

# Effectiveness of the Surgical Techniques in Acute Inguinal Hernia

MIHAI GLOD<sup>1</sup>, CAMELIA ANA GRIGORE<sup>2</sup>, DANA TUTUNARU<sup>2\*</sup>, CIPRIAN ADRIAN DINU<sup>2\*</sup>, MARIUS DABUJA<sup>1</sup>

<sup>1</sup> Grigore T. Popa University of Medicine and Pharmacy of Iasi, Faculty of Medicine, 16 University Str., 6600 Iasi

<sup>2</sup> Dunarea de Jos University of Galati, Faculty of Medicine and Pharmacy, 47 Domneasca Str., 800008, Galati, Romania

*The weakness in the abdominal wall may be a birth defect or it may be developed later in life when muscles are loosened with age, but also in various intense physical activities. Men are the most affected section of population, 8 times more prone to inguinal hernia than women. In certain moments, when the intestinal tissue descends towards the scrotum, bulging areas occur, accompanied by pain around testes. Appreciation of the degree of dystrophism and anatomic dislocation of the inguinal region made possible to adequately choose the tactics of the surgical treatment of inguinal hernias. Presenting a case of incarcerated right inguinal-scrotal hernia. epiploectomy, followed by treatment of hernia, an alloplastic technique. The choice of the technique to repair an inguinal parietal defect depends on the surgeon.*

**Keywords:** inguinal hernia, surgical treatment, surgical techniques.

Appeared once with the biped posture, inguinal hernia has been certified in the second millennium BC, on the famous Egyptian papyrus of Ebers in 1552 and recorded on the sculpture in stone by the ancient Greeks. The concept *hernia* derives from the old Greek (*hernios*), a bulging, a bud. A female Phoenician small statue around 900 BC represented a bilateral hernia, with orthopedic support.

Located in the anterior-inferior region of the inferior abdominal wall, the inguinal-femoral region is the transition region between the abdomen and the anterior side of the thigh, that suffered major changes when passing to biped posture. At the surface, the limits of the regions are: horizontal line that unites the anterior superior iliac spine with the lateral border of the right abdominal muscle; inferior and lateral – the inguinal pocket; medial – the lateral border of the right abdominal muscle. Deep, due to continuity of the transversalis fascia, the inguinal region extends to the femoral region, for the two regions are unitary.

There are several tangible anatomic landmarks surgically speaking, such as: anterior superior iliac spine, pubic tubercle, and the inguinal ligament. The abdominal wall of the inguinal region is a bilaminar structure that includes the inguinal canal, housing the spermatic cords and the round ligament.

Inguinal hernias occur through the inguinal canal, an oblique pathway in the anterior-lateral abdominal wall, above the crural arch. The inguinal pathway is oblique downwards, inward and forward, it has two rings and four walls. The floor is made of the crural arch, has the shape of a hammock, and the roof is formed of the fascias of the minor oblique and transversum.

The skin is thin, medially covered by hairs of the pubic triangle. It is mobile on the underlying levels, except for the inguinal pocket, where it adheres through fibrous pathways that form the Petrequin's ligament.

The superficial inguinal ring is close and hardened by the intercrural fibers of the innominate fascia that binds the pillars and the spermatic cord.

The inguinal ligament (Poupart's ligament) is the inferior border of the aponeurosis of the external oblique. Towards the thigh it has a rounded surface due to inwards reflection of the inferior fibers. The strength of the inguinal ligament is due to the special obliqueness with 10-20 degrees of the

aponeurotic fibers. The lateral half is narrower and is inserted in the anterior-superior iliac spine, the medial half is longer, and it makes the inferior wall of the inguinal canal. Through pubic insertion, the inguinal ligament has the shape of the band instead of a cord, and it is sharper on the lateral half.

Transversalis fascia is a part of the endo-abdominal fascia, and it forms a continuous layer that separates the abdominal muscular-aponeurotic layers from the peritoneum and properitoneal fat. In inguinal region, it covers the abdominal part of the abdominal transversum and its terminal aponeurosis, that closely adheres by interdigital fascicles.

The deep inguinal ring is an anatomic defect located on the transversalis fascia, formed because of the descent of the testes, has the shape of a V or a U, with the concavity upwards and lateral.

The femoral canal is an upside-down cone-shaped compartment, of about 2 cm long, that contains properitoneal lax connective tissue, numerous lymphatic vessels and inconsistently 1-2 sub inguinal lymph nodes. The femoral ring is the abdominal opening of the femoral canal where femoral hernias occur. The ring ends under the inguinal ligament.

Cooper's ligament is the thickening of the superior pubic bone that covers the pectineal line and the insertion place of the abdominal transversum, transversalis fascia and ilio-pubic pathway, the dorsal border of the femoral cone. It has a curve like passing towards medial and it forms a 30-degree angle with the inguinal ligament.

The contents of the canal differ depending on the gender; in males, the spermatic cord, and in females – the round ligament of the uterus. The spermatic cord is formed of: arterial structures → deferential artery, originating in the inferior vesical artery or the middle rectal artery; the spermatic artery, a branch of the abdominal aorta; the spermatic artery, that arises from the inferior epigastric artery, the testicular veins and their coverings, divided into two groups: an interior one, that drains into the inferior vena cava on the right side, renal vein on the left side, and a posterior one, shorter, that drains into the inferior epigastric vein; the testicular lymphatics drain into the lumbar nodes; nerves – the genital branch of the genitofemoral nerve and vegetative autonomic nerves that form periarterial

\* email: danatutunaru@yahoo.com; cdinu@ugal.ro

plexuses; vas deferens; fibrous cord – resulted by obliteration of the peritoneal-vaginal process.

Innervation of the inferior portion of the anterior-lateral abdominal wall is made by nerves originating from spinal roots T12-L2. They are represented by: iliohypogastric nerve, ilioinguinal nerve, and the genital branch of the genito nerve.

The aetiology of the inguinal hernia stopped, at the beginning on the 20<sup>th</sup> Century, at a unifying theory, the imbalance between aggressive factors upon the abdominal wall (abdominal strain and visceral pressure) and protective factors (structural muscular-fascial integrity). Modern research in last decades pointed out changes of inguinal anatomic structures in the supportive connective tissue.

For each weak point of the abdominal wall, there is a name of hernia. The weak points of the abdominal walls appear, usually, where the anatomic structures pass from the abdomen to the neighboring regions or the other way around.

The herniating organ crosses the abdominal wall in inguinal region in a certain pathway. Considering the direction of the pathway, oblique or perpendicular to the abdominal wall, there is an oblique hernia or a direct hernia. The pathway may be, in some hernias, a ring.

Topographically, two types of landmarks can be described; emergency landmarks of the hernial sac, determined by projection in fossa of the collection of fluid, depending on which there are : external oblique inguinal hernia - externalized by medial parietal fossa; direct inguinal hernias - externalized by medial parietal fossa; internal oblique inguinal hernias, arising through medial parietal fossa; femoral hernias.

This classification may have more complex forms, such as direct external oblique hernia, or various unilateral or bilateral associations that may raise interesting surgical-anesthetic and technical-tactical challenges.

Progression landmarks, for external oblique inguinal hernias and femoral hernias with extra parietal-abdominal evolution. The external oblique inguinal hernia have a few possible stages: the hernial point, with the projection of the sac in deep ring, with a round swelling, of about 2 cm; inguinal-interstitial hernia located between the deep and the superficial ring, ovoidal, with big axes in the axis of the funicle; bubonocoele is formed beyond the superficial inguinal ring; funicular inguinal hernia shows a tumor at the root of the scrotum, near the testicle; scrotal-inguinal hernia is the most advanced form, in which the abdominal viscera invade the scrotum, with giant dimensions. Less frequent in women, it is called inguinal labial hernia.

In addition to distinct, well defined types of hernia, there are double or complex variants, presenting cysts of cordon or associated hydrocele. There are also other classifications of parietal defects: Mc-Vay classification, Casten classification, Halverson-McVay, and Gilbert classification.

In 1993 Bendavid presented a complete classification of all the hernial defects, starting from the myopectineal orifice with potential weak areas. Each classification is made on the nature, quality, and disposal of various muscular-ligamental structures.

The symptoms are: a *swelling* in the inguinal area of the scrotum in men or of labium majus in women; a *small discomfort* or pain in inguinal area or in scrotum. The discomfort is felt more intense while bending or weightlifting and disappears while lying down; *the sensation of weight*, swelling, burn in the area of the hernia, scrotum or the inside of the thighs.

Symptomatology is dominated in general by pain experienced as weight, traction, but vivid, more intense with effort or standing up.

It can mimic a painful syndrome, typical to biliary, ulcerous, appendicular sufferance.

A hernia must never be infirmed based on the simple appearance of parietal deformation, just like not any pain in the weak areas with risk for herniation is a hernia.

During general examination, the following must be examined: the status of the cardio circulatory apparatus, the status of respiratory apparatus, any presence of constipation, any urine retention; the rectal exam is compulsory.

Local examination consists of: inspection, palpation, assessment of reducibility by manual pressure, estimating the size, location and elasticity of the hernial ring; the content of the hernial sac can be estimated by palpation - renitent, elastic, enterocele or soft consistency with granular surface - epiplocele, and by percussion - dullness, tympanism or auscultation - presence or absence of peristaltic noises; the standing patient is asked to cough with the tip of the index finger inserted in the hernial canal - feeling the hit: of the viscera in the exploring finger (as a response to coughing).

Differential diagnosis: benign tumors of the inguinal region (fibroma, lipoma, angioma); fluid inguinal adenopathy; cysts of cordon; hydrocele can be mistaken for scrotal inguinal hernia, but it is not reducible, the testicle can be palpated, incorporated in the fluid mass, and the palpation of the mass is felt like a fluid under tension. The case of a communicating hydrocele may generate confusion, especially because, by complete persistence of the peritoneal-vaginal canal, coexists (varicocele, especially when it is large).

In present, the treatment of inguinal hernias has two strategic lines: (elective) surgical treatment, and orthopedic treatment.

The surgical treatment in elective conditions is not complex, does not involve major exploration of the peritoneal cavity and large visceral manipulations, is not subject to metabolic complications, while the postoperative mortality is almost zero.

Orthopedic treatment is absolutely indicated in uncomplicated hernias secondary to advanced neoplasia or secondary to extended cirrhotic ascites, with minimal surgery benefit. In case of strangulation, the intervention is postponed only to restore the hydric and electrolytic balance by administering Ringer solution intravenously. The antibiotic therapy is started systematically.

The adequate preparation may need a longer time for administering liquids and electrolytes, especially potassium and blood for patients suffering from bowel obstruction for several days. Prior to stabilization of the general state, the intervention may have disastrous results.

For uncomplicated hernias, one evening before the surgery, an evacuation enema is performed, as well as sedatives. Preoperative, the bladder is emptied.

For voluminous hernias, one must consider the possibility of intestinal or colic resection, with the appropriate bowel preparation. Because suppuration, one of the complications of this surgery may recurrence, it is important to do the local preparation of the patient. Local anesthesia with 0.5% novocain is preferred.

The operative steps are dissection of the inguinal canal, repairment of the myopectineal ring, and closure of the inguinal canal.

The sac is a white membrane, anterior and inside the spermatic cord; usually, it is slightly different from the

surrounding structures. If the hernia is small, the sac is upwards in the canal. The vas deferens can be recognized by palpation due to its firm consistency compared to other structures of the cord. The wall of the sac is slightly raised and carefully opened to avoid any damage to the content. While the borders of the sac are kept with clamps, the content is pushed in the peritoneal cavity. With the index finger of the left hand inserted in the sac to give counter-resistance, the surgeon releases the sac with his right hand by blunt or sharp dissection.

Sharp dissection is used to separate the vas deferens and adjacent vessels from the sac. If done carefully, one may encounter a few bleeding points, which can be kept away from the sac by blunt dissection with compression. Continue the dissection until reaching the peritoneal fat which will be removed, identifying the peritoneum behind the hernial fluid collection. The sac is open at 2-3 cm distance from the fluid collection and the index finger can explore to point out the presence of an inverted Y hernia, a direct hernia, or a femoral hernia.

To ensure the closure of the sac, a bursa is performed on the inner side of the fluid collection, or several transfixion suture points. The lumen of the fluid collection of the sac must be viewed when placing and closing the suture, to avoid any possible damage of the omentum or the intestine. This suture should include fascia transversalis and peritoneum. The fluid collection of the sac can be sometimes identified as a whitish and slightly thickened ring. That sac should be ligated proximal to this ring. After the thread of bursa is tightened, the excessive sac is cut with the scissors.

Tissular techniques: Marcy operation (balancing the deep inguinal ring); Bassini.

Since 1884, when Bassini published the surgical technique of the inguinal hernia, numerous techniques have been applied. Many of them, after a period of enthusiasm, have been abandoned because of not having the expected results. During the last 30 years, the surgical treatment of inguinal hernias continued being the most debated topic of all general surgery operations. The surgical treatment of inguinal hernias can no longer be viewed as the simple suture of the borders of a parietal defect. Ferguson's technique (keeping the cord in place).

Techniques derived from Bassini surgery are a group of surgical techniques that obey to Bassini's postulate: resection of cremaster muscle, complete opening of the posterior wall, tissular repair of the posterior wall.

Tissular Lichtenstein's technique was published in 1976, attempting to improve Bassini's technique, replacing the triple layer.

Techniques that use the iliopubic tract (Condon's technique) -the purpose of this surgical intervention in herniorrhaphy is to amplify the known hernial protection mechanisms -the sphincter of the deep ring, for the indirect forms, and the shutter of the aponeurotic arch of the transversalis for direct forms. Keeping the anatomic accuracy to Bassini's technique, R. E. Condon adopts a technique based on distinct use of iliopubic tract in herniorrhaphy.

Repairing the posterior wall of the inguinal canal, it could be considered anatomic, maybe the best method.

Lichtenstein doesn't challenge the iliopubic tract, but he regards it of a variable consistency, unable to support a routine herniorrhaphy. Between the iliopubic tract and the aponeurotic arch of the transversalis there is a significant space that destroyed through a weak suture may develop a tension that may generate relapse.

In indirect hernia, apply a strengthening of the posterior wall of various sizes, but one must recalibrate the deep ring. There are no standard criteria to repair the medial cord posterior wall.

In indirect hernia the technique focuses on strengthening the posterior wall, without paying too much attention on the repair of the deep ring.

More and more the traditional surgery of hernias is replaced by hernioplasty without tension because by traditional repair of inguinal-femoral parietal defects structures that normally are not in appositions are joined; the use of iliopubic tract in repair leads to raising it with the anterior-medial enlargement of the femoral ligament, that may lead to the onset of a iatrogenic femoral hernia; there are metabolic and biochemical proves that certify the association of direct inguinal hernia with a damage of the collagen in connective tissue of the inguinal region. Their use in repairment of such structures with a low biologic quality is illogical.

The goals of the laparoscopic treatment of inguinal hernias are similar with the ones of the classic technique – dissection of the sac and protection of the posterior wall to avoid the relapses. Currently, the most used technique is the transabdominal one, consisting in incision of the peritoneum near the inguinal fossae, dissection of the anatomic elements in the region, with the dissection and resection of the sac, application and fixation of the surface, and the closure of the peritoneum.

The principles are like the ones used in classical technique: a convenient way of approach, precise identification of the anatomic elements, resection of the lipoma, adaptation of the technique to the type of hernia and to the patient.

Contraindications refer to complicated hernias (strangulation with hernial occlusion, saccular peritonitis, irreducibility), sliding hernia, cardiac patient, who cannot be operated under general anesthesia, to whom the pneumoperitoneum increases the risk for arrhythmia and of cardiac decompensations, children, young people with hernias type I or II Nyhus.

The operatory preparations do not involve special measures. General anesthesia with orotracheal intubation is preferred. Epidural anesthesia without CO2 insufflation can be used, using devices to raise the abdominal wall.

The preperitoneal transabdominal procedure included the techniques through which the preperitoneal space is approached by incision of the peritoneum in abdominal cavity.

The post operatory care is simple. Any drainage is suppressed after 12-24 hours, depending on the drained quantity. After 2 days, the patient may be released from hospital. The stitches will be removed after 4 days. The patient may resume physical exercises much sooner (7-14 days).

The most frequent complication is the relapse by incomplete covering of the parietal defect. Occlusions by strangulating an intestinal loop in trocar orifices or in the peritoneal subject breach are specific to transabdominal technique.

## **Experimental part**

### ***Material and method***

A male patient, 55 years old, was included in a study, conducted at Department of Surgery, of Clinic Hospital CF Iasi, between 02/05/2019 and 10/05/2019, with presumed diagnosis: inguinal hernia.



## Results and discussions

The patient was hospitalized with sub-occlusive phenomena on an incarcerated hernial formation (incarcerations = irreducible through adherences to sac, reaction fluid serous-citrine - various dilatation of the cross of internal saphenous vein); a feeling of traction with burning in inguinal-scrotal hernia.

Objective examination was essential for inguinal-scrotal hernia diagnosis.

The clinical examination was performed with the patient standing, asking him to cough, when hernia showed.

Inguinal-scrotal hernia appears clinically like a mass, inguinal tumefaction located immediately above the inguinal arcade, down to the scrotum. The tumefaction is often obvious when the intraabdominal pressure increases (standing position, cough crying, etc.) and it spontaneously disappears when the abdominal muscles are relaxed, and the patient is lying down. The teguments of the inguinal region and of the scrotum are elastic, normally colored, but the scrotal folds faded by distention. The palpation reveals a mass of elastic consistency, reduced under gentle pressure, cranial and posterior, disappearing with perception of hydroaerial noises, when the content is an interstitial segment.

At the inferior pole of the tumefaction the testes is palpated, with normal volume and consistency.

Epiploectomy was performed, followed by the treatment of hernia, an alloplastic procedure.

The surgical treatment was classic, alloplastic = elliptical incision - vertical or horizontal - suppressing the umbilic = hernial pouch (sac + content) = repair of the abdominal wall: - peritoneum is horizontally sutured - the aponeurotic muscle is sutured (classic procedure) either horizontally (Mayo technique), or vertically (opening the sheath of the ring).

Good post-operative evolution. The lab exams show normal values, and well as pathologic values: serum uric acid: 7.24, gamma glutamyl transferase 57, tgo 63, tgp 151, direct bilirubin 0.40, total bilirubin 1.23, tgp 66.

Diagnosis upon release from hospital: incarcerated right inguinal scrotal hernia.

Secondary diagnosis upon release from hospital: sub-occlusive syndrome, right acute orchiepididymitis, hepatic steatosis and chronic hepatitis, cholesterosis chronic cholecystitis, bilateral renal microlithiasis.

The patient was called again for another check up, suppressing the stitches after 14 days. Hygienic- dietary regimen and treatment with Rp → Zanolin 200mg (one capsule/12 h) Metronidazole arena 250mg (1 capsule 3 times a day), Nystatin Atb 500000UN (1 capsule a day).

Treatment: algocalmin 1g/2mL; alprazolam lph 0.5mg; ceftamil 1g; sodium chloride 0.9% 500mL, sodium chloride 0.9%-250mL; fraxiparine 3800ui/04mL; gelofusine 500mL; gentamicin 40mg/mL-1mL; glucose 10% 250mL; hepamertz conc. Infusion solution 10mL; lagosa, 150mg; nystatin 500000ui; Ringer's lactate solution 500mL.

The recovery time from an inguinal hernia depends on age, previous conditions, type of hernia and the method of the intervention.

## Conclusions

The operator must have deep knowledge of the anatomy and physiology of the abdominal wall and the inguinal canal; the surgical interventions, performed for inguinal hernias, are the most frequent interventions in general surgery.

The effectiveness of the surgical technique is given by the ratio of post-operative complications (especially the incidence of the chronic pain) and the recurrence ratio.

## References

1. D. MOGA. Cum Putem Îmbunătăți Urmărirea Pacienților Operați De Hernie Inghinală. Journal of Surgery 2014;
2. DOMINO, FRANK J. (2014). The 5-minute clinical consult 2014 (ed. 22nd). Philadelphia, Pa.: Wolters Kluwer Health/Lippincott Williams & Wilkins. p. 562.
3. FITZGIBBONS RJ, JR; FORSE, RA (19 February 2015). Clinical practice. Groin hernias in adults. The New England Journal of Medicine. 372 (8): 756-63.
4. GAVRILAS, V OPREA - Elemente de chirurgie în hernia inghino-femurală. Editura Oelty, Cluj-Napoca, 2000.
5. BASSINI E. Nuovo metodo sulla cura radicale dell' ernia inguinale. Arch Soc Ital Chir. 1887;4:80.
6. \*\*\* Hernia Repair - Surg Clin N Amer, 2003; 83:5.
7. \*\*\* Hernia Trialist Collaboration Repair of groin hernias with synthetic mesh: meta-analysis of randomized controlled trials. Ann Surg, 2002; 235:322-32.
8. JENKINS JT, O'DWYER PJ. Inguinal hernias. BMJ. 2008 Feb 2;336(7638):269-72. Chung L, O'Dwyer PJ. Treatment of asymptomatic inguinal hernias. Surgeon. 2007 Apr;5(2):95-100. Eklund A, Rudberg C, Leijonmarck CE, Rasmussen I, Spangen L, Wickbom G, Wingren U, Montgomery A. Recurrent inguinal hernia: randomized multicenter trial comparing laparoscopic and Lichtenstein repair. Surg Endosc. 2007 Apr;21(4):634-40.
9. KEIDAR A, KANITKAR S, SZOLD A. Laparoscopic repair of recurrent inguinal hernia. Surg Endosc. 2002 Dec;16(12):1708-12.
10. MOORE JB, HASENBOEHLER EA. Orchiectomy as a result of ischemic orchitis after laparoscopic inguinal hernia repair: case report of a rare complication. Patient Saf Surg. 2007 Nov 7;1(1):3.
11. NIGAM, VK (2009). Essentials of Abdominal Wall Hernias. I. K. International Pvt Ltd. p. 6.
12. ROMAN, S; KAHRILAS, PJ (23 October 2014). The diagnosis and management of hiatus hernia. BMJ (Clinical research ed.). 349: g6154.
13. SABAU D, OPRESCU S, IORDACHE N, SAVLOVSKI C - Chirurgia deschisă, mini-invasivă și laparoscopică a defectelor parietale abdominale. Editura Medicală, Bucharest, 2000.
14. SANABRIA A, DOMINGUEZ LC, VALDIVIESO E, GOMEZ G. Prophylactic antibiotics for mesh inguinal hernioplasty: a meta-analysis. Ann Surg. 2007 Mar;245(3):392-6.
15. VOYLES CR, HAMILTON BJ si colab. - Meta-analysis of laparoscopic inguinal hernia trials favors open hernia repair with preperitoneal prothesis. Am J Surg. 2002; 184:6-10.
16. WAKE BL, MCCORMACK K, FRASER C, VALE L, PEREZ J, GRANT AM. Transabdominal pre-peritoneal (TAPP) vs totally extraperitoneal (TEP) laparoscopic techniques for inguinal hernia repair. Cochrane Database Syst Rev. 2005 Jan 25;(1):CD004703.
17. MOLDOVANU R, PAVY G. Laparoscopic transabdominal pre-peritoneal (TAPP) for bilateral inguinal hernia. Jurnalul de chirurgie (Iasi). 2010; 6(3): 373-382.
18. CRAWFORD DL, HIATT JR, PHILLIPS EH. Laparoscopy identifies unexpected groin hernias. Am Surg. 1998; 64(10): 976-978.
19. TARCOVEANU E, BRADEA C, MOLDOVANU R. [Anatomy of the inguinal region]. Jurnalul de chirurgie (Iasi). 2005; 1(4): 436-446.
20. DULUCQ JL, WINTRINGER P, MAHAJNA A. Occult hernias detected by laparoscopic totally extraperitoneal inguinal hernia repair: a prospective study. Hernia. 2011; 15(4): 399-402.
21. HACHISUKA T. Femoral hernia repair. Surg Clin North Am. 2003; 83(5): 1189-1205. 8. Wu J-M, Lin H-F, Chen K-H, Tseng L-M, Huang S-H. Laparoscopic preperitoneal mesh repair of incarcerated obturator hernia and contralateral direct inguinal hernia. J Laparoendosc Adv Surg Tech A. 2006; 16(6): 616-619.
22. MATHONNET M, MEHINTO D. Femoral hernias: repair techniques. J Chir (Paris). 2007; 144 Spec No 4: 5S15-8.

23. KRAFT BM, KOLB H, KUCKUK B, HAAGA S, LEIBL BJ, KRAFT K, et al. Diagnosis and classification of inguinal hernias. *Surg Endosc.* 2003; 17(12): 2021–2024.
24. SIMONS MP, AUFENACKER T, BAY-NIELSEN M, BOUILLOT JL, CAMPANELLI G, CONZE J, et al. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia.* 2009; 13(4): 343–403.
25. ROBINSON A, LIGHT D, KASIM A, NICE C. A systematic review and meta-analysis of the role of radiology in the diagnosis of occult inguinal hernia. *Surg Endosc.* 2013; 27(1):11–18
26. SAYAD P, ABDO Z, CACCHIONE R, FERZLI G. Incidence of incipient contralateral hernia during laparoscopic hernia repair. *Surg Endosc.* 2000; 14(6): 543–545.
27. KESEK P, EKBERG O, WESTLIN N. Herniographic findings in athletes with unclear groin pain. *Acta Radiol.* 2002; 43[6]: 603–608.
28. OPREA V, GAVRILAS F. *Chirurgia peretelui abdominal - vol II Hernia inghinala recidivată. Hernia incizionala.* Cluj Napoca: Editura Universitara Iuliu Haieganu 2010.
29. HERNANDEZ-RICHTER T, SCHARDEY HM, RAU HG, SCHILDBERG FW, MEYER G. The femoral hernia: an ideal approach for the transabdominal preperitoneal technique [TAPP]. *Surg Endosc.* 2000; 14(8): 736–740.
30. GARG P, ISMAIL M. Laparoscopic total extraperitoneal repair in femoral hernia without fixation of the mesh. *JSLs.* 2009; 13(4): 597–600
31. CHAN G, CHAN C-K. Longterm results of a prospective study of 225 femoral hernia repairs: indications for tissue and mesh repair. *J Am Coll Surg.* 2008; 207(3): 360–367. 10(1):59–62. doi:10.7438/1584-9341-10-1-11

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