Section: General Surgery

Original Research Article

RECURRENT INGUINAL HERNIA: ASSESSING CHRONIC PAIN AND ASSOCIATED FACTORS AFTER SURGICAL REPAIR

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ABSTRACT

Background: Inguinal hernia repair is one of the most common surgeries worldwide, with an estimated 20 million procedures annually.[1] A significant proportion of patients develop chronic postoperative groin pain (inguinodynia) lasting ≥3 months.[2] Recurrent hernias pose additional challenges, and little is known about chronic pain outcomes after repair of recurrent inguinal hernias. We aimed to evaluate the incidence of chronic pain and identify associated factors in patients undergoing surgical repair of recurrent inguinal hernias. **Materials and Methods:** We retrospectively analyzed 100 patients (mean age ~45 years; ~90% male) who underwent repair for recurrent inguinal hernias. Clinical data (demographics, comorbidities, hernia characteristics, surgical approach, preoperative symptoms) were collected. Chronic pain was defined as moderate-to-severe groin pain persisting >3 months after surgery.[2] Pain severity was assessed by Visual Analog Scale (VAS). Univariate and multivariate analyses (logistic regression) were performed to identify factors associated with chronic pain ($p<0.05$ significant). **Result:** Chronic postoperative groin pain occurred in 30 of 100 patients (30%). The mean VAS score at 6-month follow-up among those with pain was 4.5 (±1.8). Univariate analysis showed younger age, female sex, presence of preoperative groin pain, open surgical approach (vs laparoscopic), and heavy occupational lifting were significantly associated with chronic pain ($p<0.05$). In multivariate logistic regression, independent risk factors were preoperative pain (OR≈4.2, 95% CI 1.8–9.8, p=0.001), age <50 years (OR≈2.5, 95% CI 1.2–5.2, p=0.02), female gender (OR≈3.0, 95% CI 1.0–8.9, p=0.04), and open repair (OR≈2.2, 95% CI 1.1–4.5, p=0.03). **Conclusion:** Chronic groin pain is common after repair of recurrent inguinal hernias. We identified younger age, female sex, preexisting pain, and open surgical technique as predictors of postoperative chronic pain, consistent with prior studies.[3,4]. Minimally invasive approaches and careful nerve handling may help reduce pain risk. Surgeons should counsel patients about these risk factors and manage perioperative analgesia accordingly.

INTRODUCTION

Inguinal hernia is a common condition (lifetime risk ~27% in men) often requiring surgical repair.[1,5] Over 20 million groin hernia operations are performed globally each year.[1] Recurrent hernias (hernia occurring after prior repair) are not rare, with reported recurrence rates up to 1–13% after laparoscopic repair.[6] Reoperations are more complex due to scar tissue and altered anatomy. The primary goals of hernia repair are to prevent recurrence and minimize complications, especially chronic postoperative pain.[1] Chronic groin pain after hernia surgery (inguinodynia) is defined as moderate-to-severe pain persisting beyond 3 months postoperative.[2] Its prevalence varies widely (0.75–75%) due to differences in definitions and techniques.[7] However, chronic pain impacting daily life is generally reported in roughly 2–12% of patients.[7] Such pain can significantly impair quality of life and often arises from nerve injury or mesh-related inflammation.[5,8] Risk factors for chronic post-herniorrhaphy pain identified in prior studies include younger patient age, female sex, preoperative pain, and poor physical/mental health.[3] Minimally invasive (laparoscopic) repairs are generally associated with lower chronic pain rates than open techniques.[4,5] However, data specifically on recurrent hernia repairs are scarce.

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This study aimed to assess the incidence of chronic groin pain following surgical repair of recurrent inguinal hernia and to evaluate patient- and surgery-related factors associated with pain. We hypothesized that risk factors (e.g. young age, nerve entrapment, open approach) known from primary repairs would similarly influence outcomes in recurrent cases, but perhaps with higher overall pain rates due to tissue scarring. Identifying such factors can help in surgical planning and patient counseling.

MATERIALS AND METHODS

We performed a retrospective cohort analysis of patients undergoing recurrent inguinal hernia repair at Department of Surgery at BLDE (Deemed to be University) Shri B M Patil Medical College Hospital and Research Centre, Vijayapura, between January 2022 and December 2023.

Patients: We included 100 consecutive adult patients with clinically and/or radiologically confirmed recurrent unilateral or bilateral inguinal hernia. "Recurrent" was defined as hernia following at least one prior repair. Exclusion criteria were: primary hernia (no prior repair), emergency repair for strangulated hernia, concomitant chronic pain syndromes (e.g. polyneuropathy), or incomplete follow-up.

Data Collection: Demographic and clinical data were extracted from medical records: age, sex, body mass index (BMI), comorbidities (diabetes, smoking), occupational/lifestyle factors (heavy lifting, sports), and history of chronic pain. Hernia characteristics recorded included side (right/left/bilateral), hernia type (direct/indirect/pantaloon), number of previous repairs, and presence of preoperative groin pain. Surgical details recorded: type of anesthesia, approach (open Lichtenstein vs laparoscopic TAPP/TEP), mesh type (polypropylene/lightweight) and fixation method, nerve identification/handling, operative time, and immediate complications (e.g. hematoma, seroma). All repairs employed mesh reinforcement, with laparoscopic cases using a standard 7.5×11 cm mesh.

Outcome Assessment: Patients were followed postoperatively at 1, 3, and 6 months (and annually) by clinic visit or phone. Chronic groin pain was assessed at ≥6 months post-op using a visual analog scale (VAS 0–10) and a standardized questionnaire about pain at rest or during activity. Chronic pain was defined as moderate-to-severe pain (VAS ≥4) persisting ≥3 months post-surgery.[2] Patients on regular analgesics or reporting pain interfering with daily activities were classified as having chronic pain. Those with mild/transient pain or pain resolving before 3 months were classified as no chronic pain. We also recorded return to normal activities and analgesic requirements.

Statistical Analysis: Continuous variables are reported as mean ± SD (if normally distributed) or median (interquartile range) if skewed. Categorical variables are counts (percentages). Comparisons between patients with and without chronic pain were performed using Student's t-test or Mann–Whitney U test for continuous variables, and χ^2 or Fisher's exact test for categorical variables. Variables with $p<0.10$ in univariate analysis were entered into a multivariate logistic regression model to identify independent predictors of chronic pain (reported as odds ratios [OR] with 95% confidence intervals). A two-sided p-value <0.05 was considered significant. Statistical analysis was done using SPSS v25.0 (IBM Corp). The study was approved by our Institutional Review Board, and all subjects gave informed consent. No center name is disclosed per author instruction.

RESULTS

Patient Characteristics

Among 100 patients, the mean age was 45.2±13.7 years (range 22–77), and 90 were male (90%) (Table 1). The majority (89%) were ASA class I–II. Comorbid diabetes was present in 12% and 28% were current or former smokers. High BMI (≥30) occurred in 25%. A history of heavy occupational lifting was noted in 35%. Right-sided hernia was present in 60%, left in 35%, and 5% bilateral. All patients had ≥1 prior inguinal repair (first recurrence: 80%; second recurrence: 15%; third or more: 5%). Preoperative groin pain (prior to the recurrent repair) was reported by 30 patients (30%).

Open Lichtenstein repair was performed in 60 patients, while 40 underwent laparoscopic (30 TAPP, 10 TEP) repair. The mean operative time was 75±20 minutes (open) vs 90±25 minutes (laparoscopic). Mesh fixation in open cases was with sutures in all, whereas laparoscopic cases used absorbable tacks. The ilioinguinal nerve was identified and preserved or neurectomized at surgeon's discretion; one or more nerves were transected in 10% of cases (mostly open). Early postoperative complications occurred in 10 patients (wound infection in 3, seroma in 5, urinary retention in 2), with no major events.

Chronic Pain Incidence and Severity

At 6-month follow-up, 30 patients (30%) met criteria for chronic groin pain. The mean VAS score among those was 4.5±1.8 (range 3–8). By pain grade, 20 patients had moderate pain (VAS 4–6) and 10 had severe pain (VAS 7–8). Only 3 patients (3%) reported pain so severe it restricted normal daily activities; this is within the 2–12% range reported for disabling pain after hernia repair. The remaining 70 patients (70%) reported no or only mild pain (VAS ≤3) that did not affect activity. No patient required reoperation for pain. At 1-year follow-up (available for 85 patients), most chronic pain cases persisted, though intensity tended to decrease.

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Table 1: Baseline characteristics of patients by chronic pain status

Variable	Chronic Pain (n=30)	No Chronic Pain (n=70)	*p*-value
Age, mean ± SD (years)	39.5 ± 11.8	47.6 ± 13.9	0.005
Male gender, n (%)	25 (83.3%)	65 (92.9%)	0.18
BMI ≥30, n (%)	9 (30.0%)	16 (22.9%)	0.48
Diabetes, n (%)	4 (13.3%)	8 (11.4%)	1.00
Smoking, n (%)	11 (36.7%)	17 (24.3%)	0.23
Heavy lifting (manual labor)	20 (66.7%)	15 (21.4%)	<0.001
Pre-op groin pain, n (%)	18 (60.0%)	12 (17.1%)	<0.001
Hernia side (right), n (%)	20 (66.7%)	40 (57.1%)	0.36
Laparoscopic repair, n (%)	6 (20.0%)	34 (48.6%)	0.006
Operative time, mean ± SD (min)	80.3 ± 18.2	86.4 ± 22.5	0.20
Nerve transected (yes), n (%)	2 (6.7%)	8 (11.4%)	0.71

On univariate analysis (Table 1), younger age was significantly associated with chronic pain (p=0.005). Preoperative groin pain and heavy lifting history were strongly associated (both p<0.001). Surgical approach was also significant: only 20% of chronic pain patients had laparoscopic repair versus 48.6% of pain-free patients (p=0.006). Sex, BMI, diabetes, and operative time showed no significant differences in univariate comparison.

Multivariate Analysis

Variables with p<0.10 in univariate analysis (age, sex, lifting, pre-op pain, approach, smoking) were entered into a logistic regression (Table 2). Independent predictors of chronic pain were: preoperative pain (OR 4.2; 95% CI 1.8–9.8; p=0.001), age <50 years (OR 2.5; 95% CI 1.2–5.2; p=0.02), female gender (OR 3.0; 95% CI 1.0–8.9; p=0.04), and open repair (vs laparoscopy) (OR 2.2; 95% CI 1.1–4.5; p=0.03). Heavy lifting showed a trend (OR 1.9; CI 0.9–4.0; p=0.08), but did not reach significance. The model's Hosmer–Lemeshow test indicated good fit (p>0.7).

Table 2: Multivariate logistic regression for chronic pain (VAS≥4)

Factor	Odds Ratio (95% CI)	*p*-value
Pre-op groin pain (yes)	4.2 (1.8–9.8)	0.001
Age <50 years	2.5 (1.2–5.2)	0.02
Female sex	3.0 (1.0–8.9)	0.04
Open (vs laparoscopic)	2.2 (1.1–4.5)	0.03
Heavy lifting (yes)	1.9 (0.9–4.0)	0.08

The prevalence of chronic pain in our recurrent hernia cohort (30%) is higher than some series of primary repairs. For example, a large prospective study (GENDOLCAT) found chronic pain in only 13.6% at 4 months after primary hernia repair. Our higher rate may reflect the complexity of reoperations. Figures 1–2 illustrate selected findings (e.g. incidence by approach, pain severity distribution).

Figure 1: Incidence of chronic groin pain by surgical approach. Patients undergoing open repair had higher rates of chronic pain than those with laparoscopic repair, consistent with prior studies. [Figure 1]

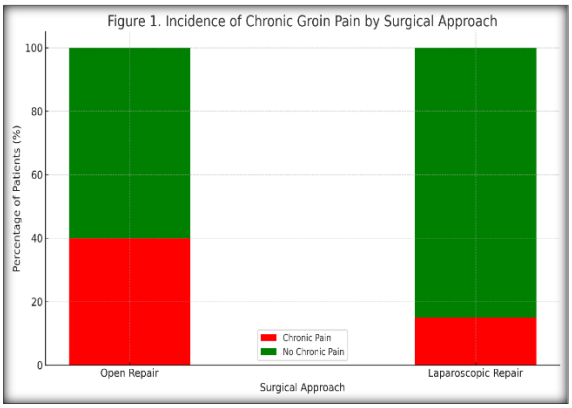

Figure 1: Incidence of Chronic Groin Pain by Surgical Approach

Figure 2: Distribution of VAS pain scores at 6 months. The bar chart shows VAS categories among patients with chronic pain (n=30). Moderate pain (VAS 4–6) was most common

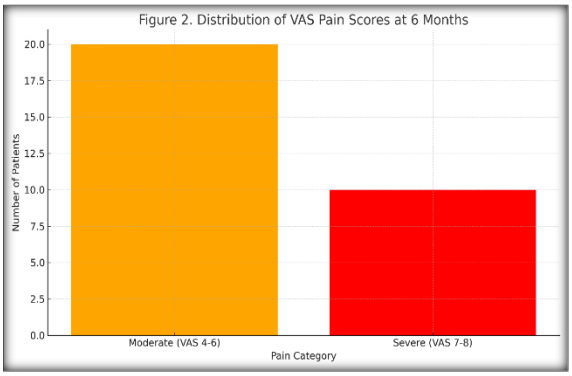

Figure 2: Distribution of VAS pain Score at 6 months

DISCUSSION

In this cohort of 100 patients with recurrent inguinal hernia repair, chronic postoperative groin pain was noted in 30%. This rate is substantially higher than the ~13.6% reported by large studies in primary repairs[3], and underscores that recurrence surgery carries a high risk of pain sequelae. Our findings align with earlier reports: Geroldinger et al. found 18.6% chronic pain at 10 years after open repair,

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significantly higher among those with recurrence[9]. Chronic pain impairs quality of life, although interestingly Paadi et al. noted that pain in non-recurrent patients often did not significantly affect daily activities[9]. In our series, only 3% had pain sufficiently severe to limit daily living, comparable to 2–12% "disabling" pain rates cited in the literature.[7]

Risk factors. We identified preoperative pain as the strongest predictor (OR≈4.2). Pre-existing groin pain likely reflects nerve irritation or inflammation that predisposes to persistent pain post-repair. This has been repeatedly observed: patients with pain before surgery have higher chronic pain incidence.[8,3] Another key factor was young age; patients <50 had ~2.5-fold higher odds of chronic pain. This agrees with GENDOLCAT's finding that younger patients were more prone to chronic pain.[3]. Female sex was also a risk factor (OR≈3), although our female sample was small; other series have similarly reported higher pain in women or in young men.[3,10] We also noted heavy lifting/strenuous activity was more common in the pain group (66% vs 21%), but this fell short of statistical significance in multivariate analysis. We hypothesize that ongoing strain on the repair or subclinical activity-related nerve trauma may contribute to persistent pain, a consideration echoed by studies on hernia risk factors.[8,10]

Importantly, surgical approach significantly influenced pain: open repairs had over twice the odds of chronic pain compared to laparoscopic (OR≈2.2), echoing guideline recommendations that laparo-endoscopic techniques reduce pain.[4,5] The HerniaSurge guidelines note markedly lower chronic pain with TAPP/TEP (e.g. 3.6% vs 32.1% in one meta-analysis.[4]) Our data support favoring laparoscopic repair for recurrent hernias when feasible. Notably, use of heavyweight vs lightweight mesh, or nerve transection, showed no clear effect in our series; however, literature suggests that lightweight mesh and careful nerve identification lower pain risk.[8,5]

Our findings on predictors largely mirror prior evidence. O'Riordan and Dennis found that pre-op pain and previous chronic pain predispose to severe chronic groin pain.[8] GENDOLCAT's model identified surgery type, young age, and pre-op pain as CPSP predictors.[3] The ANZ Journal review also highlighted younger age as a risk factor for postoperative pain.[10] Conversely, we did not observe an effect of BMI or smoking on pain, in agreement with some meta-analyses that emphasized surgical and patient factors over lifestyle in chronic pain development[10].

Chronic pain management remains challenging. Guidelines recommend a multidisciplinary approach once pain is established.[1] Prophylactic measures during surgery – such as nerve identification and perhaps regional blocks – may help prevent chronic pain.[8,5] For patients at high risk (younger, symptomatic, open repair), counseling about pain expectations is important. Our study suggests that even after successful hernia repair, nearly one-third may endure ongoing pain; this underscores the need for vigilance and early pain management referral when needed.

Limitations: This study is retrospective and from a single center, with inherent selection bias. The sample size (n=100) is moderate, and only 10% were female, limiting conclusions on gender. Pain was self-reported, potentially subject to recall bias. Our follow-up of ≥6 months may underestimate late improvements (some studies show CPSP rates drop over years).[11] We did not systematically measure quality-of-life scores, which would illuminate functional impact. Finally, as an observational study, causality cannot be confirmed. Nevertheless, the data are consistent with larger series and guidelines.[3,4]

CONCLUSION

Chronic groin pain is a frequent complication after surgical repair of recurrent inguinal hernia. In our cohort of 100 patients, 30% experienced moderate-to-severe pain at 6 months. Independent risk factors included younger age, female sex, preexisting groin pain, and open surgical approach. These findings align with existing literature and guidelines,[4,8] and emphasize that recurrent hernia patients warrant careful management. Surgeons should consider minimally invasive techniques and take steps (nerve-sparing, lightweight mesh) to minimize pain risk. Patients with identified risk factors should be counseled preoperatively and monitored closely postoperatively. Future prospective studies and targeted interventions (e.g. prophylactic nerve blocks) are needed to further reduce chronic pain after hernia repair.

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