HERNIAS OF ABDOMEN

External hernias of a abdomen (herniae abdominalis externae) – Are those hernias where the contents are covered by the skin followed by the layers of the abdominal wall and the parietal layer of the peritoneum through various defects of the abdominal wall. V.N.Sels gave classical definition of the hernia, as protrusion of the abdominal viscera through acquired and congenital hiatus.

Internal hernias (herniae abdominalis internae) - is the protrusion of abdominal viscera and contents into the pouches and folds of the peritoneum or into the thoracic cavity through the natural or acquired hiatus and clefts of a diaphragm.

The hernias remain the most wide-spread surgical pathology and occupy the second place after an acute appendicitis. The hernias occur at the rate of 50 per 10,000 population (A.V.Protosov and Soavt., 1999 y.). In USA more than 700,000, Russia - 200,000, France - 110,000 and Great Britain - 80,000 herniotomies are annually carried out.

In Ukraine about 90,000 herniotomies are carried out annually, from them concerning incarceration - more than 13,000. The interrelation scheduled and emergency herniotomies in Ukraine makes it as a ratio of 6:1. In the advanced countries this ratio is not less than 15:1, that specifies a unsatisfactory state of the surgical help to the patients with hernias in our countrv. Urgency and complication is seen in every 8th-10th patient (medium average) 10-15 % of the patients have relapses of disease (V.F.Saynco 2001y.).

The mortality after scheduled herniotomies in Ukraine was 0.06% (for 1999), at the same time mortality in the operations of strangulated hernias was 3%, and at late admission of the patient with features in the hospital is - 10 %. An especially high mortality is seen in patients with big or gigantic postoperative hernias - up to 21 % (V.V.Grubnic 2001y.).

Hernias are known from old times and occur in various stages of life from embryonic development un to old age.

The hernias are much more often seen in males (80-85% inguinal hernias), other kinds of hernias are more often in females.

Contents of hernia - Components of external hernias are the hernial hiatus, hernial sac and its contents.

Hernial orifice / Ring is, first of all, weaknesses in the musculoanoneurotic abdominal wall through which the internal organs with the parietal peritoneum out of the abdominal cavity. Form hernial orifice is oval, round, slit, triangular and uncertain. Postoperative and traumatic hernias more frequently occur in irregular shaped hernial orifice. The dimensions of hernial hiatus is highly variable - from a few centimeters in diameter to 30 cm or more.

The margins of hernial hiatus initially are pliable and elastic, and then roughens, become rigid due to scarring. Exceptions and properties form neuropathogenic hernias - where there is no expressed hiatus, over a large area of the abdominal wall muscles atrophies and lose their tone. and full-anoneurotic tissues are not available, then this part of the wall begins to bulge (an example - relaxation of the diaphragm or abdominal muscle atrophy due to surgical trauma innervating their nerve fibers).

The hernial sac is a part of the peritoneum which passes through hernial hiatus. Divided into mouth or opening (ostium), neck, body and floor (or apex) hernial sac.
The ostium is a part of the hernial sac, margined with abdominal cavity. The neck is the part passing through the hernial hiatus. The body is the widest part of the sac lying under the skin. And the apex (floor) is the distal part of the hernial sac. The hernial sac can be unicameral (unilocular) or multichambered and in various dimensions.

Anatomical features of sliding hernias.

Sometimes the wall of the hernial sac may be a body partially covered with abdomen or retroperitoneal located. Most often it is the bladder, kidney, cecum or ascending colon, most often sigmoid colon. This is called a sliding hernia.

Hernial contents Hernial contents can be any organ of the abdominal cavity. but mostly it is the omentum of small and large intestine. If the contents of hernial sac is a loop of ileum with a Meckel diverticulum – Liters Hernia.

The international classification of hernias

By origin are divided into two groups: congenital (hernia congenitalis) and acquired (hernia acquisita).

Congenital hernia - umbilical, inguinal, white line of the abdomen, umbilical cord hernia. gastroschisis (from the Greek. - splitting of the abdomen).

Acquired hernia are divided into groups depending on aetiology, which lead to genesis defect of abdominal wall.

1. Predestined hernia (hernia pretormata). They arise in the typical "weak" places the abdominal wall. It inguinal canal, femoral and umbilical ring, the ove in the white???. semilunar and arcuate (Douglas) lines. triangle Petit. gap Grünfeld-Lecgraft, the obturator canal, perineum, holes and cracks in the diaphragm.

2. Postoperative hernia (hernia postoperativae).

3. Recurrent hernia (hernia recidivus).

4. Traumatic hernia (hernia traumatica).

5. Neuropathic hernia (hernia neuropathica).

6. Artificial rupture (hernia artificialis).

By localization (anatomical classification)

There are inguinal. femoral. umbilical. white line of the abdomen.

Less common hernias semilunar and Douglas line, metasternum, lumbar, ischiadic, perineal, diaphragmatic, obturator.

Clinical (by run of the disease) classification

1. Free (reducible) hernia (hernia renonibilis).

2. Irreducible hernia (hernia irrenonibilis).


4. Conroastasis of the hernia

5. Inflammation of the hernia.

6. Traumatic hernia.

The internal hernias are classified into the following:

1. Preperitoneal internal hernias: a) epigastric ; b) supravesicle :

c) paravesical.

2. Postperitoneal internal hernias: a) Treitz's hernia b) paracecal:

c) intersigmoidal; d) Illio-

subfascial.

3. Intraperitoneal internal hernias:

a) Mesenteric-Parietal; b) foramen of Winslow;
c) through colo-mesenteric a hernia of the omental bursa:
d) hernia in omental openings. mesenterv of a small bowel and appendix, gastrocolic ligament, falciform ligament of liver, hernia of Douglas pouch.

The internal hernias are usually found out during operation concerning an acute intestinal obstruction and post-mortem period.

Diaphragmatic hernia diagnosed by contrasting of the gastrointestinal tract.

The concepts of eventration and prolapse come near to concept of hernia.

Eventration - is acute developing defect in the peritoneum and the abdominal wall with protrusion of the viscera (omentum/intestine) through this defect. The eventrations are of three types congenital, traumatic and postoperative.

Evagination (evagination) – Is protrusion of some part or the whole organ from its normal position through a stroma (artificial opening).

Prolapse- the partial or complete falling, sinking, or sliding of an organ from its normal position or location in the body., example: prolapse of the uterus through a vagina. uterus or rectal prolapse.

When collecting anamnesis of hernia should find favorable and producing factors. Risk/Favorable factors: heredity, age, sex, weight loss, obesity. Producing factors: traumatic injuries of the abdominal wall, the presence of scars, increased intraperitoneal pressure. constipation, cough, short urethra. difficult/prolonged labour/childbirth, weight lifting, Benign prostatic hyperplasia.

Etiology and pathogenesis

The fact that various congenital anomalies can lead to hernias confirmed their appearance immediately after birth or in the newborn period. So children blacks 20% and 5% of children of Caucasian neones are congenital umbilical hernia. The same regularity is marked with oblique inguinal hernia. which occurs as a result of disorder of vaginal obliteration of the processus vaginalis. that’s why there is communication between the abdominal cavity and the scrotum in men and Nuck’s canal in women. Found that in 50% boys processus vaginalis is not developed.

At autopsy in 20% in total was found vaginal processes without any clinical signs of herniation in life (W. Hughson. 1995). Also found in 5% of young women exposed to herniography after hysterosalpingography, processus vaginalis of peritoneum – Nuck’s diverticulum (A. Cullmo, 1984.) But they had no clinical signs of herniation.

From this it follows that the occurrence of hernia due to various reasons: the repeated local trauma, degenerative changes in aponeurosis due to increased intra abdominal pressure and a disorder of the synthesis of collagen.

Conduct biochemical studies led to the discovery of molecular and cellular structures in the fascia, which normally prevent the appearance of hernia. Collagen - the main element of the fascia and aponeurosis. Formation and the destruction of his are in a state of equilibrium. Processes of destruction of collagen on the side of the hernial protrusion more expressed. The assumption that the anomalies in the structure of collagen molecules are the factors predispose to the development of hernias, has been confirmed in studies of hydroxyproline (acid, which is the basis of collagen), which was taken from the aponeurosis in patients with hernia and healthv.

It was also discovered a large number of randomly arranged microfibrils, which confirms the view of the role of structural abnormalities of collagen in
the occurrence of hernias. Several centuries ago, doctors noticed that the sailors long at sea developed scurvy. Together with bleeding gums, periosteal pain, general weakness, many hernia occurred. Later proved the role of vitamin C in the synthesis of collagen, allowed to explain the above symptoms.

It follows that individuals have a "breakage" in the synthesis of the protein collagen, more likely to suffer recurrences of hernias. In the etiology of hernias, there are other factors. Thus, the example of persons with alcoholic cirrhosis and ascites increased intraperitoneal pressure and the common umbilical and inguinal hernias.

In persons subjected to considerable physical exertion (athletes, working foundries, etc.) also often occur hernia. Pathogenesis of hernia same - congenital predisposing factors plus the generating factor in increasing the intraabdominal pressure during physical exertion.

By generating factors are also difficult delivery, difficulty urinating during rhinitis, urethral stricture, prostate cancer, prolonged cough (tuberculosis, bronchitis), constipation, diarrhea and other pathological conditions accompanied by increased intra-abdominal pressure.

A certain percentage of hernias due to iatrogenic factors. For instance when appendectomy may be damaged branches infracostal nerve, iliac-hypogastric and iliac-inguinal nerve, which leads to atrophy of muscles and aponeurosis.

As a result, can herniate. In general, referring to postoperative hernia, it should be noted that there exists a direct correlation between the size of laparotomy and the probability of postoperative hernia.

In the development of external abdominal hernias (especially inguinal) can distinguish 4 stages.

Most hernia appears gradually, gradually increasing in size. Less hernias occur acutely, when a sharp rise in intra-abdominal pressure in the presence of anatomical weakness of the abdominal wall rupture occurs inguinal canal with subsequent formation of hernia.

**I stage.** Initially formed hernial orifice. Starting hernia (at the time of coughing in the hiatus is determined by pushing motion of parietal peritoneum).

**II stage.** Hernia has all the constituent parts, but the hernial sac does not extend through the thickness of the abdominal wall. Hernia occurs only on exertion and disappears after removal of exertion. **Incomplete hernia.**

**III stage. Full hernia.** Hernia go beyond the abdominal wall, causes a change in the abdomen (bulging) that appear when standing up and at the slightest physical exertion.

**IV stage.** Are pertain largeness hernias - huge hernias

### Complications of hernial disease.

**Fig. 1 Irreducible hernia**

Under the influence of permanent injury to the inner surface of the hernia sac develops aseptic inflammation and adhesive process, which prevents the occurrence of hernia contents into the abdominal cavity - there comes a partial or complete **irreducible hernia.** Most irreducible hernias are umbilical, femoral and epigastric abdomens.

**Fig. 2 Strangulated hernia**

When compression of the fallen organs of hernial ring comes, **hernia strangulation** - a dangerous complication requiring immediate surgical
intervention. The incarceration may be in the body, and in the bottom of the hernial sac. If it has a seam and partitions, incarcerated may be any organ, but the greatest danger is the incarceration of the intestine. Strangulated hernia occurs when a sudden rise in intraabdominal pressure, which may be by coughing, sneezing, weight-lifting. Thus there is a hyperextension hernial orifice and in the hernial sac goes more gutted than usual and incarcerated upon return hernial orifice to its former condition. Such incarceration is elastic.

Fig. 3 Elastic incarceration
There are still "fecal" incarceration, which happens when the dysperistalsis, especially in the elderly. Fell in herniating has intestine fills intestinal contents, poorly emptied. Overfilling of intestine is increased: the passage is stopped and occurs in the compression of the loop in hernial orifice.

Fig. 4 "Fecal" incarceration

Third type of strangulation - partial enterocele (hernia Richter). In the hernial sac only a part of the wall of the gut (opposite to mesenteric edge) is involved. Difficulties in the diagnosis of this type of strangulation related to the fact that the hernial protrusion is small and it is not always possible to find, especially in obese patients and in violation of survey methodology surgical patient.

Fig. 6 A Richter's hernia.

In the reverse (retrograde, W-shanied, hernia Maidla) strangulation in the hernial sac is two bowel loops, and connecting the third loop is located in the abdominal cavity and can be strangulated.

Fig. 6 Maydl's hernia.

Strangulation may be different from the minor, when the blocks a gut to pronounced strangulation with a inmairement of arterial blood supply and rapid development of necrosis organs. Strangulation of bowel causing bowel obstruction with all the consequences.

Common symptoms. diagnosis
Hernias usually develop slowly and gradually increases the characteristic symptoms. With heavy physical work, running, jumping patient feels dull or lancinating pain on the site formed hernias (usually in the groin area, below the inguinal ligament, in the navel or postoperative scar). Pain in the beginning of the weak, little concern to the patient, and then obstruct the physical work, and even walking fast. Then in place of pain appears protrusion, which appears during physical exertion and disappears at rest. Protrusion gradually increased, becoming a rounded shane. With the increase in hernial protrusion of pain can increase or disappear altogether, and sometimes the patient concerned only with the protrusion. Hernias can reach large sizes (if they do not operate in a timely manner).

The main symptom of hernia is a protrusion, which appears at the exertion and the self disappears at rest, horizontal position or at the light pressing his hand. These classic manifestations of the external abdominal hernias can
make a diagnosis before the examination of the patient. An objective study conducted on the local status of the scheme: observation, palpation, percussion, auscultation, and special methods of investigation. On examination, the patient in a horizontal position cannot find signs of herniation. For large hernia bulge can be seen, the relevant provisions of hernial orifice. At small uncomplicated hernias skin of protrusion has the usual form. For large, long-standing ruptures the skin is stretched, flabby, with areas of scar changes and expanded veins. When coughing, straining, active movements appear. Upon the termination of active movements, right away disappears. At large hernias through the thinning of the skin can be seen peristalsis of intestine.

Percussion of hernial protrusion gives tympanic sound in the presence of a hernial sac loops of bowel and blunting when the hernia is located omentum, or another organ.

On auscultation hernias rarely use (eg, for suspected aneurysm femoral artery when auscultated gives systolic noise). The special methods of investigation include the determination of hernial orifice and the cough impulse. Fingers penetrate into the depth of the abdominal wall and define the edge of hernial ring (form, size, feature of their edges and surrounding tissue). When coughing, patient fingers exploring the doctor feel pushes bulging of the peritoneum and adjacent organs (cough impulse).

Some authors for the accurate diagnosis of inguinal hernia, especially in infants, produce herniography – X-Ray after administration of contrast material (diatrizoate - 2 ml per 1 kg) in the abdominal cavity. Transcending contrast material beyond the peritoneal cavity indicates the presence of hernia.

Laboratory and other research methods are applied only to getting a more complete picture of the general condition of the patient.

In case of irreducible hernia, as a rule, constant pain, intensifying during physical exertion. Hernial protrusion does not change its shape and size, and decreases slightly in the horizontal position. Irreducible hernia often tend to strangulation.

Symptoms of strangulated hernia - sudden-onset pain in the hernia, increase, irreducible, severe tension and soreness protrusion. These symptoms associated with clinic of acute intestinal obstruction: abdominal pain, cramping, vomiting, delayed stool and gas. The patient is restless, moaning, tossing, cry for help. Clinical picture less expressive in the infringement of the omentum. The old people picture of strangulated hernia sluggish and possible overlooked complication.

Sometimes it is difficult differential diagnosis of irreducible and strangulated hernia, which must be decided quickly by the law of emergency surgery - suspicion in the diagnosis of acute abdominal pathology necessitates surgical intervention.

Basic principles of treatment of abdominal hernias
The basic method of treatment of external abdominal hernia is operational. In the presence of contraindications for surgery patients is recommended. to carry bandage. Allowed even wearing bandage temporarily, during the preoperative preparation for large ventral hernia. If irreducible hernia bandage is contraindicated. Wearing a bandage for persons who have shown the operation has a negative side. Under the bandage is noted skin irritation, there are scratches, folds, maceration, lymphadenitis. Under the influence of traumatic, hernial sac undergoes scar’s degeneration, there are adhesions to
abdominal organs, atrophy of the tissues occurs abdominal wall.

**Contraindications to surgery in uncomplicated hernia:**
Old age (unward 75 years), decompensated cardiac anomaly, active tuberculosis, malignant tumors, stricture urethra, adenoma prostate, pustular disease, and others which make herniotomy life-threatening.
The basic principle of surgical treatment of abdominal hernia is individual, a differentiated approach to the selection method of herniotomy. Operation for hernia, should be as simple and minimally invasive, technically executed flawlessly and providing radical treatment.

**General principles of operation for uncomplicated hernias:**

1) dissection of the tissues over the hernia;
2) the separation of hernial sac;
3) opening it;
4) reducing content in the abdominal cavity;
5) ligation hernial sac in the neck;
6) cutting off it;
7) suturing the abdominal wall defect (plasty).
Reducible uncomplicated hernias do not require urgent surgical treatment. Not be delayed for a long time operation with non-reducible hernia. **Strangulated hernia requires immediate surgical treatment.** There are no contraindications for surgery of strangulated hernia, except for moribund state.

**The peculiarity of the operation in strangulated hernia** is the need before dissection of the ring opening of hernial sac, fixation incarcerated organs (herniated sin). otherwise they can slide away into the abdominal cavity, which requires a laparotomy for revision. After opening the bag and cut the ring inspect the contents in the intestine mesentery introduced 0.25% sol. novocaíne and intestine warmed drane dampened with warm saline. If the intestine is viable it is dip into the abdominal cavity, whereas in case of necrosis we resect intestine. Determine the amount of resection is not always easy. Therefore decided to resect the distance from the apparent border of necrosis in the proximal direction at 30-40 cm, and 20 cm distal. The operation ends with plasty.

**Forced reducing of strangulated hernia is unaccepta**ble (either patients or their relatives or health professional). It should be borne in mind that some patients because of fear of surgery reduce a strangulated hernia. In this case, there is a risk dilaceration of incarcerated organ and imaginary (false) reducing.

**Possible variants imaginary reducing:**
1) Separation of hernial sac from the surrounding tissue and reducing with the into the abdomen or preperitoneal cellular tissue:
2) Detachment of the neck and reducing with the incarcerated organ in the abdominal cavity:
3) Complete detachment of the neck from the body, and from the parietal peritoneum and reducing in the abdominal cavity:
4) The movement of strangulated part from one cell of hernial sac to another. It is important to detect all that timely with a picture of peritonitis and acute intestinal obstruction.

**Tactics of the surgeon at spontaneous reducing of strangulated hernia.** Spontaneous reducing of strangulated hernia can be at any stage of the preoperative period. What to do? Tactics must be individualized. In the
presence of tachycardia, leukocytosis, abdominal pain, vomiting, a history, the patient should be operated immediately, using mid line incision. In doubtful cases, a more rational laparoscopy. If, after the spontaneous reducing of strangulated hernia patient feels well, no complaints, no alarming symptoms of the abdomen, then emergency surgery is not indicated. The patient should reside in the hospital under constant observation, tactics expectant. When peritoneal symptoms, the patient has operated on in emergency order and with satisfactory condition of patients, has operated on routinely over 3-5 days.

**Strangulated of sliding hernias.** When necrosis in the cecum - right hemicolectomy followed by plasty of hernial orifice. When necrosis in the bladder wall - resection of the bladder with epicystostomy. **In case of hernial sac phlegmon** – operation starts with laparotomy, the intersection of strangulated bowel loop at the mouth of a nurse string suture on the orifice of hernial sac for the purpose of that the pus shouldn’t fall into the abdominal cavity. Is superimposed on enterocostostomy and laparotomy wound is sutured. Then a cut above the hernia dissect tissue with hernial sac. Identify hernial hiatus derive strangulated loop. Sanitise nurulent cavity and drain. Mortality in this group of patients is above 50%. In the case of recovery and the presence of granulation of wound, the patient is reoperated by excision of the wound with the remnants of hernial sac. Followed by hernioplasty.

**There are five basic methods of plasty of hernias:**
1) aponeurotic fascial;
2) musculoaponeurotic;
3) muscular;
4) plasty with additional biological or synthetic materials (alloplasty, explantation);
5) combined (using auto and foreign tissue).

The advantage of fascial-aponeurotic plasty is that this method is implemented the principle of the connection of homogeneous tissue, as a result of which is the reliability of their adherence. Operation is least traumatic. However, their reliability depends on the size of hernia defect, the degree of tension in the tissues and strength qualities of fascia and aponeurosis. In cases where the tissue is thinned, atrophic or separated tissues at large (more than 10 cm) distance between the edges of the hernial defect, the use of fascial-aponeurotic plasty leads to frequent relapses (from 14 to 53%).

Currently, the main method of plasty abdominal hernia is musculoaponeurotic plasty. With this method, the strengthening of the abdominal wall defect is caused not only the aponeurosis, and muscle. The major advantage of this method is that the defect in the abdominal wall strengthening muscle tissue, capable of providing an active dynamic resistance fluctuations in intra-abdominal pressure, due to her characteristic of contractility and elasticity. Using this method leads to a very good late results of treatment of ventral hernias. At the same time, the use of this method in large and giant hernial defects gives up to 35% of recurrences (KT Toskin et al., 1994).

To apply the method of plasty with additional biological and synthetic materials there are some indications:
1) recurrent, especially multiple times recurrent hernias;
2) the primary hernia of large size when flaccid abdominal wall due to atrophy of muscles, fascia and aponeurosis;
3) postoperative hernia with multiple hernial ring when herniorrhaphy does
not give full confidence in their substantiality;
4) huge hernias the size of the defect of the abdominal wall more than 10x10 cm.
5) "difficult" inguinal hernia (large straight, slanting with the direct channel, the sliding and combined), with marked atrophy of muscles, separated tissues aponeurosis, hypoplasia ligaments.

Transplants. depending on their origin are divided into:
1) Autologous (taken within the same organism), these include - auto fascia, skin autotransplantation;
2) Allogeneic (taken in the body of the same species as the body of the recipient), these include - allogeneic fascia, allogenic pericardium, allogeneic dura mater;
3) Xenogeneic (taken in the body of another species);
4) Explants (tissue or organ were incubated out of organism);
5) Composite grafts.
The most important stage of development of surgery of abdominal hernial plastv is associated with the synthesis of high molecular polymers. The most common today synthetic material are: Marlex, Dacron, nolvnronylene, Mersilene, Teflon. Studies of remote results indicate that the use of mesh prostheses can dramatically reduce the number of relapses.

Hernias of midline of abdomen:
White line (linea alba) - anoneurotic part of the anterior abdominal wall (width from 1-2 mm to 2-3 cm), coming from the xiphoid process to lacunar articulation between the rectus muscles. Between the bundles of fibrous filaments are cracks and depressions, which may be predisposing factors in the formation of hernias. Hernias develop slowly, often without clinical manifestations. Initially through the hernial orifice bulges preperitoneal fat, and then formed hernial sac. Enigastrocele rarely large. Hernial sac can be delayed in the thick white line and hernial protrusion is not defined, these are called hidden hernia (hernia occulta).

Clinic epigastrocele consists of two symptoms - pain and palpable protrusion. Pain in the field of hernia may cause pyloric spasm and increased secretion. We have to carry out differential diagnosis of peptic ulcer. chronic cholecystitis.

Enigastrocele incarcerated frequently - a sharp increase in pain. can appear symptoms of intestinal obstruction. Expansion of the white line of the stomach called diastase recti: I st. - up to 5-7 cm. stage II - 7-10 cm. III stage - 10 cm or more. Selecting operation depends on the size of hernia, the degree of diastasis, severity of the clinic, the patient's condition and age.

Anesthesia both local and general.
At small hernia defect in the aponeurosis stitched in the longitudinal direction of the interrupted stitches.
Hernias medium and large sizes are operated on Sanezhko and Mayo. When combined hernia with diastase muscles aponeurotic plasty by Nanalkov or Martynov is used.

Plasty by Nanalkov - after removal of hernial sac edge of anoneurosis is sewed by interrupted stitches. Then, at the medial edge make two parallel cuts anterior wall of vagina with rectus muscles. Inner edge joined, and the first layer stitches are embedded. Then also sewed is the outer edge of the cut wall to anoneurotic sheath.

Plasty by Martynov - the elimination of diastase follows - on the medial edge of one of the lines cut through the muscles of the front wall of the vagina throughout the diastasis. Then the medial edges of vagina and rectus muscle are sutured. The line of stitches strengthens layer of aponeurosis of
the anterior wall of the vagina previously dissected. Then used and implemented is the practice of plasty "no tension" with the use of synthetic mesh.

**Umbilical hernia in adults (hernia umbilicalis adulorum)**
More common in women. Causes - defect in anatomical structure of umbilical ring, on the other - the factors predisposing increase in the intra-abdominal pressure (pregnancy, obesity). Clinical manifestations depend on the size of hernia, severity of adhesions, and the presence of complications. Results of treatment of umbilical hernia are worse than in inguinal and femoral (often up to 15-40% of relapses and complications more). Used are two ways of operations.

**Method Mayo.** Anesthesia general. Hernia is surrounded by two cross convergent arch forming cuts. Reveal the hernial sac, take out the adhesion, adherent omentum separated and internal organs are reduced to the abdominal cavity. Bag excised and the edges sutured in the transverse direction. Hernial orifice is expanded by two transverse incisions to internal edges of the muscles. Then apply U-shaped stitches (bottom flap under the top). The second series of sutures (upper flap to the bottom forming duplicate).

**Method Sapezhko.** Produce two longitudinal curved incision with excision of loose skin and umbilical button. Scared edges excised. Peritoneum from the posterior surface of one muscle detach at 2-4 cm. Stitch on the peritoneum. Then it created is duplicate in the longitudinal direction of 2-4 cm in width edge aponeurosis on the one hand sutured to the posteromedial part of the vaginal rectus muscle, which was the narenated peritoneum. The second layer stitched by duplicating). Method Sapezhko is more physiological (reduced width of the white line, straightened the course of rectus muscle fibers).
Due to unsatisfactory results of plasty umbilical hernia, developed and implemented in the practice of plasty using knitted polypropene mesh, which is fixed to the aponeurosis by polypropylene mono-filament sutures.

**Inguinal hernia**
More common than others. Anatomically, due to two types: **indirect and direct.** **Indirect** are congenital and acquired. In addition to these classical forms is practically important to know their variants, although they are rare. The Indirect hernias with a direct channel inside the wall (nperitoneal, intermuscular, subcutaneous), encysted, parainguinal, supravesicle and combined.

**Acquired indirect inguinal hernia.** Protrusion parietal peritoneum in the fovea inguinalis lateralis, which is implemented in the anulus inguinalis profundus, passes the entire inguinal canal and exits through the anulus inguinalis superficialis. Internal inguinal ring is the hernial orifice. The walls of this ring strengthened transverse muscle (above and outside) and Hesselbach's ligament (from the bottom and inside). Elements of the spermatic cord are scattered on hernial sac.

**Direct inguinal hernia.** Protrusion of the peritoneum in the fovea inguinalis medialis and enters the inguinal canal outside of the spermatic cord through the inguinal gap, hernial orifice is the inguinal gap, which in this case is the
"weak point". Inguinal \( \text{sin} \) increases and the valve function of muscles is absent. Hernial sac is covered with a layer of preperitoneal fat and dramatically extended the transverse fascia.

**Supravesical inguinal hernia.** Protrusion of the peritoneum through the medial \( \text{sin} \).

**Combined inguinal hernia.** 2-3 individual hernial sac.

**Sliding inguinal hernia (hernia inguinalis labentes).** In the formation of hernial sac is involved not only the parietal layer of the peritoneum. One of the walls of the hernial sac is formed by surrounding organ. located retroperitoneally. There may be a sliding inguinal hernias of the urinary bladder, cecum, ovaries, tubes, uterus, sigmoid colon, ureters and kidneys.

**Recurrent inguinal hernias occur up to 10%.**

**Causes of recurrent inguinal hernias:**
1) late surgery in the presence of significant changes in tissues of the groin;
2) old age;
3) the wrong choice method of operation;
4) gross defects in operational technology;
5) inflammatory complications from the surgical wound;
6) Early loading has not yet formed a scar;
7) heavy physical load in the late postoperative periods.

**Classification (Nyhus):**

**I type** - indirect inguinal hernia. Internal ring not dilated, hernial contents is situated in inguinal canal (canals inguinal hernia).

**II type** - indirect inguinal hernia by large widening inguinal ring.

**III type:** A - all form direct inguinal hernia. There is weakness transverse fascia
B - indirect inguinal hernia large size (inguinal-scrotal) ; C - femoral hernia

**IV type** - recurrent hernia: A - direct recurrent; B - indirect recurrent; C - femoral recurrent; D - combination recurrent direct, indirect and femoral hernias

**Diagnosis of inguinal hernias in women** is different in that the introduction of the finger in the external inguinal ring is not possible. Limited to inspection and palpation. In a direct - located above the inguinal ligament, and in case of indirect hernia slides down to external genital labia.

**Surgery of inguinal hernias**

**Anesthesia.**
At present, the following methods of anesthesia in herniotomy:
1) the local infiltration and block anesthesia;
2) multicomponent intravenous general anesthesia with spontaneous breathing;
3) multicomponent intravenous general anesthesia with artificial pulmonary ventilation;
4) peridural anesthesia;
5) peridural anesthesia in combination with intravenous anesthesia;
6) peridural anesthesia in combination with intravenous anesthesia and ventilation.

**Stages of herniorrhaphy:**
1) formation of access:
2) separation from the surrounding tissues and removal of hernial sac (moving the hernial stump from hernial sac by Krasintsev-Barker in direct inguinal hernia):
3) suturing the deep inguinal orifice: Ioffe’s method to the upper and lower
edge of medial deep inguinal orifice (the edge of the transverse fascia) impose forceps, then encircling suturing the opening up to 0.6-0.8 cm);
4) plasty of inguinal canal
Methods of Girara, Spasokukotsky, Kimbarovsky, Martynov, Bassini, Postempsky.

**Bassini - Nygus** - cut through the transverse fascia, detach it. Put the stitches on the mobilized layer of transverse fascia. Herniotomy with approximation of posterior wall of the inguinal canal by suturing the conjoined tendon above to the inguinal ligament below, by using interrupted, nonabsorbable suture material like nylon or polypropylene.

**Fig. 8 Bassini’s herniorrhaphy**
The method of plasty of the inguinal canal by Sholdice is in large enough popularity practice is enjoyed in Western Europe, the United States.
Features of plasty: the author proposes dissection of cremasteric muscle, further dissection of the transverse fascia of the inner ring to lacunar tubercle. Surplus fascia can be dissected. For the reconstruction of posterior wall of the inguinal canal using atraumatic monofilament material (polypropylene, RDS, etc.). The stitches from beginning to lacunar tubercle to the internal inguinal ring with the formation of its own diameter of the spermatic cord. After this the same thread in the direction of the internal inguinal ring to lacunar tubercle form the second layer of stitches. It brings together from the bottom inguinal ligament, from the top edge the transverse fascia, the transverse and internal oblique muscle together. Sutures extend to lacunar tubercle. where both ends of the threads are tied. At the formation of the inguinal canals posterior wall operation in two-layers method ends. Then like traditional plasty.

**Fig. 9 Plasty of the inguinal canal by Sholdice.**
*Plasty of inguinal hernias with mesh allografts.* Since 1984, the clinic Liechtenstein began to apply a new technique for plasties "without tension" ("free tension"). The key point of this method was the application alloplasty. Currently, the method Liechtenstein became one of the best modern methods of treatment of inguinal hernias.
When indirect inguinal hernia after removal of hernial sac reconstructed is deep inguinal ring and the transverse fascia is sutured. In direct hernia, the transverse fascia is cut just above the hernial sac and if possible is reduced of hernial sac without cutting and then sutured in continuous suture to transverse fascia. From polypropylene mesh is cut patch of 6X12 cm that put under the spermatic cord. The rounded lower end of the mesh is fixed with 2-3 sutures to lacunar tubercle along with lacunar (Cooner) ligaments. To inguinal ligament is fixed the mesh with 4-5 interrupted or continuous polypropylene sutures. Form a window in the wall at the level of internal ring for the spermatic cord. Upper medial edge of mesh sutured to the internal oblique muscle, transverse muscle and to the rectus abdominis muscle. Suture the external oblique muscle aponeurosis.

**Fig. 10 Plasty of inguinal hernias with mesh allografts by Liechtenstein**
Femoral Hernias

Herniation of intra-abdominal contents through the femoral canal is described as femoral hernia. Hernias go through the femoral ring below the inguinal ligament. Under the inguinal ligament located space that is divides the iliac-pectinate ligament into two gaps: the muscular and vascular.

Fig. 11 Anatomy of femoral ring and canal.

In laterally placed muscle pan is Iliopsoas muscle (m. iliopsoas) and femoral nerve (n. femoralis). Medially in the vascular lacuna is located femoral artery. femoral vein. nerves (n. seinitofemoralis et n. lumboiniquinalis). lymphatic vessels. Inner third of the vascular lacuna between the vein and the lacunar ligament is called the femoral ring. It holds a spongiose fatty tissue. lymph vessels and lymph node Rosenmüller- Pirogov.

The boundaries of the femoral rings: anterior - inguinal ligament. posterior - pectineal ligament. medial - lacunar ligament (lig. lacunare Gimbernati), lateral - femoral Vein.

Femoral canal normally is absent. In the case of going out of the interior organs through femoral ring is formed femoral canal with a length of 2 cm. Margins of which are:

- **Anterior** – posterio-inferior surface of the inguinal ligament, superficial layer of broad femoral fascia.
- **posterior** - pectineal ligament (Cooper ligament) and pectineal muscles fascia.
- **medial** - Lacunar ligament.
- **lateral** - fascial sheath of femoral vein.

Internal foramen of femoral canal is the femoral ring and the outer - oval fossa - a orifice in the broad fascia of the femur through which passes is the large subcutaneous femoral Vein.

"Corona mortis" - a. obturatoria. branch of a. hypogastrica. sometimes arises from a. epigastrica inferior and goes on the top and bottom edges of the femoral canal, as if covering the neck of hernial sac. In this case, all the walls are blood vessels.

Depending on the outlet of the hernia femoral hernias are of following types:

1) **typical femoral hernia** - going through the vascular lacuna medially from the femoral vein:
2) **external** - outside from the femoral artery:
3) **before vascular** hernia (medium) - goes over the vessels:
4) **musculo-lacunary** hernia (Hesselbach's hernia) - goes through the muscular lacuna;

5) femoral hernia of lacunar ligament.

Fig. 12 Femoral hernia (Rt)             Fig. 13 The relationships of an indirect inguinal and and indirect hernia (Lt). femoral hernia.

**Causes for femoral hernia**

1. Pregnancy: increased abdominal pressure due to repeated pregnancies is one of the chief factors responsible for femoral hernias. The maximum incidence is around 30-40 years of age.
2. Wide femoral canal.

**Clinics.** More commonly women suffer. Complaints of pain in the groin, lower abdomen, upper portions of the thigh. To start with, there is a small swelling **below the inguinal ligament**, which goes unnoticed very often. Characteristic signs - the presence of hernial protrusion in the femoro-inguinal fold, positive symptom of "cough impulse". The differential diagnosis is carried out with inguinal hernia, lymphadenitis, tumors, aneurysms, congestive abscess, cysts, varicose disease.

**Treatment - surgical.**

There are many methods of hernioplasty. Among them there are two basic methods: **femoral and inguinal.**

**Femoral method - Bassini:** hernial ring is closed by sutures: the first layer - inguinal ligament and pectineal ligament (Cooper ligament) and the second series of stitches - between the semilunar edge of the broad fascia of the thigh and pectineal fascia.

**Inguinal method - Rudi-Parlavechcho.** Open the inguinal canal, mobilize the spermatic cord. Dissect the transverse fascia and enter into the preperitoneal space, where is found hernial sac neck. Pulled hernial sac from the femoral canal, the hernial sac is opened, the revision is performed, and then hernial sac is removed. Femoral ring is closed by stitching pectineal ligament and inguinal ligament - (Rudi). The second layer of stitches (Parlavechcho) internal oblique and transverse muscle sutured to the inguinal ligament.

**Reich (1911)** suggested a one layer of stitches to sew the internal oblique, transverse muscles, Cooper’s ligament and inguinal ligament. Then reconstructing inguinal canal.

Patients with femoral hernias, and patients with symptoms of atrophy of musculoaponeurotic and ligamentous apparatus the method of choice is plastic with polypropylene mesh.

**Postoperative ventral hernia**

Surgical treatment of postoperative ventral hernia - the issue of the day in abdominal reconstructive and cosmetic surgery. Postoperative hernia polyetiological disease is regarded as a complex disease, entailing numerous disturbances in the activity of internal organs. Number of patients with postoperative hernias continues to grow.

**CLASSIFICATION VENTRAL HERNIA SWR (J.P.Chevrel, A.M.Rath)**

**Localization**

<table>
<thead>
<tr>
<th>M (medianus):</th>
<th>M1 - supraumbilical</th>
<th>I (lateralis):</th>
<th>I.1 - subcostal</th>
</tr>
</thead>
<tbody>
<tr>
<td>M2 - paraumbilical</td>
<td>I.2 - transversal</td>
<td>M3 infraumbilical</td>
<td>I.3 - ileac</td>
</tr>
<tr>
<td>M4 xiphoid-pubic</td>
<td>I.4 - lumbar</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| W (wideness hernial orifice) | W1 until 5 cm | W2 (5-10 cm) | W3 (10-15 cm) | W4 (more 15 cm) |

**Recurrence (number recurrence)** R1 (first recurrence) R2 (second recurrence)

The method of surgical treatment of ventral hernias depends on the size of
hernia, condition of the anterior abdominal wall, and on the functionality of a particular patient.

Principle autoplasty methods of plasty of postoperative ventral hernias based on the closing of the anterior abdominal wall defect with mobilized musculoaponeurotic edges of the hernial ring, which are stitched together by type duplicating. Significant tension can lead to relaxation of the anterior wall of the rectus muscle. Plastic of ventral hernia using the own tissue of the anterior abdominal wall is very difficult and lead to recurrence in more than 50% of cases. To strengthen the lines of stitches a number of authors used auto dermal skin flaps. Experience the world's leading clinics confirms the world tendency towards increased use of alloplastic treatment of postoperative hernias.

Methodology of synthetic meshes can be divided into three groups:

1) strengthening the anterior abdominal wall through fixing of mesh transplant to the aponeurosis over the hernial defect (on lay meshplasty).

   Fig. 14 On lay meshplasty.

2) the strengthening of the anterior abdominal wall by placing mesh under the preperitoneal musculoaponeurotic layer (in lay meshplasty).

   Fig. 15 In lay meshplasty.

3) Laparoscopic meshplasty intervention in which the mesh graft is fixed inside the abdominal cavity, closing in the form of a patch hernial ring.

   Fig. 16 Laparoscopic meshplasty.