods, as well as using separation plastic surgery. All patients were divided into 2 groups depending on the method of operation used.

The first group included 51 patients who underwent open hernioplasty using separation plastic surgery and was divided into 2 subgroups: - 1.1 group of 29 patients who underwent anterior separation prosthetic plastic surgery and 1.2 group using posterior separation of the abdominal wall muscles. The second group (comparative) consisted of 56 patients who used standard hernioplasty methods such as onlay (n=38) and sublay (n=18).

All patients were divided into separate subgroups according to the classification of the European Society of Herniologists

The age of the observed patients varied from 23 to 76 years with an average of  $51.3 \pm 1.2$  years. There were 64 female patients (59.8%), and 43 male patients (40.2%).

Most often, POVGs were formed after surgical interventions on the gallbladder and bile ducts - 26.2% of observations. In the anamnesis, 21.6% of patients had 2 surgical interventions within 12 months.

The duration of hernia in the patients we observed ranged from 2 months to 10 years. Most patients underwent surgical treatment in the period from 12 to 60 months after the detection of signs of hernia formation.

In 36 cases (33.6%), the patients had a history of complications in the immediate postoperative period. In 10 (9.3%) patients, the healing of the surgical wound was secondary. Formation of ligature fistulas was observed in 11 patients (10.3%).

Among the identified concomitant diseases in the observed patients, the prevalence of cardiovascular pathologies was noted - 62 cases (57.9%), obesity was noted in 34 patients (31.7%), gastrointestinal diseases - in 49 patients (45.8%) and diabetes mellitus - in 10 patients (9.3%), 50 patients (46.7%) had more than one concomitant pathology.

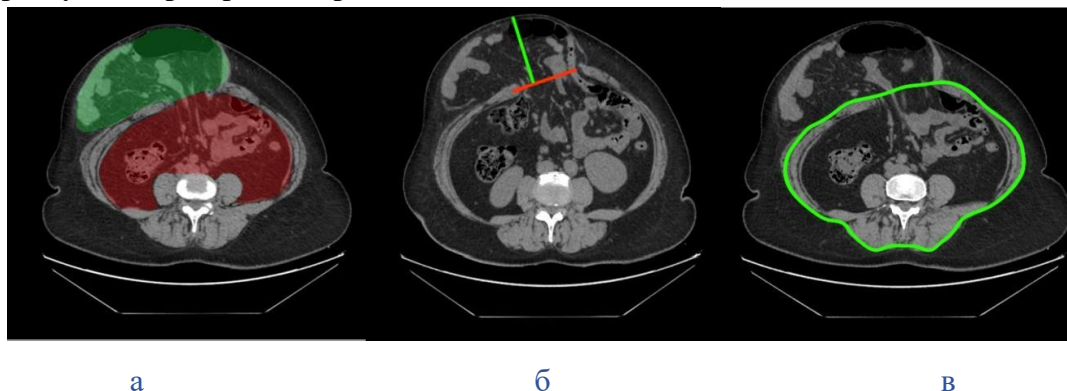
Assessment of anesthesiological and surgical risk was carried out according to the scale of the American Society of Anesthesiologists (ASA). In most cases, the patients we observed had risk grade III according to the ASA scale. Among patients of group 1.1, in 14 cases (48.3%) the risk grade according to the ASA scale corresponded to II, and anesthesiological and surgical risk grade III was established in 15 patients (51.7%). In group 1.2 patients, stage II surgical-anesthesiological risk was established in 10 (45.5%) patients, and stage III of this risk was established in 12 (54.5%) patients. In group 2, stage II surgical-anesthesiological risk was established in 27 (48.2%) patients, and stage III of this risk was established in 29 (51.8%) patients.

Most patients (n=54, 36.5%) were overweight. On average, the body mass index in patients of group 1.1 was  $33.4 \pm 3.5$  kg/m<sup>2</sup>, in patients of group 1.2 -  $34.1 \pm 2.2$  kg/m<sup>2</sup>, in patients of group 2 -  $32.2 \pm 2.2$  kg/m<sup>2</sup>.

Ultrasound of the abdominal organs, including ultrasound examination of the hernia, was performed in all 107 patients. During the ultrasound examination, the size of the hernial defect, the size of the hernial sac and the nature of its contents were determined. In the postoperative period, it was performed in 26 patients (24.3%) for monitoring and assessing complications. In the postoperative period, ultrasound was performed on the 3rd, 7th and 10th days.

CT examination of the abdominal organs was performed in 7 patients (6.5%), whose hernias were giant in size (over 15 cm).

Using CT examination, we determined the ratio of the size of the hernial sac to the volume of the abdominal cavity in order to predict the risk of compartment syndrome development after hernioplasty in the preoperative period.

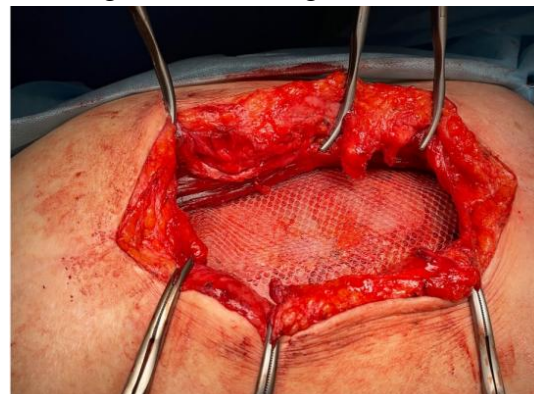


**Figure 1. Scheme of measuring CT dimensions: a – volumes of the hernial sac and abdominal cavity, b – dimensions of the hernial orifice and hernial sac, c – circumference of the abdominal wall**

In patients of the main group (n=51), hernia repair was performed in 29 patients of subgroup 1.1 using the anterior separation technique of dividing the abdominal wall muscles. For this purpose, adhesiolysis was performed after laparotomy. Then, the posterior leaf of the sheath of the rectus abdominal muscles was dissected with a 0.5-1 cm indentation from their edges. When separating the rectus abdominal muscles with their division from the posterior leaf of the aponeurosis, it was possible to preserve the perforating vessels and nerves passing in this area. Also, on the right and left sides of the surgical wound, mobilization of the anterior abdominal wall was performed by transecting the muscular aponeurosis of M. obliquus externus abdominis, starting from the edge of the costal arch and up to the inguinal canal (Fig. 2).



**Figure 2. Rectus muscle separation stage**



**Figure 3. Mesh implant placement**

A lightweight mesh endoprosthesis made of polypropylene was installed on the platform formed in this way, which was sutured transdermally in 6 areas using monofilament suture material with long-term absorption properties (Fig. 3).

The aponeurosis of the anterior abdominal mesh was sutured with a continuous suture using the same monofilament suture material using the Small byte 4:1 technology.

Drainage tubes for Redon drainage were brought to the subcutaneous fat areas, the outer ends of the tubes were brought out to the anterior surface of the abdomen through separate punctures. The operation was completed by suturing the skin. The duration of the operation in the first group of patients averaged  $134.4 \pm 41.2$  min.

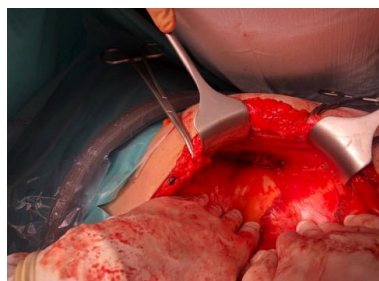
In patients of group 1.2 (n = 22), the posterior separation plastic technique was used for hernioplasty. When carrying out this method, laparotomy and adhesion dissection are performed sequentially. After this, the posterior leaf of the rectus abdominis sheath is opened with an indentation of 5–10 mm from its edge. It is necessary to take into account that at the border of the transition of the anterior leaf of the aponeurosis to the posterior leaf, there are branches of the thoracoabdominal nerves, they should be preserved. Indenting 5 mm to the medial side from the area of the junction of the two leaves of the aponeurosis above the transverse muscle, the posterior leaf of the sheath is opened (Fig. 4).

It is considered most optimal to perform this stage of the operation in the area of the upper third of the abdomen, since in this area the muscle is the most developed and is located closer to the midline of the abdomen. Next, the fibers of the transverse muscle are separated from the fascia of the same name, after which the fibers of the transverse muscle are dissected (Fig. 5).

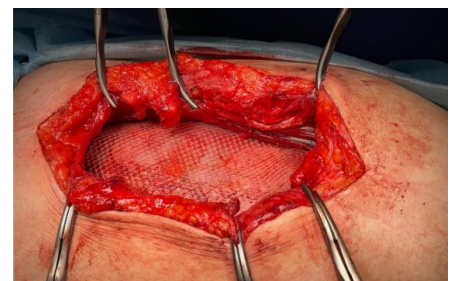
Thus, access is formed to the space between the transverse fascia and the lateral edge of the intersected transverse muscle. The tissues are mobilized to the upper side up to the level of the costal arch and xiphoid process, and below the isolation was carried out up to the Retzian space and Cooper's ligaments. Only after such isolation of tissues on both sides can the posterior wall of the rectus abdominis sheath be sutured without tension. After this, a mesh endoprosthesis is placed under the rectus abdominis muscles and sutured transdermally in 6 areas using monofilament suture material with long-term absorption properties.



**Figure 4. Stage of separation of the rectus muscle Figure 5. Stage of intersection of the transverse muscle Figure 6. Positioning of the mesh implant**



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## RESULTS AND DISCUSSION

The main factor influencing the choice of the surgical method in patients of all 3 observed groups was the intraoperative study parameters of the intra-abdominal pressure level. When measuring the initial parameters of intra-abdominal pressure in the patients we observed, a direct relationship was noted between these parameters and the size of the hernial orifice ( $p < 0.05$ ). At the same time, these values did not reach the threshold level of stage I intra-abdominal

hypertension (12-15 mm Hg), the average IAP values were  $10.8 \pm 1.3$  mm Hg. When measuring IAP after reducing the edges of the hernial orifice in patients with W2 hernias, a slight increase in IAP parameters relative to their initial values was observed - up to  $8.5 \pm 0.8$  mm Hg, while the resulting difference in the parameters was not statistically significant ( $p > 0.05$ ). In patients with W3 hernias, when the edges of the hernial orifice were reduced, there was a significant increase in IAP values to a level corresponding to grade I intra-abdominal hypertension, which averaged  $12.8 \pm 1.9$  mm Hg ( $p < 0.05$ ), and in patients with W4 hernias, the level of intra-abdominal pressure after reducing the edges of the hernial orifice was significantly higher than in patients with W3 hernias, and on average they were  $14.7 \pm 1.7$  mm Hg ( $p < 0.05$ ), which corresponded to the upper limit of grade I intra-abdominal pressure. The results of control studies of the IAP level, conducted in the postoperative period, showed that as the effect of muscle relaxants ceased and the patient recovered from the effects of anesthesia, a significant increase in the IAP level was observed. Thus, in patients with W3 size hernias, the IAP level on the first postoperative day increased to an average of  $15.2 \pm 1.5$  mm Hg, remaining at  $14.8 \pm 1.8$  mm Hg ( $p < 0.05$ ) by the third day of observation, which corresponds to grade I intra-abdominal hypertension. In patients with W4 size hernias, on the first postoperative day, the IAP level increased to  $16.7 \pm 4.2$  mm Hg, which corresponded to grade II intra-abdominal hypertension, and by the third postoperative day, there was a slight decrease in the IAP level to  $14.6 \pm 2.8$ , which corresponded to grade I intra-abdominal hypertension. Only in patients with W2-sized hernias, regardless of the method of hernioplasty used, were there no statistically significant differences in the IAP values measured on the first postoperative day and after bringing the edges of the hernial orifice together ( $p > 0.05$ ), while by the third postoperative day, the IAP values returned closer to the initial values. A slightly different picture is observed when monitoring the IAP level in the postoperative period in patients with large hernias corresponding to W3 and W4, who used separation methods of hernioplasty. When measuring intra-abdominal pressure after bringing the edges of the hernial orifice together, a reliable increase in the IAP values relative to its initial values was observed. On the first postoperative day, a slight decrease in the IAP values was observed, which by the third postoperative day were already approaching the initial values ( $p < 0.05$ ). Thus, according to the results of the study of the IAP level in the perioperative period, when choosing a standard method of hernioplasty in patients with W3 and W4 hernias, one cannot rely on the IAP values measured after bringing the edges of the hernial orifice together. This is due to the fact that in the postoperative period, the IAP values will be significantly higher, since the patient is under anesthesia and under the influence of muscle relaxants during the operation. The results of perioperative monitoring of intra-abdominal pressure indicate the tension nature of the onlay and sublay methods of hernioplasty, and therefore their use for hernias of sizes W3 and W4 is not recommended. At the same time, the non-tension nature of the separation methods of hernioplasty was confirmed.

Based on the results of our study, we proposed our own algorithm for choosing a hernioplasty method in patients with median hernias of sizes W2-W4 (Fig. 7). In case of application of separation methods of hernioplasty, the condition of tissues was assessed, primarily the rectus abdominis muscles, which influenced the choice of the method of plastic surgery according to the degree of reconstruction of the normal anatomy of the anterior abdominal wall. A great danger during operations in patients with ventral hernias is the development of intra-abdominal hypertension syndrome (IAHS), which occurs due to the so-called "non-containment". With this complication, disorders of the respiratory and cardiovascular systems occur first of all.

## CONCLUSIONS

The results of perioperative monitoring of intra-abdominal pressure at  $W3-W4 \geq 11$  substantiate the priority of posterior separation hernioplasty, at  $<11$  it is possible to perform anterior separation plastic surgery. The algorithm for choosing the method of standard (onlay, sublay) or separation (anterior, posterior) plastic surgery for postoperative ventral hernias W2, W3, W4 is based on the condition of the muscular-aponeurotic structures of the anterior abdominal wall and the indicator of intraoperative monitoring of intra-abdominal pressure. Optimization of the tactical and technical aspects of surgical treatment of patients with postoperative ventral hernias made it possible to reduce the frequency of immediate postoperative complications from 16.1% to 9.1% and relapse from 10.7% to 4.5% ( $p < 0.05$ ).

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