

Different Surgical Approach of Groin Hernia Repair: A Systematic Review

Alharthi Saif Abdullah M, Alhamyani Abdulmajeed Hamed M, Al- Kurayzi Majed. Hassan,
Alqurashi Ibrahim Abdullah, Althomali Faris Ahmed, Alzahrani Mohammed Khalid,
Albaqami Majed Mohammed, Alzahr Abdulaziz Ahmed, Ahmad Faisal Albishry

- **Abstract:**

Background: The prevalence of hernia is far greater in developing countries like India amounting to a major health care burden.

Purpose: this study was aimed to discuss and review the different surgical techniques for groin hernia repair and demonstrate the advantage and disadvantage of each surgical procedure.

Method: A systematic review was conducted. A search of the literature was conducted using Medline, Embase, Helms, Cinahl, Assia, Psyclit and the Cochrane Library to July 2016. Key search terms were hernia, inguinal, femoral, groin, with searches limited to human adult subjects and the English language.

Conclusion: Most surgeons select the type of repair on the basis of the clinical scenario. Laparoscopic repair of inguinal hernia using Surgisis mesh secured with fibrin sealant can be effectively used to treat primary, recurrent, direct, indirect, and bilateral inguinal hernias

in adults without unexpected complications and minimal incidence of recurrence in a short-term follow-up.

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- **Introduction:**

Groin Hernia is a naturally occurring defect in the anterior abdominal wall. This weak muscular area in the inguinal region has been named after surgeon and anatomist Henri Fruchaud and it is a common problem of the modern world with an incidence ranging from 5%-7%. The prevalence of hernia is far greater in developing countries like India

amounting to a major health care burden. Of all groin hernias, around 75% are inguinal hernias^{1,2}. The lifetime risk of developing an inguinal hernia is 3% for women and 27% for men **Figure1**³. The incidence rises with age and is eight times higher in persons with a positive family history⁴.

In adults, there are two main types of groin hernia, inguinal and femoral hernia. Inguinal hernias are described further as being direct, where the hernia enters through the wall of the canal, or indirect, where the hernia enters the inguinal canal via the internal ring at the top. Femoral hernias account for <10% of all groin hernias, but 40% of these present as emergencies with incarceration or strangulation⁵. The mortality rates for emergency repair are higher than for elective repair. Femoral hernias are more common in older patients and in those who have previously undergone an inguinal hernia repair^{6,7}.

The repair of the groin hernia is one of the most common operations performed in general surgery with significant costs to health care and society. Rates of repair are increasing annually and have the potential to double over the coming years⁸.

Operative techniques have evolved continuously over the past decades establishing tension free mesh repair as standard of care for inguinal hernia management and more recently laparoscopic technique in hernia. Therefore this study was aimed to discuss and review the different surgical techniques for groin hernia repair and demonstrate the advantage and disadvantage of each surgical procedure.

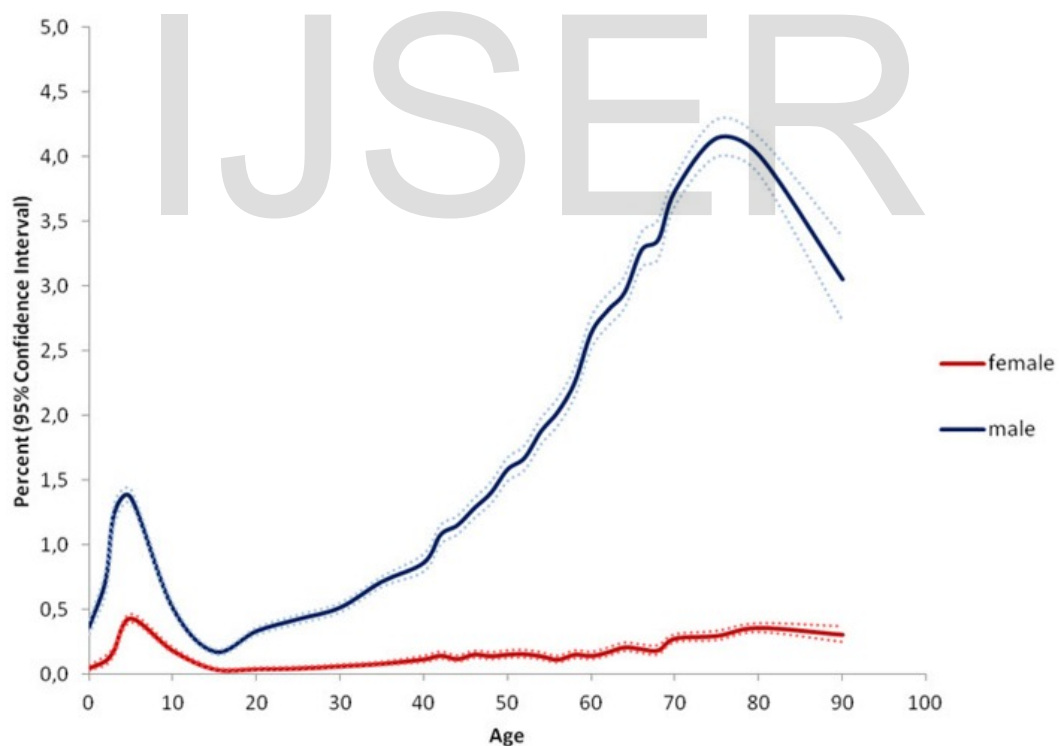


Figure1: Prevalence of inguinal hernia repair stratified by age and gender.³

- **Method and Material:**

A systematic review was conducted. A search of the literature was conducted using Medline, Embase, Helms, Cinahl, Assia, Psyclit and the Cochrane Library to July 2016.

Key search terms were hernia, inguinal, femoral, groin, with searches limited to human adult subjects and the English language. The abstracts of the articles identified in the literature searches were examined. Articles that appeared to contain relevant subject matter were selected and obtained. Bibliographies of all articles located in this way were examined for further citations. On the basis of the abstract, articles were excluded because they had been superseded (the literature on hernia extends over more than a century) or because they dealt only with technical surgical considerations. We included most of evidence based studies which were discussing the repair techniques of hernia.

- **Results and findings:**

Groin hernias can be classified according to several different classification systems and is usually used to describe inguinal hernia (medial/direct and lateral/indirect) and femoral hernia in common. Groin hernia repair is a commonly performed general surgery procedure in both adults and children with inguinal hernias constituting more than 95% of all groin hernia repairs^{22,23}.

This systematic review has included An American registry study Saleh et al,⁹ that addressed the question of perioperative complication rates after open versus endoscopic/laparoscopic primary hernia repair. The study involved 37 645 patients, 16.9% of whom underwent endoscopic/laparoscopic surgery, there was no difference between the two types of procedure in 30-day morbidity or mortality. Complications arose in about 1% of patients, severe complications in 0.5%. The mortality was 0.02% for laparoscopic and 0.05% for open procedures⁹.

According to European Hernia Society (EHS) guidelines¹⁰ they recommends open surgery for primary, unilateral inguinal hernia in a male patient¹⁰. two included meta-analyses studies^{11,12} found that the extraperitoneal approach (TEP) has a significantly higher

recurrence rate than Lichtenstein repair, but this conclusion was based on the findings of a Scandinavian randomized multicenter trial¹³ which was also in our included trials, in which a single participating surgeon accounted for 33% of the recurrences after TEP.

Once this surgeon's results are set aside, the difference disappears. The meta-analysis of O'Reilly et al.¹² did not reveal any disadvantage of transabdominal approach (TAPP)

Figure1 in terms of recurrence rates, and the laparoscopic/endoscopic techniques were superior to the open techniques with regard to chronic postoperative pain. One of our included trials¹⁴ revealed a significantly lower rate of chronic pain after TAPP than after Lichtenstein repair; in this study, a group of patients at increased risk for postoperative pain was identified preoperatively by means of their response to a standardized noxious stimulus. The authors concluded that patients in this group should undergo laparoscopic/endoscopic rather than open surgery.

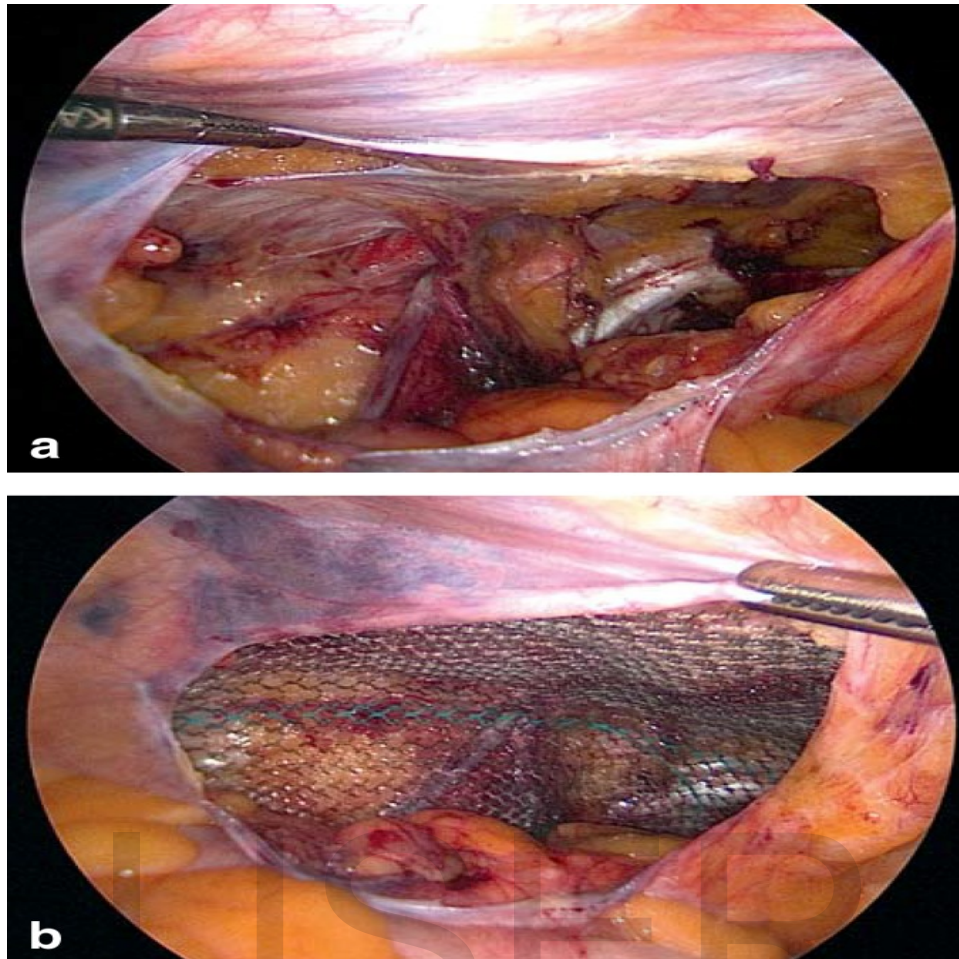


Figure 2: The operative field in a transabdominal inguinal hernia repair procedure,¹⁵
a) after adequate exposure and
b) after the introduction of a 12x17 cm mesh.

Aspects of Mesh technology in surgical techniques:

Use of meshes has decreased the rate of recurrence to a significant extent but complications related to these prostheses. Different mesh techniques have been described to date. Single and double layer meshes, and plug repairs all have been reported with good results by their users and defenders. However, EHS Guideline has clearly stated that none of the alternative mesh techniques except for the Lichtenstein and endoscopic techniques has received sufficient scientific evaluation to be recommended¹⁰.

Recent evidences is in favor of mesh use in cases with incarceration, however prosthetic repair creates a risk for surgical site infection in cases where a gangrenous intestine is met and a resection-anastomosis is required. Suture repairs like Shouldice- Bassini operation are employed in those cases.

A meta-analysis study ¹⁶ has shown that the use of a mesh does not increase the recurrent of chronic pain among patients. Klinge et al¹⁷ have summarized the important attributes of modern meshes in surgical repair of hernia **Table 1**. Large-pore meshes are obligatory. In laparoscopic/endoscopic hernia repair, as opposed to the Lichtenstein technique, they do not need to be fixed in most cases¹⁷.

Table.1 : Required properties of modern mesh materials, such as polypropylene and polyvinylidene fluoride

	Polypropylene (PP)	Polyvinylidene fluoride (PVDF)
Monofilament	+	+
Pore size >1–2 mm	+	+
Foreign-body reaction	++	+
Visibility in imaging studes (ultrasonography, CT, MRI)	-	++

CT, computerized tomography; MRI, magnetic resonance imaging

Histopathologic study ¹⁸ of hernia meshes explanted from human patients has shown that they possess the desired properties, as any reintervention at the mesh-tissue compound is a surgical challenge, sometimes resulting in almost untreatable defects; huge efforts are being made to improve the biological and functional performance of the meshes. Based on numerous experimental and clinical studies in the past 20 years, our understanding of them has improved markedly. This includes the biomechanical aspects and the histopathological evaluation of the recipient tissue ^{17,18}. The markedly reduced foreign-body reaction to

polyvinylidene fluoride (PVDF) has been demonstrated in long-term animal experiments, as has the effect of polypropylene (PP) and PVDF on collagen synthesis¹⁷. PVDF visualization with supramagnetic iron ions is not merely of scientific interest; it can also be used as a diagnostic aid for the evaluation of complications^{17,18}.

In a Swedish study by Novik et al¹⁹, fixation with short-term resorbable material (e.g., when a self-adhesive mesh was used) yielded a higher recurrence rate than fixation with long-term resorbable or non-resorbable material¹⁹. The follow-up intervals in the systematic review and meta analysis studies^{20,21} on self-adhesive meshes and on glue fixation in the Lichtenstein technique were too short (about 1 year), but they did reveal that gluing causes significantly less chronic pain.

Comparison between different procedures:

A systematic review by McCormack et al²⁴ comparing laparoscopic and open repairs has revealed no apparent difference in recurrence. Laparoscopy seems to cause less persisting pain and numbness. Return to normal day to day activities is also faster. However, operation time using laparoscopy technique is longer and there appears to be a higher risk of serious complication rate in respect of visceral (especially bladder) and vascular injuries²⁴.

In similar systematic review²⁵, on further comparing complications of laparoscopic repair to open repair, it was evident that laparoscopic repairs are associated with overall more

incidence of seroma formation. On the other hand there are less frequent chances of hematoma formation (more in TEP patients) and wound/superficial infections but there has been a heterogeneity in data to deduce a final statement²⁵. Other study²⁶ have showed complications related to laparoscopic hernia repair, although in lower frequency, include trocar site hemorrhage and/or herniation, and injury to the epigastric or gonadal vessels. Complications related to use of laparoscopy and less to surgeon technique are hypotension secondary to elevated intra-abdominal pressure, hypercapnia, subcutaneous emphysema, pneumothorax, and increased peak airway pressures²⁶.

- **Conclusion:**

The laparoscopic technique has replaced the open approach in many surgical procedures. This development has largely taken place without desirable preceding studies proving the safety and benefit to the patient. Laparoscopic repair of inguinal hernia using Surgisis mesh secured with fibrin sealant can be effectively used to treat primary, recurrent, direct, indirect, and bilateral inguinal hernias in adults without unexpected complications and

minimal incidence of recurrence in a short-term follow-up. Complications noted in this series were typical of the operation, similar in incidence to those rates reported in the literature, and resolved without surgical intervention.

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