

Hernia of the abdominal wall

The definition of the concept «hernia». The classification of hernia

Hernia of the abdominal wall or external hernia (*herniae abdominalis externae*) is such surgical disease, which is characterized by outlet of the visceral organs from the place of their physiological placement through the natural channels or defects of the abdominal and pelvic wall. In such case all visceral organs covered by parietal peritoneum and skin cover are not damaged. Internal hernia (*herniae abdominalis internae*) is such disease, visceral organs hit the peritoneum pouch. It formed in the place of natural peritoneum fold or recess and generally kept in the abdominal cavity.

Classification

Hernia of the abdominal wall is divided:

- 1) depends on etiology: congenital (*herniae congenitae*) and acquired (*herniae acquisitae*).
- 2) Depends on anatomical localization: inguinal (indirect and direct), midline hernia, omphalocele, femoral hernia, lumbar hernia, sciatic hernia, (enterischiocele), lateral hernia, ischiorectal [perineal] hernia (perineocele).
- 3) Depends on clinical presentations: complete and incomplete, reducible and nonreducible, traumatic and postoperative, complicated and noncomplicated.

Etiology and pathogenesis

Hernias are divided into two main groups: congenital (*herniae congenitae*) and acquired (*herniae acquisitae*). The main reason of congenital hernias is malformation. Thus, inguinal hernia arose in case of unclosure of the process of peritoneum, which passes by inguinal channel during descending the testis. On such hernias testis is located in the hernia pouch. Acquired inguinal hernia has hernia pouch and testis located outside it. Many factors are of great importance in the beginning and developing of the acquired hernia. One of them contributes, other - causes disease. The first are hereditary, anatomical inferiority of the abdominal wall, sex (inguinal area weakness in males and largeness internal femoral ring in females), age (atrophic processes in older age, anatomical inferiority of the abdominal wall in babies), weight loss, injury, postoperative scar, physical activity, pregnancy, during which abdominal wall stretched (for example, midline increased in 12 times). Such reasons, as increased abdominal pressure and weakness of the abdominal wall, cause hernia. That arise after hard physical

activity, continued cough, constipation, nerves palsy, which innervated abdominal wall, injury of muscles or aponeurosis of the abdomen.

The components of hernia (anatomical elements). The distinction of hernia from eventration and loss.

Each abdominal hernia consists of hernia gate, hernia sac and hernia contents. Hernia sac forms by outpouching of parietal peritoneum and can contain any organ from abdominal cavity, but mostly – small intestine and omentum. Sometimes it contains other organs: large intestine, urinary bladder, ovary, and appendix. The main parts of the hernia pouch are neck, body and fundus. Through the hernia's gate, peritoneum is outpouching. In the case of sliding hernia organ in the hernia pouch has mesoperitoneal disposition and not enclosed by peritoneum. Eventration named the outcoming of the internal organs from the postoperative defect of the peritoneal tissue (eventration has no «hernia sac»), loss named the outcoming of the internal abdominal organs none covering by the peritoneum from the anatomical places of the abdominal cavity.

Common symptoms of hernia. Diagnosing. The contraindications to surgery.

The typical symptom of hernia is swelling, which arises on vertical position of the patient or during rise of intraperitoneal pressure. These can disappear in a state of dormancy, on vertical position of the patient or after applying small pressure. Such factors make it possible to confirm hernia. In the case of hernia primary formation skin over the swelling almost not changed. Hernia is determined by finger examination of the inguinal channel. We can feel positive symptom of the "cough push", which is caused by cough or by the rise of intraperitoneal pressure. In the case of late stage of hernia developing evagination appear on changing body position from horizontal to vertical or after rising of the intraperitoneal pressure. If hernia sac contained small intestine than every next tension of the abdominal muscle inflated hernia sac by intestinal loop. Diagnostics of the noncomplicated external abdominal hernias is easy. Anamnesis of patients and clinical data are enough. However, we should remember about nonreducible hernias. Such hernia's shape and dimension often does not change. Patients complicated for continuous pain in the hernia region, which irradiated to other abdominal organs. The main danger of the nonreducible hernias is jamming.

Contraindications to surgery are the uncompensative severe disorders with high anesthesiological risks of the surgery.

Diagnosis program

1. Anamnesis and physical examination.
2. Digital investigation of the hernia channel.
3. Sonography of the hernia pouch.
4. Common blood analysis.
5. Common urine analysis.

The clinical features and diagnosing inguinal hernia. Tactics and choice of treatment method

Inguinal hernias are developed in two ways: through the internal (middle) inguinal cavity and external (lateral). In the first case formed direct in other - indirect inguinal hernia. Indirect hernias could be congenital and acquired. Direct hernias are only acquired and occur in older patients. There are two main signs, which differentiate direct and indirect hernias. Direct hernia is always located medially from a. epigastrica inf. Indirect hernia is always located laterally from a. epigastrica inf. The other sign is: direct hernia located medially from deferent duct, indirect hernia located inside it.

The methods of operations for inguinal hernia (plastic surgery by Rou, A.V.Martynov, Girard-Spasokukotsky, N.I.Kukudzhanov, Postemsky, Bassini, PULL and NON pull methods).

Inguinal hernia usually should be surgically repaired. On oblique inguinal hernias, we should strengthen anterior wall of the inguinal channel. On direct inguinal hernias, we should strengthen posterior wall of the inguinal channel. On recurrence hernias - we should strengthen anterior and posterior wall of the inguinal channel.

Bassini repair. After extraction of the hernia sac, we are taking spermatic duct on holders. Between the borders of transverse muscle, internal oblique muscle, transverse fascia and inguinal ligament interrupted sutures placed. Except that, couples sutures placed between border of abdominal rectus muscle sheath and pubic bone periosteum. In such way, inguinal space closed and posterior wall strengthened. Spermatic duct placed on the new-formed posterior wall of the inguinal channel. Over the spermatic duct aponeurosis restored by interrupted sutures. Girard in such kind of the operations propose to attach the edges of the internal oblique muscle and transversal muscle to the inguinal ligament over the spermatic duct. The aponeurosis of the external oblique muscle sutured by second layer of the suture. Excess of the aponeurosis is fixed to the muscle in the form of duplication.

Spasokukotsky proposed to catch the edges of the internal oblique muscle and transversal muscle with aponeurosis of the external oblique muscles by single layer interrupted suture.

Martynov proposed the fixation to the Poupart's ligament only internal edge of the external oblique muscle aponeurosis without muscles. External edge of the aponeurosis sutured over internal in the form of duplication.

Kimbarovskyy, based on the principles of joining similar tissues, proposed special suture: Sutures placed on 1 cm from the edge of the external oblique abdominal muscle aponeurosis, grasped the part of the internal oblique and transversal muscle. After that, aponeurosis is sutured one more time from behind to the front and attached to the Poupart's ligament.

Kukudganov proposed to restore back wall of inguinal interval. Sutures are placed between the Couper's ligamentum, vagina of direct abdominal muscle and aponeurosis of the transversal muscle.

Postempysky proposed the deep closing of inguinal interval with the lateral moving of spermatic duct.

The plastic narrowing of internal inguinal ring of to 0,8 cm is the important moment of this modification. On occasion, when internal and external inguinal rings are in one plane, a spermatic duct is displaced in lateral direction by transversal incision of the oblique and transversal muscles. Then edge of the vagina of direct muscle and aponeurosis of the internal and transversal muscles is fixed to the Couper's ligament.

Likhtenshtein The "tension-free" mesh technique was pioneered by the Lichtenstein Hernia Institute in 1984 and is currently considered the gold standard of hernia repair by the American College of Surgeons. In this procedure, repair is accomplished by covering the opening of the hernia with a patch of mesh, instead of sewing the edge of the hole together/

The surgical mesh acts as a bridge or scaffolding for ingrowth of new tissue to reinforce the abdominal wall. Over time, the mesh safely becomes incorporated into the muscle layer, creating a very strong, permanent repair. In the standard Lichtenstein Repair, this mesh is placed between the layers of the abdominal wall. In laparoscopic repair, the mesh is placed behind the abdominal wall muscles. The mesh used by the Lichtenstein Amid Hernia Clinic is thin, flexible, and lightweight to decrease the risk of pain and foreign body sensation.

Femoral hernia, its varieties. The anatomy of the femoral canal. Clinical features, diagnosing.

Femoral hernias are such pathological formation, which is encountered 10-20 times more often in males than females. This is explained by anatomical peculiarity of the females' pelvis, wider interval between femoral vein and lacunar [Gimbernat's] ligament and inguinal [Poupart's] ligament weakness. There are distinguished femoral hernias, vasculo-lacunar, rural pectineal [Cloquet's] hernia, Hesselbach's hernia. In addition, there are some kinds of femoral hernias, which can be identified only during the operation:

- 1) Medial vascular-lacunar femoral hernia, most common;
- 2) Hernia, which passed through the middle part of vascular lacuna or through the vascular sheath;
- 3) Lateral vascular-lacunar hernia, which pass outside of the femoral vessels. Besides, there is middle or prevascular hernia.

Medial vascular -lacunar femoral hernia has three stages of developing:

- 1) Beginning femoral hernia - swelling does not pass outside internal femoral ring;
- 2) Incomplete (interstitial) hernia - swelling does not pass outside of superficial fascia;
- 3) Complete femoral hernia - swelling passed through all anatomical part of the femoral channel and outgoing to the subcutaneous cellular tissue on the anterior femoral surface below inguinal [Poupart's] ligament. In spite of small size of the hernia sac, femoral hernia could contain omentum, small intestine and urinary bladder. It is more difficult to diagnose femoral hernia in overweight patients because of inexpressive clinical signs.

We should differentiate femoral hernias with inguinal hernias, increased or varicose changed lymphatic nodes. In those cases, we should determine external inguinal ring and inguinal ligament. Midline [epigastric] hernia usually has males in giving age. There are distinguished supraumbilical, umbilical and paraumbilical hernias. Very often, such kind of the hernia has no clinical signs and can be determined on the medical examinations. The usual clinical signs are: swelling on linea alba and intermittent pain.

There are some methods of surgical treatment of the femoral hernia, when the plastic re performed intraperitoneal from the side of thigh through the inguinal channel.

The Bassini method is attributed to —femorall. It is performed from a cut, that passes under inguinal fold. After removal of hernia sack a hernia gate is liquidated by suturing of inguinal to the pectineal ligament.

The Rudgi-Parlavecho Method. A cut passes parallel to the inguinal fold and higher it (the same as at inguinal hernia). A hernia sack is removed. After that the edges of the transversal and internal oblique muscles and inguinal ligament sutured to the periosteum of pubic bone.

Umbilical hernia

Umbilical hernias occur in 2 % from all kinds of hernia. The most frequent hernia in females (the ratio is 5:1), which is explained by anatomical peculiarity of the females' umbilicus after pregnancy. Such hernia often has two- and three-chambers hernia sacs, which could contain omentum, small intestine, and sometime stomach. Clinical signs depend on those contents. However, it always characterized by pain and swelling. In some patients swelling is very large.

Diagnosis of the umbilical hernia in typical case is not very difficult. Sometimes it is arduous to differentiate incarcerated umbilical hernia and umbilical metastasis of tumor. We should remember about umbilical evagination (without organs) in the patients with liver cirrhosis because of presence ascitic fluid in the abdominal cavity

For operative treatment of umbilical hernia a few methods are used.

The Lexer operation is most widespread. It performed by imposition of sutures on an umbilical ring.

After the Mayo method defect of anterior abdominal wall in the umbilical ring is sutured by U-shaped stitches in transversal direction.

Sapezhko proposed to form duplication of the abdominal white line by stitches in longitudinal direction.

At surgical treatment of hernia of abdominal white line, abdominal lateral hernia, lumbar and obturator hernia, sciatic and ischiorectal hernias after deleting of hernia sack it is needed to try to close a hernia orifice by suturing of fissures in aponeurosis and muscles.

Lumbar hernias are abdominal wall or retroperitoneal outpouchings. It does not occur very often. The area of the hernia orifice includes the superior costolumbar triangle and the inferior iliolumbar triangle. Besides that, it could be in aponeurosis slit. Lumbar hernias could be congenital and acquired. Congenital lumbar hernias are frequently the result of aponeurosis slit or enlargement of the Pti triangle or Hrunfeld interval. Acquired lumbar hernias are usually result of injury those anatomical structure or after pyoinflammatory diseases. The most frequent clinical sign is pain. The other signs depend on hernia content. The hernia contents may include any intra- and retroperitoneal structures, e.g., the kidney, small bowel, and omentum. Diagnosis is made by clinical examination: in the horizontal patient position on healthy side, swelling disappeared, and on the vertical patient position appeared again. Obturator hernia is the result of wide obturator channel. In those cases hernia sac formes inside pelvic cavity, and than passes through the obturator channel, and arises on internal femoral surface. Diagnosis of the obturator hernias is not easy, especially in the patients without swelling on the hip. In such cases,

patients have complaints for pain along obturator nerve with irradiation to knee joint or hip joint. Pain increases during leg rotation or abduction. Sometime pain irradiates to the foot.

Sciatic hernias is divided into two main types: hernia of the major sciatic foramen, which passes above and under piriform muscle and hernias of the small sciatic foramen, which passes under sciatic muscle. Patients complained for pain in the sciatic region, which increased during walking. Sometime pain irradiated along sciatic nerve.

Ischiorectal [perineal] hernia is formed in the urogenital diaphragm or in the perineum muscle. Anterior and posterior hernias are distinguished depending on whether the hernia is anterior or posterior to the transverse perineal muscle and sacrospinal ligament. Hernia ring formed by rectouterine [Douglas'] pouch in the female and by retrovesical pouch [Proust's space] in the male. Anterior hernias usually contained internal genital organs or urinary bladder. Posterior hernias usually contained omentum or small intestine loops. Diagnosis of the anterior ischiorectal hernias, which passed to perineum, usually is not difficult. Diagnostic pitfall should be on the patients with posterior hernias, which is located under large sciatic muscle and looks like sciatic hernia. In such cases, we performed vaginal and rectal examination or X-Ray examination of the urinary bladder and intestine as required.

Strangulated hernia. Definition of the concept. Types. Mechanisms. Features of the operative techniques. Incarcerated hernia is sudden pressing of hernia contents in a hernia orifice Incarceration is the most frequent and most dangerous complication of hernia diseases.

Etiology and pathogenesis

Depending on mechanism, the elastic and fecal incarceration is distinguished. At the elastic incarceration, after increasing intraabdominal pressure, one or a few organs relocated from an abdominal cavity to the hernia sack, where it is compressed with following ischemia and necrosis in the area of hernia gate. At the fecal incarceration in the intestinal loop which is in a hernia sack, plenty of excrement passed quickly. Proximal part of loop is overfilled, and distal is compressed in a hernia gate. So, arose its strangulation, as well as at the elastic incarceration. The excrement jamming is erected, mainly, to that in an intestinal loop which is in a hernia sack, a plenty of excrement the masses acts quickly. Its part is overfilled, and taking is compressing in a hernia gate. In the total there is its strangulate, as well as at the elastic jamming. Most often the loop of bowel is incarcerated. Thus three parts are distinguished in it: proximal, distal loop, central

part. The heaviest pathological changes during incarceration takes place in a strangulated furrow in the central part of the incarcerated bowel.

Pathomorphology

At incarcerated hernia an important role has all internal rings: inguinal, umbilical, weak places in a diaphragm, orifice of the omental bursa, numeral and variant folds of peritoneum. In the place of compressing of the bowels and mesentery, as a rule, it is possible to find a strangulation furrow. If circulation of blood changes, the wall of bowel cyanotic, with hemorrhages and necrosis of a different size. The loop of bowel which is located proximally the places of strangulation are extended, and distal loop mainly without changes.

Classification of the incarcerated hernia

The incarcerated hernia is divided into the complete and incomplete. The other types of incarceration is partial (the Richter's hernia) and retrograde. The incarcerated hernia can be without the destructive changes of hernia contents and with the phlegmon of hernia sack.

Clinical management

The clinic of the incarcerated hernia depends on pulling in organ, character and duration of jamming. The clinical signs of the incarcerated hernia can be divided into three groups:

- 1) local changes;
- 2) common signs;
- 3) complication.

From the most characteristic signs of local changes the most common is sharp pain, irreducible hernia, tension of hernia sack that and negative symptom of the "cough push". Pain sometimes is so intensive that causes pain shock. In the case of intestinal obstruction a pain is attack-like. In case of occurring of peritonitis pain changes the character and becomes permanent. It is necessary to mean that tensions of hernia sack and incarceration of the hernia, as signs of jamming, lose it value, if hernia was irreducible. From other side, the isolation of hernia sack from an abdominal region during jamming is the reason of the negative symptom of the "cough push". The common signs at the incarcerated hernia has phase character. Nausea and vomits during first hours of disease has reflex reason, and on 2nd and 3rd days has toxic reason, that is consequence of antiperistaltic and reflux of intestinal contents to the stomach. The temperature of body at first time is normal, than rises, but usually low grade fever. The clinic of acute intestinal obstruction and peritonitis develops at the protracted jamming of intestine. The phlegmon of hernia sack can develop in the area of the hernia swelling.

Clinical variants and complications

There are different forms of incarceration of internal organs, and accordingly different clinical variants.

Retrograde incarceration (Maydl's hernia (Hernia-in-W)). In such cases a hernia sack contains no less than two loops of intestine. But these loops are damaged less, than loop which is in an abdominal cavity. At this variant of jamming peritonitis arose quicker. So, surgeon during operation must always remember about the necessity of careful revision of the incarcerated loops of bowel.

Parietal incarceration (the Richter's hernia). Unlike retrograde, which has wide hernia gate, a similar pathology arises in case of narrow hernia gate. In a hernia sack in such patients located part of bowel wall, opposite it mesentery edge. Thus, as a rule, patency of bowel is not broken. Such variant of jamming is dangerous, because there are no evident clinical signs or some of them are quite absent and intestinal patency almost is always present. Necrosis of bowel wall comes quickly and in 2-3 days the perforation with subsequent development of peritonitis begins after jamming.

The Littre's hernia. Jamming of Meckel's diverticulum can come at oblique inguinal hernia. Clinical signs of this pathology reminds the parietal incarceration. Sometimes is possible to palpate dense, short, thick tension bar in a hernia sack. Incarceration at sliding hernia. It is observed at patients with inguinal hernia. At sliding hernia of colon, as a rule, there is the fecal incarceration. A bowel is the external wall of hernia sack in such cases. About it is necessary to remember during opening of hernia sack. Jammings of urinary bladder meet enough rarely, mainly at older-men at oblique sliding hernia of inguinal channel. It is necessary to ask before the operation, whether a patient had disorders of urination before jamming. Frequent urges, or, opposite, the reflex delay of urination is arose at the beginning of jamming already, and in urine expose macro- or microhematuria. If during operation at opening of hernia sack it medial wall has dense, doughy consistency, it is an urinary bladder.

At the incarcerated hernia the contents of hernia sack can be also omentum, appendages of colon, internal female genital organs. Sometimes combination of the incarcerated inguinal hernia with different pathological changes of testicle and deferent duct can take place. Rough manual reduction of the incarcerated hernia can bring to pseudoreduction. Then the local signs of the incarcerated hernia disappear, and jamming of organs and its consequences is kept.

There are five variants of the pseudoreduction:

1) at multicompartiment hernia sacks there is the possible moving of strangulated organs from one chamber in other, that located more deep or in a preperitoneal adipose tissue;

2) separation and reduction of hernia sack together with it content in an abdominal cavity or in a preperitoneal adipose tissue; 3) abruption of the neck from other part of hernia sack and reduction it together with content in an abdominal cavity or in a preperitoneal adipose tissue;

4) abruption of the neck from a hernia sack and from a parietal peritoneum with reduction of the incarcerated organs in an abdominal cavity;

5) break of the incarcerated bowel at the rough reduction of hernia.

Untimely operative at the incarcerated hernia, usually, is complicated by the gangrene of bowel, peritonitis or phlegmon of hernia sack. Such complications considerably worsen clinical status of patient and require other surgical tactic.

Diagnosis program

1. Anamnesis examination.
2. Physical examination.
3. Blood analysis and urine analysis.
4. Digital investigation of the rectum.
5. Survey X-Ray of abdominal cavity organs.

Incarcerated hernia should differentiate with irreducible, which as a rule, is not tense, positive symptom of the "cough push", painful on palpation. A patient complained for long duration of the disease. The incarcerated hernia needs to be differentiated with coprostasis. In such patients, disorder of bowel loop patency, that is in a hernia sack, creates accumulation of excrement. Coprostasis mostly found at fecal hernia in older people, that suffer from intractable constipation. Clinically it develops gradually and slowly. The hernia swelling almost not painfully, some tense, a positive symptom of the "cough push". Beginning of coprostasis is unconnected with physical tension. Application of cleansing siphon enema washed of excrement and liquidated coprostasis.

Tactics and choice of treatment method

The incarcerated hernia, regardless of time of its origin, localization and age of patient, must be operated on. However, if a patient is hospitalized already with the expressed symptoms of intestinal obstruction, than should be preoperative treatment. Such conservative therapy must be brief (1–1,5 hours), but always actively directed for correction of violations of metabolism and prophylaxis of possible pulmonary and cardiovascular complications. It is necessary also to

conduct evacuation of the gastric contents and other preparatory procedures. Patient with reduced hernia must be hospitalized and observed during 1–2 days. If abdominal pain is contained or is growing, the signs of peritonitis and intoxication appear, than performed urgent laparotomy and necessary operation. If the symptoms of acute abdomen are not present, a patient examined and prepared for elective operation. Operation at the incarcerated hernia is executed under the general anesthesia. A hernia sack is selected from surrounding tissue, cut it in the area of bottom and remove hernia water, defining its character and sending to bacterial inoculation. Retaining the damaged organs, a strangulated ring is cut. It is necessary to remember, that at the incarcerated femoral hernia ring cut up and some medially, because a femoral vein passes from a lateral side. If a bowel is contents of hernia sack, we must estimate its viability. Remembering about possibility of the retrograde jamming, special attention must be paid to the state of strangulation furrow.

About viability of the bowels testify:

- 1) renewal of its normal color;
- 2) presence or renewal of peristalsis;
- 3) renewal of pulsation of vessels of mesentery and bowel.

If there are the certain doubting, a bowel is dipped on a holder in an abdominal cavity and in 15–20 minutes it is examined repeatedly. If one of the resulted signs of viability is absent even, it is necessary to conduct the resection of bowel. The resection is executed, receded from the strangulation furrow on a proximal loop 30–40 cm and distal – 15–20 cm. Anastomosis between proximal and distal loops it is better to impose – end-to-end. The plastic of hernia gate are conducted depending on indications after one of the surgical methods. When the necrosis elements of omentum or fatty pendants of colon are contents of hernia sack, they must be removed within the limits of healthy tissue. There can be necrosis of wall of colon or urinary bladder at sliding hernia. In such cases it is needed to be limited to the minimum surgical procedure: to dip a necrosis area by sutures inside the bowel or use it for forming of colostomy or epicystostomy.