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Original Research Article

Randomised controlled trial of mesh fixation with nonabsorbable versus delayed absorbable suture in open inguinal hernia patients undergoing open inguinal hernioplasty in tertiary health center of Ahmedabad

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ABSTRACT

Background: Inguinal hernia repair is a globally frequent surgical procedure. The Lichtenstein tension-free hernioplasty is highly effective, yet the optimal suture material non-absorbable versus delayed absorbable for mesh fixation remains debated regarding its impact on postoperative pain and complications.
Methods: A prospective, single-center, randomized controlled trial was conducted on 200 adult patients with primary inguinal hernias. Patients were randomized to undergo open Lichtenstein hernioplasty using either 2-0 polypropylene (non-absorbable, n=100) or 2-0 polyglactin (delayed absorbable, n=100) sutures. Postoperative pain (visual analog scale), recurrence rates, hospital stay, and complications were evaluated over a 6-month follow-up.
Results: Postoperative pain scores showed no statistically significant difference between the polypropylene and polyglactin groups at any time point up to 6 months. The incidence of complications, including wound infection, local swelling, seroma, and recurrence, was comparable across both groups. Duration of hospital stay was also similar.
Conclusion: Delayed absorbable polyglactin sutures provide a safe and effective alternative to non-absorbable polypropylene sutures for mesh fixation in open Lichtenstein inguinal hernioplasty, offering comparable short-term outcomes in pain and complication rates.

Keywords: Inguinal hernia, Lichtenstein hernioplasty, Mesh fixation, Polypropylene suture, Polyglactin suture

INTRODUCTION

Inguinal hernia repair is one of the most frequently performed surgical procedures globally, with an estimated 20 million cases annually.[1] The history of inguinal hernia repair dates back to ancient times with significant advancements made through anatomical studies and the development of surgical principles.[2-7] The advent of mesh repair marked a revolutionary step and since then, ongoing research has focused on refining techniques and materials.[8-12] The Lichtenstein tension-free hernioplasty, introduced by Irving Lichtenstein in 1986, has become a cornerstone of open hernia repair due to its effectiveness in reducing recurrence rates. This technique involves reinforcing the abdominal wall with a prosthetic mesh, typically placed in an "onlay" position.[9] While the Lichtenstein repair has significantly improved outcomes, the optimal method for securing the mesh remains a subject of investigation. A key consideration in this regard is the choice of suture material, with both non-absorbable and absorbable options available. Suture materials play a crucial role in tissue approximation and mesh fixation. Non-absorbable sutures, such as polypropylene, provide permanent strength, while delayed absorbable sutures, like polyglactin, are gradually absorbed by the body through hydrolysis.[6]

Understanding the potential impact of these different suture types on postoperative outcomes, particularly pain and complications, is essential for optimizing patient care.

Published studies comparing non-absorbable and delayed absorbable sutures in inguinal hernia repair have yielded varied results. Some studies have suggested that absorbable sutures may lead to lower chronic pain while others reported no significant difference in postoperative pain.[13-19,22] Similarly, the incidence of complications such as seroma, wound infection, and recurrence has been reported as comparable in some studies but with conflicting findings in others.[15-18,22-25] Notably, there is a relative lack of focus in the literature on patient-centric outcomes such as the duration of hospital stay.[16] This study aims to compare the postoperative pain and complication rates, including the length of hospital stay, between the use of non-absorbable polypropylene and delayed absorbable polyglactin sutures for mesh fixation in patients undergoing open Lichtenstein inguinal hernioplasty.

METHODS

The primary aim of this study was to compare postoperative pain, as assessed by the VAS in the immediate postoperative period, between mesh fixation with non-absorbable versus delayed absorbable suture material in patients undergoing open Lichtenstein tension-free inguinal hernioplasty. Secondary objectives included the comparison of recurrence rates within the first 6 months postoperatively, duration of hospital stay, incidence of bleeding, local swelling, wound infections, and seroma formation between the two suture groups.

This was a prospective, single-center, randomized controlled trial conducted at the Department of General Surgery, GMERS Medical College, Sola Civil Hospital, Ahmedabad, between May 2022 and April 2023.

Two hundred adult patients diagnosed with primary inguinal hernia based on clinical examination and ultrasound findings were enrolled. Patients were randomly assigned using a simple lottery method, with allocation concealment via sealed envelopes, to undergo open Lichtenstein tension-free hernioplasty with mesh fixation using either 2-0 polypropylene (non-absorbable, Group A, n=100) or 2-0 polyglactin (delayed absorbable, Group B, n=100) sutures. Patients were blinded to the suture allocation.

The primary outcome was postoperative pain assessed using the VAS at 6 hours, 24 hours, discharge, 2 weeks, and 6 months postoperatively. Secondary outcomes included recurrence rate (clinically and radiologically at 2, 3, and 6 months), duration of hospital stay, and the incidence of bleeding, local swelling, wound infections (defined as pus discharge), and seroma formation (clinically assessed) in the postoperative period. Mesh fixation was performed at four points in all patients.

Data analysis was conducted using the Chi-square test to compare proportions. Ethical approval was obtained from the institutional ethics committee, and written informed consent was obtained from all participants prior to enrollment. Key exclusion criteria included patients with hernias other than inguinal, obstructed, strangulated, or recurrent inguinal hernias, and those unfit for surgery.

RESULTS

The randomized controlled trial successfully enrolled 200 patients undergoing open Lichtenstein hernioplasty. The study population was predominantly male, with key demographic and clinical characteristics outlined in Table 1.

Evaluation of the primary outcome revealed no statistically significant difference in postoperative pain scores between the polypropylene and polyglactin groups at any of the measured time points, including 6 hours, 24 hours, discharge, 2 weeks, and 6 months postoperatively (Table 2). Furthermore, the incidence of postoperative complications was comparable across both study arms. Analysis showed no significant differences in the rates of wound infection, local swelling, seroma formation, or hernia recurrence within the 6-month follow-up period. The duration of hospital stay was also similar in both groups (Table 3).

Table 1: Demographic and clinical characteristics (n=200).

Characteristics	Total (%)
Gender	
Male	199 (99.5)
Female	1 (0.5)
Age distribution (in years)	
18-30	3 (1.5)
30-40	8 (4.0)
40-50	46 (23.0)
50-60	100 (50.0)
60-70	33 (16.5)
70-80	9 (4.5)

Continued.

Characteristics	Total (%)
>80	1 (0.5)
Material used	
Polypropylene	100 (50.0)
Polyglactin	100 (50.0)

Table 2: Post-operative pain scores (Mean±SD).

Time points	Polypropylene (n=100)	Polyglactin (n=100)	P value
6 hours	5.60±0.82	5.62±0.76	0.858
24 hours	4.18±0.85	4.08±0.83	0.398
Discharge	2.46±0.73	2.41±0.71	0.625
2 weeks	1.16±0.88	1.18±0.83	0.869
6 months	0.57±0.71	0.51±0.58	0.514

Table 3: Post-operative complications and outcomes.

Outcome	Polypropylene (n=100)	Polyglactin (n=100)	P value
Wound infection, N (%)	9 (9.0)	8 (8.0)	0.800
Local swelling, N (%)	4 (4.0)	5 (5.0)	0.730
Seroma, N (%)	1 (1.0)	0 (0.0)	0.310
Recurrence (at 6 months), n (%)	1 (1.0)	0 (0.0)	0.310
Hospital stays (days), median (range)	3 (2-8)	3 (2-7)	> 0.05

DISCUSSION

During the past 3 decades, the incidence of colorectal This prospective, single-center, randomized controlled trial compared the postoperative outcomes of mesh fixation using non-absorbable polypropylene and delayed absorbable polyglactin sutures in 200 adult patients undergoing open Lichtenstein hernioplasty.

The primary finding was that there was no statistically significant difference in postoperative pain scores between the two groups at any of the measured time points (6 hours, 24 hours, discharge, 2 weeks, and 6 months). This aligns with the results of several previous studies, including those by Kharadi et al and Aggarwal et al who also reported comparable pain outcomes between these suture types.[15,18] Paajanen et al and Hidalgo et al similarly evaluated alternative fixation methods like tissue glue and absorbable options, finding comparable or improved pain profiles compared to non-absorbable sutures.[19,24] However, the findings contrast with studies by Igor et al, Singh et al and Koujalagi et al which suggested a potential benefit of absorbable sutures in reducing chronic pain at later follow-up periods.[13,14,21] This discrepancy may be attributed to variations in the type of absorbable suture used, the specific time points of pain assessment, and the study populations. Regarding postoperative complications, authors observed no statistically significant difference in the incidence of wound infection, local swelling, seroma, or recurrence between the polypropylene and polyglactin groups. These findings are consistent with the results reported by Kharadi et al and Shanoo et al.[18,23] While Singh et al reported similar rates of seroma, Vinoth et al found a lower incidence of seroma in the prolene (non-absorbable) group, highlighting the need for prevention strategies as outlined by Janis et al.[13,16,24] The single case of recurrence in the polypropylene group in the study is consistent with the low recurrence rates reported in the literature for the Lichtenstein technique and the Ismail et al meta-analysis.[22,25] An important aspect of the study was the assessment of hospital stay, a patient-centric outcome that has been noted as underreported in the literature.[22] Authors found no significant difference in the duration of hospital stay between the two groups, suggesting that the choice of suture material for mesh fixation does not significantly impact the immediate postoperative recovery period in terms of hospital stay. The similar outcomes observed in our study may be attributed to the fact that both polypropylene and polyglactin are well-established suture materials with good biocompatibility.[6,10] While polyglactin is absorbed over time, its strength is maintained during the critical initial healing phase.[6]

The lack of significant difference in chronic pain in the study, despite some literature suggesting otherwise, warrants further investigation with longer follow-up periods to assess for any potential late-onset differences.[17] The limitations of the study include its single-center design and a follow-up period of 6 months. Longer-term follow-up would be beneficial to assess for any differences in very late complications or recurrence rates.

CONCLUSION

This randomized controlled trial demonstrates that the use of delayed absorbable polyglactin sutures for mesh fixation in open Lichtenstein inguinal hernioplasty results in similar postoperative pain levels and a comparable incidence of early complications, including recurrence and hospital stay, compared to non-absorbable polypropylene sutures within a 6-month follow-up period. These findings suggest that delayed absorbable sutures are a safe and effective alternative to non-absorbable sutures for mesh fixation in this common surgical procedure, without compromising short-term clinical outcomes. Surgeons may consider the use of either suture type based on their preference and other patient-specific factors. Further research with longer follow-up is warranted to evaluate the very long-term outcomes and potential differences in specific patient subgroups.

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