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[Original Research paper]

"Comparative study between mesh fixation using continuous and interrupted suture to inguinal ligament in a Lichtenstein tension free mesh repair"

1. Dr. Sanil Sadashiv Shinde
Assistant Professor, Department of General Surgery, Dr. Vasantrao Pawar Medical College, Hospital & Research centre, Nashik, Maharashtra. 422003
Email: drsanilshinde@gmail.com

2. Dr. Abhijeet Thorat*
Assistant Professor, Department of General Surgery, Dr. Vasantrao Pawar Medical College, Hospital & Research centre, Nashik, Maharashtra. 422003
Email: abhijeetthorat888@gmail.com ***Corresponding Author**

3. Dr. Mansi Choudhar
Junior Resident, Department of General Surgery, Dr. Vasantrao Pawar Medical College, Hospital & Research centre, Nashik, Maharashtra. 422003

4. Dr. Amrit Kaur Saini
Junior Resident, Department of General Surgery, Dr. Vasantrao Pawar Medical College, Hospital & Research centre, Nashik, Maharashtra. 422003

5. Dr. Mohil Shah
Junior Resident, Department of General Surgery, Dr. Vasantrao Pawar Medical College, Hospital & Research centre, Nashik, Maharashtra. 422003

6. Dr. Shubham Misal
Junior Resident, Department of General Surgery, Dr. Vasantrao Pawar Medical College, Hospital & Research centre, Nashik, Maharashtra. 422003

Abstract:

Introduction: Inguinal hernia repair is a prevalent surgical procedure with ongoing debates about optimal mesh fixation techniques. This study aimed to compare the outcomes of continuous versus interrupted suturing for mesh fixation in Lichtenstein tension-free inguinal hernia repair. We conducted this study to compare the operative time, hospital stay, and postoperative pain between continuous and interrupted suture techniques in Lichtenstein hernia repair.

Methodology : A comparative analytical study was conducted over one year (January 2023 to December 2023) at a tertiary care hospital in Western Maharashtra. Eighty patients were divided into two groups (Group C: continuous sutures, Group I: interrupted sutures) and assessed for mean operative time, hospital stay, and postoperative pain scores using SPSS version 22.

Results: Group I had a mean operative time of 54.24 minutes (SD: 12.47) compared to 68.12 minutes (SD: 15.02) in Group C ($P < 0.001$). The mean hospital stay was shorter in Group I (4.2 days, SD: 1.5) compared to Group C (5.6 days, SD: 1.8) ($P <$

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0.001). Postoperative pain scores were significantly lower in Group I on postoperative days 1, 3, 7, and 30 ($P < 0.001$ for all).

Conclusion: Interrupted suturing for mesh fixation in Lichtenstein tension-free inguinal hernia repair demonstrated significant benefits over continuous suturing, including shorter operative times, reduced hospital stays, and lower postoperative pain scores. These findings suggest that interrupted suturing may enhance patient recovery.

Keywords: Inguinal hernia, Lichtenstein repair, continuous sutures, interrupted sutures, postoperative pain.

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Introduction:

Inguinal hernia repair is a common surgical procedure in India, reflecting a significant prevalence of this condition. According to recent studies, the prevalence of inguinal hernias in India varies between 3% and 5% among the adult male population, with a higher incidence observed in older age groups. The standard approaches to inguinal hernia repair include open hernioplasty, such as Lichtenstein's tension-free repair, and laparoscopic techniques, including Transabdominal Preperitoneal (TAPP) and Totally Extraperitoneal (TEP) repairs. [1] These procedures are chosen based on the patient's condition, surgeon's expertise, and resource availability. Lichtenstein repair remains widely used due to its simplicity and effectiveness, while laparoscopic methods are gaining popularity for their benefits of reduced postoperative pain and quicker recovery times. However, the choice of procedure is also influenced by factors such as recurrence rates, cost, and patient preferences, with ongoing research aimed at optimizing surgical outcomes and minimizing complications in the Indian context. [2, 3]

The choice between continuous and interrupted suture techniques for mesh fixation to the inguinal ligament in Lichtenstein tension-free mesh repair is a subject of ongoing research and debate. The Lichtenstein method, a widely adopted standard for inguinal hernia repair, typically involves securing a polypropylene mesh to reinforce the inguinal canal floor. This reinforcement prevents hernia recurrence by providing a tension-free closure of the hernia defect. [4, 5]

Continuous suture technique offers a quicker and more efficient means of securing the mesh, with a single suture line running along the mesh edges. This method can potentially reduce operative time and may lead to less postoperative pain due to fewer needle punctures through the inguinal ligament. [6] However, concerns exist regarding the risk of suture failure, which could result in mesh displacement and increased recurrence rates. Studies have shown mixed outcomes; some suggest that continuous sutures might lead to slightly higher recurrence rates, while others find no significant difference compared to interrupted sutures. [7, 8]

Interrupted sutures, on the other hand, involve multiple individual stitches placed at intervals along the mesh edge. This method provides a more secure fixation by distributing tension across multiple suture points, potentially reducing the risk of mesh migration or deformation. Additionally, if one suture fails, the others remain intact, offering a form of redundancy that may lower recurrence rates. However, this technique is generally more time-consuming and may increase operative duration and tissue trauma due to multiple punctures. [9]

A randomized controlled trial comparing these two techniques found no significant difference in recurrence rates or chronic pain between continuous and interrupted suturing methods. However, the choice of technique may depend on surgeon preference, experience, and specific patient factors, such as tissue quality and hernia size. Ultimately, both techniques can be effective, and the decision often hinges on balancing the potential benefits of reduced operative time with continuous

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sutures against the theoretically more secure fixation offered by interrupted sutures. [10]

We conducted this study to evaluate the difference in patient outcome in mesh fixation using continuous and interrupted suture to inguinal ligament in a Lichtenstein tension free mesh repair of hernia cases.

Methodology:

We conducted a comparative analytical study to evaluate the patient outcome in mesh fixation surgeries using continuous (Group C) and interrupted suture (Group I) to inguinal ligament in a Lichtenstein tension free mesh repair of hernia cases. We conducted this study over a period of one year January 2023 to December 2023 at a tertiary care hospital and medical college in Western Maharashtra.

The investigation, the surgical techniques, and the associated risks were fully disclosed to the patients. Every patient who took part gave their written informed consent.

The study included adult male and female patients over the age of 18 who presented with either direct or indirect inguinal hernias, whether unilateral or bilateral, and were scheduled for elective surgery. Patients were also required to fall under the American Society of Anaesthesiologists (ASA) physical status classification I or II. The study excluded individuals with a body mass index (BMI) greater than 30 kg/m², those with recurrent or sliding hernias, and patients who required emergency surgery for complications such as obstruction, strangulation, or incarceration of the hernia.

We included total 80 cases in our study, 40 from each group. We evaluated patients age, gender, diagnosis, mean operation time and mean duration of hospital stay and pain scores. Data was entered in Microsoft excel 2019 and was analysed using SPSS version 22.

Observations and Results:

The mean age in the two groups of our study was 32.45 ± 10.24 years in Group I and 34.47 ± 12.41 years in Group C. There were 37 males in Group I (92.5%) and 38 males in Group C (95%). Group I had 38 cases of Indirect Hernias (95%) while rest 2 Direct hernias (5%), Group C had 37 cases of Indirect Hernias (92.5%) while rest 3 Direct hernias (7.5%). Group I and Group C, based on the type of hernia they presented with. In Group I, the majority of patients, 92.5% (37 out of 40), had unilateral hernias, while a smaller proportion, 7.5% (3 out of 40), had bilateral hernias. Conversely, in Group C, 87.5% (35 out of 40) of the patients had unilateral hernias, and 12.5% (5 out of 40) had bilateral hernias. We observed that unilateral hernias were more common in both groups, with a slightly higher occurrence in Group I compared to Group C.

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In our study, the distribution of hernias among patients in Group I and Group C was analysed based on their location. In Group I, 47.5% (19 out of 40) of patients had hernias on the right side, while 45% (18 out of 40) had left-sided hernias. Additionally, 7.5% (3 out of 40) of patients in this group presented with bilateral hernias. In Group C, 45% (18 out of 40) of patients had right-sided hernias, 42.5% (17 out of 40) had left-sided hernias, and 12.5% (5 out of 40) had bilateral hernias. The data reveals a relatively even distribution of right and left-sided hernias in both groups, with a slightly higher prevalence of bilateral hernias in Group C compared to Group I. [Fig 1]

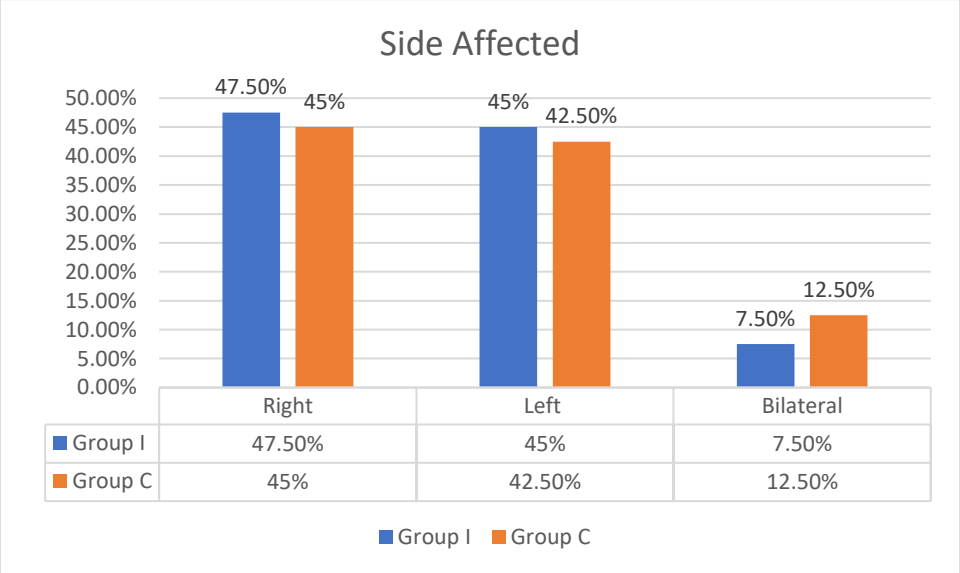

Fig 1: Side affected in the two groups

The comparison between Group I and Group C revealed significant differences in both mean operative time and mean hospital stay. Group I had a shorter mean operative time of 54.24 minutes with a standard deviation (SD) of 12.47, whereas Group C had a longer mean operative time of 68.12 minutes with an SD of 15.02, with the difference being statistically significant ($P < 0.001$). Similarly, the mean hospital stay was shorter in Group I, averaging 4.2 days with an SD of 1.5, compared to Group C, where the mean hospital stay was 5.6 days with an SD of 1.8. This difference was also statistically significant ($P < 0.001$). These findings suggest that patients in Group I experienced both shorter surgery durations and quicker recoveries compared to those in Group C. [table 1]

Table 1: Mean Operative time and Mean Hospital stay in the two groups

	Group I	Group C	P Value
Mean Operation Time (Min)	54.24	68.12	<0.001
SD	12.47	15.02	

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Mean Hospital Stay (Days)	4.2	5.6	<0.001
SD	1.5	1.8	

We studied the median pain scores postoperatively in the two groups. The comparison of median Visual Analog Scale (VAS) pain scores between Group I and Group C across different postoperative days revealed significant differences in patient-reported pain levels. On the first postoperative day (D1), Group I had a lower median VAS pain score of 5 compared to Group C's score of 6 ($P < 0.001$). This trend continued on the third postoperative day (D3), with Group I reporting a median pain score of 3, while Group C reported a higher score of 5 ($P < 0.001$). By the seventh postoperative day (D7), the pain in Group I had further decreased to a median score of 1, compared to a score of 3 in Group C ($P < 0.001$). Finally, on the thirtieth day (D30), Group I maintained a lower median pain score of 1, whereas Group C had a score of 2 ($P < 0.001$). These results indicate that patients in Group I experienced consistently lower pain levels throughout the postoperative period compared to those in Group C. [Table 2]

Table 2: Median VAS Pain Scores Post Operative Day in two groups

Median VAS Pain Scores Post Operative Day	Group I	Group C	P Value
D1	5	6	<0.001
D3	3	5	<0.001
D7	1	3	<0.001
D30	1	2	<0.001

Discussion

In this study, the outcomes of continuous versus interrupted suturing for mesh fixation in Lichtenstein tension-free inguinal hernia repair were compared, with a focus on operative time, hospital stay, postoperative pain, and other complications. These findings are evaluated alongside existing literature to contextualize their significance.

The study found that the interrupted suture group (Group I) had a significantly shorter operative time compared to the continuous suture group (Group C), with mean times of 54.24 ± 12.47 minutes and 68.12 ± 15.02 minutes, respectively ($P < 0.001$). This is consistent with findings from Vidhya Sree S et al. [11], where minimal stitch techniques resulted in reduced operative times compared to conventional suturing. Additionally, the shorter operative time in Group I likely contributes to reduced hospital stays, as observed in the current study, where Group I had a shorter mean hospital stay (4.2 ± 1.5 days) compared to Group C (5.6 ± 1.8 days, $P < 0.001$). These findings are further supported by the study by C. Kim-Fuchs et al. [12], where the use of tissue glue for mesh fixation resulted in a shorter operative time (73 minutes vs 79 minutes for

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sutures, P = 0.01), highlighting that alternative fixation methods can further reduce surgical time.

The meta-analysis by Ladwa et al. [13], which compared suture mesh fixation (SMF) and glue mesh fixation (GMF) in open inguinal hernia repair (OIHR), also reported reduced operative time with GMF. Although their study focused on different fixation techniques, the findings underscore the potential benefits of techniques that minimize operative time, such as interrupted suturing or glue fixation.

Postoperative pain, as measured by the Visual Analog Scale (VAS), was significantly lower in the interrupted suture group across all postoperative time points. On the first postoperative day, Group I had a median VAS score of 5, while Group C had a score of 6 ($P < 0.001$). By the seventh postoperative day, pain scores in Group I decreased to 1, compared to 3 in Group C ($P < 0.001$). These findings align with those of Vidhya Sree S et al., who also reported lower pain scores with minimal stitch techniques.

The study by P. Negro et al. [14] further supports these results, demonstrating that patients who received fibrin glue for mesh fixation in the Lichtenstein repair experienced significantly less postoperative pain compared to those who received sutures (mean pain score: 2.5 vs. 3.2, $P < 0.001$). Additionally, fewer patients in the fibrin glue group reported complications such as numbness and discomfort at 1 month postoperatively, suggesting that alternative fixation methods may reduce the incidence of postoperative complications. Shah MY [4] and Jain SK [7] reported similar findings.

Similarly, the study by C. Kim-Fuchs et al.[12] found that after 5 years, chronic pain was less prevalent in the tissue glue group compared to the suture group (4.2% vs. 11.7%, P = 0.108), although the difference was not statistically significant. This suggests that while both techniques result in comparable long-term outcomes, tissue glue may offer advantages in reducing early postoperative pain and complications.

Recurrence rates were another key outcome evaluated in this study. After 1 year, neither group showed significant differences in recurrence rates. These findings are consistent with the study by Marcos Bruna Esteban et al.[15], where no recurrences were observed in the group treated with autoadhesive mesh (AA) compared to one recurrence in the classic Lichtenstein group (CL) after 1 year. Similarly, C. Kim-Fuchs et al. [12] reported no significant differences in recurrence rates between the suture and glue fixation groups after 12 months (0% recurrence in both groups), although after 5 years, the recurrence rates were slightly higher in the tissue glue group (10%) compared to the suture group (5.9%), but the difference was not statistically significant ($P = 0.379$).

This study's findings indicate that interrupted suturing for mesh fixation in Lichtenstein tension-free inguinal hernia repair offers significant advantages over continuous suturing, including shorter operative times, reduced hospital stays, and lower postoperative pain. These advantages are consistent with findings from other studies, such as those by Shah MY [4], Jain SK [7], Vidhya Sree S [11], C. Kim-Fuchs [12] and P. Negro [14], which collectively highlight the benefits of alternative fixation techniques like tissue glue, which can further reduce operative time and postoperative pain.

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Given these findings, interrupted suturing should be considered in clinical practice, particularly in cases where minimizing operative time and postoperative discomfort is a priority. However, the choice of fixation method should be individualized based on patient characteristics and surgeon preference, with tissue glue fixation emerging as a viable alternative, particularly for patients at risk of chronic pain.

Conclusion:

In our study comparing continuous versus interrupted suturing techniques for mesh fixation in Lichtenstein tension-free inguinal hernia repair, the interrupted suture technique demonstrated significant benefits over the continuous suture technique. The interrupted suture group (Group I) had notably shorter operative times, reduced hospital stays, and lower postoperative pain scores compared to the continuous suture group (Group C). These findings align with existing literature, suggesting that interrupted suturing may enhance patient recovery by minimizing surgical time and pain. Although both techniques showed comparable recurrence rates after one year, the advantages of interrupted suturing, including faster recovery and reduced pain, underscore its potential benefits in clinical practice. Future studies could further explore the long-term outcomes and complications associated with different fixation techniques to refine surgical approaches and improve patient outcomes.

Conflict of Interest and Source of Funding: None

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