

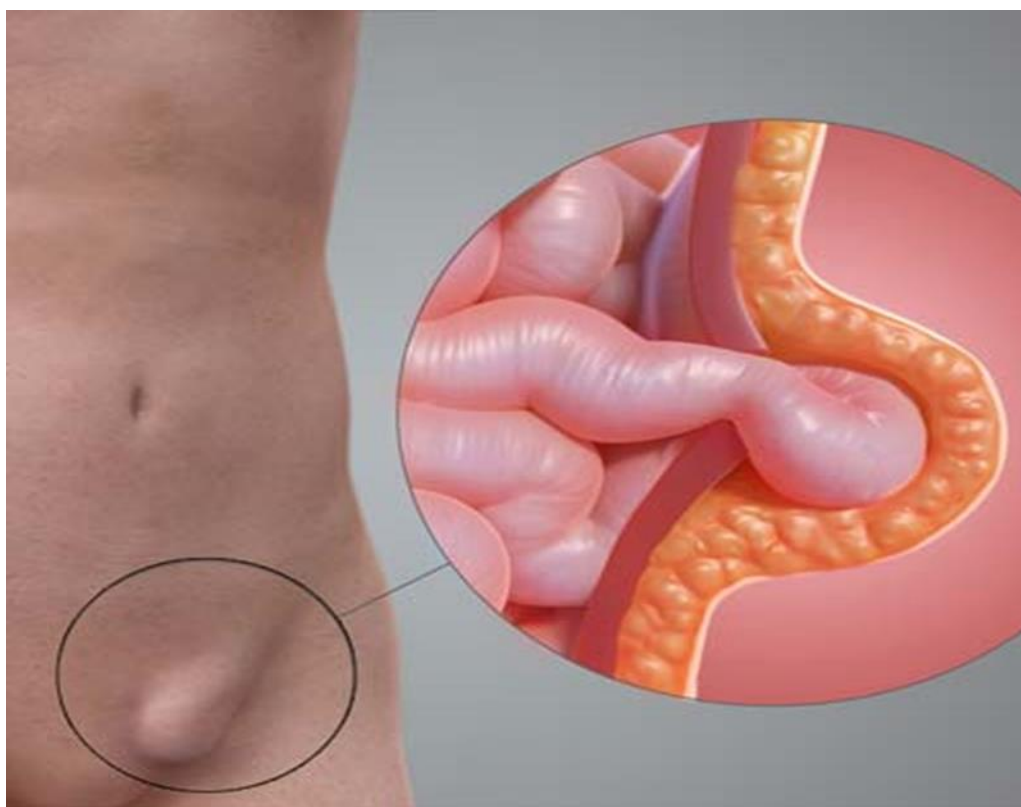
ROYAL METROPOLITAN UNIVERSITY

Department of Clinical Disciplines



INGUINAL HERNIA

Educational and methodical manual



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The educational and methodological manual is devoted to inguinal hernia. Objectives and tasks are spelled out in a form understandable to students. The presentation of the material is intended to provide students with a unified picture, since this material is based on a universally recognized academic structure in the world, starting with etiology/pathogenesis and ending with diagnostics (including instrumental and differential) and treatment (including conservative and surgical). In order to check the level of students' knowledge, control questions, tests and tasks, and situational problems are given.

The educational and methodical manual is written in English at the highest level and is intended for international students of the 6th semester of the Faculty of "Medical Science" of the RMU.

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1. Introduction

Relevance. The first place among the hernias of the anterior abdominal wall is occupied by inguinal hernias (66.8 %), followed by femoral (21.7 %), umbilical (6 %) and all the others (5.5 %).

The introduction of new methods of surgical treatment led to a significant reduction in the frequency of inguinal hernia recurrences to (1-5%). At the same time, surgical methods for the treatment of inguinal hernias at the present stage are extremely numerous, which indicates the dissatisfaction of surgeons with the results of treatment of this disease. Intra- and postoperative complications, even with seemingly simple types of surgery, such as open herniation, still reach 4-8%.

The occurrence of seroma, or hematoma, damage to the groin-iliac nerve, long-term postoperative causalgia, etc. complications are not far from casuistry.

The second side of the problem is a relapse of inguinal hernia. The causes of recurrence of the disease may not always be clear, but is often a result of the use of any one or more of the ways plastics without taking into account topographic and anatomical features of the inguinal region, the state of its tissues, like hernias, age of the patient [1, 2].

The purpose of this training lecture is to show surgeons and help them master modern approaches and methods to the organization of surgical care for patients with inguinal hernias; to consider the issues of surgical tactics, the technique of performing the main modern methods of hernia repair and inguinal canal plastic surgery.

As a result of mastering the educational material, students should supplement their knowledge with the following theoretical knowledge:

1. Classification of inguinal hernias.
2. Anatomy of the inguinal and femoral canals.
3. Features of the clinical picture of inguinal hernias.
4. Methods of plastic surgery of the inguinal canal with local tissues.
5. Methods of alloplasty of the inguinal canal.
6. Criteria for choosing the type of inguinal canal plastic surgery.

7. Criteria for choosing the method of operation (traditional, laparoscopic).

8. Complications after surgery for inguinal hernias.

9. Rehabilitation of patients who have undergone surgery for inguinal hernias.

As a result of the replenishment of knowledge with the specified theoretical knowledge, students should master the following practical skills:

1 By all clinical methods of recognizing different types of oblique and direct inguinal hernia, systematizing its various forms according to the classification of L. Nyhus.

2. The methodology and technique of conducting herniography.

3. The main methods and interpretation of the data of ultrasound examination of hernial protrusion and inguinal region.

4. Performing open hernia sections using the main methods of tension plastic surgery (Bassini, Shouldice, MacVay, Kukudzhанov)

5. Performing open surgical procedures involving non-tensioning prosthetic plastic surgery (Lihtenshtein, Trabucco, PHS-plastic surgery)

6. The main technical techniques and rules of laparoscopic surgery, which provide for participation in the operation as the 1st assistant when performing transabdominal preperitoneal plastic surgery (TAPP) and transabdominal extraperitoneal plastic surgery (TEP)

7. Methods of prevention of intraoperative complications and methods of treatment of postoperative complications.

2. Terms and definitions

A hernia is the exit of the internal organs covered with the peritoneum through natural or artificial (arising after trauma, surgical interventions) holes in the abdominal wall, pelvic floor, diaphragm under the outer covers of the body or into another cavity. Such natural openings of the abdominal wall include the inguinal canal-the site of the formation of inguinal hernias.

The main criterion for inguinal hernia is the presence of an abdominal wall defect in the area of the inguinal canal. In this case, the presence of a hernial sac is not necessary, although usually the components of a hernia are: the hernial gate, the hernial sac, the contents of the hernial sac.

A herniated gate is a congenital or acquired defect in the musculoaponeurotic layer of the abdominal wall.

The hernial sac is the part of the parietal peritoneum that protrudes through the hernial gate.

The contents of the hernial sac can be represented by any organ of the abdominal cavity, but most often-a strand of the large omentum or a loop of the small intestine.

Recurrent inguinal hernia – a hernia that appears in the area of a previously performed herniation.

Early complications of inguinal herniation-complications that develop within 30 days after surgery. Early complications include gray, hematoma, urinary retention, purulent-inflammatory complications (suppuration, fistula).

Late complications of inguinal herniation are complications that develop within 30 days after surgery. Late complications, in particular, include chronic pain in the area of surgery.

3. Etiology and pathogenesis

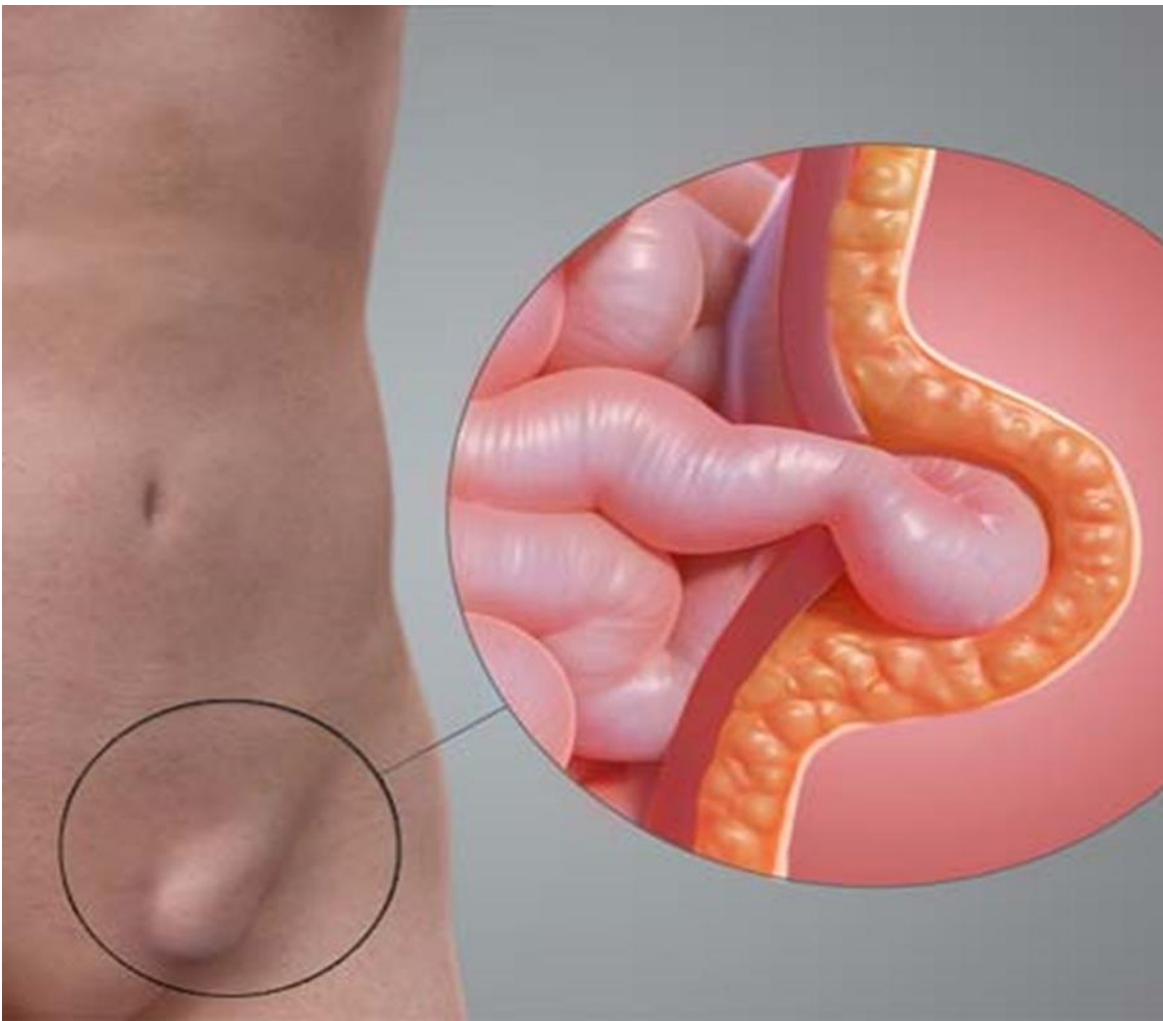


Fig. 3.1 Inguinal hernia

The causes of inguinal hernias can be divided into two groups: predisposing-gender, age, body features, anatomical weakness of the walls of the inguinal canal, etc., as well as producing-conditions that contribute to an increase in intra-abdominal pressure (heavy physical labor, diseases of the gastrointestinal tract, leading to a slowdown in bowel emptying, etc.).

Inguinal hernias are congenital and acquired, oblique and straight. Congenital inguinal hernia is always oblique and is formed only as a result of non-infection of the vaginal process of the peritoneum. The occurrence of acquired oblique and straight inguinal hernias is largely due to the anatomical weakness of the anterior and posterior walls of the inguinal canal.

One of the risk factors for inguinal hernias is the gender of the person. It is known that inguinal hernias in 82.6% are observed in males. This is due to the peculiarities of the structure of the inguinal canal in men: the deep inguinal ring is larger, the inguinal gap is higher, etc.

With mild aponeurosis of the external oblique abdominal muscle, when it has numerous interaponeurotic slits, the risk of oblique inguinal hernia is significantly higher. According to Yu. A. Yartsev weak aponeurosis of the external oblique abdominal muscle in healthy individuals is observed in 17.7%, and in herniated patients-in 32.6%.

The risk of an oblique inguinal hernia is significantly higher when the internal oblique abdominal muscle is not involved in the formation of the anterior wall of the inguinal canal and does not cover the deep inguinal ring. This anatomical variant, according to I. L. Joffe, is observed in healthy individuals in 17%, and in herniators – in 48%.

The probability of a direct inguinal hernia is significantly higher in individuals with a high inguinal gap(triangular shape), in which the posterior wall of the inguinal canal in the medial inguinal fossa is significantly weakened. The triangular shape of the inguinal space in healthy individuals is observed in 5.3%, and in hernia carriers-in 55.5%. Such a form of the inguinal space is significantly more often observed in persons of the brachymorphic body type, with a male abdominal shape, a submarginal height of more than 7.5 cm and an angle of inclination of the inguinal ligament of more than 35.

According to N. I. Kukudzhinov, the insufficient development of aponeurotic structures that strengthen the transverse fascia of the abdomen in the area of the lateral and medial inguinal pits (inter-inguinal ligament, inguinal sickle, twisted ligament) causes a large size of the deep inguinal ring and inguinal gap, and, as a result, a high risk of inguinal hernias.

It is known that inguinal hernias are significantly more common in people over 40 years of age. This is due to the fact that with age, the aponeurosis of the external oblique abdominal muscle and the transverse fascia become thinner and more

fibrous, the deep inguinal ring expands, the height of the inguinal space increases, and atrophic processes occur in the lateral abdominal muscles.

Damage to the branches of the ileo-submandibular and ileo-inguinal nerves during surgical approaches in the lateral and ileo-inguinal regions of the anterior abdominal wall leads to a violation of the innervation of the internal oblique and transverse abdominal muscles that form the walls of the inguinal canal, and, as a result, an increase in the risk of inguinal hernias.

Spermatic cord lipoma, which occurs in 32.4-72.5% of healthy individuals, is also a risk factor for inguinal hernia. The growing lipoma expands the deep inguinal ring and puts pressure on the lower edges of the internal oblique and transverse abdominal muscles, which contributes to an increase in the height of the inguinal space.

An important risk factor for inguinal hernia is the presence of undifferentiated connective tissue dysplasia, which occurs in 76.2%, and in which, due to impaired collagen synthesis, there is a weakness of the aponeurotic structures of the inguinal canal. The role of matrix metalloproteinases in the etiology of inguinal hernias is currently being actively studied. Patients with inguinal hernias in the transverse fascia of the abdomen have high levels of various types of metalloproteinases and a low content of their inhibitors.

4. Classification

Classification of inguinal hernias according to Nyhus:

Type I-oblique inguinal hernias, occurring mainly in children, adolescents, and young adults. In this type, the inner inguinal ring is usually not dilated and the hernial protrusion extends from the inner inguinal ring to the middle third of the inguinal canal. (In the literature, this type of hernia is called "channel inguinal hernias").

Type II-oblique inguinal hernias with a moderately expanded (1.5 - 2.0 cm in diameter) inner inguinal ring. In this type, the hernial sac does not descend into the

scrotum, however, when straining, the hernial protrusion is determined under the skin in the inguinal region.

Type III-weakness of the inguinal floor-is divided into: a) straight; b) oblique inguinal; c) femoral hernias.

Type IIIA - all types of direct inguinal hernias. In these hernias, there is weakness and stretching of the transverse fascia, which leads to a violation of the structure of the posterior wall of the inguinal canal.

Type IIIB-oblique inguinal hernias of large size, usually inguinal-scrotal. In this type, there is a defect in both the anterior and posterior walls of the inguinal canal. The internal inguinal ring, as a rule, considerably expanded. Sliding hernias are often observed. There may be both direct and oblique inguinal hernias, which in foreign literature is called "pantaloon hernia". Depending on the size, there are 4 degrees: 1) at the level of the inner inguinal ring; 2) descending into the inguinal canal; 3) reaching the outer inguinal ring; 4) reaching the scrotum.

Type IIIC-femoral hernias.

Type IV-recurrent hernias.

Type IVA-recurrent direct inguinal hernias.

Type IVB-recurrent oblique inguinal hernias.

Type IVC-recurrent femoral hernias.

IVD type-a combination of recurrent direct, oblique inguinal and femoral hernias.

Classification of inguinal hernias EHS (2014)

This classification makes it possible to determine the type of hernia fairly accurately and, when studying various types of hernioplasty, to objectively evaluate the advantages and disadvantages of each method, depending on the type of hernia. In addition, it is advisable to use it in order to unify the results obtained and compare them with world data. The classification is presented in the proceedings of the 35th International Congress of the European Hernia Society (35th International Congress of the European Hernia Society, Poland, Gdansk, May 2014).

EHS Groin Hernia Classification		Primary	Recurrent		
	0	1	2	3	x
L (lateral)					
M (medial)					
F (femoral)					

4.1. Clinical picture

Inguinal hernia is a tumor-like protrusion in the groin area, soft and elastic when felt. Inguinal hernias can be bilateral. Uncomplicated hernia is easily set in the abdominal cavity, appears in an upright position and under stress, accompanied by pulling and pain in the groin. Possible irradiation of pain in the lower abdomen, lower back, sacrum. Small hernias can occur without clinical symptoms. As the hernia increases, complaints appear, their intensity increases, and disability occurs. There may be constipation, as well as, with a sliding hernia of the bladder, urination disorders, pain when urinating, as well as urinary retention. Large inguinal hernias can descend into the scrotum.

5. Diagnosis

5.1. Physical examination

The examination of patients begins with an examination of the inguinal region, palpation of the inguinal region with a finger examination of the external inguinal ring, percussion of hernial protrusion. There is a swelling (protrusion) of a soft-elastic

consistency, which, in the horizontal position of the patient or when pressed, is set in the abdominal cavity, and when coughing and straining, it reappears. The "cough push" symptom is positive.

On palpation, uncomplicated hernial protrusion is painless and usually freely set into the abdominal cavity. After reduction, it is possible to detect a defect in the anterior abdominal wall (hernial gate). Level of reliability of evidence 4

On palpation, it is possible to determine the incorrectness of an inguinal hernia. Level of reliability of evidence 4

Difficulties in clinical diagnosis may occur in the initial stage of hernia formation, which may be accompanied by pain. During palpation, in most clinical cases, it is possible to determine a defect in the anterior abdominal wall, through which a small soft-elastic formation exits with an increase in intra-abdominal pressure.

In patients with typical hernia symptoms, only a clinical examination with a sensitivity of 74.5-92% and a specificity of 93% is sufficient. Differential diagnosis of direct and indirect hernia is not required. In cases of difficulties in clinical diagnosis, it is possible to use special instrumental research methods.

Level of credibility of recommendations C (level of reliability of evidence 4)

5.2. Laboratory diagnosis

Uncomplicated inguinal hernia has no effect on laboratory parameters.

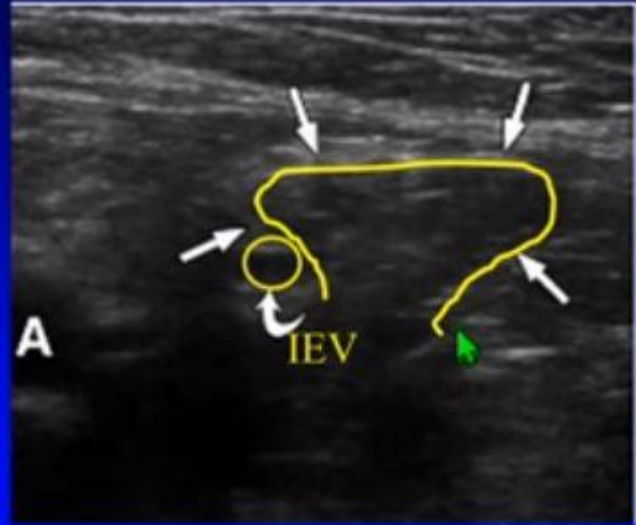
5.3. Instrumental examination

Ultrasound examination, despite its low information content, is an affordable non-invasive instrumental method for diagnosing hernias, as well as concomitant diseases of the abdominal cavity, the degree and nature of changes in the muscloponeurotic tissues of the anterior abdominal wall.

Direct inguinal hernia



Pre-Valsalva maneuver sonogram



Post-Valsalva maneuver sonogram

Fig. 5.3.1 Direct inguinal hernia

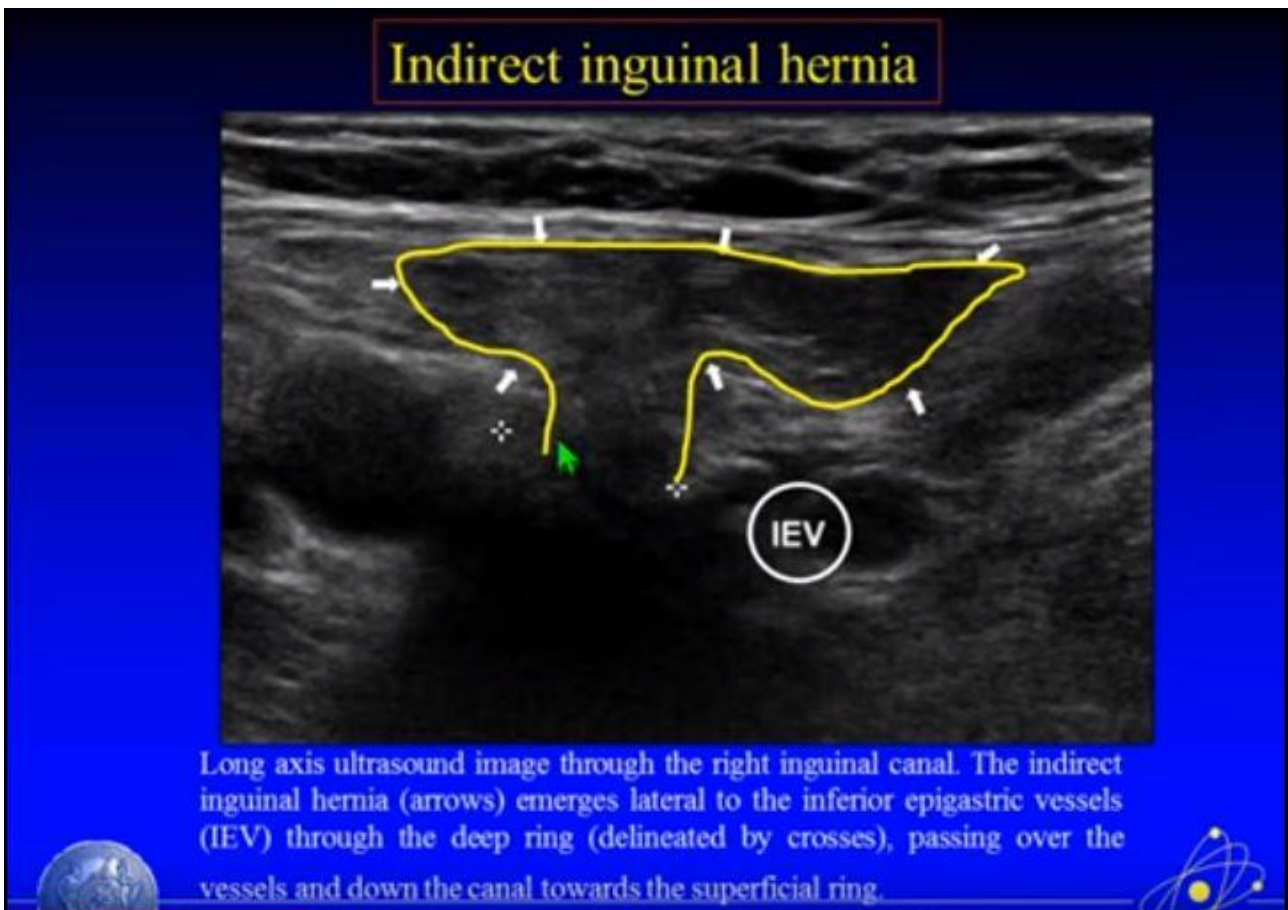


Fig. 5.3.2 Indirect inguinal hernia

The maximum diagnostic value of ultrasound is in patients with difficulties in the clinical diagnosis of inguinal and femoral hernias. Its implementation allows you to clarify the size of the hernial gate, the nature of the hernial contents, to diagnose the lipoma of the spermatic cord, hernial protrusion on the contralateral side, to conduct a differential diagnosis with other pathological conditions. The sensitivity and specificity of ultrasound in everyday practice is determined by the experience and quality of training of a specialist doctor. In the hands of a specialist, the specificity of ultrasound examination in the diagnosis of inguinal hernia and differential diagnosis with femoral hernia and tumor is 81-100%, sensitivity - 33-100%. However, in general, ultrasound examination in the diagnosis of anterior abdominal wall hernias has low sensitivity and specificity.

Level of credibility of recommendations C (level of credibility of evidence 2)

X-ray computed tomography (CT) should be used in patients with severe obesity, rare forms and relapses of hernial formations, repeated interventions on the

abdominal organs, as well as to measure the ratio of the volume of the hernia sac and abdominal cavity with the nature of the planned surgery, in particular, to prevent compartment syndrome with giant hernias

Level of credibility of recommendations C (level of credibility of evidence 2)



Fig. 5.3.3 X-ray computed tomography (CT)

Performing magnetic resonance imaging (MRI) using the Valsalva technique is the most informative in the differential diagnosis of pelvic hernias with diseases of the musculoskeletal system and the diagnosis of the adhesive process in the abdominal cavity. MRI in the diagnosis of inguinal hernia has a specificity and sensitivity higher than 94%. When using it, a tumor, a sliding hernia of the bladder can be diagnosed. The level of credibility of recommendations C (level of reliability of evidence 2) RCT and MRI have the highest indicators of sensitivity and specificity in the diagnosis of hernias.

Evidence confidence level 2

Currently, herniography



Fig. 5.3.4 Herniography

is mainly used in complex pelvic hernias for clinical diagnosis, in asymptomatic hernias (sensitivity of herniography 100%, specificity 98-100%). Despite the invasiveness of the study, the risk of allergic reactions and intraabdominal complications, herniography has the greatest informative value compared to ultrasound and RCT. Herniography can be performed in specialized surgical hospitals that have experience in performing it.

Level of credibility of recommendations C (level of credibility of evidence 2)

Diagnosis of the general condition of patients with giant inguinal hernias includes the use of functional (spirometry, pneumotachometry, echocardiography) methods that allow us to study the parameters of cardiac output, vital capacity of the lungs, the volume of forced exhalation in the first second, etc.

Level of reliability of evidence

5.4. Differential diagnosis

Differential diagnosis of hernias is performed with lymphadenitis and lymphadenopathies, soft tissue neoplasms, inflammatory infiltrate and abscess, endometrioid cyst, aneurysm, varicose vein transformation and organ ectopia.

6. Treatment

The purpose of treatment of patients with inguinal hernia is the elimination of hernial protrusion through the inguinal gap, the reduction of internal organs in the abdominal cavity and the plastic of the hernial gate.

6.1. Conservative treatment

There are no effective methods of conservative treatment of inguinal hernias. Conservative measures (wearing a bandage, limiting physical activity, limiting diet, taking laxatives) are aimed at reducing the likelihood of developing complications of inguinal hernias, but not at their treatment.

Conservative treatment, wearing a bandage and monitoring in dynamics is acceptable for patients with absolute contraindications to surgical treatment.

6.2. Surgical treatment

The main types of modern surgical interventions for inguinal hernias are based on the use of mesh prostheses. To them, first and foremost, include surgery and computer assisted surgery Lichtenstein hernioplasty. Currently, endovideosurgical methods of operations for inguinal hernia are represented by two types of surgical interventions: laparoscopic (transperitoneal) preperitonealalloplasty of the inguinal space (TAPP) and total extraperitonealalloplasty of the inguinal space (TEP). These methods, along with Lichtenstein surgery, are the methods recommended by the EHS for the surgical treatment of inguinal hernias in adults.

The level of credibility of recommendations A

TAPP is a type of plastic surgery of the inguinal space without tension with a pre-peritoneal arrangement of the mesh prosthesis. At the same time, access to the site of its installation is carried out endovideosurgically peritoneal.

TEP-a type of plastic surgery of the inguinal space without tension with a pre-peritoneal arrangement of the mesh prosthesis. In this case, access to the place of installation of the prosthesis is performed endovideosurgically extraperitoneal.

The Lichtenstein technique and the endoscopic technique for inguinal hernias are comparable in the frequency of early complications and relapses (with a follow-up period of 1-4 years), with the exception of giant hernias. The level of reliability of evidence – 1 Less frequently performed methods of PHS and Plug and Patch (mesh swab) lead to outcomes comparable in the frequency of complications with the Lichtenstein method (at the same time periods of observations)

Level of reliability of evidence – 1

JUSTIFICATION OF THE USE OF MESH PROSTHESES FOR INGUINAL HERNIOPLASTY

A large number of relapses (up to 25-30%) after inguinal hernioplasty with their own tissues led to the need to find fundamentally new ways to form the posterior wall of the inguinal canal.

In 1959, F. C. Usher proposed the use of a polypropylene mesh endoprosthesis in medicine. In the same year, J. Zagdoun developed a method for plasticizing the posterior wall of the inguinal canal with a nylon mesh endoprosthesis. In the early 70s, I.Lichtenstein proposed the concept of hernia repair for all inguinal hernias without tissue tension by prosthetics of the posterior wall of the inguinal canal with a polypropylene mesh endoprosthesis without a "muscle-tendon" connection. After 10-14 days, the mesh sprouts its own connective tissue and forms a new bottom of the inguinal canal. Due to the refusal to fix the edges of the fascia and the muscles on the inguinal ligament, the so-called "tension-free" adaptation is obtained.

OPERATION LICHTENSTEIN

ANTIBIOTIC THERAPY (ANTIBIOTIC PROPHYLAXIS) DURING OPERATION LICHTENSTEIN

Antibiotic prophylaxis does not reduce the incidence of wound infections with open mesh repair in patients with primary hernias. In the conditions of a modern clinic, there are no indications for the mandatory use of antibiotic prophylaxis during routine open plastic surgery for inguinal hernia. In the presence of risk factors for the development of wound infection in patients (relapse, old age, immunosuppressive conditions, diabetes mellitus) antibiotic prophylaxis is mandatory.

Level of credibility of recommendations A (level of reliability of evidence 1)

ANALGESIA DURING LICHTENSTEIN SURGERY

An inguinal hernia can be operated on under any type of anesthesia. In Russia, local infiltration anesthesia according to Vishnevsky is most often used.

In order to ensure an adequate course of the postoperative period and early activation of patients operated on in outpatient settings, it is advisable to conduct combined types of anesthesia using local anesthetics of long-acting (5-7 hours). Premedication, conduction anesthesia of the ileo-inguinal nerve, and case blockages significantly reduce the total dose of anesthetics administered during general intravenous anesthesia and often allow you to completely abandon narcotic drugs.

This is the prevention of complications from the central nervous system (depression, cyanotic psychosis), cardiovascular (tachycardia, rhythm disorders, coronary ischemia), respiratory, immune, and other systems. Modern tablet drugs, and intravenous drugs, allowed to completely abandon the use of narcotic analgesics in the postoperative period. Restrictions to the use of infiltration anesthesia occur in anxious patients, with morbid obesity and hernia infringement.

Level of reliability of evidence – 1

Infiltration anesthesia during surgery leads to a reduction in pain in the postoperative period.

Level of reliability of evidence – 1

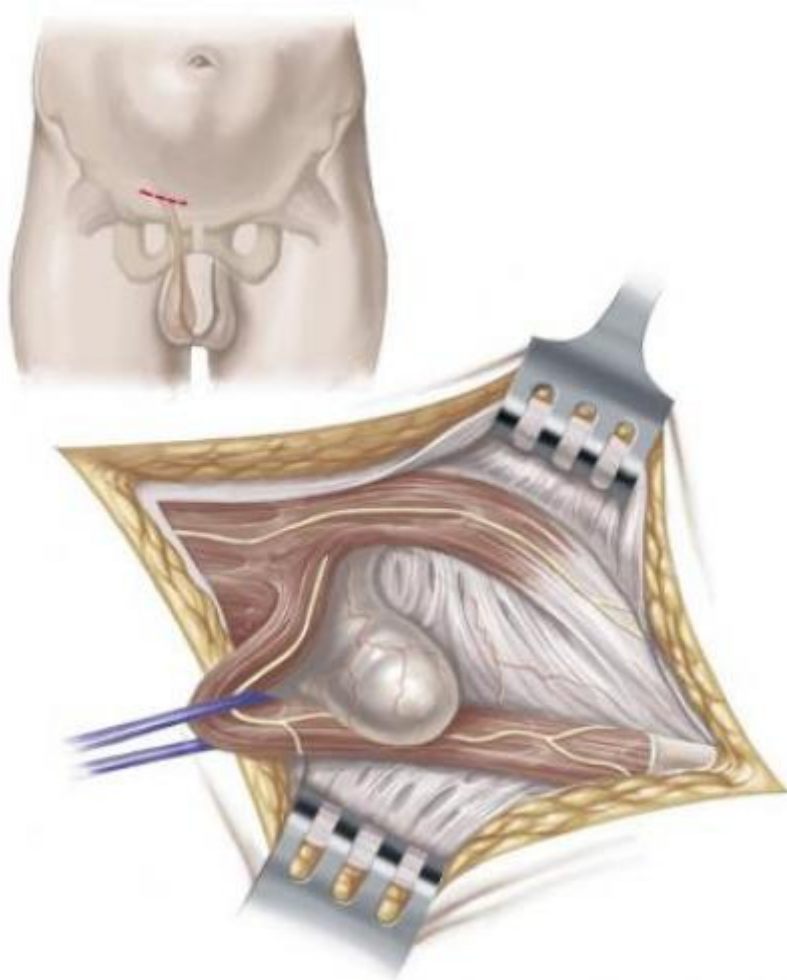
Quite often, spinal types of anesthesia are performed. In some cases, it is possible to use a balanced anesthesia with a ventilator.

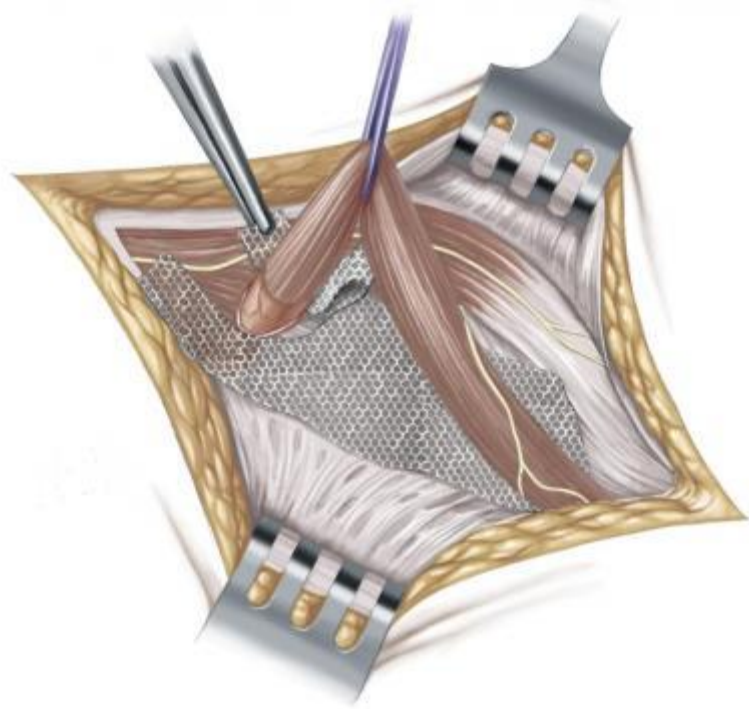
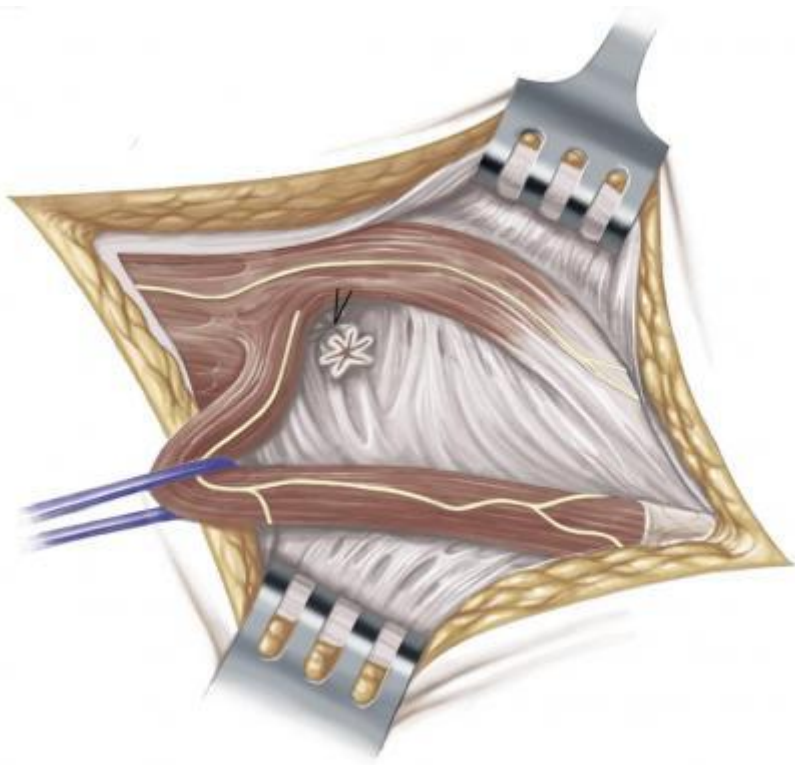
Ideally, inguinal hernia repair should be performed using a simple and safe method of anesthesia that is suitable for the patient, and that is easy to master in

general surgical practice. The method of anesthesia should be accompanied by a low risk of mortality, and should also be cost-effective. Postoperative side effects and increased hospitalization after inguinal hernia surgery are usually associated with the effects of anesthesia.

Regional anesthesia using high doses and / or long-acting drugs has no advantages in open hernioplasty and increases the risk of urinary retention.

TECHNIQUE FOR PERFORMING THE LICHTENSTEIN OPERATION





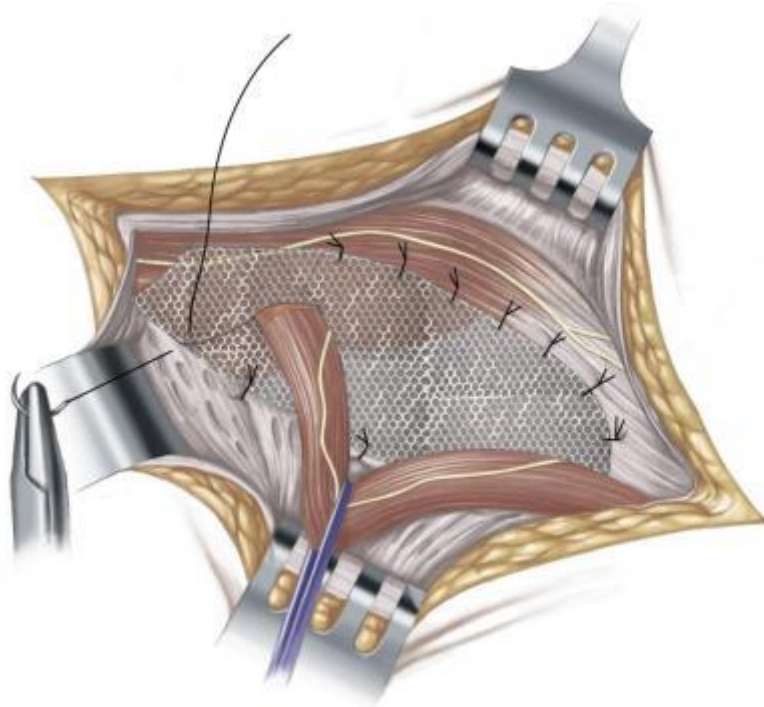
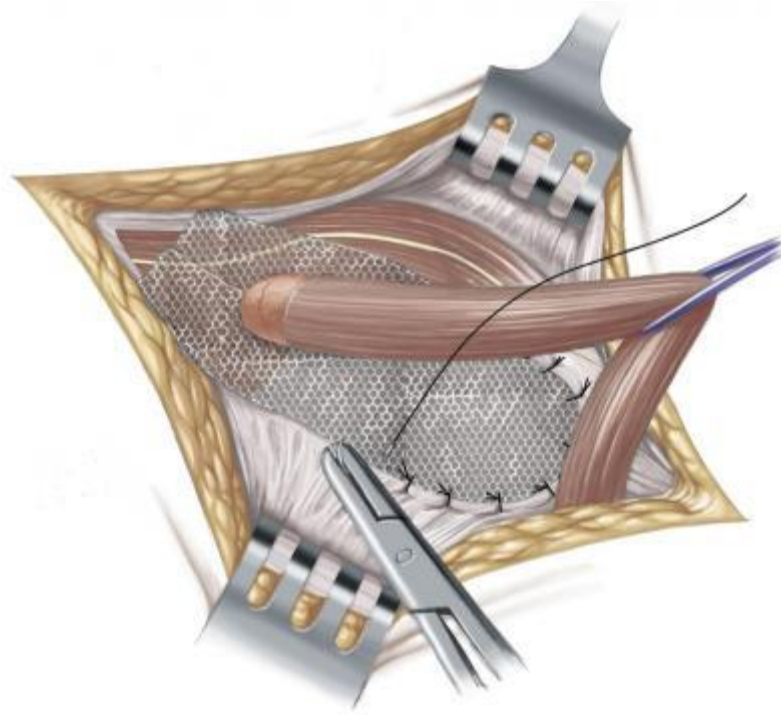


Fig. 6.2.1 LICHTENSTEIN OPERATION

The incision of the skin and subcutaneous tissue with a length of 7-10 cm fully corresponds to that of traditional hernioplasty with local tissues. Aponeurosis of the external oblique muscle is released from adipose tissue only along the dissection line. There is no need for its wide allocation as when creating a duplicate. After opening the aponeurosis with scissors and a preparation tuffer, the inguinal ligament, the edge of the internal oblique and transverse muscles by 2 – 3 cm, the edge of the vagina of

the rectus muscles and the pubic tubercle are distinguished. The finger allocates the space under the aponeurosis up along the incision for the subsequent placement of the mesh prosthesis. The spermatic cord is acutely released from the connection with the underlying tissues throughout the wound. It is impractical to partially cross the muscle that raises the testicle.

If the direct inguinal hernia is not affected, the transverse fascia above the hernial sac is not opened. The sac, covered with a transverse fascia, sinks into the abdominal cavity.

If the oblique hernia is not pinched, the vaginal membrane of the spermatic cord is opened. A small hernial sac is secreted up to the neck and invaginated into the abdominal cavity. With large oblique and inguinal-scrotal hernias, it is sometimes more advisable to first isolate the neck of the hernial sac, stitch it and bind it, and then completely remove the sac. Leaving part of the sac in the scrotum is impractical, especially in young and mature patients. After removing the sac, the vaginal membrane of the spermatic cord is restored.

In oblique inguinal hernias, when the inner inguinal ring is significantly expanded or there is a hernia with a straightened channel, the inner inguinal ring is narrowed by several sutures on the transverse fascia.

For plastic surgery, mesh prostheses with a size of 8 X13X 13 cm or slightly narrower with a small inguinal gap are used. Lightweight polypropylene prostheses are more often used. At the medial end of the mesh, the corners are rounded, from the lateral end, a longitudinal incision is made for about $\frac{2}{3}$ of the length of the prosthesis so that there is a wide branch ($\frac{2}{3}$) on top, and a narrow one ($\frac{1}{3}$) on the bottom. At the end of the incision, make a round hole up to 1 cm in diameter for the spermatic cord.

The prepared prosthesis is placed under the spermatic cord and fixed with a continuous polypropylene suture first to the vagina of the pyramidal muscle down to the pubic tubercle, then to the pubic tubercle, without capturing the periosteum. For the prevention of relapses, it is important that the prosthesis is fixed to the specified

formations not edge to edge, but is located on top of them at 1-1.5 cm beyond the suture line.

After that, the spermatic cord is transferred upwards and the same polypropylene ligature is used to fix the mesh to the Cooper ligament and the inguinal ligament to a level slightly lateral to the inner inguinal ring.

The upper edge of the mesh is fixed over the inner oblique and transverse muscles with 3-4 separate polypropylene seams or a continuous seam. In this case, the edge of the mesh should be located about 2 cm above the lower edge of the muscles. It is necessary to make sure that the nerves passing in this area do not get into the seam.

After that, the wide branch of the prosthesis is placed on top of the narrow one so that the spermatic cord is placed in the hole prepared for it, and the branches are fixed together with a polypropylene seam.

The hole in the prosthesis for the spermatic cord should pass the tip of the tool (tweezers). Both branches of the prosthesis, one on top of the other, are tucked under the aponeurosis of the external oblique muscle into the previously formed space.

Aponeurosis of the external oblique muscle is stitched edge to edge without tension.

The diameter of the forming external inguinal ring does not matter.

After that, the wound is sewn up as with traditional plastic surgery.

COMPLICATIONS OF LICHTENSTEIN SURGERY

The frequency of complications after open operations for inguinal hernia according to reviews varies from 15% to 28%. The most common early complications are hematomas and seromas (8-22%), urinary retention, and early pain. To aspirate the seroma is not recommended.

The level of credibility of recommendations C

The risk of developing a wound infection after a planned inguinal hernia repair with a mesh is about 1.3%. The use of mesh for inguinal hernia repair does not increase the risk of wound infection. Deep tissue infections are rare. Infection in the postoperative period is not an absolute indication for the removal of the

endoprosthesis. Drainage of the wound is recommended only for indications (heavy blood loss, coagulopathy).

The level of credibility of recommendations B

The grid may shift if it is not fixed properly or not properly. Cases of migration of the mesh into the lumen of the bladder, to the colon, are described. Grid migration is one of the causes of relapses.

Chronic pain is observed in 10-12% of patients. The risk of developing chronic pain after hernioplasty with mesh is lower than after plastic surgery without mesh.

The risk of developing chronic pain decreases with age. Isolation and identification of inguinal nerves during open hernioplasty significantly reduces the risk of nerve damage and the risk of postoperative chronic pain.

There is a possibility of a short-term advantage according to the criterion of chronic postoperative pain in atraumatic mesh fixation, used in the framework of the Lichtenstein method.

Level of credibility of recommendations B (level of reliability of evidence 1)

SURGERY USING A PHS ENDOPROSTHESIS (UHS)

The use of "bulk" implants allows you to combine various non-strenuous techniques in the course of one operation. The leaf of the system, located in the preperitoneal tissue, creates a reliable protective barrier that closes the lateral and medial inguinal fossa. The connector tampons the hernial gate, and the leaf located under the aponeurosis of the external oblique abdominal muscle provides all the advantages of the Lichtenstein plastic surgery.

Surgical access to the anatomical structures of the inguinal region is typical. After excision or invagination of the hernial sac, it is necessary to create a cavity between the transverse fascia and the parietal peritoneum. To do this, a large swab is inserted into the preperitoneal tissue, controlling the integrity of the lower epigastric vessels.

The front sheet of the prosthesis is folded across, then longitudinally and captured with a clip so that the tip is facing the cylinder-connector. The back leaf remains free. The posterior leaf of the system is introduced into the preperitoneal

space, straightening under the transverse fascia with a finger and a tuffer. When forming an opening in the anterior leaf for the spermatic cord, it is advisable to change the course of the latter in the proximal direction. Then the anterior subaponeurotic leaf is positioned and fixed, as in the Lichtenstein operation.

ENDOVIDEOSURGICAL TECHNIQUES OF HERNIOPLASTY (TAPP AND TEP)

The main endovideosurgical methods for the correction of inguinal hernias are laparoscopic (transperitoneal) preperitonealalloplasty of the inguinal space (TAPP)

Transabdominal preperitoneal (TAPP) inguinal hernia repair using a vertical peritoneal flap

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Background

- Transabdominal preperitoneal (TAPP) inguinal hernia repair requires a 10mm and two 5mm trocars
- Tacks for MESH fixation and re-approximation of the flap may be associated with pain and are costly
- Transverse flap creates a large wound surface

Objectives

Improved technique of TAPP with several goals

1. Peritoneal flap from a vertical midline incision
2. Avoid tacks by:
 - Use of ProGrip MESH, re-approximation of peritoneum with a running suture
3. Replace one port with a Teleflex minigrasper
4. Use 5 instead of 10-12 mm port

Surgical techniques

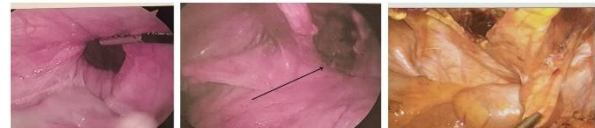
1. 1st entry port left or right upper quadrant, create pneumoperitoneum: exploration with focus on hernia(s); 5 or 10-12 mm trocar (sub)umbilical; Minigrasper at variable sites
2. Peritoneal incision in midline from subumbilical to bladder dome



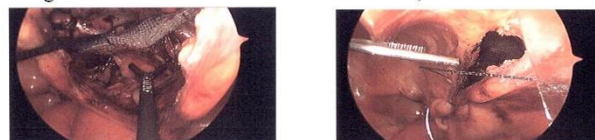
3. Traditional steps of TAPP

Result

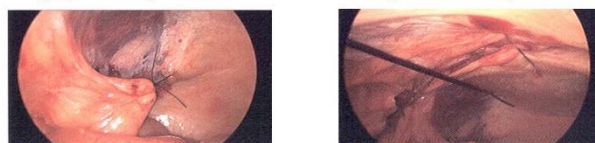
- 21m/4f; median aged 65.3 (range 36.2-82) yrs
- 19 unilateral and 6 bilateral inguinal hernias
- 2 large inguinoscrotal hernias
- 3 recurrent hernias, 5 incarcerated hernias
- Minigrasper use: 20% first 10, 67% last 15 cases
- Tacks used in 50% first 10 cases, 13% last 15 cases (in 87% flap was sutured)
- Two 5mm ports and minigrasper 4 cases



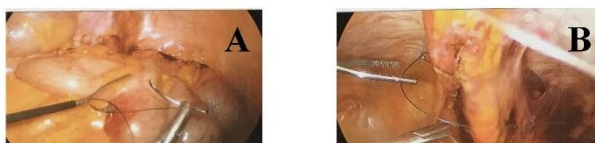
Large left IH Midline Peritoneal incision, sac reduced



ProGrip MESH placed V-lock suture of peritoneal flaps



Hernia sac "pexied" closed peritoneal midline incision



Suturing with minigrasper : A: cecum; B: peritoneum

Peritoneal flap sutured in 18 patients, in 8 using Minigrasper

- V-lock bottom to top or top to bottom; Vicryl/silk
- Hernia sac pexied in 11 cases

- Complications: seroma, (4), hematoma (1), urinary retention (2), ongoing groin pain (2), bladder injury (1)
- No recurrence: median FU 18.4 (range 6.3-26.6) months

Conclusions

Creation of peritoneal flap from midline incision is feasible and allows good access for TAPP;

Peritoneal flap can be reattached with suturing
Minigrasper can replace a 5 mm instrument with trocar
Cosmetic results excellent, great patient satisfaction
ProGrip MESH very useful in this technique

Fig. 6.2.2 TAPP

and total extraperitoneal plastic surgery (TEP).

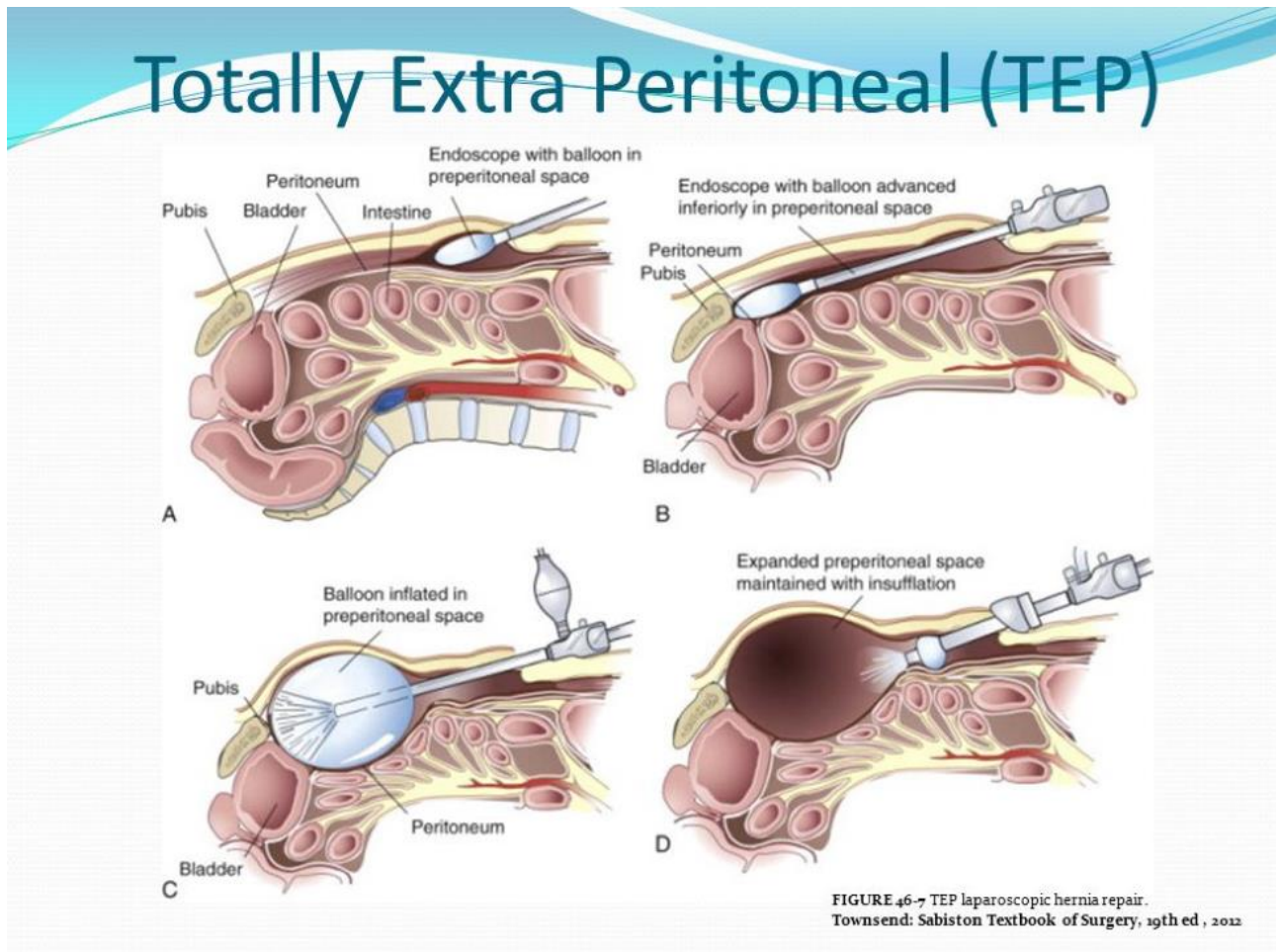


Fig. 6.2.3 TEP

Both endovideosurgical techniques are fundamentally identical: prosthetics of the posterior wall of the inguinal canal with a synthetic prosthesis with the cover of both inguinal and femoral pits are performed, and the prosthesis is located preperitoneal. The difference in the methods of access to the posterior wall of the inguinal canal: TAPP determines laparoscopic (transabdominal) access, and TEP determines extraperitoneal access.

The advantages of the method include the absence of a tense carboxyperitoneum, therefore, less impact on the cardiovascular system, less pronounced pain syndrome, and therefore better tolerability of the operation.

Proponents of TAPP consider the absence of laparoscopy itself to be the main drawback: there is no diagnostic stage of the intervention, therefore, there is no

possibility of performing simultaneous operations. The differences in quality of life associated with the operation are unreliable.

The level of credibility of recommendations B

The choice of endovideosurgical inguinal hernioplasty technique is related to the size of the hernia and the presence of aggravating circumstances, and is largely determined by the operating surgeon and the settings of the clinic.

PREOPERATIVE PREPARATION FOR TAPP AND TEP, ANITIBIOTIC PROPHYLAXIS

Antibiotic prophylaxis may not be used routinely. It is recommended for patients with risk factors for infectious complications (obesity, diabetes, immunosuppressive therapy, etc.).

The level of credibility of the recommendations C

Compulsory: early activation of patients getting out of bed immediately after recovery of cognitive functions (usually 1 hour after the end of the operation); the use of customised compression hosiery hours for 5-7 days; the implementation of Unlearning exercises physical therapy immediately after surgery; drug prevention at the suggested scheme.

PAIN RELIEF FOR TAPP AND TEP

Balanced anesthesia with a ventilator.

TECHNIQUE OF PERFORMING LAPAROSCOPIC (TRANSPERITONEAL) PREPERITONEAL ALLOPLASTY OF THE INGUINAL SPACE (TAPP)

To perform TAPP, it is necessary to have a standard endovideosurgical complex in the operating room, consisting of a video camera with a control unit, a monitor, an illuminator, and an insufflator. The standard uses a 10 mm laparoscope with an angular optics of 30 degrees, it is quite possible to use a 5 mm laparoscope.

The use of angular optics is recommended, since different angles of view are required at different stages of the intervention for optimal vision of the operation site, preserving the triangulation of the instruments, and preventing their conflict.

The trocar kit includes two 5 mm trocars and one 10 mm trocar for the laparoscope. It is possible to use two 10 mm and one 5 mm trocar. In this case, the

introduction of a mesh, needle and thread into the abdominal cavity is simplified. In cases where the patient has high requirements for the cosmetic result of the intervention, the operation can be performed using a set of 3 mm tools and trocars.

In this case, a 10 mm trocar for the laparoscope and two 3 mm trocars for working tools are used. A standard minimum set of laparoscopic instruments is used for performing TAPP: "hard" (clinch) and "soft" (grasper) clamps, scissors. Monopolar scissors are used as standard electrosurgical instruments. You also need a laparoscopic needle holder, which is used to suture the defect of the peritoneum. It is possible to use ultrasonic scissors, but this tool for laparoscopic hernioplasty is optional.

Pneumoperitoneum 12-14 mmHg is applied in the pericupial region. The use of the Veresh needle for this purpose and the open method according to Hasan are equally safe, and are the methods of choice.

The level of credibility of recommendations A (level of reliability of evidence 2)

Optical 10 mm trocar is installed on the upper semicircle of the navel. A video camera is inserted into the abdominal cavity and the other two trocars are installed under its control. They are located at the level of the navel in the gap between the midclavicular and anterior axillary lines.

After examining the abdominal cavity, the patient is given the Trendelenburg position. The inguinal spaces are examined on both sides. Thus, laparoscopy within the framework of TAPP is a method for diagnosing contralateral inguinal hernia. If a bilateral inguinal hernia is detected, it is advisable to perform surgery on the right and left inguinal spaces simultaneously, with the appropriate consent of the patient taken before the operation.

The level of credibility of recommendations B

The incision of the peritoneum should start laterally from the level of the anterior superior spine of the ilium, pass in the medial direction 3-4 cm above the upper edge of the hernial gate and reach the lig.umbilicalismedialis without crossing it. The mobilization of the preperitoneal space should be broad and extend 1-2 cm beyond the pubic joint on the medial side, to the upper anterior spine of the ilium on

the lateral side. Downwards, the pre-bubble space should be mobilized to a level 2-3 cm below the Cooper ligament and further laterally 4-5 cm below the iliac tract. It is necessary to clearly understand that in this space a grid with a size of at least 10x15 cm should fit freely and lie in the straightened state.

Level of credibility of recommendations B (level of reliability of evidence 2)

The isolation of the hernial sac in oblique hernias can be very laborious with its large size, as well as in the presence of dense adhesions with the elements of the spermatic cord due to a long history of herniation, previous infringements. Complete isolation of the hernial sac is usually possible, and does not increase the frequency of seromas and hematomas in the early postoperative period. Only in the presence of dense, difficult-to-separate junctions between the hernial sac and the elements of the spermatic cord can the hernial sac be crossed below the inguinal ring to prevent damage to the elements of the spermatic cord.

Level of reliability of evidence 4

In the case of lipomas of the spermatic cord preperitoneal space, the femoral canal must be removed, as they can mimic recurrent hernias or cause pain symptom in the postoperative period.

Level of credibility of recommendations B (level of reliability of evidence 2)

In direct inguinal hernias, the allocation of the hernial sac is much easier by separating it from the transverse fascia. In the case of large hernias, it is necessary to perform an inversion of the transverse fascia to reduce the frequency of seroma formation in the postoperative period.

The level of credibility of recommendations B (level of reliability of evidence 2)

The standard grid size recommended for TAPP is 10x15 cm.

The level of credibility of recommendations A

The use of a smaller mesh is a risk factor for relapse. Evidence confidence level 2

At the same time, the fixation (reinforced fixation) does not compensate for the small size of the grid. In cases of detection of a hernia with large hernial gates (>3-4 cm in direct hernias and >4-5 cm in oblique hernias), it is necessary to consider the use of a

larger mesh, for example, 12x17 cm. In case of non-tensioning inguinal hernia repair (including TAPP), it is necessary to use synthetic non-absorbable meshes, or composite meshes with a non-absorbable component.

The level of credibility of recommendations A

It is believed that large pores contribute to better integration of the mesh into the tissue, cause a high level of elasticity, and the monofilament structure of the thread has a higher resistance to infection. The use of lightweight coarse-porous meshes contributes to a faster recovery in the first weeks after surgery, but does not affect the quality of life and the regression of discomfort in the future.

Evidence confidence level 1

The authors of the chapter on mesh selection in the recommendations of the International Endohernia Society (IEHS), based on the results of five randomized studies with a level of confidence of evidence 1, give the following parameters of meshes recommended for use in TAPP: monofilament structure, pore size 1-1.5 mm, strength more than 16N/cm.

Some authors believe that cutting out a hole in the mesh for the spermatic cord may be a risk factor for hernia recurrence, so it is advisable to use a non-split mesh. A complete prosthesis can be used with sufficient mobilization of the flap of the parietal peritoneum downwards (the criterion for adequate mobilization is the free, without deformities and displacement, location of the prosthesis during an attempt at peritonization). If it is not possible to adequately separate the peritoneum, a lateral cutting of the prosthesis is possible, followed by bringing its lower lobe under the previously mobilized spermatic cord with prosthetics of the inner inguinal ring.

Level of credibility of recommendations B (level of reliability of evidence 3)

When performing TAPP, it is possible to use a grid with or without fixing. However, at present, data on the effectiveness of using a conventional flat mesh without fixation in TAPP are few, in contrast to the TEP method. Nevertheless, we can talk about the availability of data with a high level of reliability of evidence, indicating the effectiveness of the fixation-free technique in hernias with small hernial gates (less than 3 cm). The use of a conventional flat mesh without fixation in

TAPP can be considered in patients with small hernias (L I-II, M I-II according to EHS). Level of credibility of recommendations B (level of reliability of evidence 1) Fixing the mesh with TAPP can be carried out with the help of seams (used extremely rarely), various types of spirals, brackets, anchors, as well as fibrin or synthetic glue.

From the point of view of the occurrence of hernia recurrence, the effectiveness of rigid fixation (spirals, brackets, anchors) and the use of glue has no statistically significant differences.

Evidence confidence level 1

It is also proven that adhesive fixation is associated with a lower severity of acute postoperative pain and the frequency of chronic pain. At the same time, it is necessary to note the opinion of experts that in the presence of a large hernia (L-III, M-III), it is advisable to fix the mesh with a rigid fixation. Evidence confidence level 1

Self-fixing meshes have special micro-hooks in their structure, with the help of which the endoprosthesis is fixed. There are numerous data on the effectiveness of such meshes for open inguinal hernia repair, as well as on the reduction of the risk of developing chronic pain in the long-term period when using them. As for laparoscopic plastic surgery using self-fixing meshes, currently research in this direction is actively conducted. Completed studies are rare. These studies indicate the effectiveness and safety of using self-locking meshes in TAPP. However, there is currently insufficient data to formulate clear recommendations. This issue requires further study, and this section will be revised in the future.

Evidence confidence level 2

Anatomical meshes are made in the form of a "cast" of the inguinal space of a person, repeating the anatomical curves and irregularities of this area. The main idea of using these meshes is the possibility of reducing the fixation points or completely abandoning the fixation, as well as the convenience of positioning the endoprosthesis. These grids can be used for TAPP. A number of studies have shown good results

regarding the frequency of relapse and the development of chronic pain, however, these studies have a low level of reliability of evidence.

Suturing the defect of the peritoneum is an important stage of the operation. Insufficiently thorough suturing of this defect increases the risk of intestinal obstruction in the postoperative period.

Level of reliability of evidence 3

The defect of the peritoneum can be closed with the help of sutures, brackets, spirals. Most experts believe that it is most appropriate to suture the defect of the peritoneum with a continuous absorbable suture.

The level of credibility of recommendations C

After desufflation and removal of trocars, wounds of 10 mm or more should be sutured with a peritoneal grip to prevent the formation of postoperative (trocar) hernias.

The level of credibility of the recommendations C

FEATURES OF TAPP IN INGUINAL-SCROTAL HERNIAS

Performing TAPP is possible with inguinal-scrotal hernias. At the same time, we should expect an increase in the time of surgery, the number of complications and the frequency of relapses in comparison with the results of interventions for conventional inguinal hernias. The most common complication is the occurrence of seromas and hematomas.

Level of reliability of evidence 3

TAPP surgery for inguinal-scrotal hernia should be performed by a surgeon who has extensive experience in performing these operations.

The level of credibility of recommendations C

Complete isolation of the hernial sac laparoscopically in inguinal-scrotal hernia is possible.

Level of reliability of evidence 3

In the presence of dense, difficult-to-separate junctions between the hernial sac and the elements of the spermatic cord and the danger of their damage, it is possible

to cross the hernial sac below the inguinal ring. The bottom of the hernial sac can be removed through a 2-3 cm incision at the root of the scrotum.

The level of credibility of recommendations C

FEATURES OF TAPP FOR NON-PERMANENT INGUINAL HERNIAS

Performing TAPP is possible with non-permanent inguinal hernias. At the same time, we should expect an increase in the time of the operation in comparison with the intervention for a reversible inguinal hernia. The frequency of complications and relapses does not differ significantly. In most cases, in the conditions of muscle relaxation and tense carboxyperitoneum, the hernial contents are reduced to the abdominal cavity with minimal intra-abdominal traction (that is, the hernia is repairable, but, more often, fixed). Dissection of the hernial ring is best performed after partial mobilization of the preperitoneal space in the upper-outer direction with an oblique hernia and in the upper-inner direction with a straight hernia.

Level of reliability of evidence 3

FEATURES OF TAPP IN WOMEN

Women have a high incidence of femoral hernias, both primary and after inguinal hernia surgery. In this regard, it is recommended to use a laparoscopic method of surgery in women. It allows you to close the mesh simultaneously both the lateral and medial inguinal fossa, and the inner opening of the femoral canal.

(Level of reliability of evidence 2)

FEATURES OF TAPP IN BILATERAL INGUINAL HERNIAS

In bilateral inguinal hernia, endovideosurgical interventions (especially TAPP) are the method of choice.

Evidence confidence level 2

If a contralateral inguinal hernia is detected during surgery, it is advisable to perform a simultaneous operation on the left and right inguinal spaces, with the appropriate consent of the patient taken before the operation.

Recommendation credibility level C (evidence confidence level 5)

INTRAOPERATIVE COMPLICATIONS OF TAPP

Damage to the intestine. The average incidence of intestinal injuries is about 0.1% and does not differ statistically from this indicator in open surgery.

Damage to the bladder. The average incidence of bladder injuries is also about 0.1%, which is statistically higher than in open surgery.

Damage to large vessels. The average incidence of large vessel damage is estimated at approximately 0.09% and does not differ statistically from this indicator in open surgery.

EARLY POSTOPERATIVE COMPLICATIONS OF TAPP

Wound infection. The average incidence of this complication is estimated to be about 1 %, which is more than twice lower than in open surgeries.

Hematoma. Inguinal hematoma occurs on average in 8-13% of cases after TAPP, which is statistically lower than with open interventions.

Seroma. It occurs more often after laparoscopic interventions than after open operations. The average frequency of occurrence after TAPP is estimated at approximately 7-12%. It should be noted that seroma is treated as a complication only in some studies and in a number of studies is regarded as a feature of the postoperative period.

LONG-TERM POSTOPERATIVE COMPLICATIONS OF TAPP

Pain that lasts for more than 3 months is considered chronic. The risk of developing chronic pain after laparoscopic plastic surgery is lower compared to open plastic surgery with and without mesh.

Evidence confidence level 1

Risk factors for the development of chronic pain are: the presence of a history of other symptoms associated with pain, age younger than 40 years, the presence of severe acute postoperative pain, laparoscopic intervention for recurrent hernia.

Evidence confidence level 2

Indicators of the frequency of chronic pain after surgical treatment of inguinal hernia differ in pronounced heterogeneity, but on average they can be estimated at 10-17%.

TOTAL EXTRAPERITONEAL PLASTIC SURGERY (TEP)

Scope of application: small inguinal hernias (L I-II, M I-II according to EHS).

TECHNIQUE OF PERFORMING TEP

To perform TER, it is necessary to have a standard endovideosurgical complex in the operating room, consisting of a video camera with a control unit, a monitor, an illuminator, an insufflator, an electrosurgical unit and an aspirator-irrigator. The standard uses a 10 mm laparoscope with an angular optics of 30 degrees, it is quite possible to use a 5 mm laparoscope. The use of angle optics is recommended.

The trocar kit includes two 5 mm trocars and one 10 mm trocar for the laparoscope. It is possible to use two 10 mm and one 5 mm trocar. In this case, the introduction of the mesh into the working cavity is simplified. In cases where the patient has high requirements for the cosmetic result of the intervention, the operation can be performed using a set of 3 mm tools and trocars. In this case, a 10 mm trocar for the laparoscope and two 3 mm trocars for working tools are used. The diameter of the working trocars may vary, depending on the chosen method of fixing the prosthesis.

A standard minimum set of laparoscopic instruments is used for performing TEP: "hard "(clinch) and" soft " (grasper) clamps. It is possible to use ultrasonic scissors, but this tool for laparoscopic hernioplasty is not optional. To create a working volume in the pre-abdominal space, there are special cylinders-dissectors, it is possible to use an optical trocar.

Access to the pre-abdominal space is carried out immediately under the navel (for an analog, you can take the Hassan method). After dissection of the skin, the anterior and posterior leaves of the aponeurosis of the rectus muscles, without opening the peritoneal leaf, the direction of dissection changes to the pubic joint along the midline. Creating a working volume in the preperitoneal space can be carried out: by finger dissection, by laparoscope dissection in the case of using an optical trocar and additional carbon dioxide insufflation, and, finally, by a special dissector balloon. The latter, in an inoperable state, is gently passed through the created access to the pubic joint and inflated. The design of the balloon allows you to control the process through a laparoscope, the exposure of the inflated balloon in 5

minutes provides absolute hemostasis in the preperitoneal space. The pressure in the balloon is released and the balloon is removed from the preperitoneal space.

An optical 10 mm trocar is installed in the wound, sutured to the trocar, a carboxyretroperitoneum is applied up to 8-10 mm Hg. A laparoscope is inserted into the preperitoneal space and under its control the remaining two trocars are installed at the level of the navel as laterally as possible. There is a method of installing all trocars along the middle line: the 1st under the navel, the 2nd 5 mm above the womb and the 3rd in the middle between them. Both options require perfect manual skills, since the angles of interaction of the instruments are sharper than with TAPP, that is, the principle of triangulation can not always be observed.

After examining the working preperitoneal space, the patient is given the Trendelenburg position. The only anatomical reference point is the pubic joint, that is, laparoscopy within the TEP, as a diagnostic stage, is absent.

An additional instrumental dissection is performed in the direction of the hernia, the spermatic cord is visualized. The mobilization of the preperitoneal space should be broad and extend 1-2 cm beyond the pubic joint on the medial side, to the upper anterior spine of the ilium on the lateral side. Downwards, the pre-bubble space should be mobilized to a level 2-3 cm below the Cooper's ligament and further laterally 4-5 cm below the iliopsoal tract. It is necessary to clearly understand that in this space a grid with a size of at least 10x15 cm should fit freely and lie in the straightened state. Thus, this stage of intervention is similar to that of TAPP.

The isolation of the hernial sac in oblique hernias can be very time-consuming, especially in cases of congenital hernia. Complete isolation of the hernial sac is usually possible, and does not increase the frequency of seromas and hematomas in the early postoperative period. Resection of the hernial sac is not performed, since the opening of the parietal peritoneum loses the very idea of TEP.

In the case of detection of lipomas of the spermatic cord, preperitoneal space, femoral canal, they must be identified at the level of the upcoming plastic surgery, because they can simulate and provoke a recurrence of a hernia or manifest as a

painful symptom in the postoperative period. In direct inguinal hernias, the allocation of the hernial sac is much easier by separating it from the transverse fascia.

The standard mesh size recommended for TEP is 10x15 cm. The use of a smaller mesh is a risk factor for relapse, and fixation (enhanced fixation) does not compensate for the small size of the mesh. The characteristics of the mesh prosthesis correspond to those when performing TAPP.

Level of credibility of recommendations A (level of credibility of evidence 2)

When performing TEP, it is possible to use the grid both with and without fixing. Currently, the use of a conventional flat mesh without fixing at TEP is effective. There are data with a high level of reliability of evidence, indicating the effectiveness of the fixation-free technique in hernias with small hernial gates (less than 3 cm).

Level of credibility of recommendations B (level of reliability of evidence 1)

Fixing the mesh at TEP can be carried out with the help of seams (used extremely rarely), various types of spirals, brackets, anchors, as well as fibrin or synthetic glue.

From the point of view of the occurrence of hernia recurrence, the effectiveness of rigid fixation (spirals, brackets, anchors) and the use of glue does not have statistically significant differences. Adhesive fixation is accompanied by a lower severity of acute postoperative pain and the frequency of chronic pain.

Evidence confidence level 1

INTRAOPERATIVE COMPLICATIONS OF TEP

Damage to the parietal peritoneum. The average frequency of occurrence is 10%, which is not a significant complication. Options for getting out of the situation: 1) continuation and completion of the intervention according to the TEP method, 2) in case of significant difficulties, transfer of the operation to the TAPP.

Damage to the intestine. The average frequency of occurrence is about 0.1%, which does not statistically differ from this indicator in open surgery.

Damage to the bladder. The average frequency of occurrence of bladder injuries is about 0.1%, statistically more than in open surgery.

Damage to large vessels. The average incidence of large vessel damage is estimated at approximately 0.09%, and does not differ statistically from this indicator in open surgery.

EARLY POSTOPERATIVE COMPLICATIONS OF TEP

Wound infection. The average incidence of this complication is about 1 %. Hematoma. Inguinal hematoma occurs on average in 3-5% of cases after TEP, which is statistically lower than with open interventions.

Seroma. The average frequency of occurrence after TEP is estimated at approximately 4-6%. It should be noted that seroma is treated as a complication only in some studies and in a number of studies is regarded as a feature of the postoperative period.

POSTOPERATIVE RECOVERY AFTER ENDOVIDEOSURGICAL HERNIOPLASTY

The use of endoscopic methods of inguinal hernia repair leads to an earlier return to normal life or to work than the use of Lichtenstein plastic surgery.

Evidence confidence level 1

It is recommended to consider the possibility of using the endoscopic method, if rapid postoperative recovery is of particular importance.

The level of credibility of recommendations A

FEATURES OF SURGICAL TREATMENT OF RECURRENT INGUINAL HERNIAS

THE MAIN CAUSES OF RECURRENT INGUINAL HERNIAS

Operations using a mesh endoprosthesis are characterized by a lower number of relapses than interventions in which the mesh is not used. Evidence confidence level 1

Predisposing factors are the use of a mesh prosthesis of an inappropriate (small) size and technical errors in the fixation of the endoprosthesis. The risk of recurrent hernias increases with the development of early postoperative purulent-inflammatory complications and with surgery for recurrent inguinal hernia (the more recurrent hernias in the anamnesis, the higher the risk of a new relapse).

The producing factors in recurrent inguinal hernias are the same as in other variants of anterior abdominal wall hernias: increased intra-abdominal pressure as a result of postoperative intestinal paresis, early intestinal obstruction (most often adhesive), with concomitant diseases (for example, chronic obstructive pulmonary disease and benign prostatic hyperplasia), early excessive physical exertion, etc.

Prevention of recurrent hernias in the postoperative period consists in quitting smoking, limiting prolonged and heavy physical work, and preventing and treating COPD, prostatitis, and constipation. Alternative methods of plastic surgery with a mesh, with the exception of Lichtenstein plastic surgery and endoscopic techniques, have not received sufficient scientific evaluation.

RELAPSES OF INGUINAL HERNIAS AFTER LICHTENSTEIN SURGERY

Relapses are noted, according to various data, from 0.9 to 5.25% of cases. The main cause of relapses is considered to be technical errors during the operation: 1.

1. Insufficient endoprosthesis size;
2. Incorrect fixation of the endoprosthesis;
3. Poor preparation of tissues and their incorrect identification.

THERAPEUTIC TACTICS IN PATIENTS WITH RECURRENT INGUINAL HERNIA AFTER LICHTENSTEIN SURGERY

If anterior inguinal hernioplasty (Lichtenstein surgery) was previously used, it is advisable to use posterior inguinal hernioplasty (open preperitoneal mesh surgery or endoscopic access). Level of credibility of recommendations A (level of credibility of evidence 1)

In recurrent hernias after traditional open plastic surgery, the use of endoscopic methods leads to a reduction in postoperative pain and to a faster recovery, compared with the use of Lichtenstein plastic surgery.

Evidence confidence level 1

Surgery for a complex inguinal hernia (repeated relapses, chronic pain, infection of the mesh) should be performed by a specialist in the field of hernia repair.

The level of credibility of recommendations C

PREVENTION OF RELAPSES AFTER LICHTENSTEIN SURGERY

To prevent relapses, the following measures are proposed: the mesh should overlap the inner inguinal ring by 4 cm, overlap the Hesselbach triangle by 3 cm, overlap the pubic tubercle by 2 cm, and the Cux window should correspond to the diameter of the spermatic cord. The best way out of this situation is to use standard endoprotheses for inguinal hernioplasty, or to prohibit the use of self-cut endoprotheses smaller than 7 by 12 cm.

RECURRENT INGUINAL HERNIAS AFTER TAPP

Endoscopic hernioplasty using a mesh prosthesis no larger than 8×12 cm is associated with a higher risk of recurrence compared to the Lichtenstein technique. Thus, the size of the mesh prosthesis for endoscopic hernioplasty should be at least 10×15 cm.

Evidence confidence level 2

When performing endoscopic inguinal hernia repair, TAPP is accompanied by a higher frequency of trocar hernias and internal organ injuries, which is probably why TEP is more preferred. Evidence confidence level 2

THERAPEUTIC TACTICS IN PATIENTS WITH RECURRENT INGUINAL HERNIA AFTER TAPP

If a posterior inguinal hernioplasty was previously used, anterior prosthetic repair (according to Lichtenstein) is indicated.

The level of credibility of the recommendations C

FEATURES OF TAPP IN RECURRENT INGUINAL HERNIAS

It is possible to perform repeated TAPP in case of recurrent inguinal hernia after laparoscopic plastic surgery. At the same time, we should expect an increase in the time of surgery and the frequency of complications in comparison with TAPP in primary hernia. Re-TAPP is recommended to be performed only by an expert surgeon in the field of laparoscopic hernia surgery.

Level of credibility of recommendations C (level of reliability of evidence 3)

OUTPATIENT TREATMENT OF INGUINAL HERNIAS

The main task of outpatient treatment of patients with inguinal hernias is their active labor and social rehabilitation, which implies a speedy return to the usual way of life and the continuation of their previous work activities.

Performing inguinal hernia surgery in a day-care surgical hospital is just as safe and effective as in an inpatient setting, but it is also more cost-effective. Most patients with uncomplicated inguinal hernias can be operated on on an outpatient basis. Contraindications to outpatient treatment are a set of reasons that require direct observation of the patient by a doctor for more than a day: pronounced concomitant pathology, psychoemotional and social aspects.

Evidence confidence level 2

Surgery for inguinal hernia can be freely performed in a day surgical hospital, regardless of the technique used for the operation. Evidence confidence level 2

The possibility of performing the operation in a day surgical hospital should be considered for each patient individually. Evidence confidence level 1

Individual elderly patients and patients with ASA III may also undergo outpatient surgical treatment (open-access hernioplasty under local anesthesia).

Evidence confidence level 2

7. Control questions

1. Define an inguinal hernia.
2. What is the etiology of inguinal hernias?
3. Specify the main reasons for the formation of inguinal hernias.
4. The main elements of inguinal hernia.
5. Classification of inguinal hernias.
6. The main causes of postoperative inguinal hernias.
7. Causes of recurrent inguinal hernias after hernioplasty.
8. The essence and methods of "tension" hernioplasty.
9. List the disadvantages of "tension" techniques?
10. Complications of "tension" techniques.

11. What methods of alloplasty and autoplasty are used during herniation?
12. What materials are used for hernioplasty?
13. The essence of "non-strenuous" methods of hernia repair.
14. Modern methods of surgical treatment of inguinal hernias.
15. Principles of laparoscopic hernioplasty techniques.
16. Advantages and disadvantages of endoscopic hernia repair techniques.
17. Possible complications of laparoscopic hernioplasty

8. Tests and tasks

1. The lower wall of the inguinal canal is:

1. Transverse fascia
2. The lower edge of the external oblique abdominal muscle
3. Imperative bundle
4. Inguinal ligament
5. The edge of the ilium

2. Inguinal-scrotal hernia is differentiated with all but:

1. Varicocele
2. Tumors of the spermatic cord
3. Testicular tumors
4. Hydrocele
5. Aneurysms v. saphema magna

3. A direct inguinal hernia is characterized by a weak wall:

1. Back
2. Upper
3. Front
4. Bottom
5. All of the walls

4. The method that facilitates the differentiation of inguinal-scrotal hernia and testicular dropsy is:

- 1 Puncture
2. Auscultation
3. Emergency operation
4. Transillumination
5. Palpation
5. In the case of a combination of prostate adenoma and inguinal hernia requiring surgical treatment, it is indicated:
 1. Observation
 2. Adenectomy, then hernia repair
 3. Conservative treatment
 4. Hernia repair, then adenectomy
 5. Application of the bandage
6. Distinguish inguinal-scrotal hernia from dropsy of the testicular membranes allows:
 1. Inspection
 2. Diaphanoscopy
 3. Radioscopy
 4. Ultrasound
 5. Percussion
7. The upper part of the Scarp triangle is delimited:
 1. Tailor's muscle
 2. Scallop fascia
 3. The inguinal ligament
 4. Lacunar ligament
 5. The honeysuckle ligament
8. Which of the following organs can be the wall of the hernial sac with a sliding inguinal hernia on the right?
 1. Small intestine
 2. Right kidney
 3. The bladder

4. Caecum

5. Left ovary with fallopian tube

Specify the correct combinations:

A) 1,2

B) 2,5

C) 3,4

D) 5,4

E) Everything is correct

9. What should I recommend to a patient of 80 years without gross somatic pathology with frequent infrangements of inguinal-scrotal hernia?

1. Conservative treatment aimed at regulating the stool

2. Emergency surgery-hernia repair

3. Elective surgery after outpatient examination

4. Hospitalization, observation in the surgical department

5. Wearing a suspension

10. The patient, 70 years old, has a left-sided oblique inguinal hernia with a tendency to infrangement. There is a prostate adenoma with a violation of urination. Your recommendations?

1. Wearing a permanent bandage

2. Emergency operation in case of another infrangement

3. Surgical treatment with a rapid increase in the size of the hernia

4. Elective surgery, after examination by a urologist and correction of urination disorders

5. Simultaneous herniation and removal of the adenoma

11. In a 40-year-old patient, a year after surgery for a right-sided inguinal hernia, hernial protrusion reappeared. Your actions?

1. Observation, surgery for hernia infrangement

2. To operate with the progressive increase of the hernia

3. Follow-up, surgery if there is an inguinal-scrotal hernia

4. Elective surgery before the development of complications or hernia enlargement

5. Wearing a bandage

12. The back wall of the inguinal canal is:

1. Inguinal ligament
2. Groin sickle
3. Cooper's Bundle
4. Transverse fascia
5. Rectus abdominis

13. Weakness of which wall of the inguinal canal is characteristic of an oblique inguinal hernia?

1. Posterior
2. Front
3. Upper
4. Bottom
5. All of the walls

14. Oblique inguinal hernia is characterized by all signs, except:

1. It has an oval shape
2. The herniated contents often descend into the scrotum
3. It may be congenital
4. Located outside of the lower epigastric artery
5. The hernia exits through the medial inguinal fossa

15. What is correct? Hernial sac of congenital inguinal hernia:

1. Parietal peritoneum
2. Mesentery of the intestine
3. The vaginal process of the peritoneum
4. Visceral peritoneum
5. Transverse fascia

16. When describing the diagnosis: "... the patient has a clinical picture of a direct reversible congenital inguinal-scrotal hernia...". The doctor made the following inaccuracies:

1. A direct hernia is not congenital
2. A direct hernia cannot descend into the scrotum
3. Direct hernia is not affected
4. A reversible hernia is not congenital
5. Inguinal-scrotal hernia is not recoverable

Make the correct combination of answers:

- A) 1,3,4
- B) 1,2
- C) 1,4,5
- D) 2,3
- E) All the answers are wrong, the diagnosis is written correctly

17. The characteristic signs of an oblique inguinal hernia are:

1. The hernial sac is located in the thickness of the spermatic cord
2. The hernial sac is located inside the spermatic cord
3. Hernia is often bilateral
4. The hernia can descend into the scrotum
5. A hernia may be congenital

Choose the correct combination of answers:

- A) 1,3
- B) 2,4
- C) 2,3
- D) 1,4,5
- E) 2,3,5

18. A 60-year-old patient suffering from prostate adenoma was found to have a direct inguinal hernia. The amount of residual urine is 100 ml. Your recommendations?

1. Send for hernia repair surgery
2. Recommend hernia repair surgery after adenectomy
3. Only conservative treatment is indicated
4. Recommend hernia repair surgery, followed by an adenectomy
5. All answers are correct

19. The main signs of congenital inguinal hernia are:

1. The hernia is always oblique
2. Causes the urge to urinate frequently
3. Has a tendency to frequent infringement
4. The hernia is always straight
5. Inability to palpate the testicle contained in the hernial sac

The correct answer is:

- A) 1,2
- B) 4,5
- C) 2,4
- D) 1,5
- E) 2,3

20. A patient, 26 years old, during an operation for an inguinal hernia was found: a hernial sac measuring 6x8 cm, upon opening, its contents are a strand of the omentum and a testicle. What kind of hernia did the surgeon encounter?

1. Congenital inguinal hernia
2. Direct inguinal hernia
3. Oblique inguinal hernia
4. Littre Hernia
5. Oblique inguinal hernia in combination with funiculocele

21. The following hernias may occur in the inguinal-femoral region:

1. Straight groin
2. Oblique inguinal
3. Femoral
4. Locking hole
5. Hiatal

Make the correct combination of answers:

- A) 1,2,3
- B) 1,3,4
- C) 2,3,5

D) 1,4,5

E) All the answers are correct.

22. What are the signs characteristic of a direct inguinal hernia?:

1. Exits through the medial inguinal fossa
2. Exits through the lateral inguinal fossa
3. The hernial sac is located in the thickness of the spermatic cord
4. The hernial sac is located inside the spermatic cord
5. Hernia is often bilateral
6. A hernia may be congenital

Choose the correct combination of answers:

A) 1,3,5

B) 1,4, 5

C) 1,4,6

D) 2,4,5

E) 2,4,6

23. Specify a sign that is not typical for an oblique inguinal hernia:

1. The hernial protrusion has an oval shape.
2. Herniated protrusion may descend into the scrotum.
3. A hernia may be congenital.
4. A hernia can be bilateral.
5. One of the walls of the hernial sac is a retroperitoneal organ.

24. A patient with a myocardial infarction suffered from an inguinal hernia 12 hours ago. The hernia was formed 3 months ago. Your actions?

1. It is shown that the hernia is reduced after the administration of antispasmodics and narcotic painkillers
2. Tactics depend on the location of the infarction
3. Emergency operation
4. Surgery for the development of peritonitis
5. Surgery for the development of hernial sac phlegmon

25. A patient with a pinched inguinal hernia during transportation to the surgical department had a spontaneous reduction of the hernia contents. What are your next tactics?

1. Emergency operation
2. Refuse to be hospitalized, the operation is scheduled
3. Emergency laparoscopy
4. Dynamic observation of the patient is shown
5. All the answers are wrong

26. The operation for a pinched inguinal hernia consists of the following:

1. The operation is performed under endotracheal anesthesia
2. The skin incision is made parallel to and slightly above the Pupart ligament
3. One of the first stages of the operation is the dissection of the hernial gate, and then the hernial sac is opened
4. One of the first steps of the operation is to open the hernial sac, and then dissect the outer inguinal ring
5. Initially, a median laparotomy is performed

Specify the correct combination of answers:

- A) 1,3
- B) 2,3
- C) 1,4
- D) 2,4
- E) All of the above is incorrect

27. During the examination in the emergency department of a patient with a pinched inguinal hernia, 2 hours ago, there was a spontaneous reduction of the hernial contents.

1. Observation of the patient in a hospital setting
2. Emergency hernia repair
3. The patient can be released home
4. Laparotomy with bowel revision and hernia repair
5. Emergency laparoscopy

28. A patient, 26 years old, during an operation for an inguinal hernia was found: a hernial sac measuring 6x8 cm, when opened, its contents are a strand of the omentum and a testicle. What kind of hernia did the surgeon encounter?

1. Congenital inguinal hernia
2. Direct inguinal hernia
3. Oblique inguinal hernia
4. Littre Hernia
5. Oblique inguinal hernia in combination with funiculocele

29. The primary measure for a pinched inguinal hernia is:

1. Warm bath
2. Hernia repair
3. Emergency operation
4. Antispasmodics to facilitate hernia repair
5. Analgesics before hernia reduction

30. Most often, inguinal hernia is affected:

1. Large oil seal
2. Small intestine
3. The large intestine
4. The bladder
5. Paravesical fiber

31. Which of the following signs are characteristic of a pinched groin hernias?

1. Free gas in the abdominal cavity
2. Sudden pain in the area of hernial protrusion
3. Non-rectification of the hernia
4. Phlegmon of the hernial sac
5. Positive symptom of " cough push "

Specify the correct combinations:

- A) 1,2,3
- B) 1,4,5
- C) 2,4,5

D) 2,3,4

E) 3,4,5

32. The patient, 70 years old, turned with a pinched inguinal hernia, called the therapist at home. The limitation period of infringement is 10 hours. There are signs of intestinal obstruction, hyperemia of the skin over the hernial protrusion. Actions of the doctor who examined the patient?

1. Hernia repair
2. Reduction of the hernia after drug injection
3. Cold on the hernia area, analgesics, antibiotics
4. Emergency admission to a surgical hospital
5. Referral to a surgeon

33. A patient with a pinched inguinal-scrotal hernia was admitted for 3 days from the onset of the disease. Temperature up to 39°C, hyperemia, infiltration and edema of the hernial sac. What complication is observed in the patient?

1. Acute intestinal obstruction
2. Funikulit
3. Phlegmon of the hernial sac
4. Acute orchitis
5. Dropsy of the testicle

34. What complications of a hernia can be observed in an 80-year-old patient with a left-sided inguinal-scrotal hernia with constant wearing of a bandage?

1. Transformation of a corrected hernia into a non-corrected one
2. Infringement of a hernia
3. Trophic ulcers on the skin
4. Traumatization and atrophy of the anterior abdominal wall tissues
5. Lymphostasis of the lower extremities

Specify the correct combinations:

A) 1,3,4,5

B) 1,2,3,4

C) 2,3,4,5

D) 1,4,5

E) 1,2,3,5

35. What is the primary action for a pinched inguinal hernia?:

1. Administration of antispasmodics before hernia repair
2. Administration of analgesics before hernia repair
3. Emergency operation
4. Warm bath
5. Attempt to repair a hernia under general anesthesia

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