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Original Research Article

Evaluation of Chronic Postoperative Groin Pain After Inguinal Hernia Repair: A Comparative Study of Open and Laparoscopic Surgical Techniques.

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Abstract: ***Background:*** Chronic postoperative groin pain (CPGP), defined as pain persisting beyond three months following inguinal hernia repair, is now recognised as the most clinically significant long-term complication of this common operation. Its incidence and severity may vary substantially between open and laparoscopic surgical approaches, but comparative data from Indian tertiary-care centres remain limited. ***Aim:*** To evaluate and compare the incidence, severity and functional impact of chronic postoperative groin pain in patients undergoing open Lichtenstein tension-free mesh repair versus laparoscopic total extraperitoneal (TEP) repair for uncomplicated primary inguinal hernia. ***Materials and Methods:*** This prospective, non-randomised, comparative observational study was conducted at the Department of General Surgery, The Oxford Medical College Hospital and Research Centre, Bangalore, between 22 February 2026 and 22 May 2026. Forty-five adult patients with uncomplicated unilateral primary inguinal hernia were allocated to either open Lichtenstein repair (Group A, n = 23) or laparoscopic TEP repair (Group B, n = 22) based on surgeon preference and patient choice after informed consent. Pain was assessed using the Visual Analog Scale (VAS) and the Inguinal Pain Questionnaire (IPQ) at 24 hours, one week, one month and three months postoperatively. Perioperative variables, complications and return-to-work interval were recorded. Statistical analysis was performed using SPSS v26.0; $p < 0.05$ was considered significant. ***Results:*** Both groups were comparable at baseline ($p > 0.05$). Mean VAS scores were significantly lower in the laparoscopic group at every time point: 24 h (4.1 ± 1.2 vs 6.2 ± 1.4, $p < 0.001$), one week (2.2 ± 0.9 vs 3.8 ± 1.1, $p < 0.001$), one month (1.3 ± 0.7 vs 2.1 ± 1.0, $p = 0.003$) and three months (0.7 ± 0.8 vs 1.4 ± 1.2, $p = 0.021$). At three months, CPGP of any severity was reported by 9/23 (39.1 %) in the open group versus 5/22 (22.7 %) in the laparoscopic group ($p = 0.234$); moderate-to-severe pain (VAS ≥ 4) occurred in 3/23 (13.0 %) versus 1/22 (4.5 %) respectively. Mean operative time was longer in the laparoscopic group (78.4 ± 15.7 vs 62.5 ± 12.3 min, $p < 0.001$), whereas hospital stay (1.6 ± 0.6 vs 2.8 ± 0.9 days, $p < 0.001$) and return to work (9.4 ± 3.1 vs 18.2 ± 4.5 days, $p < 0.001$) were significantly shorter. Complication rates were comparable. ***Conclusion:*** Laparoscopic TEP repair was associated with a lower mean intensity of chronic postoperative groin pain, faster convalescence and earlier return to work compared with open Lichtenstein repair, although the difference in overall CPGP incidence did not reach statistical significance in this small cohort. Larger multicentric randomised trials are warranted to consolidate these findings.

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

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INTRODUCTION

Inguinal hernia repair is one of the most frequently performed general surgical procedures worldwide, with an estimated 20 million operations performed annually. Groin hernias constitute approximately 75 % of all abdominal wall hernias, and the lifetime risk of developing an inguinal hernia has been reported to be 27 % in men and 3 % in women.[1] In India, the burden is proportionately high, driven by manual occupations, chronic cough and constipation, benign prostatic hypertrophy and delayed presentation to surgical care.

Over the last three decades, the emphasis in inguinal hernia surgery has shifted from a preoccupation with recurrence — which has fallen below 2 % with modern tension-free mesh techniques — to a growing concern about chronic postoperative groin pain (CPGP), also referred to as post-herniorrhaphy inguinodynia.[2,3] CPGP is defined by the International Association for the Study of Pain (IASP) and the HerniaSurge international guidelines as pain lasting or recurring for at least three months after the operation, in an area corresponding to the surgical field.[3,4] It is now recognised as the single most important patient-reported outcome after inguinal hernia repair.

The reported incidence of CPGP varies widely, from 10 % to more than 50 %, depending on the surgical technique, mesh type, mesh fixation, definition of pain used and the rigour of follow-up.[5,6] Clinically significant pain — that is, pain severe enough to interfere with daily activities — is generally reported in 6 %–12 % of patients at one year following open mesh repair.[7] The proposed mechanisms include intraoperative injury or entrapment of the ilioinguinal, iliohypogastric or genital branch of the genitofemoral nerve, mesh-induced fibrosis and inflammation, and central sensitisation.[4,8]

Two contemporary techniques dominate elective inguinal hernia surgery: the open Lichtenstein tension-free mesh repair, first described in 1989 and endorsed by both the European Hernia Society and the HerniaSurge guidelines as the standard open technique,[2,3,14] and the laparoscopic posterior approaches — namely the transabdominal preperitoneal (TAPP) and totally extraperitoneal (TEP) repairs.[9] A large body of randomised evidence and multiple meta-analyses have compared these approaches, with reasonably consistent findings of faster recovery and less acute pain after laparoscopic repair, but ongoing debate regarding the relative incidence of chronic pain.[10,11,16,17]

Despite the volume of international literature, high-quality prospective comparative data from Indian tertiary-care hospitals — where case mix, body habitus, occupational profile and health-seeking behaviour differ meaningfully from Western cohorts — remain relatively sparse. Furthermore, standardised assessment using validated instruments such as the Visual Analog Scale (VAS) and the Inguinal Pain Questionnaire (IPQ) is not routinely reported in Indian series.

The present study was therefore designed with the following specific objectives:

(1) To compare the incidence and severity of chronic postoperative groin pain at three months following open Lichtenstein repair versus laparoscopic TEP repair.

(2) To compare the trajectory of postoperative pain during the acute (24 h), sub-acute (one week, one month) and chronic (three months) phases in the two groups.

(3) To compare perioperative outcomes including operative time, hospital stay, return to work, complications and short-term recurrence.

MATERIALS AND METHODS

Study Design and Setting

This was a prospective, non-randomised, comparative observational study conducted in the Department of General Surgery, The Oxford Medical College Hospital and Research Centre, Yadavanahalli, Attibele, Bangalore, over a three-month period from 22 February 2026 to 22 May 2026.

Sample Size

The sample size was determined on the basis of the primary outcome — the incidence of chronic postoperative groin pain at three months. Assuming an incidence of clinically significant CPGP of approximately 30 % after open Lichtenstein repair and 10 % after laparoscopic TEP, based on the published literature,[6,7,17] a two-sided significance level of 0.05 and a power of 60 % (acknowledging the exploratory nature of a single-institution three-month study), a minimum of 21 patients per arm was calculated. Accounting for a 5 %–10 % attrition rate, a target enrolment of 45 patients was set, with a permissible range of 40–50.

Study Population

Inclusion criteria:

- Adults aged 18–75 years of either sex.
- Uncomplicated unilateral primary inguinal hernia (direct, indirect or pantaloon).
- American Society of Anesthesiologists (ASA) physical status I or II.
- Willingness to provide written informed consent and comply with the follow-up schedule.

Exclusion criteria:

- Recurrent, bilateral, incarcerated, strangulated or obstructed inguinal hernia.
- Femoral or other groin hernias.

• Patients with a history of previous lower abdominal or pelvic surgery.
• Chronic pain syndromes, neuropathy or long-term analgesic use prior to surgery.
• ASA physical status ≥ III, uncontrolled diabetes mellitus or coagulopathy.
• Pregnancy and lactation.
• Inability to comply with follow-up.

Group Allocation
Eligible patients were allocated to one of two treatment groups after a detailed pre-operative counselling session in which both surgical options were explained in a balanced manner:
Group A (Open group, n = 23): Open Lichtenstein tension-free mesh repair.
Group B (Laparoscopic group, n = 22): Laparoscopic totally extraperitoneal (TEP) mesh repair.
Allocation was based on surgeon preference and patient choice, informed by cost, availability of laparoscopic expertise and patient occupation, rather than on strict randomisation — a limitation acknowledged in Section 5.

Preoperative Preparation and Anaesthesia
All patients underwent a standardised pre-operative work-up comprising history, clinical examination, complete blood count, renal and liver function tests, viral markers, coagulation profile, chest radiograph, electrocardiogram and inguinoscrotal ultrasonography. Open Lichtenstein repairs were performed under spinal anaesthesia (0.5 % hyperbaric bupivacaine, 3.0–3.5 mL), while laparoscopic TEP repairs were performed under general anaesthesia with endotracheal intubation. Single-dose antibiotic prophylaxis with intravenous cefazolin 1 g was administered at induction.

Surgical Technique
Open Lichtenstein repair: A 6–7 cm oblique incision was made 2 cm above and parallel to the inguinal ligament. After incising the external oblique aponeurosis, the ilioinguinal, iliohypogastric and genital branch of the genitofemoral nerves were carefully identified and preserved wherever anatomically feasible, in accordance with HerniaSurge recommendations. The hernial sac was dissected free and reduced (indirect sacs) or invaginated (direct sacs). A pre-shaped polypropylene mesh (7.5 × 15 cm, 45–50 g/m²) was placed over the posterior wall and fixed with interrupted 2-0 polypropylene sutures to the pubic tubercle, inguinal ligament and conjoint tendon, with a new internal ring fashioned around the cord.

Laparoscopic TEP repair: The extraperitoneal space was accessed through a 10 mm sub-umbilical incision, developed initially by blunt balloon dissection and thereafter by CO_2 insufflation to 12 mmHg. Two 5 mm working ports were placed in the midline. The pubic bone, Cooper's ligament, epigastric vessels, cord structures and myopectineal orifice of Fruchaud were systematically exposed. A 15 × 10 cm polypropylene mesh was positioned to cover the direct, indirect and femoral spaces, with 3–5 cm of overlap in every direction. Mesh fixation was performed selectively using absorbable tacks to Cooper's ligament only in patients with large direct defects, in accordance with the International Endohernia Society guidelines.[8] The pre-peritoneal space was desufflated slowly under vision to prevent mesh dislodgement.

Postoperative Care and Pain Assessment
All patients received a standardised multimodal analgesic regimen: intravenous paracetamol 1 g every 6 hours for 24 hours, followed by oral paracetamol 650 mg thrice daily and oral diclofenac 50 mg twice daily as required for a maximum of five days. Rescue analgesia consisted of intravenous tramadol 50 mg. Ambulation and oral intake were encouraged as early as tolerated.
Pain intensity was assessed using two complementary tools:
(a) The 10-point Visual Analog Scale (VAS), a horizontal 100 mm line anchored by "no pain" at 0 and "worst imaginable pain" at 10, administered by an investigator not directly involved in the operation. VAS scores were categorised as 0 = no pain, 1–3 = mild pain, 4–6 = moderate pain and 7–10 = severe pain.
(b) The Inguinal Pain Questionnaire (IPQ), a validated seven-item instrument specifically developed for post-herniorrhaphy pain, assessing pain during rest, walking, sitting, standing, stair climbing, physical exertion and sexual activity.

Assessments were made at 24 hours, one week (out-patient review), one month and three months postoperatively. Chronic postoperative groin pain (CPGP) was operationally defined as any groin-region pain (VAS ≥ 1) persisting at the three-month assessment.

Outcome Measures
Primary outcome: Incidence and severity of chronic postoperative groin pain at three months.

Secondary outcomes: Mean VAS score at 24 hours, one week and one month; operative time; duration of hospital stay; postoperative complications (seroma, hematoma, wound infection, urinary retention, scrotal edema); time to return to work; and early recurrence.

Statistical Analysis
Data were entered into Microsoft Excel 2019 and analysed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY). Continuous variables are expressed as mean ± standard deviation (SD) or median with interquartile range, as appropriate; categorical variables are expressed as frequencies and percentages. Normality was assessed using the Shapiro–Wilk test. Between-group comparisons for continuous variables were performed using the unpaired Student's t-test or the Mann–Whitney U test; categorical variables

were compared using the chi-squared test or Fisher's exact test, as appropriate. A two-tailed p-value < 0.05 was considered statistically significant.

RESULTS

Baseline Demographics and Clinical Characteristics

A total of 45 patients completed the study during the enrolment period, with 23 in the open Lichtenstein group (Group A) and 22 in the laparoscopic TEP group (Group B). No patient was lost to the three-month follow-up. The two groups were comparable with respect to age, sex, body mass index, occupational category, comorbid conditions, hernia laterality, hernia type and duration of symptoms (all p > 0.05), as summarised in Table 1.

Table 1. Baseline demographic and clinical characteristics of the two study groups.

Variable	Open group (n=23)	Laparoscopic group (n=22)	p-value
Age (years), mean ± SD	48.7 ± 12.4	46.9 ± 13.1	0.638
Male, n (%)	21 (91.3)	20 (90.9)	1.000
Female, n (%)	2 (8.7)	2 (9.1)	—
BMI (kg/m²), mean ± SD	24.1 ± 2.8	23.8 ± 2.6	0.712
Occupational category, n (%)			
Sedentary	8 (34.8)	9 (40.9)	0.678
Manual / heavy labour	15 (65.2)	13 (59.1)	—
Comorbidities, n (%)			
Hypertension	5 (21.7)	6 (27.3)	0.667
Diabetes mellitus	4 (17.4)	3 (13.6)	1.000
Chronic smoking	7 (30.4)	5 (22.7)	0.560
COPD / chronic cough	3 (13.0)	2 (9.1)	1.000
Hernia laterality, n (%)			
Right	15 (65.2)	14 (63.6)	0.910
Left	8 (34.8)	8 (36.4)	—
Hernia type, n (%)			
Indirect	14 (60.9)	15 (68.2)	0.610
Direct	8 (34.8)	6 (27.3)	—
Pantaloon	1 (4.3)	1 (4.5)	—
Duration of symptoms (months), mean ± SD	6.8 ± 3.2	6.4 ± 3.5	0.688
Preoperative VAS at rest, mean ± SD	2.3 ± 1.1	2.1 ± 1.0	0.526
ASA I : II ratio, n	15 : 8	14 : 8	0.902

SD = standard deviation; BMI = body mass index; COPD = chronic obstructive pulmonary disease; ASA = American Society of Anesthesiologists; VAS = Visual Analog Scale. p-values calculated using unpaired t-test or chi-square/Fisher's exact test as appropriate.

Perioperative Outcomes

The mean operative time was significantly longer in the laparoscopic group (78.4 ± 15.7 min) than in the open group (62.5 ± 12.3 min; mean difference 15.9 min, 95 % CI 7.6 – 24.2; p < 0.001). Conversely, the mean duration of hospital stay was shorter in the laparoscopic group (1.6 ± 0.6 vs 2.8 ± 0.9 days, p < 0.001), and the mean time to return to work was almost halved in the laparoscopic group (9.4 ± 3.1 vs 18.2 ± 4.5 days, p < 0.001). These outcomes are illustrated in Figure 3 and summarised in Table 2.

Table 2. Perioperative outcomes in the two study groups.

Outcome	Open group (n=23)	Laparoscopic group (n=22)	p-value
Operative time (min), mean ± SD	62.5 ± 12.3	78.4 ± 15.7	< 0.001
Estimated blood loss (mL), mean ± SD	32.4 ± 8.9	18.6 ± 6.4	< 0.001
Postoperative hospital stay (days), mean ± SD	2.8 ± 0.9	1.6 ± 0.6	< 0.001
Time to first ambulation (h), mean ± SD	11.4 ± 3.2	6.8 ± 2.1	< 0.001
Time to resume oral intake (h), mean ± SD	6.2 ± 1.8	4.1 ± 1.4	< 0.001
Rescue analgesia required, n (%)	9 (39.1)	3 (13.6)	0.049
Return to work (days), mean ± SD	18.2 ± 4.5	9.4 ± 3.1	< 0.001

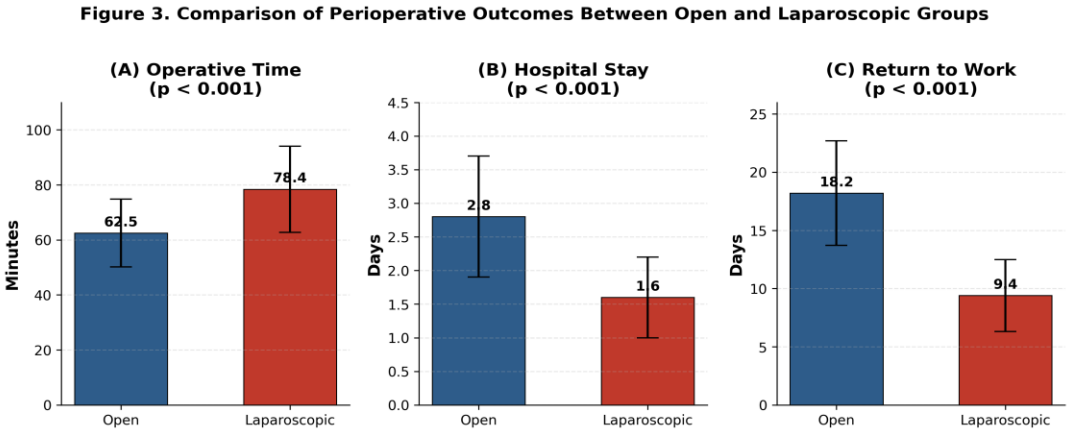

Figure 3. Comparison of perioperative outcomes between the open Lichtenstein and laparoscopic TEP groups: (A) operative time, (B) postoperative hospital stay and (C) time to return to work. Error bars represent one standard deviation.

Postoperative Pain Trajectory

The mean VAS pain scores followed a clear and progressive decline in both groups over the follow-up period, but were consistently and significantly lower in the laparoscopic group at every time point of assessment (Table 3, Figure 1). At 24 hours postoperatively, the mean VAS score in the open group was 6.2 ± 1.4 versus 4.1 ± 1.2 in the laparoscopic group ($p < 0.001$). This difference persisted at one week (3.8 ± 1.1 vs 2.2 ± 0.9, $p < 0.001$), one month (2.1 ± 1.0 vs 1.3 ± 0.7, $p = 0.003$) and three months (1.4 ± 1.2 vs 0.7 ± 0.8, $p = 0.021$).

Table 3. Mean Visual Analog Scale (VAS) scores at various postoperative time points.

Time point	Open group (mean ± SD)	Laparoscopic group (mean ± SD)	Mean difference	p-value
24 hours	6.2 ± 1.4	4.1 ± 1.2	2.1	< 0.001
1 week	3.8 ± 1.1	2.2 ± 0.9	1.6	< 0.001
1 month	2.1 ± 1.0	1.3 ± 0.7	0.8	0.003
3 months	1.4 ± 1.2	0.7 ± 0.8	0.7	0.021

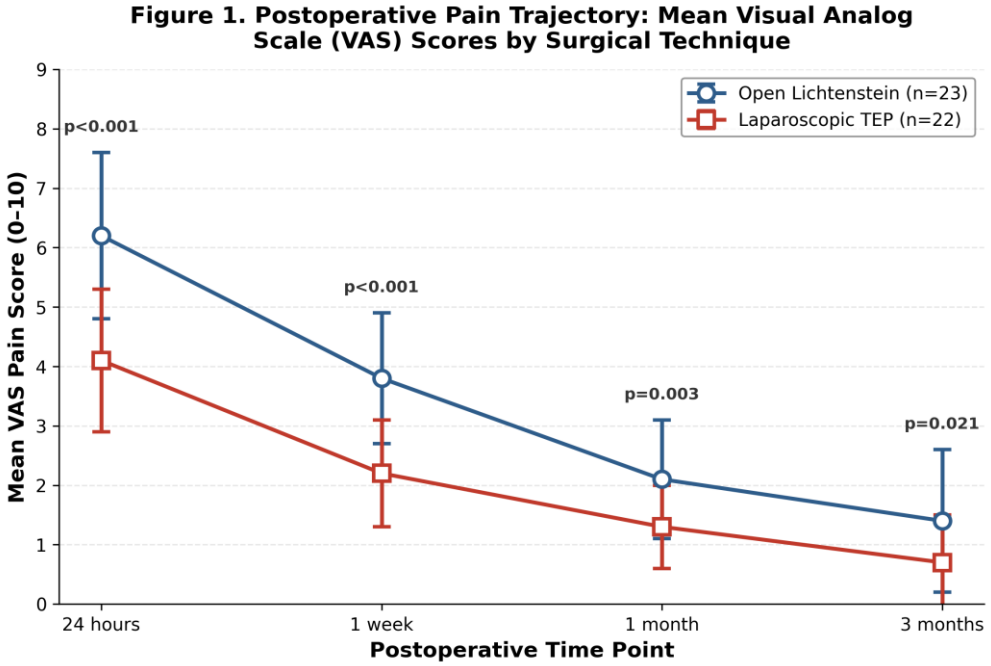

Figure 1. Postoperative pain trajectory: mean Visual Analog Scale (VAS) scores at 24 hours, 1 week, 1 month and 3 months in the two study groups. Error bars represent one standard deviation.

Chronic Postoperative Groin Pain (CPGP) at Three Months

At the three-month assessment — the primary end-point of the study — any degree of chronic groin pain (VAS ≥ 1) was reported by 9 of 23 patients (39.1 %) in the open group and 5 of 22 patients (22.7 %) in the laparoscopic group. Although this difference favoured the laparoscopic approach, it did not reach statistical significance in this small cohort ($\chi^2 = 1.418$, $p = 0.234$; Figure 4). The distribution across pain severity categories is shown in Figure 2 and Table 4. Moderate-to-severe chronic pain (VAS ≥ 4) — the clinically relevant subset that interferes with daily activity — was reported by 3 of 23 patients (13.0 %) in the open group and 1 of 22 patients (4.5 %) in the laparoscopic group.

Table 4. Distribution of chronic postoperative groin pain severity at three months.

Pain severity (VAS)	Open group n (%)	Laparoscopic group n (%)	p-value
No pain (0)	14 (60.9)	17 (77.3)	0.234
Mild pain (1–3)	6 (26.1)	4 (18.2)	—
Moderate pain (4–6)	2 (8.7)	1 (4.5)	—
Severe pain (7–10)	1 (4.3)	0 (0.0)	—
Any CPGP (VAS ≥ 1)	9 (39.1)	5 (22.7)	0.234
Clinically significant CPGP (VAS ≥ 4)	3 (13.0)	1 (4.5)	0.610

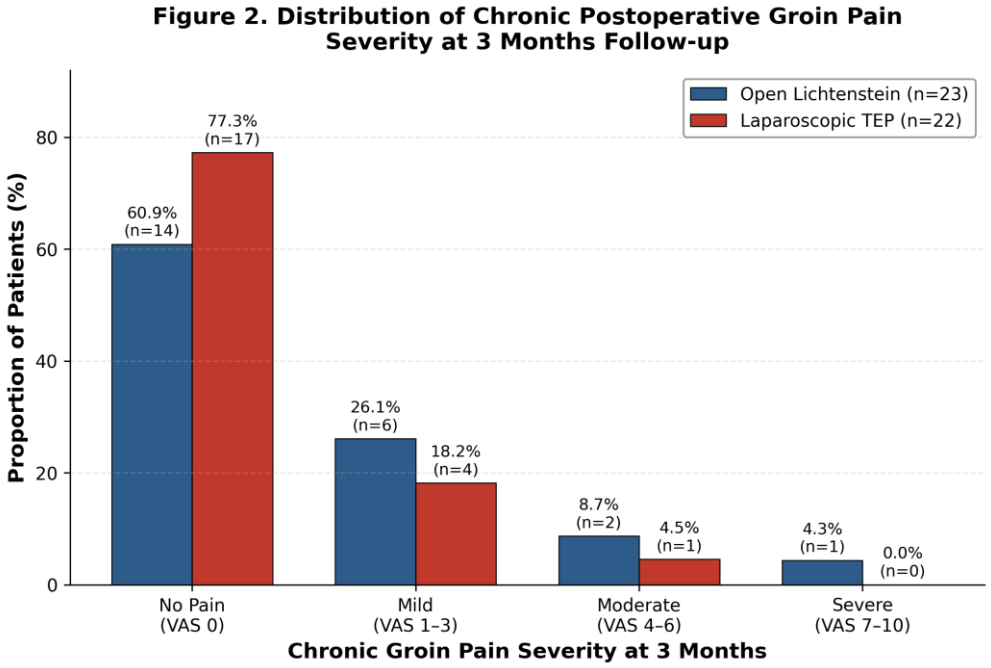

Figure 2. Distribution of chronic postoperative groin pain severity at three months follow-up. Values above each bar represent proportion and absolute number of patients.

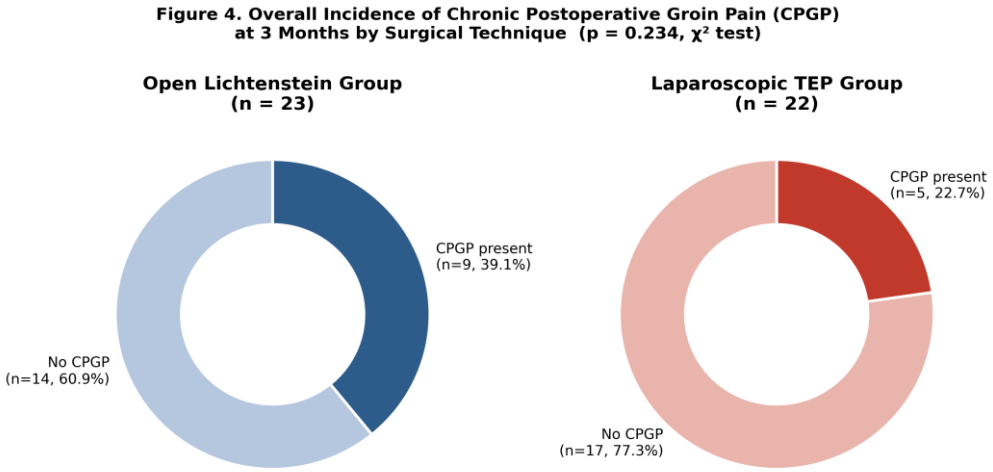

Figure 4. Overall incidence of chronic postoperative groin pain (CPGP) at three months in the two groups. Difference not statistically significant (p = 0.234).

Nature and Impact of Chronic Pain

Among the 14 patients reporting any chronic pain at three months, the character was described as dull or aching in 8 patients, sharp or stabbing in 4 and burning or neuropathic in 2. Pain was elicited or aggravated by prolonged standing in 9 patients, physical exertion (lifting, climbing stairs) in 7, sexual activity in 2 and coughing in 3. On the IPQ, 11 patients reported at least mild interference with routine daily activity, and 2 patients (both from the open group) required intermittent oral analgesia beyond three months. No patient required nerve block, neurectomy or mesh removal during the study period.

Postoperative Complications

Overall complication rates were low and comparable between the two groups (Table 5). Superficial seroma was the most frequent complication, occurring in 3 of 23 patients (13.0 %) in the open group and 2 of 22 (9.1 %) in the laparoscopic group; all resolved spontaneously within four weeks. Superficial wound infection occurred in 2 patients (8.7 %) in the open group only, both managed conservatively with oral antibiotics. There were no cases of mesh infection, deep haematoma requiring drainage, visceral injury, port-site hernia or 30-day mortality. No recurrence was documented in either group up to three months, although this is a short interval and precludes any conclusion regarding long-term recurrence rates.

Table 5. Postoperative complications in the two study groups.

Complication	Open group (n=23) n (%)	Laparoscopic group (n=22) n (%)	p-value
Seroma	3 (13.0)	2 (9.1)	1.000
Hematoma	1 (4.3)	1 (4.5)	1.000
Superficial wound infection	2 (8.7)	0 (0.0)	0.489
Urinary retention	2 (8.7)	1 (4.5)	1.000
Scrotal edema	2 (8.7)	1 (4.5)	1.000
Testicular pain / orchitis	1 (4.3)	0 (0.0)	1.000
Port-site hernia	—	0 (0.0)	—
Recurrence at 3 months	0 (0.0)	0 (0.0)	—
Any complication	7 (30.4)	4 (18.2)	0.334

DISCUSSION

The present prospective comparative study of 45 patients undergoing elective inguinal hernia repair at a tertiary-care teaching hospital in Bangalore demonstrated three principal findings. First, laparoscopic totally extraperitoneal (TEP) repair was associated with significantly lower postoperative pain intensity across all time points measured, including the three-month chronic phase. Second, the incidence of any chronic postoperative groin pain (CPGP) at three months was numerically lower after laparoscopic TEP (22.7 %) than after open Lichtenstein repair (39.1 %), and the same trend was observed for clinically significant (moderate-to-severe) pain, although statistical significance was not reached in this modestly-sized cohort. Third, laparoscopic TEP was associated with shorter hospital stay and substantially earlier return to work, at the cost of a somewhat longer operative time.

These observations are broadly consistent with the international literature. Bay-Nielsen and colleagues, in a nationwide questionnaire study from the Danish Hernia Database, reported that 28.7 % of patients had persistent pain one year after open herniorrhaphy, of whom 11 % had pain interfering with daily activities.[12] Callesen and co-workers documented pain in 19 % of patients one year after open repair, with 6 % requiring analgesics.[13] The systematic review by Nienhuijs et al. of 40 studies including 8,857 patients pooled a chronic pain incidence of 11 % after Lichtenstein repair.[7] Our observed rate of 39.1 % for "any" chronic pain lies at the upper end of this range, primarily because we adopted a liberal definition (VAS ≥ 1) that captures even minor discomfort; when the clinically meaningful threshold of VAS ≥ 4 is applied, our figure of 13.0 % is closely aligned with published estimates.

For the laparoscopic approach, the Cochrane systematic review by McCormack et al., which analysed 41 randomised trials, concluded that laparoscopic repair is associated with less persistent pain and numbness than open mesh repair, at the expense of longer operative time and a small increase in the risk of serious visceral or vascular complications during the learning curve.[9] The landmark Veterans Affairs multicentre randomised trial by Neumayer and colleagues, published in the New England Journal of Medicine, likewise showed lower rates of chronic pain after laparoscopic repair (although with a higher recurrence rate that was later attributed to inadequate mesh size and inexperience with the technique).[10] The five-year follow-up of the Swedish Multicentre Trial of Inguinal Hernia Repair by Laparoscopy (SMIL) by Eklund and co-workers demonstrated that the incidence of chronic pain at five years was 9.9 % after laparoscopic TAPP versus 24.8 % after Lichtenstein repair ($p < 0.001$).[17] Our findings echo the direction and magnitude of these differences.

Several biological and technical explanations for the lower incidence of CPGP after laparoscopic posterior repair have been proposed. First, the laparoscopic posterior approach places the mesh in the pre-peritoneal plane, behind the inguinal canal, and therefore avoids direct contact between the mesh and the three inguinal nerves — the ilioinguinal, iliohypogastric and genital branch of the genitofemoral nerves — that are the classical culprits in post-Lichtenstein neuralgia.[4,8] Second, laparoscopic repair typically involves less sutured fixation of the mesh, and the widespread adoption of self-gripping or minimally fixed meshes in the pre-peritoneal plane further reduces mechanical nerve irritation.[19,20] Third, the smaller incisions and reduced tissue trauma of the laparoscopic approach translate into less local inflammation and less peripheral sensitisation. Fourth, the anatomical dissection of the myopectineal orifice of Fruchaud in TEP repair produces a more physiologically complete repair without tension on adjacent muscular and aponeurotic structures.

Nevertheless, the laparoscopic approach is not without limitations. In our series, mean operative time was approximately 16 minutes longer, and the technique requires general anaesthesia, dedicated equipment, and a proficient surgical team. The learning curve of TEP has been variously estimated at between 50 and 250 cases, depending on prior laparoscopic experience.[8,16] Cost considerations remain relevant in the Indian context, where consumables such as the ballooning trocar and mesh fixation devices add materially to the operative expense. These practical realities partly explain why open Lichtenstein repair continues to be the workhorse operation in many Indian public and private hospitals, and why our study was designed as a pragmatic non-randomised comparison rather than a strict randomised trial.

The magnitude of the benefit in early return to work — from 18 days after open repair to 9 days after laparoscopic repair — has significant implications for a working-age population employed predominantly in manual and semi-skilled occupations. From a societal and economic perspective, this near-halving of convalescence may partly offset the higher direct operative cost of laparoscopy.

A few patient-level observations merit brief comment. Neuropathic pain was uncommon in our cohort (2 patients, both in the open group), consistent with the recommendations of Alfieri et al. and the HerniaSurge guidelines that meticulous identification and preservation — or, alternatively, planned pragmatic neurectomy — of the three inguinal nerves during open repair minimises the risk of chronic neuralgia.[3,4] Preoperative pain has been consistently identified as an independent predictor of chronic postoperative pain,[5,6,18] and this is congruent with the finding that patients with higher preoperative VAS scores tended to be over-represented among those with residual pain at three months. Younger age, higher body mass index, longer symptom duration and female sex have also been reported as risk factors for CPGP,[18] but our sample was too small to permit meaningful multivariable analysis of these predictors.

LIMITATIONS

(1) This was a single-institution study with a modest sample size (n = 45), which limits statistical power, particularly for the primary end-point of CPGP incidence — a difference of approximately 16 percentage points between groups did not reach conventional statistical significance.

(2) Patients were allocated on the basis of surgeon preference and patient choice, rather than by strict randomisation. Although the two groups were well matched at baseline, residual selection bias cannot be excluded.

(3) The follow-up interval was limited to three months,

which meets the accepted definition of chronic pain but does not permit assessment of longer-term outcomes, including recurrence and evolution of chronic pain up to one, two or five years.
(4) Pain assessment relied on subjective, patient-reported scales; although the VAS and IPQ are validated instruments, no objective measurement of nerve function (for example, quantitative sensory testing) was performed.
(5) Only two surgical techniques (open Lichtenstein and laparoscopic TEP) were compared; the transabdominal preperitoneal (TAPP) approach and robotic-assisted repairs were not evaluated.
(6) The study did not stratify by mesh weight or by mesh fixation method (tacks vs glue vs no fixation), both of which have been shown in previous work to influence chronic pain.

CONCLUSION

In this prospective comparative study conducted at a tertiary-care centre in Bangalore, laparoscopic totally extraperitoneal (TEP) repair of primary uncomplicated inguinal hernia was associated with significantly lower postoperative pain scores throughout the acute, sub-acute and early chronic phases, together with a lower — though not statistically significant — incidence of any chronic postoperative groin pain at three months (22.7 % vs 39.1 %) when compared with open Lichtenstein repair. Laparoscopic repair also delivered shorter hospital stay and approximately half the time to return to work, at the expense of a modestly longer operative time. Both techniques were safe, with comparable and infrequent complications and no early recurrences.

These findings support the growing international consensus that laparoscopic repair offers meaningful advantages in postoperative pain and functional recovery for suitably selected patients with primary inguinal hernia, and that it should be offered as an alternative to open Lichtenstein repair wherever appropriate expertise and infrastructure are available. Larger, multicentric randomised controlled trials with longer follow-up are required to confirm the difference in chronic pain incidence and to further refine patient selection.

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