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An Overview of Techniques of Inguinal Hernia Management

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Abstract

Background: Inguinal hernia repair is one of the commonly performed elective general surgical operations. The only treatment modality for inguinal hernia is surgical repair there is more trend towards minimal invasive surgery. Techniques to repair inguinal hernias fall into two broad categories termed "open" and "laparoscopic". Surgeon's tailor their approach by taking into account factors such as their own experience with either technique, the features of the hernia itself, and the person's anesthetic needs.Majority (75%) of all abdominal wall hernias occur in the groin. Laparoscopy has revolutionized the general surgery, now everyone is keen towards keyhole surgery, giving cosmetically small scars to patient. Laparoscopic approach is considered more difficult than open approach.

Keywords: Inguinal Hernia Management

Background

The laparoscopic anatomy is different from traditional open procedures because they are performed in a different direction. Laparoscopic operations for inguinal hernia is carried out intraperitoneally or in preperitoneal space. Surgeons must understand important anatomic landmarks of the operation area under laparoscopic views before they begin to perform these procedures otherwise, it will be very risky to cause complications such as bleeding, nerve damage, insufficient repair, and recurrence[(1).]

The inguinal canal in the adult is an oblique rift in the lower part of the anterior abdominal wall. It measures approximately 4 cm in length. It is located 2 to 4 cm above the inguinal ligament, between the opening of the external (superficial) and internal (deep) inguinal rings [(2).]

Techniques to repair inguinal hernias fall into two broad categories termed "open" and "laparoscopic". Surgeon's tailor their approach by taking into account factors such as their own experience with either technique, the features of the hernia itself, and the person's anesthetic needs[(3).]

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I. Open Approach:

All techniques involve an approximate 10-cm incision in the groin. Once exposed, the hernia sac is returned to the abdominal cavity or excised, and the abdominal wall is very often reinforced with mesh. There are many techniques that do not utilize mesh and have their own situations where they are preferable [(4)].

Open repairs are classified via whether prosthetic mesh is utilized or whether the patient's own tissue is used to repair the weakness. Prosthetic repairs enable surgeons to repair a hernia without causing undue tension in the surrounding tissues while reinforcing the abdominal wall. Repairs with tension have been shown to increase the inguinal hernia. Repairs not using prosthetic mesh are preferable options in patients with an above-average risk of infection such as cases where the bowel has become strangulated[(3)].

A) Open non-mesh repairs:

Techniques in which mesh is not used are referred to as tissue repair technique, suture technique, and tension technique. All involve bringing together the tissue with sutures and are a viable alternative when mesh placement is contraindicated. Such situations are most commonly due to concerns of contamination in cases where there are infections of the groin, strangulation, or perforation of the bowel [(5)].

1. Bassini technique:

The first efficient inguinal hernia repair was described by **EdoardoBassiniin the** [(6)].In the Bassini technique. The conjoint tendon (formed by the distal ends of the transversusabdominis and internal oblique muscles) is approximated to the inguinal ligament and closed[(7)].

2. Shouldice technique:

The Shouldice technique is the most effective non-mesh repair thus making it one of the most commonly utilized methods. studies have been validated the conclusion that patients have lower rates of hernia recurrence. However, this method frequently experiences longer procedure times and length of hospital stay. Despite being the superior non-mesh technique, the Shouldice method results much higher rates of hernia recurrence in patients when compared to repairs that utilize mesh[(8)].

3. McVay technique:

The McVay repair addresses both inguinal and femoral ring defects. This technique is indicated for femoral hernias and in cases where the use of prosthetic material is contraindicated [(3)].

4. Desarda Repair:

The Desarda hernia repair was described in 2001, and it consists of a mesh-free repair utilizing a strip of external oblique aponeurosis[(8)].

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B) Open mesh repairs:

1- Types of mesh:

a. Synthetic:

Mesh provides the option of using "heavy weight" as well as "light weight" variations according to the diameter and number of mesh fibers. Heavy weight (density > 100 g/m2) Polypropylene, Polyester,Light weight (density 35-50 g/m^2). Lightweight mesh has been shown to have fewer complications related to the mesh itself than its heavyweight counterparts[(8)].

b. Biological Mesh:

Biological grafts are derived from human, bovine, and porcine tissue that has been decellularized to leave a collagen matrix. This structure acts as a regenerative framework that supports remodeling and new collagen deposition. Biologic mesh is indicated in cases where the risk of infection is a major concern such as cases with the strangulated hernia[(9)].

c. Absorbable Mesh:

The development of absorbable mesh using Dexon or Vicryl was triggered by the complications of using permanent mesh in contaminated fields. The material is completely absorbed between 90 and 180 days and generally results in a hernia where the mesh was placed. They do not have to be removed in the setting of infection, and therefore are often used as a temporary barrier in contaminated fields. Newer biosynthetic prostheses are being developed. The BIO-A mesh is a copolymer of polyglycolic acid and trim ethylene carbonate in a three-dimensional matrix. It is designed to maintain its structure long enough for tissue ingrowth, but completely degrade in approximately 6 to 7 months. It is available as a fistula plug, inguinal plug, and mesh [(10)].

Repairs that utilize mesh are usually the first recommendation for the vast majority of patients including those that undergo laparoscopic repair. Procedures that employ mesh are the most commonly performed as they have been able to demonstrate greater results as compared to non-mesh repairs. utilizing mesh have been able to demonstrate faster return to usual activity, higher rates of persistent pain, shorter hospital stays[(11)].

2- Techniques:

a. Lichtenstein technique:

The Lichtenstein tension-free repair has persisted as one of the most commonly performed procedures in the world. The European Hernia Society recommends that in cases where an open approach is indicated, Lichtenstein technique should be utilized as the preferred method [(12)].

Another study concluded that mesh attachment with the use of adhesive glue is faster and less likely to cause postoperative pain as compared to attachment via suture material [(13)].

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b. Plug and patch technique:

The plug and patch tension-free technique has fallen out of favor due to higher rates of mesh shift along with its tendency to irritate surrounding tissue. This has led to the European Hernia Society recommending that the technique not be used in most cases [(13)].

C) Laparoscopic repair:

There are two main methods of laparoscopic repair: transabdominalpreperitoneal (TAPP) and totally extra-peritoneal (TEP) repair. When performed by a surgeon experienced in hernia repair, laparoscopic repair causes fewer complications than Lichtenstein, particularly less chronic pain. However, if the surgeon is experienced in general laparoscopic surgery but not in the specific subject of laparoscopic hernia surgery, laparoscopic repair is not advised as it causes more recurrence risk than Lichtenstein while also presenting risks of serious complications, as organ injury. Indeed, the TAPP approach needs to go through the abdomen. All that said, many surgeons are moving to laparoscopic methodologies as they cause smaller incisions, resulting in less bleeding, less infection, faster recovery, reduced hospitalization [(14)].

1-Laparoscopic totally extra-peritoneal (TEP) inguinal hernia repair:

TEP completely avoids entry to the abdomen which can be advantageous in patients with prior surgery. TEP also avoids the issue of peritoneal closure and the problems associated with that closure. TEP can be performed without the use of electrocautery which may translate into less postoperative pain. When the space of Retzius is developed in TEP, 3/4 (femoral, obturator and direct) hernias are explored on the contralateral side. These hernias may not be readily identifiable by examining the peritoneal side [(15)].

Since the initial description of laparoscopic totally extraperitoneal (TEP) inguinal hernia repair by **Ferzli**[(15),] abundant data have become available on laparoscopic inguinal hernia repairs and their outcomes compared to open approaches (Decreased wound complications, faster recovery, and decreased incidence of chronic pain are some of the advantages that drove more surgeons to adopt these techniques [(16)].

a) The steps of TEP Operative technique [(3)].

Start from the placement of the trocars and ending by close skin, a stepwise approach is critical to perform a safe, effective, and reproducible repair. The goal is to completely dissect the myopectineal orifice (MPO) and identify all potential sites of hernia formation: (I) direct space, (II) indirect space, (III) femoral space, (IV) obturator space.

Step 1

Inserted of 3 trocars in the lower midline, one Hasson and two 5 mm trocars.A 15mm curvilinear infra umbilical incision is made and carried down sharply to the level of the fascia. The anterior rectus sheath is incised transversely off the midline to expose the rectus abdominis muscle. Avoiding the Linea alba is important to avoid inadvertent entry

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into the peritoneal cavity. The use of a balloon in space maker for the initial access is an option, however, it adds cost to the procedure).

Step 2

The second step is to identify the pubic symphysis in the midline. The pubic symphysis serves as an important landmark to orient the surgeon especially in complicated cases. The bladder is posterior to the pubic symphysis and care must be made not to injure it when dissecting posterior to the pubic symphysis.

Step 3

Cooper's ligament is bluntly swept clear in a medial to lateral direction while staying close to the ligament and close to the bone in a gentle and controlled manner. This will allow visualization of the femoral and obturator spaces. If a femoral or obturator hernia is encountered, they are reduced bluntly. Care must be made during reduction of femoral hernias to avoid injuring the femoral vein or the occasional corona mortis artery. Full dissection of the space of Retzius is achieved by dissecting the contralateral Cooper ligament thereby ruling out a femoral, direct and obturator hernia as well on the contralateral side.

Step 4

The direct space (Hesselbach's triangle) is identified immediately superior to the femoral space and separated by the medial aspect of the iliopubic tract. A direct hernia normally obscures the view to Cooper's ligament and is readily identifiable during the initial dissection. A convexity or a bulge in Hesselbach's triangle signifies the presence of a large indirect hernia. A direct hernia sac is reduced by peeling it away from the attenuated transversalis fascia and using constant and gentle traction and countertraction

The epigastric vessels are identified and elevated anteriorly.

Step 6

While elevating the epigastric vessels, the space of Bogros is developed using horizontal blunt dissection. The space is developed laterally to the level of the anterior superior iliac spine (ASIS) to allow placement of an appropriately sized mesh.

Step 7

The indirect space is now identifiable by finding the cord structures in men or round ligament in women passing through the internal ring and lateral to the epigastric vessels. The indirect sac can be seen overlying the cord structures or round ligament. If it is not possible to identify the vas deferens or the round ligament immediately next to the epigastric vessels, then an indirect hernia is present. Prior to reduction of the indirect sac, it is important to look for and reduce cord lipomas that are found in the upper and outermost quadrant of the internal rings. Their reduction allows more working space and better identification of the edge of the indirect sac. Reduction of the sac is accomplished

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by sweeping the cord structures or round ligament posteromedially while holding the sac superiolaterally.

Step 8

Numerous mesh products for inguinal hernia repair are available. Our preference is a 15 cm^2 sheet of medium weight polypropylene that is trimmed to an appropriate shape and size, rolled, and introduced into the space of Retzius through the Hasson port. The mesh is then unrolled and should extend from the midline to the ASIS and cover all hernia spaces The mesh should be placed in the visceral plane of the extraperitoneal fascia in the space of Bogros to avoid contact with the nerves. No slit is placed in the mesh as this has been shown to be a factor in recurrences. We do not routinely tack the mesh in place. However, some may find it helpful to place a single tack in Cooper's ligament to facilitate unrolling of the mesh. Also, and to ensure adequate medial overlap, tacking may be needed in the case of large direct and femoral hernias.

2-Transabdominal Pre-Peritoneal (TAPP) InguinalHernioplasty:

The laparoscopic transabdominalpreperitoneal (TAPP) inguinal hernia repair is an evolving technique associated with the well-known advantages of a minimally invasive approach **(1).**

A study stated that for the treatment of recurrent inguinal hernias, the first choice should be given to the laparoscopic method, especially for young, physically active, non-obese patients **(17).**

a) Surgical technique of (TAPP):

Under general anesthesia, the patient was placed on the operating table in a supine position. Initially, we placed a 10-mm trocar into the peritoneal cavity above or below the umbilicus and inserted surgical microscopes into the peritoneal cavity to observe and assess the location of the hernia. We defined the hernia type, measured the size of the deep inguinal hole, and assessed the position of the outside position if any. Two 5-mm trocars were placed on the outer edge of the rectus abdominis in line with the 10-mm trocar position Next, proceeded with the dissector through the two 5-mm trocars **(18).**

A peritoneal incision above the deep inguinal ring from 3-4 cm, from outside to inside to the lateral umbilical fold. Then we separated the peritoneum to the deep inguinal opening, from the bundle of the inferior epigastric vessels, and separated the herniated sac if present from the cord **(18).**

A 10 cm x15cm Proline mesh was placed into the anterior peritoneal cavity created The deep inguinal opening was covered and the posterior inguinal canal. Then we fixed the mesh with ProTack™ (Medtronic, Minneapolis, MN, USA). Finally, we closed the peritoneum, discharged the gas, and closed the trocar holes **(18).**

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