

### A Modern Solution in Less Invasive Treatment Tactics of Complex Inguinal Scrotal Hernias

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#### ABSTRACT

The frequency of occurrence of the inguinal hernias is 60% among other types of abdominal hernias. Accordingly, the problem of the inguinal hernias is very common, especially in men, and on average, hernioplasty for inguinal hernias is 40%. It is always difficult to find a solution in complex and complicated forms of the inguinal hernias. Depending on the traditional classification, the so-called gigant inguinal-scrotal hernia has a recurrence rate of 25-35% after hernioplasty. And according to the size and shape of this type of the hernia, scientists have different opinions on the choice of the plastic surgery. There is no clear classification of the size of the inguinal-scrotal hernias and the number of recurrences.

**Relevance.** One of the most frequently performed abdominal surgeries in the world's leading medical clinics is hernia surgery. Abdominal hernia repair accounts for 37% of daily operations for abdominal pathology [1,7,14,17]. One of the urgent problems of herniology is the correct choice of the optimal plasty method for complex and recurrent hernias.

The percentage of hernia recurrence is 30% with autoplasty, and after alloplasty this figure remains at the level of 5-7% [4,11,12,16,18]. Theodor Billroth wrote about herniology two centuries ago (1885) and said: "If such a tissue were created to replace the fascia, we would be completely spared from the recurrence of hernias", but despite the development of many types of allomaterials, the number of relapses remains high [2,6,9,10].

The introduction of laparoscopic hernioplasty has caused some progress in herniology, and the number of relapses has sharply decreased. Protasov A.V. and Cooper, N.J., after adequately performed laparoscopic hernioplasty, re-visiting a surgeon for inguinal hernias decreased from 10% to 2% [3,5,12,17]. This indicates the high role and importance of laparoscopic hernioplasty for inguinal hernias.

The frequency of Zhou hernias is 60% among other types of abdominal hernias [1,8,12,15,16]. Accordingly, inguinal hernia problems are very common, especially in men, and on average, inguinal hernia repair accounts for 40% of hernias [3,8,11,12,18]. It is always difficult to find a solution for complex and complicated forms of Chow's hernias. According to the traditional classification, the so-called giant inguinal hernia has a recurrence rate of 25-35% after hernioplasty [12,17,19]. And depending on the size and shape of this type of hernia, scientists have different opinions about the choice of plastic surgery. There is no exact classification of the size and number of hernia recurrences.

Despite the large number of cases and relevance, research work on the use of minimally invasive and open methods for inguinal hernias is rarely covered in the literature.

Therefore, we sought to improve the results of surgical treatment of complex hernias by developing new approaches and comparative analysis.

**Material and research methods.** In the department of thoracoabdominal surgery of the multidisciplinary clinic of the Tashkent Medical Academy, the clinical results of 102 patients who were hospitalized during 2014-2022 were studied. with a diagnosis of inguinal hernia III B according to the classification of L. Nyhus.

All patients were male, by age 34 (33.4%) patients were aged 18–30 years, 43 (42.1%) were aged 31–50 years, 25 (24.5%) were older than 50 years . According to the hernia anamnesis, 46 (45.1%) patients had a hernia for one year, 41 (40.1%) - from 2 to 5 years, 15 (14.8%) - more than 5 years.

**Table 1**

	18-30 y	31-50 y	50 above age	general
1 y	15(14,8%)	20(19,6%)	11(10,8%)	46(45,1%)
2-5 y	14(13,7%)	17(16,7%)	10(9,8%)	41(40,1%)
over a 5year	5(4,9%)	6(5,8%)	4(3,9%)	15(14,8%)
	34 (33,4%)	43(42,1%)	25(24,5%)	102 (100%)

In the preoperative period, 79 (77.4%) patients had a monolateral location and 23 (22.6%) patients had bilateral inguinal hernia, of which 8 (7.8%) were assessed as bilateral inguinal hernia, and the remaining 15 (14 , 7). %) was operated on with a diagnosis of unilateral inguinal hernia and bilateral inguinal hernia. In 28 (27.5%) cases, patients had a recurrence of inguinal hernia, and 3 (2.9%) of them had a recurrence.

18 (17.6%) patients had cholelithiasis, 3 (2.9%) had a simple liver cyst, 5 (4.9%) had a hiatal hernia, and 2 (1.9%) had obesity II degree. completed.

Among the additional diseases, 7 (6.9%) patients had ischemic heart disease, II degree arterial hypertension, 4 (3.9%) patients had moderate type 2 diabetes mellitus, 5 (4.9%) patients had chronic cerebrovascular insufficiency of the 1st degree., 4 (3.9%) patients had a peaceful period of chronic obstructive pulmonary disease.

Inguinal hernias are a form of inguinal hernia in which the hernial product is located at the superior border of the inguinal hernia (below the base of the penis). According to the classification of L. Nykhus, inguinal hernias were classified as type III B, which caused us difficulties, and their uncontrolled types, as well as their forms and the number of relapses according to their size, were not specified according to this classification in the diagnosis.

We divided inguinal hernias into several levels in order to predetermine the intraoperative analysis of surgical tactics. To do this, the location of the hernial sac in patients in a standing position was determined according to anthropometric structures.

We studied inguinal-scrotal hernias, divided into levels according to the following criteria:

Inguinal-scrotal hernias I– degree. Small hernias (up to 10 cm). The hernia was set in the abdominal cavity, the size of the hernia was not changed. The patient had not previously undergone hernioplasty. Congenital inguinal-scrotal hernias.

Inguinal-scrotal hernias II – degree.

- ✓ Large inguinal-scrotal hernias (up to 20 cm) are located in the abdominal cavity, the size of the uterus is increased. Acquired inguinal hernia. Sliding hernias (up to 10 cm in size).
- ✓ Recurrent inguinal-scrotal hernias (up to 10 cm in size)
- ✓ small congenital inguinal-scrotal hernias (up to 10 cm).

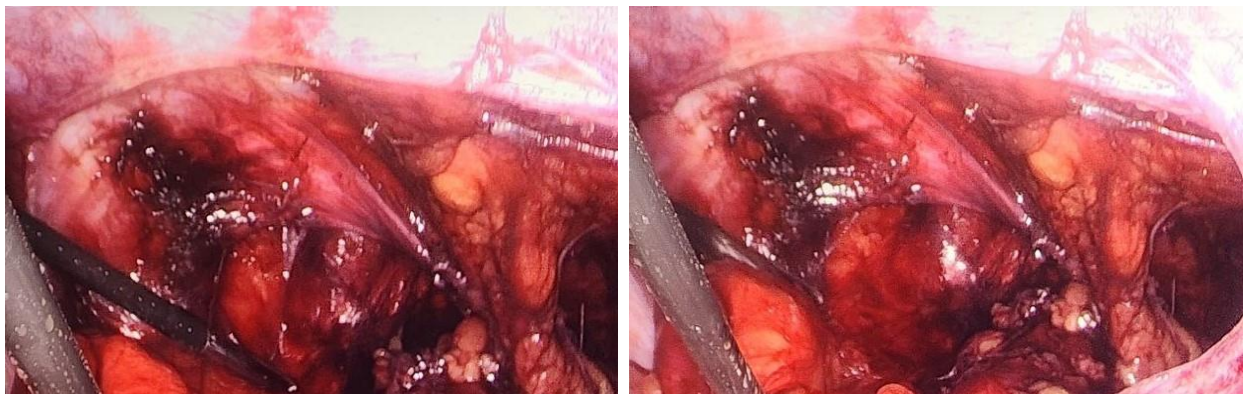
Inguinal-scrotal hernias III – degree. Irreducible inguinal hernias up to 20 cm in size. Recurrent hernias up to 10 cm. Large congenital inguinal-scrotal hernias over 10 cm in size. Large sliding hernias (from 10 cm to 20 cm).

Inguinal-scrotal hernias IV – degree. Large hernia (more than 20 cm), changes the shape of the pelvis (increases), interferes with walking. Unrepairable hernias or hernias that cannot be repaired intra-abdominally due to their large size.

According to the classification we developed, in 48 (47.1%) cases of reducible hernias, they were classified as Inguinal-scrotal hernias I– degree, and surgical interventions were performed using the transabdominal preperitoneal hernioplasty (TAPP) method. Laparoscopy was performed in 19 (18.6%) patients with grade Inguinal-scrotal hernias II– degree, and in 11 (10.8%) patients, surgery was completed using the TAPP method. In other cases, the method of helping hands was used.

The patient was placed on the operating table in Troyanov's position, TAPP was performed in the standard way, a camera was inserted above the navel and under his control two working instruments were introduced from the right and left iliac regions. After that, the food was separated from the tissues located under the parietal peritoneum, in the form of a crescent 3 cm above the internal opening. Find the lateral angle of the symphysis and the upper anterior angle of the ilium. In most cases, the hernial sac was attached to the testicular system and its vessels, the vessels gradually separated and descended into the abdominal cavity. The prosthesis was fixed to the symphysis and the upper anterior edge of the ilium with the help of hernia staples, and the peritoneum was reconstructed with absorbable sutures with continuous intracorporeal sutures. At the second stage, simultaneous laparoscopic operations were performed, for which operations were performed by installing working trocars corresponding to the supra-umbilical branches of the abdomen, without changing the optical trocar in the abdominal cavity.

The peculiarity of umbilical hernias is that due to the fact that the peritoneum has grown to the umbilical cord, in most cases it is attached to the egg. Here, separation of the parietal layer was somewhat difficult compared to conventional inguinal-scrotal hernias, and during separation, hematoma of the vessels of the seminal system or damage or rupture of the upper testicular membranes was avoided.



**Clinical results and analysis.** In 67 (65.7%) patients with scrotal hernias, TAPP with reducible hernias was performed, and the remaining 35 (34.3%) patients were operated on with a hernia history of 5 years or more and a diagnosis of uncontrolled scrotal hernia.

The width of the gate was measured in each case in accordance with our proposed intraoperative method for determining the size of the hernia orifice. Then, in 34 (33.4%) reducible hernias, the width of the hernial orifice is 2x3 cm, in 17 (16.7%) 3x4 cm, in 8 (7.8%) 4x5 cm, in 7 (6.9%) patients the width hernial orifice is 2x3 cm. It turned out to be more than 5 cm. Accordingly, prosthetic products measuring 6x12 cm, 10x15 cm, 15x15 cm were made and installed in the preperitoneal region.

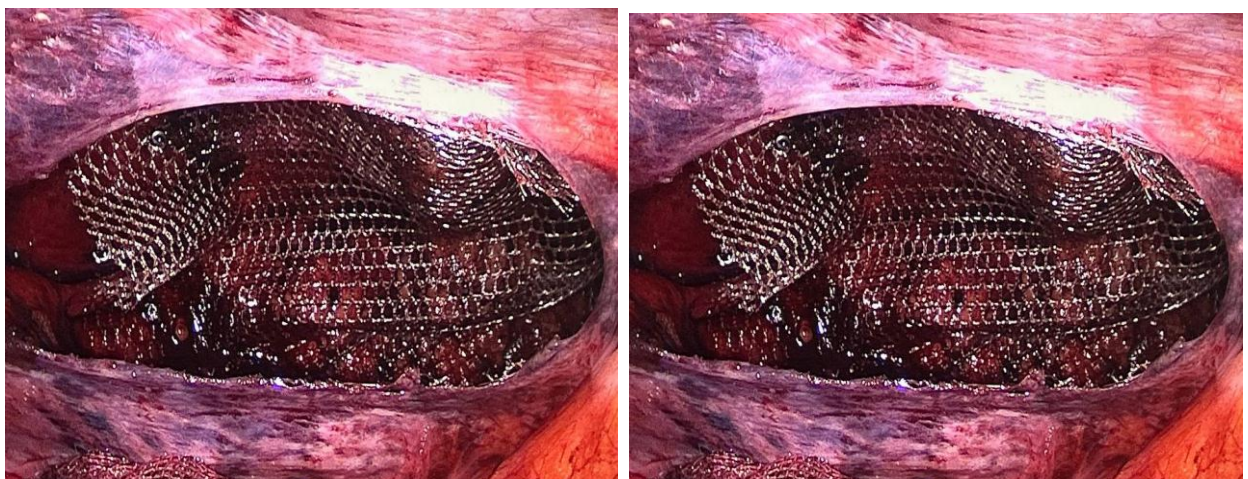
**Table 2**

	Hernia ring width	patients undergoing surgery TAPP
1	2x3 cm	34(33,4%)
2	3x4 cm	17 (16,7%)
3	4x5 cm	8 (7,8%)
4	more than 5 cm	7 (6,9%)
	overall	67

In 31 (30.4%) cases, TAPP was performed without technical difficulties in reducible inguinal hernias. Of the remaining 16 (15.7%) cases, in 8 (7.8%) cases, a hematoma of the reproductive system developed, and in 4 (3.9%) cases, the peritoneum adhered to the egg, peritoneal bleeding during separation and at the site of the hernial sac, in placenta, the formation of a cavity in the form of a residual cavity was noted. In 4 (3.9%) cases, electrocoagulation was performed, which was stopped due to ongoing bleeding from the ovarian membrane.

Patients became more active in the early postoperative period. The duration of surgery in patients with reducible inguinal-scrotal hernias averaged 65±6 minutes. In the early postoperative period, 3 (2.9%) patients with technical difficulties had an increase in the size of the joint and pain. Ultrasound examination revealed scrotum hematoma in 2 (1.9%) patients, signs of acute orchidepididymitis in 1 patient. Due to the fact that the size of the hematoma did not decrease in dynamics, in 2 (1.9%) patients the hematoma was removed by opening the flap. Patients with symptoms of acute orchidepididymitis were prescribed conservative treatment on the recommendation of a urologist.

According to the intraoperative examination, 2 (1.9%) patients aged 20-22 years had a congenital inguinal hernia, that is, the testicle and part of the large intestine were located inside the hernial sac. Due to the impossibility of complete separation of the hernial sac in patients, the remaining part of the egg around the parietal peritoneum was cut and placed in the uterus. In the late postoperative period, ovarian cysts were detected in patients, the fluid was removed by puncture under the control of ultrasound. 3 months after the operation, 1 (0.98%) patient developed a relapse, due to the ongoing course of the disease, he underwent the Winckelmann operation.



With 4 (3.9%) recurrent inguinal hernias, it was not possible to separate the gates due to the presence of a strong cicatricial process in the small pelvis. 3 (2.9%) hernia products, a sliding hernia of the bladder, when separating the periperitoneal region, due to the large size of the hernia orifice, used the Hand Assist method. To do this, under laparoscopic control, if the hernia product itself forms a large hernia, the abdominal part of the hernia is dissected with a ligature, and the part that is adjacent to the walls of the hernia is removed from the hernia through a small incision.

According to the long-term results, 4 (3.9%) patients had a hernia recurrence. And when the surgical reports of these patients were reviewed again, they showed that the size of the hernia orifice was more than 5 cm. The patients underwent repeated TAPP, the hernial orifice was sutured with intracorporeal sutures, after which a prosthesis was installed. Long-term results of treatment of patients did not show relapses.

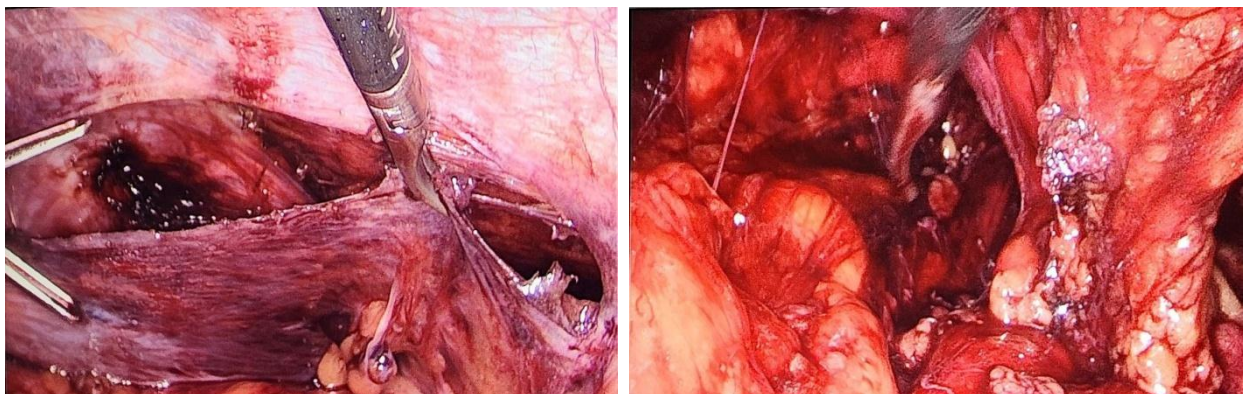
We were approached by 35 (34.3%) patients planned for TAPP with an irreducible inguinal hernia. All patients have a history of hernia for 5 years or more. It was found that 3 (2.9%) patients had a history of compression. 7 (6.8%) patients had a recurrent inguinal hernia, 3 (2.9%) had their first Liechtenstein operation, and 2 (1.9%) underwent autoplasty twice.

According to the classification we developed, uncontrolled hernias were examined for the following types: 21 (20.6%) patients were diagnosed with IS-III and 14 (13.7%) IS-IV degrees.

**Table 4. Classification of irreducible inguinal-scrotal hernias according to the developed classification**

	Deegrees of inguinal-scrotal hernias	Patients
	IS-III	21 (20,6%)
	IS-IV	14 (13,7%)

In 16 (15.7%) patients with IS-III level, intraoperative dissection of the periportal tissues was not enough to reduce the hernia product into the abdominal cavity; the hernia product could not be reduced into the abdominal cavity. In this case, we found it necessary to work in the method of helping hands. In 7 (6.9%) cases, when the hernia product was the intestine, the intestine was resected into the abdominal cavity through a small incision, and in the remaining 9 (8.8%) cases, the hernia product was a large hernia, and part of the hernia was removed through the external incision .



After that, the portal was sutured with intracorporeal sutures, and the prosthesis was placed in the preperitoneal region and fixed to the symphysis and ilium. The parietal peritoneal defect was sutured intracorporeally with Vicryl 2.0 suture. In 2 (1.9%) patients, during laparoscopy, it was found that part of the small intestine was in the form of a hernial product, and when using the assisted method, the intestinal walls were desecrated. Therefore, in this case, it was necessary to

switch to conversion.

Technical difficulties were observed in patients diagnosed with IS-IV degree. When viewed during the operation, he formed a dense fusion with the hernial orifice. The hernial orifice was separated by dissection, but it was not possible to correct the product, so the Hand Assist method was used. However, we observed that 1 (0.98%) patient developed ovarian cysts and the Winkelmann procedure was performed. In 7 (6.9%) patients, laparoscopy failed to determine what the hernial product is due to a pronounced adhesive process in the hernia area, and all these patients underwent open alloplasty.

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After operations performed by TAPP and Hand Assist methods, there were no problems with injuries, and rapid healing was observed. However, in 2 (1.9%) patients who underwent TAPP, placental hematoma was observed, which was removed by incision. In 1 (0.98%) patient, due to the symptom of orchidepididymitis, conservative therapeutic measures were taken with a consultation with a urologist. Reddening of the wound was observed in 3 (2.9%) patients with IS-III, the wound healed after conservative treatment. In 1 (0.98%) patient, symptoms of intestinal obstruction were observed in the postoperative period and resolved after gastrointestinal stimulation.

The analysis of our clinical results shows that reducible inguinal hernias should be removed laparoscopically. According to statistics, the frequency of recurrence of inguinal-scrotal hernias after open alloplasty reaches 5-10%, of course, the skill of the surgeon and the quality of the used prosthetic product play a big role here [1,6,10,13,19]. ]. In our experience, there were patients who underwent open hernia repair up to 8 times, and when we performed laparoscopy, we were sure that the inner ring was always reinforced, and the hernia came out of the outer ring, and there were no relapses after it TAPP. Considering the development of less invasive methods and their practical importance in modern medicine, the complication rate is very low, TAPP is very suitable for hernias. However, there is a percentage of complications after TAPP with reducible inguinal hernias. Intraoperative damage to the scrotum, orchidepididymitis or hematoma developing in the postoperative period indicate the need for further improvement of the method and development of algorithms for surgical treatment.

Irreducible inguinal-scrotal hernias require an individual approach with preliminary preparation before the surgeon. In our opinion, the L. Nyhus classification is not enough for this type of hernia. According to the classification of L. Nyhus III V, they are classified as oblique hernias or hernias, but the criteria for reducible or non-reducible, congenital or acquired hernias are not specified. This creates some difficulties in surgical tactics. Therefore, in order to further clarify the diagnosis, we divided the uncontrolled inguinal-scrotal hernia into types of IS-I, II, III, IV and developed specific criteria for this.

Inguinal-scrotal hernias cannot always be completely removed laparoscopically. Our clinical studies also show that the previously used term "giant hernia" may challenge laparoscopic technology. However, we found out in which cases it is better to proceed completely laparoscopically or to switch to the Hand Assist method, as well as directly to the Lichtenstein method.

According to the results, the complication rate after complete TAPP is 1.9%, after manual assistance 1.9%, after Lichtenstein 2.9%. According to the overall results, complications did not exceed 5%. prof. Egiev I.I. (2022) says that complications after small hernias can be up to 4-6%, and with complex hernias up to 10% [4,13,16,18].

Thus, inguinal-scrotal hernias are more difficult to treat than inguinal hernias, and are a clinically complex type of hernia that requires an individual approach to each patient. Surgical procedures, especially for large inoperable hernias, are technically challenging and result in conversion in most laparoscopic procedures. Diagnosis of irreducible inguinal-scrotal hernias based on criteria based on the clinical course and anthropometric body measurements contributes to the predetermination of surgical approaches and, in turn, to a positive outcome of subsequent clinical outcomes. Our clinical results indicate the need for further research in this direction and allow us to draw the following main conclusions.

### **Conclusions**

1. Regardless of the size and history of reducible inguinal-scrotal hernias, it is necessary to perform TAPP. When establishing large sizes of intraoperative hernia orifices, it is necessary to close the orifice with intracorporeal sutures, followed by the installation of a wide prosthesis in the preperitoneal region. In patients with a large hernial sac, it is advisable to place a rubber retractor with an incision in the amniotic sac in order to prevent amniotic hematoma.
2. In case of inguinal hernias, it is necessary to divide into IS-I, II, III, IV levels based on anthropometric parameters of the body and clinical criteria. At the same time, in patients with IS-I, the hernia is removed by the complete TAPP method. If there are technical difficulties during IS-II laparoscopy, a good result is obtained by performing the procedure using the Hand Assist method. In IS-III, if the hernial product affects a penis other than a large one, the Hand Assist method should be used; if the penis is affected by severe adhesions, the Lichtenstein procedure is recommended.

It is advisable for patients at the IS-IV level to perform open alloplasty.

3. Hernia reduction by less invasive techniques does not require abandoning traditional alloplasty and shows that it has special advantages. If there are indications against general anesthesia, as well as in congenital types of inguinal-scrotal hernias, when the use of open alloplasty prevails from a clinical point of view, it is necessary to prescribe conservative measures to prevent the development of orchidepididymitis.

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