

# Laparoscopic versus Open Repair of Inguinal Hernia

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## Abstract

*Background:* Despite a large number of clinical studies in recent years no consensus has been achieved on the surgical technique of inguinal hernia repair for various reasons. "Experts" believe that their own preferred open methods have the lowest possible recurrence and complication rates. They tend to attribute any negative results, as shown by a number of regional quality studies, to other surgeons' poor skill rather than to the technique itself. This review article aimed to compare laparoscopic versus open Laparoscopic hernia repair.

**Keywords:** Laparoscopic inguinal hernia repair, Hernioplasty, Inguinal hernia, Laparoscopic vs open inguinal hernia repair.

## INTRODUCTION

Repair of inguinal hernia is one of the commonest surgical procedures worldwide. Irrespective of country, race or socioeconomic status hernia constitutes a major health-care drain.

There are three important landmarks in the history of repair of inguinal hernia.

1. Tissue repair Eduardo Bassini 1888
2. Onlay mesh Irving Lichtenstein 1984 (tension-free) repair
3. Laparoscopic Ger, Shultz, hernia repair Corbitt, etc. 1990.

## AIMS

The aim of this study was to compare the effectiveness and safety of laparoscopic and conventional open repair in the treatment of inguinal hernia.

The following parameters were evaluated for both laparoscopic and open procedures.

- Method of patient selection
- Operative technique
- Operating time
- Intraoperative and postoperative complications
- Postoperative pain and amount of narcotics used
- Postoperative recovery
- Recurrence
- Bilateral assessment and treatment

- Cost effectiveness
- Learning curve.

## MATERIALS AND METHODS

A literature review was performed using Springer link, BMJ, Journal of MAS and major general search engines like Google, MSN, and Yahoo, etc. The following search terms were used: Laparoscopic inguinal hernia repair, Hernioplasty and Laparoscopic vs open inguinal hernia repair. 1,600 citations found in total selected papers were screened for further references. Criteria for selection of literature were the number of cases (excluded if less than 20), methods of analysis (statistical or non statistical), operative procedure (only universally accepted procedures were selected) and the institution where the study was done (Specialized institution for laparoscopic inguinal hernia repair were given more preference).

## METHOD OF PATIENT SELECTION

### Anesthetic Consideration

The general anesthesia and the pneumoperitoneum required as part of the laparoscopic procedure do increase the risk in certain groups of patients. However, procedures requiring only extra peritoneal insufflation of gas, like total extraperitoneal hernia repair (TEP), may be successfully conducted under regional anesthesia.<sup>1</sup>

Most surgeons would not recommend laparoscopic hernia repair in those with pre-existing disease conditions. Patients with cardiac diseases and COPD should not be considered as a good candidate for laparoscopy. The laparoscopic hernia repair may also be more difficult in patients who have had previous lower abdominal surgery. The elderly may also be at increased risk for complications with general anesthesia combined with pneumoperitoneum.

## VARIOUS OPERATIVE TECHNIQUES AVAILABLE

Presently various modalities of treatment are available for repair of inguinal hernia.

### Open Suture Repair of Inguinal Hernia

Following methods of suture repair of inguinal hernia is practiced:

- Bassini's repair
- Halsted repair
- Tanner (relaxing incision to reduce suture line tension)
- McVay repair
- Shouldice's repair

### Open Mesh Repair of Inguinal Hernia

Materials from native tissues like strips of external oblique aponeurosis, fascia lata grafts from thigh and even skin from the edges of the incision to metal and silk were tried in hernia repair.

The concept of hernia repair underwent evolution with the introduction of monofilament knitted polyethylene plastic mesh. PPM remains most popular both in open and laparoscopic surgery. However, Dacron a machine knitted polyester polymer was the first popular nonmetallic mesh. In 1976, Gore developed the expanded PTFE or e-PTFE. Recently some of the prosthetic biomaterials have been combined together to form various composite mesh in an attempt to minimize the undesirable side effects. Composix<sup>®</sup> meshes (polypropylene with a thin coat of e-PTFE on one side). Vypro<sup>®</sup> mesh {light, large pore multifilament mesh composed of 50% polyglactin 910 (absorbable) and 50% polypropylene}. Ingrowths of fibrous tissue and collagen provide strength to the repair.<sup>2</sup>

Significantly less pain on exercise after 6 months and fewer patients reported the feeling of a foreign body after repair with use of lightweight composite mesh.

Cumberland and Scales criteria for an ideal prosthetic mesh: it should be chemically inert, noncarcinogenic, capable of resisting mechanical strain and resist bursting by the maximum forces created by the intra-abdominal pressure, easy to handle and fabricate as per requirement, allow tissue ingrowth within it resulting in normal pattern of tissue healing and repair without inciting adhesion formation if placed intra-abdominally. The tissue fluids should not physically modify it or incite inflammatory, foreign body or allergic reaction and it should resist infection. It must conform easily to the abdominal/inguinal wall and be seen-through for accurate placement over the defect. Finally; it should not be too costly.

A perfect prosthesis in addition to above should be impregnated with antibiotic material to resist infection, allow fibrous tissue ingrowths on one side for proper fixation and anti-adhesive properties on the other to avoid adhesions to the abdominal viscera and finally should respond like autologous tissue *in vivo*.

### Tension-free Repair of Inguinal Hernia

Tension free repair requires a mesh. Placement is either by open anterior, open posterior approach or by laparoscopic means.

- a. Giant prosthetic reinforcement of the visceral sac (GPRVS), Reni Stoppa
- b. Lichtenstein onlay patch repair
- c. Patch and plug repair
- d. Kugel patch
- e. The PROLENE<sup>®</sup> polypropylene hernia system

### Laparoscopic Hernia Repair

Ger in 1982 attempted minimal access groin hernia repair by closing the opening of an indirect inguinal hernial sac using Michel clips. Bogojavlensky in 1989 modified the technique by intra-corporeal suture of the deep ring after plugging a PPM into the sac. Toy and Smoot in 1991 described a technique of intraperitoneal onlay mesh (IPOM) placement, where an intra-abdominal piece of polypropylene or e-PTFE was stapled over the myopectineal orifice without dissection of the peritoneum.

The present day techniques of laparoscopic hernia repair evolved from Stoppa's concept of pre-peritoneal reinforcement of fascia transversalis over the myopectineal orifice with its multiple openings by a prosthetic mesh. In the early 1990's Arregui and Doin described the transabdominal pre-peritoneal repair (TAPP), where the abdominal cavity is first entered, peritoneum over the posterior wall of the inguinal canal is incised to enter into the avascular preperitoneal plane which is adequately dissected to place a large (15 × 10 cm) mesh over the hernial orifices. After fixation of the mesh, the peritoneum is carefully sutured or stapled. TAPP approach has the advantage of identifying missed additional direct or femoral hernia during the first operation itself.

Around the same time Phillips and McKernan described the totally extraperitoneal (TEP) technique of endoscopic hernioplasty where the peritoneal cavity is not breached and the entire dissection is performed bluntly in the extraperitoneal space with a balloon device or the tip of the laparoscope itself. An advanced knowledge of the posterior anatomy of the inguinal region is imperative. Once the dissection is complete, a 15 × 10 cm mesh is stapled in place over the myopectineal orifice. It appears to be the most common endoscopic repair today.

In both these repairs, the mesh is in direct contact with the fascia of the transversalis muscle in the pre-peritoneal space, allows tissue ingrowths leading to the fixation of the mesh (as opposed to being in contact to the peritoneum as in IPOM repair where it is prone to migrate).

### Relative Contraindication for Laparoscopic Approach

- A. Obesity with BMI >30
- B. Significant chest disease
- C. Patient on anticoagulants
- D. Adhesions
- E. Massive hernias

- F. Pregnancy
- G. Unfit for GA

### Inguinal Hernia Repair in Pediatric Patients

Small children gain little benefit from laparoscopic hernia repair as inguinal skin crease incision used in the herniotomy is one of best incisions as far as cosmesis is concerned. It is hardly visible after a few months. Also, it is covered in the underwear. Compared to this three stab incisions, however small, are in the visible area.<sup>3</sup>

### Inguinal Hernia Repair in Obese Patients

Operations in patients with BMI above 27 may be difficult for less experienced surgeons, particularly when trying to encircle an indirect sac. Patients with BMI of above 30 should be encouraged to loose weight or should even be turned down for the laparoscopic approach. They are incidentally more likely to develop recurrence after an open hernia repair. It is also easy for the laparoscopic surgeon to become disoriented when the patient is very obese.

### Inguinal Hernia Repair in Recurrence

Generally, the short-term recurrence rate of laparoscopic inguinal hernia repair is reported to be less than 5%. In both the open and laparoscopic repair procedures, the aim is to cover the whole inguino-femoral area by a preperitoneal prosthetic mesh, and recurrences should not occur. When they do occur, recurrences must be regarded as technical failures. Recurrences after laparoscopic repair most often result from using too small a mesh, or not using staples to fix the mesh. Most recurrences after laparoscopic hernia repair occurred medially, and the technique was adjusted. The mesh is now placed at least until the midline, and occasionally hernia staples are used when an adequate overlap (2 cm) cannot be achieved medially. The totally extraperitoneal technique is now used more often, allowing for better visual control in the medial part of the operating field.

### OPERATING TIME

Operating times of surgical techniques varies between surgeons and also vary considerably between centers. It reduces with experience<sup>5</sup> and comparison between laparoscopic and open surgery is subject to bias due to pre-existing familiarity with open techniques. It is less important to the patient than a successful operation; the time taken to perform the surgery can have cost implications.<sup>6</sup> The operative time to perform unilateral primary inguinal repair has frequently been reported as longer for laparoscopic compared to open repair, however the mean difference in 36 of 37 randomized trials is 14.81 minutes.<sup>7</sup> These differences disappear in bilateral and recurrent hernia repairs.

### POSTOPERATIVE PAIN AND AMOUNT OF NARCOTICS USED

The open tension-free mesh repair is found to cause less postoperative pain than open non-mesh repairs. However most randomized trials assessing postoperative pain between open tension-free repairs and laparoscopic repairs report less pain in the laparoscopic groups. In many cases this also results in less analgesia being consumed by the patient.<sup>8-11</sup>

### COMPLICATION RATES

Complications in endoscopic inguinal hernia surgery are more dangerous and more frequent than those of open surgery, especially in inexperienced hands and hence are best avoided. It is possible to avoid most of these complications if one follows a set of well-defined steps and principles of endoscopic inguinal hernia surgery.<sup>4,12</sup>

Complications of laparoscopic repair of inguinal hernia can be divided into:

- Intraoperative
- Postoperative

### Intraoperative Complications and Precaution to Avoid these Complications

#### *During Creation of Preperitoneal Space*

This is the most important step for beginners.

- A wide linea alba may result in breaching the peritoneum; in such a situation, it is best to close the rectus and incise the sheath more laterally
- Improper placement of balloon trocar causing dissection of muscle fibers
- Entry into peritoneum causing pneumoperitoneum
- Rupture of balloon in preperitoneal space
- The Hassan's trocar must snugly fit into the incision to avoid CO<sub>2</sub> leak

To avoid these, one must ensure that the balloon is made properly and the correct space is entered by retracting the rectus muscle laterally to visualize the posterior rectus sheath. Also the balloon trocar is inserted gently, parallel to the abdominal wall, to avoid puncturing the peritoneum. The balloon must be inflated slowly with saline to ensure smooth and even distension and prevent its rupture.

#### *Precautions during Port Placement*

The trocars should be short and threaded in proportion to less workspace and to ensure a snug fit respectively. The skin incisions should be just adequate to grip the trocar and prevent its slipping. The patient should empty their bladder before surgery as the suprapubic trocar could injure a filled bladder.

The pressure in the preperitoneal space must be such as to offer sufficient resistance during trocar insertion to avoid puncturing the peritoneum.

### *Correct Identification of the Anatomical Landmarks*

The next most important and crucial step in any hernia surgery is the correct identification of anatomical landmarks. This is difficult for beginners as the anatomy is different from that seen in open surgery. The first most important step is to identify the pubic bone. Once this is seen, the rest of the landmarks are traced keeping this as reference point. One is advised to keep away from the triangle of doom, which contains the iliac vessels and to avoid placing tacks in the triangle of pain laterally.

### *Bladder Injuries*

Bladder injury most commonly occurs during port placement, dissecting a large direct sac or in a sliding hernia. It is mandatory to empty the bladder prior to an inguinal hernia repair to avoid a trocar injury. It is advisable that beginners catheterize the bladder during the initial part of their learning curve. The diagnosis is evident when one sees urine in the extraperitoneal space. Repair is done with vicryl in two layers and a urinary catheter inserted for 7-10 days.<sup>4</sup>

### *Bowel Injuries*

Bowel injury is rare during hernia surgery. It can occur when reducing large hernias, inadvertent opening of peritoneum causing the bowel to come into the field of surgery and in reduction of sliding hernias. Injury is best avoided in such circumstances by opening the hernial sac as close as possible to the deep ring. The initial studies showed a higher incidence, especially with TAPP, but it decreased over time.<sup>4</sup>

### *Vascular Injury*

This is one of the commonest injuries occurring in hernia repair and often a reason for conversion. The various sites where it can occur is rectus muscle vessel injury during trocar insertion; inferior epigastric vessel injury; bleeding from venous plexus on the pubic symphysis; aberrant obturator vein injury; testicular vessel injury; and the most disastrous of all, iliac vessels, which requires an emergency conversion to control the bleeding and the immediate services of a vascular surgeon to repair the same. Most of the other bleeding can be controlled with cautery or clips. Careful dissection and adherence to the principles of surgery will help in avoiding most of these injuries.<sup>4</sup>

### *Injury to vas Deferens*

Injury occurs while dissecting the hernia sac from the cord structures. The injury causes an eventual fibrotic narrowing of

the vas. A complete transaction of the vas needs to be repaired in a young patient. An injury to the vas is best avoided and this may be done by identifying before dividing any structure near the deep ring or floor of the extraperitoneal space. Also the separation of cord structures from the hernial sac must be gentle and direct; grasping of vas deferens with forceps must be avoided.

### *Pneumoperitoneum*

It is a common occurrence in TEP which every surgeon should be prepared to handle. Putting the patient in Trendelenburg position and increasing the insufflation pressures to 15 mmHg helps. If the problem still persists, a Veress needle can be inserted at Palmer's point.<sup>4</sup>

## **Postoperative Complications**

### *Seroma/Hematoma Formation*

It is a common complication after laparoscopic hernia surgery, the incidence being in the range of 5-25%. They are specially seen after large indirect hernia repair. Most resolve spontaneously over 4-6 weeks. A seroma can be avoided by minimizing dissection of the hernia sac from the cord structures, fixing the direct sac to pubic bone and fenestrating the transversalis fascia in a direct hernia. Some surgeons put in a drain if there is excessive bleeding or after extensive dissection.

### *Urinary Retention*

This complication after hernia repair has a reported incidence of 1.3 to 5.8%. It is usually precipitated in elderly patients, especially if symptoms of prostatism are present. These patients are best catheterized prior to surgery and catheter removed the next day morning.

### *Neuralgias*

The incidence of this complication is reported to be between 0.5 and 4.6% depending on the technique of repair. The intraperitoneal onlay mesh method had the highest incidence of neuralgias in one study and was hence abandoned as a form of viable repair. The commonly involved nerves are lateral cutaneous nerve of thigh, genitofemoral nerve and intermediate cutaneous nerve of thigh. They are usually involved by mesh-induced fibrosis or entrapment by a tack. The complication is prevented by avoiding fixing the mesh lateral to the deep inguinal ring in the region of the triangle of pain, safe dissection of a large hernial sac and no dissection of fascia over the psoas.

### *Testicular Pain and Swelling*

It occurs due to excessive dissection of a sac from the cord structures, especially a complete sac. Reported incidence is of

0.9 to 1.5%. Most are transient. Orchitis was found in a small number of patients but did not lead to testicular atrophy.

#### *Mesh Infection and Wound Infection*

Wound infection rates are very low. Mesh infection is a very serious complication and care must be taken to maintain strict aseptic precautions during the entire procedure. Any endogenous infection must be treated with an adequate course of antibiotics prior to surgery.

#### *Recurrence*

It is the most important endpoint of any hernia surgery. It requires a proper and thorough knowledge of anatomy and a thorough technique of repair to help keep the recurrence in endoscopic repair to a minimum.

#### **Postoperative Recovery**

Marked variations are seen in postoperative recovery due to patient motivation, postoperative advice, and definition of “normal activity”, existing co-morbidity and local “culture”. Nevertheless all trials reporting this as an endpoint of study show a significant improvement in the laparoscopic group, with no real difference between the TAPP and TEP groups. This is estimated to equate to an absolute difference of about 7 days in terms of time off work.<sup>13</sup>

#### **RECURRENCE**

Recurrence rates are low with the use of mesh and not significantly different between open or laparoscopic techniques.

#### **Causes of Recurrence in Laparoscopic Inguinal Hernia Repair**

What then can cause mesh dislocation or failure? The factors involved are insufficient size, wrong/defective material, incorrect placement, immediate or very early displacement by folding, lifting by a hematoma or urinary retention, missed cord lipomas and herniation through the keyhole (mesh slit) late displacement by insufficient scar tissue ingrowth, mesh protrusion, collagen disease or pronounced shrinkage. Despite the correct and stable mesh position, there is still a limited risk of a late sliding of the retroperitoneal fat under/ in front of the mesh into the enlarged inner ring.<sup>14</sup>

Leibl *et al* in 2000 advised to avoid slitting of the mesh and increase its size to reduce the recurrence rate. Generous dissection of preperitoneal space is required to eliminate potential herniation through the slit or strangulation of the cord structures completely and reduces the risk of genitofemoral neuropathy.

#### *Mesh Size*

The mesh size should be adequate to cover the entire myopectineal orifice. The established size in 2006 is 15 cm x 10 cm per unilateral hernia, with minor deviations.

#### *Mesh Material*

The mechanical strength of available meshes exceeds the intra-abdominal peak pressures and by far even the lightweight meshes are strong enough for inguinal repair. Aachen group made an important contribution for understanding the interaction of the living tissue with the implanted mesh material. The negative impact of pronounced shrinkage of the traditional heavyweight meshes was recognized as an important factor promoting recurrence. Schumpelick and coauthors have introduced the logical trend of the use of lightweight meshes. The new macroporous compound meshes present both the successful reduction of the overall foreign body amount and the preservation of mesh elasticity after the scar tissue ingrowths, due to very limited shrinkage and reduced bridging effect.

#### *Fixation of the Mesh*

In the early years of laparoscopic hernia repairs, a strong fixation seemed to be the most important factor in prevention of recurrence. With growing size of the mesh and true macroporous materials being used, the belief in strength reduced and gave way to the concern of acute/chronic pain possibly caused by fixation. The controversy of fixing or nonfixing the mesh is currently under scrutiny.

#### *Technical Experience*

The long learning curve of endoscopic repairs contains the potential risk of technical errors leading to unacceptable rise of recurrence rate. This fact highlights the need for structured well-mentored teaching, a high level of standardization of the procedure and rigorous adherence to the principles of laparoscopic hernia repair. The impact of experience on the recurrence rate was in both extremes well documented.

#### *Collagen Status*

Inborn or acquired abnormalities in collagen synthesis are associated with higher incidence of hernia formation and recurrences.

#### *Other Factors*

The negative effect on healing in hernia repair is often related with malnutrition, obesity, steroids, type II diabetes, chronic lung disease, jaundice, radiotherapy, chemotherapy oral

anticoagulants, smoking, heavy lifting, malignancy and anemia. Laparoscopic inguinal hernia repair offers excellent results in experienced hands.

### **BILATERAL ASSESSMENT AND TREATMENT**

Up to 30% of patients with a unilateral hernia will subsequently develop a further hernia on the contralateral side. Also, when examined at operation, 10-25% is found to have an occult hernia on the contralateral side. Both laparoscopic approaches allow assessment and treatment of the contralateral side at the same operation without the need for further surgical incisions, very little further dissection and minimal additional postoperative pain.<sup>15</sup> In open surgery a further large incision is required in the opposite groin. This considerably impairs postoperative mobility and increases the likelihood of admission to hospital. Some surgeons advocate routine repair of the contralateral side during laparoscopic repair.

### **COST EFFECTIVENESS**

It is suggested that laparoscopic hernia repair is more expensive to perform than open hernia repair. The primary reason for this relates to the cost of extra equipment used for the laparoscopic repair with secondary costs attributed to perceived increases in operating time for the laparoscopic procedure.<sup>16</sup> From the Indian perspective, various factors come into play when analyzing the cost implications of laparoscopic repair of inguinal hernia. In most hospitals, except the larger corporate ones, the theater time is charged on a per-case basis rather than by the hour. Thus, increase in the operating time, particularly during the learning curve, does not necessarily mean additional expense for the patient. If the surgeon were to adopt cost-containment strategies such as use of reusable laparoscopic instruments (which is more or less the norm in India) as against disposable ones, use of indigenous balloons devices rather than commercially available ones, sparing use of fixation devices and reliance on sutures for fixation of the mesh, the cost of the laparoscopic hernia repair should be comparable to the open repair. It is likely that many surgeons are already practicing these strategies and passing on the benefits of laparoscopic repair to their patients.<sup>17</sup>

### **LEARNING CURVE**

This period represents the developmental and learning curve for the consultant and the senior registrars. There have been some modifications of the technique as difficulties have been recognized. There is steep learning curve for laparoscopic repair. Initially everyone used to fix mesh with staples, but nowadays many surgeons are using sutures for it. As experience increases, our ability to recognize finer structures and to keep within the correct tissue planes, improves. This has been associated with

lower minor-complication rates and higher percentage of pain-free recoveries.

### **DISCUSSION**

The Shouldice technique is the 'gold standard' of open non-mesh hernia repair. The 5-year recurrence rate is acceptable, with no difference between TAPP and Shouldice repair. Poor operative performance resulted in a higher recurrence rate. The TAPP operation represents an excellent alternative for primary inguinal hernia repair. Laparoscopic repair compared favorably with Lichtenstein repair for primary indirect and direct hernias, and unilateral and bilateral recurrent hernias, but was inferior for primary bilateral hernias. General anesthesia and higher costs are reasonable compromises for a shorter period of discomfort in patients with a low ASA index and busy job/sport activity.<sup>18</sup>

With open Lichtenstein hernia repair in terms of intraoperative and postoperative complications and short-term recurrence. In fact with extra care, complications can be nearly avoided. The laparoscopic operations caused significantly less pain in the early postoperative period, leading to earlier mobilization and earlier return to work than open mesh repair. This was clearly seen in the manual workers undergoing laparoscopic operation. Furthermore, laparoscopic TEP repair is associated with greater patient satisfaction and better cosmetic results than its open counterpart. On the basis of these early experiences, laparoscopic extraperitoneal hernia repair seems to be as good as, if not superior to, the existing open Lichtenstein repair in terms of postoperative pain, hospital stay, return to work, and cosmesis provided the long-term recurrence rates also are comparable. It is possible to achieve high standards even during the learning phase of the surgeon if there is strict adherence to the protocols. The TEP technique took no longer to perform, and was associated with less postoperative pain, a shorter period of sick leave and a faster recovery, compared with open Lichtenstein hernia repair.<sup>19</sup>

TAPP and TEP repairs were compared and found to give equally good results. TAPP is an easier procedure to learn and is less expensive than TEP repair done with balloon dissectors and their ports; however, the reverse is true if no balloon dissectors and staples are used during TEP repair. TEP repair has a longer learning curve.<sup>1</sup>

Laparoscopic hernia repair may not be more expensive than open repair in terms of direct hospital costs or where a difference exists, this is relatively small. Societal costs due quicker recovery and return to employment show clear advantages for the laparoscopic repair and although not currently evaluated in detail, the reduction in chronic groin pain after laparoscopic repair is likely to lead to savings in both direct hospital costs and societal costs.

At present, the laparoscopic repair of hernias finds its clinical niche in patients with bilateral or recurrent hernias or in patients

with unilateral hernia who desire a minimal period of postoperative disability.<sup>20</sup>

Open hernia repair requires an incision at the point of maximum weakness, dividing of muscle and then suturing to repair the defect. This damage must heal before the wound become comfortable. Type of anesthetic used to affect the repair does not affect the period of discomfort. In a laparoscopic repair no incision is made in the groin. The small wounds which are made heal rapidly and have been shown to cause negligible postoperative pain. Further mesh is placed inside the groin muscle in the preperitoneal layer and this seems a more logical position to prevent peritoneal contents bulging out of a muscle defect than placing a mesh on the outside of the defect. Laparoscopic repair has no surgical weakness postoperatively.

NICE guidelines on laparoscopic hernia repair have been updated in September 2004.

#### As Per current Guidelines

1. Patient should be given a choice of open and laparoscopic repair of hernia in all suitable cases i.e., even in primary unilateral inguinal hernias.
2. Laparoscopic hernia repair should be performed only by appropriately trained surgeons.
3. Patients should be told about TAPP and TEP repair and their risks so, they choose an appropriate procedure.
4. For repair of recurrent and bilateral inguinal hernia, laparoscopic repair should be considered.
5. When laparoscopic surgery is undertaken for inguinal hernia, the totally extraperitoneal (TEP) procedure should be preferred.

#### RECOMMENDATION

The important points to be kept in mind during the surgery are:

- After dissecting direct sac, all peritoneal adhesions around the margin of the defect should be meticulously lysed.
- Always search for an indirect sac, even if a direct hernia has been reduced.
- Reflect the peritoneum off the cord completely.
- Place an adequate size mesh to cover the myopectineal orifice completely, preferably the size of 15 × 15 cm.
- The lower margin of the mesh must be comfortably placed - medially in the retropubic space and laterally over the psoas muscle.
- Perform a 2-point fixation of the mesh on the medial aspect over the Cooper's ligament.
- Avoid cutting of the mesh over the cord. This weakens the mesh and provides a potential site for recurrence.
- Ensure adequate hemostasis prior to placing the mesh.
- The most important factor is the adequate training and learning of the right technique.

#### CONCLUSION AND RECOMMENDATIONS

Laparoscopic hernia repair is safe and provide less postoperative morbidity in experienced hands and definitely has many advantages over open repair. For bilateral and recurrent inguinal hernias laparoscopic approach is recommended. Nowadays for primary inguinal hernia also it is recommended. For sliding hernia also TAPP is the preferred approach.

*The final word on hernia will probably never be written. In collecting, assimilating and distilling the wisdom of today we must provide a base from which further advances may be made.*<sup>21</sup>

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