Original Research Article

A COMPARATIVE EVALUATION OF CHRONIC GROIN PAIN FOLLOWING USE OF SELF GRIPPING VERSUS SUTURED MESH IN OPEN LICHTENSTEIN HERNIOPLASTY, A RANDOMISED CONTROLLED TRIAL

ABSTRACT

Inguinal hernia repair is one of the most frequently performed surgeries worldwide, with the Lichtenstein hernioplasty being the standard approach. However, this procedure is often associated with postoperative chronic groin pain (CGP). This study compares two fixation methods in Lichtenstein hernioplasty: self-gripping mesh (SGM) and sutured mesh (SM). The primary objective was to assess the effectiveness of SGM in minimizing CGP, with maintaining low recurrence rates and avoiding other complications. A randomized controlled trial was conducted with 48 patients diagnosed with uncomplicated inguinal hernias at the Government Medical College and Hospital, Chandigarh. The patients were randomly assigned to receive either SGM or SM. After three months, chronic pain, seroma formation, hernia recurrence, and other postoperative outcomes were assessed. While the SGM group showed a non-significant reduction in CGP compared to the SM group, both groups had similar recurrence rates and overall postoperative complication profiles. Although SGM offers potential advantages, larger studies with extended follow-up are required to confirm these findings.

Keywords: Lichtenstein hernioplasty, Self-gripping mesh, Chronic groin pain

Abbreviations: CGP (Chronic Groin Pain), SGM (Self-Gripping Mesh), SM (Sutured Mesh), SD (Standard Deviation), VNRS (Verbal Numeric Rating Scale), DN4 (Douleur Neuropathique en 4 questions)

Introduction

Inguinal hernias, which can be direct or indirect, account for 75% of all abdominal wall hernias.[1] In direct hernia, the hernial sac pushes through a weakened area in the posterior wall of the inguinal canal, while in indirect hernia, the sac enters the deep ring of the canal alongside the spermatic cord.[2] Risk factors such as smoking, obesity, and chronic coughing increase the likelihood of developing an inguinal hernia.[3] Though some hernias are asymptomatic, many patients report discomfort

or pain, particularly during physical activity, with more serious complications like strangulation or obstruction occurring in some cases.[2,4]

Surgical intervention remains the definitive treatment for inguinal hernias, and the Lichtenstein mesh repair is the current gold standard.[5] This technique involves reinforcing the weakened area with a synthetic mesh to prevent recurrence.[6] However, a frequent complication encountered is chronic groin pain (CGP), which persists for more than three months post-surgery and can result from nerve injury or tissue tension.[7]

The way the mesh is secured is critical to patient recovery.[8] Traditional sutured mesh (SM) fixation can lead to tissue tension and nerve damage, contributing to postoperative pain. A newer alternative, self-gripping mesh (SGM), attaches without the need for sutures by using resorbable microgrips made of polylactic acid, which may lower the risk of nerve entrapment.[8,9] SGM, characterised by their ability to adhere to the surrounding tissues without the need for additional fixation materials, has gained interest as a means of simplifying the hernia repair process and potentially reducing post operative pain. It minimises tissue trauma and inflammation thereby reducing CGP. This randomized controlled trial aims to compare CGP outcomes in patients undergoing Lichtenstein hernioplasty using either self-gripping mesh (SGM) or sutured mesh (SM), with the goal of reducing complications and enhancing patient comfort.

Methods

This randomized controlled trial was conducted in the Department of General Surgery at Government Medical College and Hospital, Chandigarh, in collaboration with the Department of Anesthesia and Intensive Care. A total of 48 male patients diagnosed with uncomplicated inguinal hernia who were scheduled for elective Lichtenstein hernia repair were included in our study and were divided into two groups, Group A who received SGM and Group B who received SM. Postoperative pain, recurrence, foreign body sensation, seroma formation, and infection rates were monitored for three months. Pain severity was evaluated using the VNRS and DN4 scales.

Results

The data was analyzed. Continuous data was presented as mean ± SD or median (IQR). VNRS and DN4 questionnaire scores were compared between groups using Student's t-test or Mann-Whitney U test depending on distribution normality. Changes within groups were assessed with the Wilcoxon signed-rank test. Chi-square test was used to assess the relationship between mesh type and foreign body sensation. Recurrence rates were calculated using a normal test of proportions. Data were analyzed using SPSS 7.0 software.

Demographics:

The mean age in the SGM group was 56.54 ± 21.29 years, and 64.79 ± 18.24 years in the SM group, with no statistically significant age difference (p = 0.88). Smoking history was noted in 45.8% of the SGM group and 33.3% of the SM group (p = 0.38). Heavy weight lifting was reported by 12.5% of the SGM group and 25% of the SM group (p = 0.46).

Primary Outcomes

- **Chronic Groin Pain (CGP)**: CGP at rest was reported by 8.3% of the SGM group and 20.8% of the SM group (p = 0.42) (Figure 1). During movement, CGP occurred in 12.5% of the SGM group and 25% of the SM group (p = 0.46) (Figure 2).

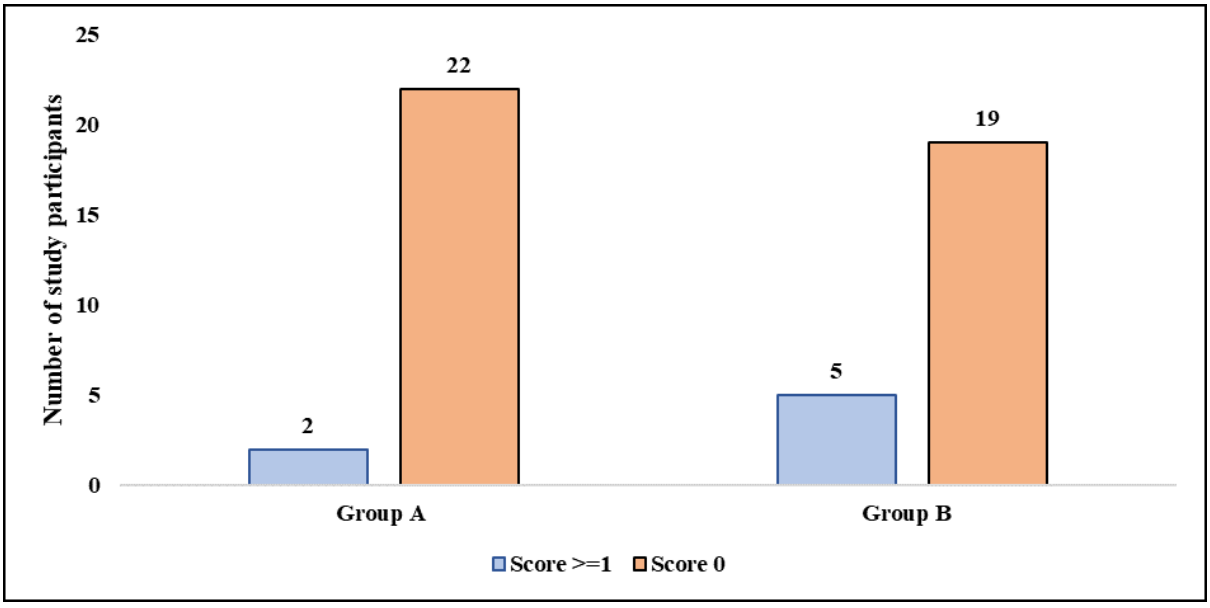

Figure 1: Distribution of the study participants according to verbal numerical rating Score (VNRS) at rest in the two groups

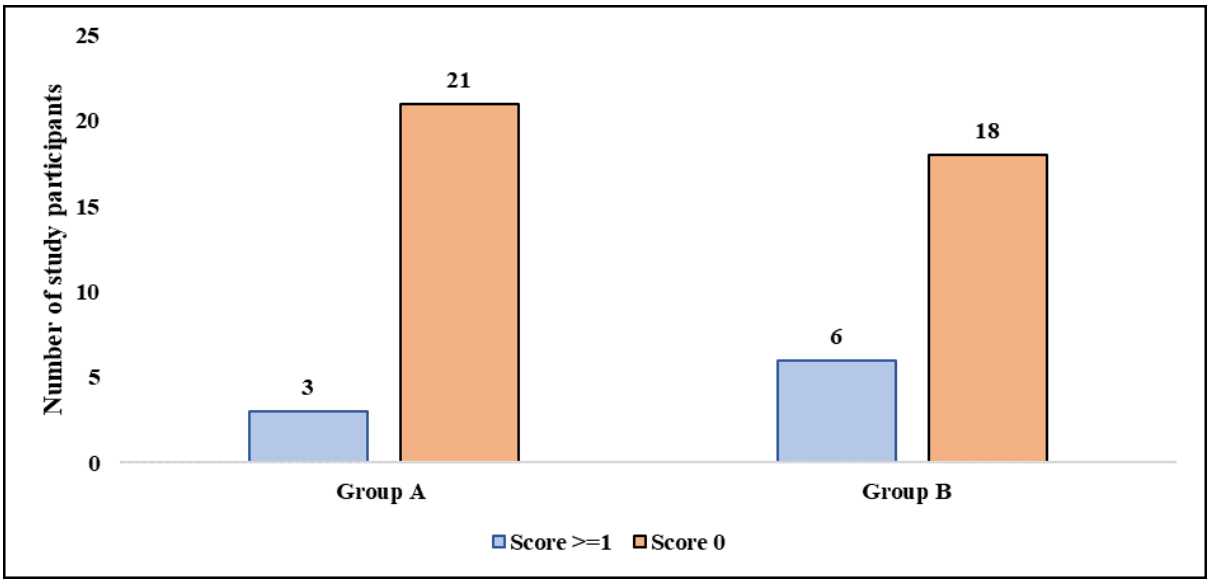

Figure 2: Distribution of the study participants according to Verbal Numerical Rating Score (VNRS) of chronic groin pain at Movement in the two groups

- **Neuropathic Pain**: Neuropathic pain, indicated by DN4 scores ≥ 4, was slightly higher in the SM group (8.3%) than the SGM group (4.2%), though not statistically significant (p = 1.00). Numbness and tingling were also more common in the SM group.

Secondary Outcomes

- **Seroma Formation**: Seroma occurred in 12.5% of the SGM group and 29.2% of the SM group, with no significant difference (p = 0.15).
- **Foreign Body Sensation**: No patients in the SGM group reported foreign body sensation, compared to 12.5% in the SM group (p = 0.23).
- **Recurrence and Infection**: No cases of hernia recurrence or infection were observed in either group during the follow-up period.

List 1 : List of parameters for Secondary Outcomes

Parameter	SGM (Group A)	SM (Group B)	p-value
Patient Demographics			
Mean Age (years)	56.54 ± 21.29	64.79 ± 18.24	0.88

Smoking History (n, %)	11 (45.8%)	8 (33.3%)	0.38
Heavy Weight Lifting (n, %)	3 (12.5%)	6 (25%)	0.46
Chronic Groin Pain (CGP)			
CGP at Rest (n, %)	2 (8.3%)	5 (20.8%)	0.42
Mean VNRS at Rest	0.125 ± 0.438	0.375 ± 0.753	-
CGP During Movement (n, %)	3 (12.5%)	6 (25%)	0.46
Mean VNRS During Movement	0.25 ± 0.721	0.58 ± 1.07	-
Seroma Formation			
Incidence of Seroma (n, %)	3 (12.5%)	7 (29.2%)	0.15
Timing of Seroma Formation	All within 5 days	4 within 5 days,	-
		3 after 5-8 days	
Foreign Body Sensation			
Foreign Body Sensation (n, %)	0 (0%)	3 (12.5%)	0.23
Recurrence and Infection Rates			
Recurrence (n, %)	0 (0%)	0 (0%)	-
Surgical Site Infection (SSI) (n, %)	0 (0%)	0 (0%)	-
Neuropathic Pain (DN4 ≥ 4)			
Neuropathic Pain (n, %)	1 (4.2%)	2 (8.3%)	1
Numbness and Tingling Sensation			

Numbness at Rest (n, %)	0 (0%)	2 (8.3%)	0.49
Numbness During Movement (n, %)	0 (0%)	2 (8.3%)	0.49
Tingling at Rest (n, %)	1 (4.2%)	0 (0%)	1
Tingling During Movement (n, %)	2 (8.3%)	1 (4.2%)	1

Discussion

Chronic Groin Pain (CGP)

In this study, CGP was reported by 8.3% of patients in the SGM group at rest and 12.5% during movement, compared to 20.8% at rest and 25% during movement in the SM group. While the SGM group exhibited lower rates of CGP, the differences were not statistically significant ($p = 0.42$ at rest and $p = 0.46$ during movement). These findings align with previous research. For instance, Sanders et al. (2017) found a significant reduction in early postoperative pain in patients treated with SGM but no significant difference in CGP at six months.[7] Similarly, Fang et al. (2019) conducted a meta-analysis of 1,353 patients and noted that SGM was associated with a lower incidence of early postoperative pain, though no significant difference in CGP was observed at 12 months.[8] J.K.M. Fan et al. (2015) also reported that at three months, CGP was slightly lower in the SGM group (8 patients) compared to the SM group (6 patients), but the difference was not statistically significant.[10] The reduced pain in the SGM group may be due to the elimination of suture-related tension and nerve entrapment, although long-term CGP was not significantly different between the two groups.

Seroma Formation

The incidence of seroma formation was higher in the SM group (29.2%) compared to the SGM group (12.5%), although this difference was not statistically significant ($p = 0.15$). These findings are consistent with other studies that have also reported a reduction in seroma formation with SGM. Ronka et al. (2019) noted a lower rate

of seroma formation with SGM, attributing this to the tension-free fixation and reduced tissue manipulation associated with the self-gripping mesh.[11] Similarly, Verhagen et al. (2016) reported a significantly lower incidence of postoperative seroma and hematoma in the SGM group compared to the SM group. The reduction in seroma formation in the SGM group may be due to the absence of sutures, which can cause tissue irritation and lead to fluid accumulation. The biodegradable microgrips of the SGM provide adequate fixation with less trauma to the surrounding tissues, potentially reducing seroma formation.[12]

Foreign Body Sensation

Foreign body sensation was reported by 12.5% of patients in the SM group, while no patients in the SGM group experienced this complication. Although the difference was not statistically significant ($p = 0.23$), the trend suggests that SGM may reduce the perception of a foreign body at the surgical site. This is supported by studies such as Ziya Anadol et al. (2020), who found a lower incidence of foreign body sensation in the SGM group compared to the SM group. They attributed this to the more natural adaptation of the self-gripping mesh to the tissues and the lack of suture-related fixation points, which can cause discomfort.[13] Similarly, Pierides et al. (2017) reported that fewer patients in the SGM group experienced foreign body sensation compared to those in the SM group, particularly during movement. The lack of sutures in the SGM likely reduces irritation and the sensation of a foreign object, which explains the trend observed in our study.[14]

Recurrence of Hernia and Surgical Site Infection (SSI)

No cases of hernia recurrence or surgical site infection (SSI) were observed in either group during the three-month follow-up period, indicating that both mesh types provide effective and durable repair options for inguinal hernia. This is consistent with previous research, which has shown that both SGM and SM offer comparable long-term durability. Axman et al. (2018) reported similar recurrence rates for SGM and SM, with recurrence rates remaining below 1% for both groups over a 12-month period.[15] Similarly, Pandanaboyana et al. (2016) conducted a meta-analysis of five randomized controlled trials and found no statistically significant difference in recurrence rates between the two mesh types. These findings suggest that despite the absence of sutures, SGM is as effective as SM in preventing hernia recurrence, offering a reliable and safe option for long-term hernia repair.[16]

Neuropathic Pain and Other Sensory Disturbances

Neuropathic pain, as indicated by a DN4 score ≥ 4, was slightly higher in the SM group (8.3%) compared to the SGM group (4.2%), although the difference was not statistically significant (p = 1.00). Additionally, numbness and tingling sensations were more common in the SM group, although these differences were also not statistically significant. The association between sutured mesh and nerve-related complications, including neuropathic pain, has been well-documented. Gopal et al. (2019) reported that sutured mesh was more likely to cause nerve entrapment, leading to neuropathic pain and sensory disturbances.[17] Similarly, Kingsnorth et al. (2017) found that patients treated with SM were more likely to report sensory disturbances, such as numbness and tingling, due to the increased likelihood of nerve manipulation during fixation.[18] In our study, the lower incidence of neuropathic pain and sensory disturbances in the SGM group suggests that avoiding sutures may reduce the risk of nerve-related complications, although further research with larger sample sizes is needed to confirm these findings.

Conclusion

CGP following hernia surgery poses a considerable challenge for the patient. It not only is a physical ailment but also acts as a psychological burden on the patient. The choice of mesh fixation method is crucial aspect of hernioplasty and debate between SGM and SM fixation continues to evolve. This study suggests that self-gripping mesh may offer some advantages over sutured mesh in reducing postoperative complications such as chronic groin pain, seroma formation, and foreign body sensation. Though not statistically significant, these trends indicate that SGM could be a promising alternative, especially for reducing postoperative discomfort. Both mesh types had comparable recurrence rates and overall safety profiles, making either a viable option for inguinal hernia repair. Further studies with larger sample sizes and longer follow-up are needed to draw definitive conclusions.

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