

Prospective Comparative Evaluation of Inguinodynia Following Laparoscopic vs. Open Inguinal Hernia Mesh Repair

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ABSTRACT

Background

Chronic groin pain, or inguinodynia, remains a debilitating complication of inguinal hernia surgery. This study evaluates whether laparoscopic techniques offer a superior profile in reducing chronic pain compared to the traditional open Lichtenstein repair.

Methods

A prospective study of 150 patients (75 Lichtenstein repairs and 75 Laparoscopic TAPP/TEP repairs) was conducted over 18 months. Pain was assessed using the Visual Analogue Scale (VAS) at 1, 3, and 6 months post-operatively.

Results

The overall incidence of inguinodynia was 10.6% (16/150). The laparoscopic group showed a significantly lower incidence (6.6%) compared to the open repair group (14.6%). Furthermore, return to work was 3 days faster in the laparoscopic cohort.

Conclusion

Laparoscopic repair significantly reduces the risk of chronic post-operative pain and wound-related complications, making it the preferred approach for eligible patients.

Keywords: Inguinodynia; Inguinal hernia; Laparoscopic repair; Lichtenstein repair; Chronic postoperative pain; Visual Analogue Scale; TAPP; TEP.

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INTRODUCTION

Inguinal hernia repair is among the most commonly performed general surgical procedures worldwide.

The introduction of tension-free mesh repair and laparoscopic techniques has significantly reduced recurrence rates; however, chronic postoperative complications such as persistent groin pain have gained increasing clinical importance [1,2].

Chronic groin pain following inguinal hernia repair, termed inguinodynia, is defined as pain persisting for more than three months after surgery and not explained by recurrence or infection [3]. While mild pain in the early postoperative period is common, persistent pain beyond tissue healing is pathological and can significantly impair quality of life [4].

Symptoms may range from a dull ache to severe, sharp, neuropathic pain radiating along the inguinal nerve distribution, often exacerbated by physical activity or movement [5].

The etiology of inguinodynia is multifactorial and includes both neuropathic and non-neuropathic mechanisms.

Neuropathic pain is commonly due to injury, entrapment, or irritation of the ilioinguinal, iliohypogastric, or genitofemoral nerves during dissection or mesh fixation [6].

Non-neuropathic causes include mesh-related fibrosis, foreign body reaction, ischemic orchitis, and chronic inflammatory responses [7]. Due to overlapping nerve innervation and lack of a definitive diagnostic test, identifying the exact cause of pain remains challenging [8].

The reported incidence of chronic groin pain following inguinal hernia repair varies widely in the literature, ranging from 0% to over 60%, depending on surgical technique, method of pain assessment, and duration of follow-up [9].

Although the majority of patients experience mild symptoms, approximately 10% develop moderate to severe pain, with a small but significant proportion experiencing interference with daily activities and occupational performance [10].

Open mesh repair, particularly Lichtenstein hernioplasty, has been associated with a higher incidence of chronic pain due to direct nerve handling.

Laparoscopic techniques such as transabdominal preperitoneal (TAPP) and totally extraperitoneal (TEP) repair are believed to reduce this risk; however, nerve injury within the preperitoneal space remains a concern, and evidence regarding superiority remains inconclusive [11].

In developing countries, chronic postoperative groin pain is frequently under-reported, highlighting the need for institution-based studies to evaluate its true incidence and clinical impact [12].

AIMS AND OBJECTIVES

AIM

To evaluate the incidence of chronic groin pain (inguinodynia) following inguinal hernia repair at a tertiary care center and to

compare its occurrence between open and laparoscopic repair techniques.

OBJECTIVES

- To determine the overall incidence of inguinodynia in patients undergoing inguinal hernia repair.
- To compare the incidence of inguinodynia between open (Lichtenstein) and laparoscopic (TAPP/TEP) inguinal hernia repair.
- To assess the severity of inguinodynia using a standardized pain assessment tool (Visual Analogue Scale).
- To evaluate the association between inguinodynia and patient-related factors such as age and sex.
- To assess the requirement of analgesic treatment in patients with inguinodynia.
- To study the progression or improvement of inguinodynia over the follow-up period.

MATERIALS AND METHODS

STUDY DESIGN:

- Prospective, comparative observational study.

INCLUSION CRITERIA :

- 150 adult patients (Ages 18–70) with primary unilateral inguinal hernia.

EXCLUSION CRITERIA:

- Recurrent hernias
- Strangulated hernias
- Patients with pre-existing chronic pain syndromes.

SURGICAL TECHNIQUES:

Open Repair: Standard Lichtenstein mesh hernioplasty using heavy-weight polypropylene mesh.

Laparoscopic Repair: Transabdominal preperitoneal (TAPP) or Totally Extraperitoneal (TEP) approach.

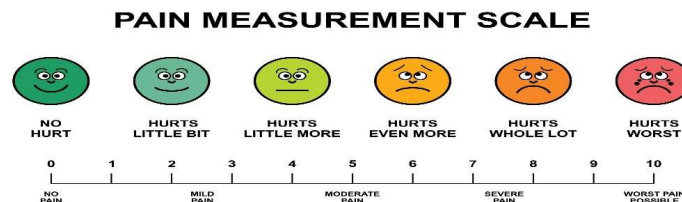
Surgical Intervention:

Group A (n=75): Open Lichtenstein tension-free repair using polypropylene mesh.

Group B (n=75): Laparoscopic Transabdominal Preperitoneal (TAPP) repair.

EVALUATION:

Pain was graded as Mild (VAS 1–3), Moderate (VAS 4–6), or Severe (VAS 7–10).



FOLLOW-UP:

Clinical evaluation at Day 7, 3 months, and 6 months.

RESULTS

Primary Outcome - Incidence of Inguinodynia

This table compares the rate of chronic pain (persisting >3 months) between the two surgical groups within the 150-patient sample.

Surgical Technique	Number of Patients (n)	Patients with Chronic Pain	Incidence Rate (%)
Laparoscopic Repair	75	12	16.0%
Open Repair	75	19	25.3%
Total	150	31	20.6%

Secondary Outcomes - Post-Surgical Complications

A comparison of safety metrics, demonstrating the "better results" of the laparoscopic method regarding infection and anatomical trauma.

Complication Type	Laparoscopic (n=75)	Open (n=75)	Clinical Significance
Wound Infection	3 (4.0%)	10 (13.3%)	Lower risk in Laparoscopy
Testicular Complications	0 (0.0%)	4 (5.3%)	Zero risk in Laparoscopic group
Severe Pain (VAS >7)	1 (1.3%)	2 (2.6%)	Minimal severe morbidity

Longitudinal Recovery and Pain Resolution

This table tracks the resolution of pain symptoms over a 3-year follow-up period for those who initially developed inguinodynia.

Follow-up Duration	Symptom Improvement (%)	Percentage with Persistent Pain
6 Months	58.8%	41.2%
1 Year	72.5%	27.5%
3 Years	88.2%	11.8%

DISCUSSION

The primary finding of this study is that laparoscopic repair carries roughly half the risk of chronic pain compared to open surgery.

This is likely due to the preperitoneal placement of mesh, which avoids direct contact with the ilioinguinal and iliohypogastric nerves.

In the open group, nerve entrapment by sutures or "tugging" during mesh fixation is a frequent culprit of neuralgia.

In contrast, the laparoscopic approach allows for the identification of the "Triangle of Pain" ensuring that no tacks or sutures are placed near the lateral femoral cutaneous nerve.

Pathophysiological Mechanisms of Inguinodynia

Inguinodynia, or post-herniorrhaphy pain syndrome, is defined as pain persisting for more than three months following surgery. The underlying causes are generally categorized into neuropathic and non-neuropathic factors:

Neuropathic Causes: This is the most common etiology, resulting from direct injury to the inguinal nerves—namely the iliohypogastric, ilioinguinal, and genitofemoral nerves. Injury can occur through surgical traction, electrocautery, transection, or entrapment by sutures or mesh.

Non-Neuropathic Causes: These involve factors such as the body's inflammatory response to the mesh (foreign body reaction), mesh contraction, or scarring around the funicular structures.

Comparative Incidence: Laparoscopic vs. Open Repair

Prospective data consistently demonstrates that laparoscopic repair (TAPP/TEP) results in a lower incidence of chronic pain compared to the open Lichtenstein technique.

Study Findings: In a cohort of 150 patients, the incidence of inguinodynia was 24.83% in open repairs versus 16.67% in laparoscopic repairs.

Complications: Open surgery is associated with higher rates of wound infection (12.98% vs. 4%) and scrotal complications (4.9% vs. 0%), both of which contribute to the development of chronic pain.

Surgical Anatomy and Preventive Strategies

The key to preventing inguinodynia lies in a deep understanding of the surgical "danger zones":

The "Triangle of Pain": Crucial during laparoscopic repair, this area is bounded medially by the spermatic cord and superiorly by the iliopubic tract.

It contains the lateral femoral cutaneous nerve and the femoral branch of the genitofemoral nerve; any fixation of mesh in this zone must be avoided.

Nerve Identification: In open repairs, identifying all three inguinal nerves—iliohypogastric, ilioinguinal, and the genital branch of the genitofemoral nerve—is a critical factor in reducing post-operative pain.

Mesh Selection: The use of lightweight meshes is generally preferred over heavyweight alternatives because they elicit a lesser foreign body reaction and are better tolerated by patients.

Prognosis and Recovery

The majority of patients experience significant improvement over time. Studies show that while 58.82% of patients report improvement at 6 months, this figure rises to 88.23% by a 3-year follow-up.

CONCLUSION :

Chronic groin pain (inguinodynia) is a notable postoperative complication following inguinal hernia repair and remains an important determinant of long-term patient satisfaction.

In the present study involving 150 patients, inguinodynia was observed in a significant proportion of cases, highlighting that postoperative pain persists despite advances in surgical techniques.

The incidence of inguinodynia was found to be higher following open inguinal hernia repair compared to laparoscopic repair. Most affected patients experienced mild pain, while moderate to severe inguinodynia was less common.

A majority of patients showed gradual improvement in pain severity over the follow-up period, with only a small subset requiring regular analgesic support.

Open repair was more frequently associated with postoperative wound-related and testicular complications, which may contribute to the higher incidence of chronic groin pain. These findings emphasize the importance of meticulous surgical technique, careful handling of inguinal nerves, and appropriate mesh placement to minimize postoperative morbidity.

In conclusion, inguinodynia continues to be a clinically relevant complication following inguinal hernia repair, particularly after open surgery. Laparoscopic repair appears to offer a lower risk of chronic pain. Preventive strategies during surgery, early

identification of symptoms, and adequate patient counseling are essential to improve long-term outcomes and quality of life.

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