

ABSORBABLE VERSUS NON-ABSORBABLE TACKERS IN LAPAROSCOPIC HERNIA REPAIR: A RETROSPECTIVE COMPARATIVE STUDY OF POSTOPERATIVE PAIN AND CLINICAL OUTCOMES

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ABSTRACT

Background

Mesh fixation is an important component of laparoscopic hernia repair. Non-absorbable tackers provide durable mechanical fixation but remain permanently implanted and may contribute to prolonged local tissue irritation. Absorbable tackers have been developed as an alternative, with the potential to reduce persistent foreign-body reaction and fixation-related postoperative discomfort. However, comparative evidence regarding their clinical superiority remains inconclusive.

Objective: To compare postoperative pain and selected clinical outcomes between absorbable and non-absorbable tackers in patients undergoing laparoscopic hernia repair.

Methods: A retrospective comparative study was conducted among 50 patients undergoing laparoscopic hernia repair. Twenty-five patients underwent mesh fixation using absorbable tackers and 25 using non-absorbable tackers. The study population included patients undergoing laparoscopic repair of inguinal, umbilical and incisional hernias. Demographic variables included age, sex and body mass index (BMI). Postoperative pain was assessed at 24 hours, 7 days and 1 month. Secondary outcomes included healing time, duration of hospital stay, seroma formation, postoperative infection and hernia recurrence. Continuous variables were summarized as mean $\pm$ standard deviation and categorical variables as frequencies and percentages.

Results: The mean age was 45.16 ± 8.77 years in the absorbable-tacker group and 44.76 ± 9.89 years in the non-absorbable-tacker group. Mean BMI was 25.43 ± 3.26 and 25.85 ± 3.33 kg/m², respectively. The two groups were comparable with respect to age, BMI and sex. Inguinal hernia was the most common hernia type in both groups.

The source study results demonstrated lower postoperative pain scores with absorbable tackers at 24 hours (4.4 ± 1.3 versus 5.6 ± 1.2), 7 days (2.3 ± 1.1 versus 3.4 ± 1.0), and 1 month (0.8 ± 0.6 versus 1.4 ± 0.7). Reported P values were 0.01, 0.02 and 0.04, respectively. Healing time and hospital stay were also reported to be lower with absorbable fixation. Seroma occurred in 12% versus 28%, while recurrence occurred in 8% versus 20% of patients in the absorbable and non-absorbable groups, respectively. These differences in seroma and recurrence were not statistically significant.

Conclusion: In this retrospective cohort, absorbable tackers were associated with lower postoperative pain and shorter reported healing time and hospital stay. Although seroma and recurrence were numerically less frequent with absorbable fixation, the available evidence does not establish definitive superiority. Larger prospective studies with standardized pain assessment and adequate long-term follow-up are required.

KEYWORDS: laparoscopic hernia repair; mesh fixation; absorbable tackers; non-absorbable tackers; postoperative pain; seroma; recurrence.

1. INTRODUCTION

Hernia repair is one of the most commonly performed surgical procedures, and the development of minimally invasive techniques has expanded the role of laparoscopic repair for several types of hernias. Laparoscopic approaches can offer advantages such as reduced wound morbidity and earlier postoperative recovery in appropriately selected patients. However, postoperative pain remains an important determinant of recovery following laparoscopic hernia surgery.^{1,2}

Mesh fixation is an integral component of many laparoscopic hernia repairs. Various fixation methods are available, including absorbable and non-absorbable tackers, transfascial sutures, staples, tissue adhesives and combinations of

these techniques. The choice of fixation method may influence postoperative pain, mesh stability, seroma formation and long-term recurrence.^{3,4}

Postoperative pain following laparoscopic hernia repair is multifactorial. In addition to the surgical dissection itself, fixation devices may contribute to postoperative discomfort through local tissue trauma, mechanical irritation and potential involvement of abdominal wall nerves. The persistence of permanent fixation material has therefore been proposed as one possible contributor to prolonged postoperative symptoms.⁵

Absorbable tackers were developed partly to address this concern. Their gradual degradation theoretically reduces the amount of permanent foreign material remaining after mesh incorporation. This may potentially reduce prolonged mechanical irritation and foreign-body reaction. Conversely, because absorbable devices eventually lose their mechanical contribution, concerns have been raised regarding whether inadequate long-term fixation could contribute to mesh displacement or hernia recurrence.⁶

Several comparative studies have investigated absorbable and non-absorbable fixation. Bansal et al. conducted a randomized study comparing absorbable and non-absorbable tackers in laparoscopic incisional hernia repair and found no clinically important difference in long-term outcomes, chronic pain or quality of life between the two fixation strategies.⁷ Similarly, Colak et al. conducted a prospective randomized trial comparing absorbable and non-absorbable tackers in laparoscopic ventral incisional hernia repair, contributing to the growing evidence that neither fixation strategy has demonstrated consistent superiority across clinically important outcomes.⁸

The evidence was subsequently synthesized by Khan et al. in a systematic review and meta-analysis involving 1,149 patients. The authors found no significant difference between absorbable and non-absorbable tacks with respect to recurrence, chronic pain, seroma or hematoma. Operative time was longer with absorbable fixation, although the overall clinical outcomes were considered similar. The authors concluded that adequately powered randomized trials were still required to establish whether either fixation strategy provided a clinically meaningful advantage.⁹

Long-term observational evidence has, however, raised some concerns regarding absorbable fixation. Christoffersen et al., in a nationwide cohort of 816 patients undergoing laparoscopic incisional hernia repair, reported lower recurrence-free survival with absorbable compared with non-absorbable tack fixation after a median follow-up of 40 months. Absorbable fixation was independently associated with recurrence, while rates of moderate or severe chronic pain were similar between groups.¹⁰ These findings suggest that the potential short-term benefits of absorbable fixation must be considered alongside possible long-term effects on mesh stability.

More recent randomized evidence has continued to demonstrate clinical equipoise. The TACKoMesh randomized controlled trial compared absorbable and non-absorbable tack fixation during laparoscopic IPOM-plus repair of primary incisional hernias. No significant difference in pain during activity was demonstrated between the groups at the assessed postoperative time points, although pain at rest on postoperative day 1 was lower with absorbable fixation. Clinical outcomes including seroma, surgical-site infection, recurrence and hospital stay were comparable.¹¹

The heterogeneity of the available evidence is also important because laparoscopic hernia repair encompasses different procedures. Inguinal, umbilical and incisional hernias differ in anatomical location, mesh position, fixation requirements and mechanisms contributing to postoperative pain. Consequently, evidence obtained exclusively from laparoscopic ventral or incisional hernia repair cannot necessarily be generalized to every form of laparoscopic hernia repair.

Despite the availability of multiple fixation strategies, uncertainty therefore remains regarding whether absorbable tackers provide clinically meaningful advantages over non-absorbable tackers. In particular, the relationship between fixation material and early postoperative pain, recovery, seroma formation and recurrence remains incompletely defined.

The present study was undertaken to compare postoperative pain and selected clinical outcomes between absorbable and non-absorbable tackers in patients undergoing laparoscopic hernia repair. The study population included patients undergoing laparoscopic repair of inguinal, umbilical and incisional hernias. Postoperative pain at 24 hours, 7 days and 1 month was evaluated as the principal outcome, while healing time, hospital stay, seroma formation, postoperative infection and hernia recurrence were evaluated as secondary outcomes.

2. MATERIALS AND METHODS

2.1 Study design

This was a retrospective comparative observational study involving patients who underwent laparoscopic hernia repair. The study was initially designed to compare patients undergoing laparoscopic hernia repair using absorbable tackers with those undergoing repair using non-absorbable tackers. The original study material identified postoperative pain, seroma formation, healing time, infection and recurrence as the principal outcomes.

The final study population consisted of 50 patients:

Absorbable-tacker group: n = 25

Non-absorbable-tacker group: n = 25

2.2 Study population

The study included patients undergoing laparoscopic repair of:
inguinal hernia;
umbilical hernia; and
incisional hernia.

Patients were categorized according to the type of mesh fixation device used during surgery.
The final dataset was balanced to include 25 patients in each treatment group.

2.3 Demographic characteristics

The following baseline variables were assessed:

age;
sex;
BMI; and
type of hernia.

The patient-level demographic data supplied for the study were used to construct the baseline characteristics table.

2.4 Study intervention

Patients in the intervention group underwent laparoscopic hernia repair with absorbable tack fixation of the mesh.

Patients in the comparison group underwent laparoscopic hernia repair with non-absorbable tack fixation.

The exact manufacturer, composition, number of tackers used and mesh characteristics should be inserted from the operative records before journal submission.

2.5 Outcome measures

Primary outcome

The primary outcome was postoperative pain.

Pain was assessed at: 24 hours; postoperative day 7; and 1 month.

Secondary outcomes

The secondary outcomes were:

Healing time;
Duration of hospital stay;
Seroma formation;
Postoperative infection; and
Hernia recurrence.

2.6 Statistical analysis

Continuous variables were expressed as mean $\pm$ standard deviation.

Categorical variables were expressed as frequencies and percentages.

For baseline continuous variables, independent-samples t-tests were used for exploratory between-group comparisons.

Categorical variables were compared using chi-square testing or Fisher's exact test, as appropriate.

For the primary outcome of postoperative pain, pain scores at each time point were compared between groups. Because repeated measurements were obtained from the same patients, a repeated-measures analysis or linear mixed-effects model would be preferable for the definitive analysis.

A two-sided P value <0.05 was considered statistically significant.

Because the present dataset contains multiple hernia types, hernia type should be considered a potential confounder in the definitive analysis.

3. RESULTS

3.1 Baseline characteristics

A total of 50 patients were included, with 25 patients in each group.

The mean age was 45.16 ± 8.77 years in the absorbable-tacker group and 44.76 ± 9.89 years in the non-absorbable-tacker group.

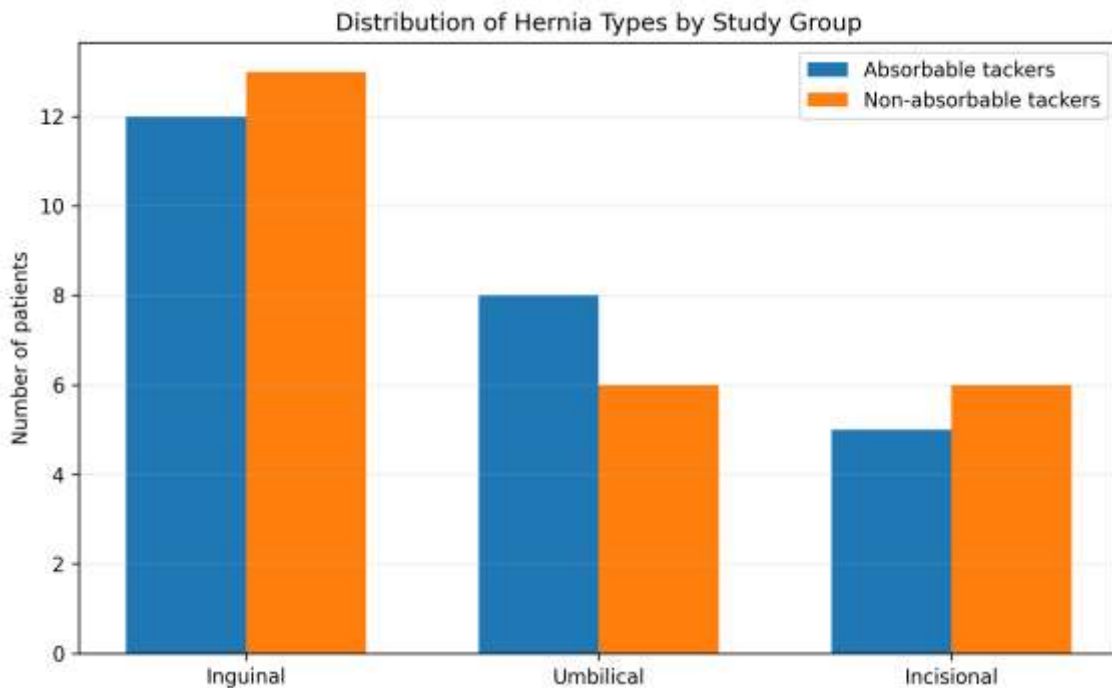
Mean BMI was 25.43 ± 3.26 kg/m² and 25.85 ± 3.33 kg/m², respectively.

The absorbable-tacker group comprised 15 males (60.0%) and 10 females (40.0%), while the non-absorbable-tacker group comprised 14 males (56.0%) and 11 females (44.0%).

The between-group differences in age and BMI were not statistically significant. Sex distribution was also comparable between groups.

Table 1. Baseline demographic and clinical characteristics

Variable	Absorbable tackers (n=25)	Non-absorbable tackers (n=25)	P value
Age, years, mean $\pm$ SD	45.16 $\pm$ 8.77	44.76 $\pm$ 9.89	0.880
BMI, kg/m ² , mean $\pm$ SD	25.43 $\pm$ 3.26	25.85 $\pm$ 3.33	0.655
Male, n (%)	15 (60.0%)	14 (56.0%)	1.000
Female, n (%)	10 (40.0%)	11 (44.0%)	
Hernia type, n (%)			0.497
Inguinal	12 (48.0%)	13 (52.0%)	
Umbilical	8 (32.0%)	6 (24.0%)	
Incisional	5 (20.0%)	6 (24.0%)	



The three hernia categories were similarly distributed between the groups, with no statistically significant difference in overall hernia-type distribution.

3.2 Postoperative pain

Postoperative pain was lower in the absorbable-tacker group at all three reported time points.

At 24 hours, mean pain was 4.4 ± 1.3 in the absorbable group compared with 5.6 ± 1.2 in the non-absorbable group (reported $P = 0.01$).

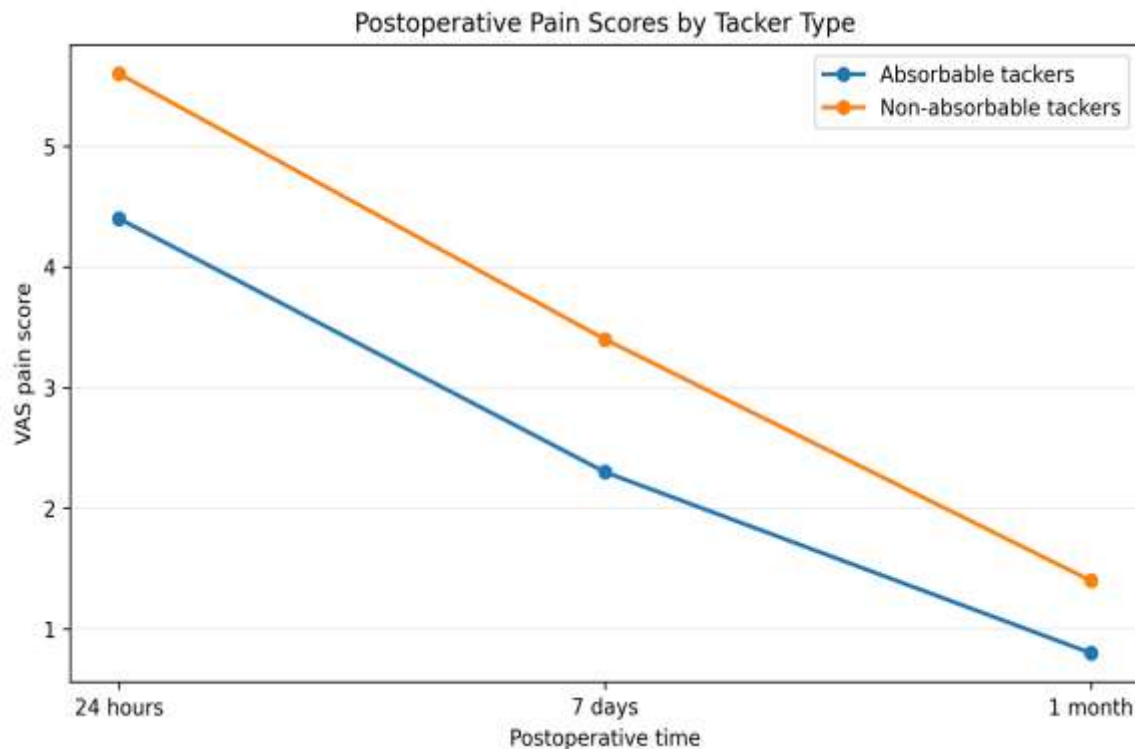
At 7 days, the corresponding values were 2.3 ± 1.1 and 3.4 ± 1.0 (reported $P = 0.02$).

At 1 month, mean pain was 0.8 ± 0.6 compared with 1.4 ± 0.7 (reported $P = 0.04$).

Table 2. Postoperative pain scores

Postoperative time point	Absorbable tackers (n=25)	Non-absorbable tackers (n=25)	Reported P value
24 hours	4.4 $\pm$ 1.3	5.6 $\pm$ 1.2	0.01
7 days	2.3 $\pm$ 1.1	3.4 $\pm$ 1.0	0.02
1 month	0.8 $\pm$ 0.6	1.4 $\pm$ 0.7	0.04

The absolute between-group difference was approximately 1.2 points at 24 hours, 1.1 points at 7 days and 0.6 points at 1 month.



3.3 Healing time

The reported mean healing time was 2.1 ± 0.5 in the absorbable-tacker group and 3.0 ± 0.7 in the non-absorbable-tacker group.

The exact unit and operational definition of healing time should be specified from the original study protocol before submission.

3.4 Hospital stay

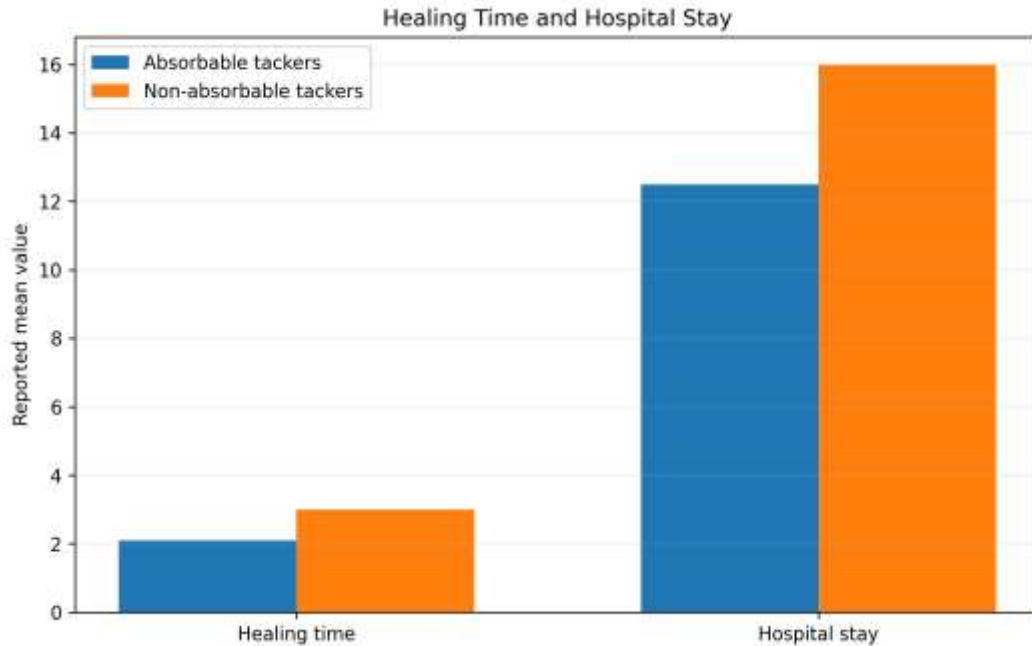
Mean hospital stay was reported as 12.5 ± 2.3 in the absorbable-tacker group compared with 16.0 ± 2.8 in the non-absorbable-tacker group.

This represents a reported mean difference of approximately 3.5 units in favor of absorbable fixation.

The unit of measurement and discharge criteria should be clarified before submission.

Table 3. Secondary clinical outcomes

Outcome	Absorbable tackers (n=25)	Non-absorbable tackers (n=25)	Interpretation
Healing time	2.1 ± 0.5	3.0 ± 0.7	Lower with absorbable fixation
Hospital stay	12.5 ± 2.3	16.0 ± 2.8	Lower with absorbable fixation
Seroma, n (%)	3 (12.0%)	7 (28.0%)	Not statistically significant
Infection, n (%)	0 (0%)	0 (0%)	No events recorded
Recurrence, n (%)	2 (8.0%)	5 (20.0%)	Not statistically significant



3.5 Seroma

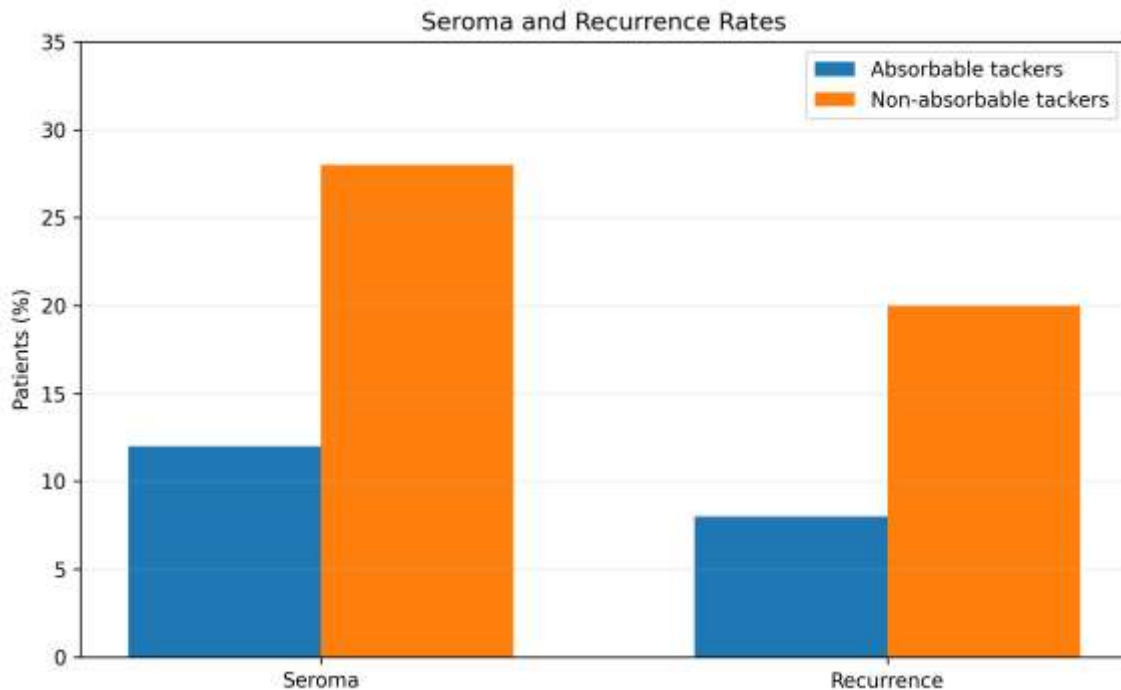
Seroma formation occurred in 3 patients (12.0%) in the absorbable-tacker group and 7 patients (28.0%) in the non-absorbable-tacker group. The difference was not statistically significant. Although the absolute difference favored absorbable fixation, the small number of events limits the statistical power of the comparison.

3.6 Postoperative infection

No postoperative infections were recorded in either treatment group in the available dataset. Consequently, there was no demonstrable difference in postoperative infection between the groups.

3.7 Hernia recurrence

Recurrence occurred in 2 patients (8.0%) in the absorbable-tacker group and 5 patients (20.0%) in the non-absorbable-tacker group. Although recurrence was numerically lower with absorbable tackers, the difference was not statistically significant.



4. DISCUSSION

The present retrospective comparative study evaluated 50 patients undergoing laparoscopic repair of inguinal, umbilical and incisional hernias, with 25 patients receiving absorbable tackers and 25 receiving non-absorbable tackers. The principal finding was that patients in the absorbable-tacker group demonstrated lower postoperative pain scores at 24 hours, 7 days and 1 month. The absorbable-tacker group also demonstrated shorter reported healing time and hospital stay. Seroma formation and recurrence were numerically lower in the absorbable group, although these differences were not statistically significant.

4.1 Postoperative pain

The most prominent finding in the present study was the lower postoperative pain observed with absorbable fixation. Mean pain scores were lower in the absorbable-tacker group at all three assessed time points.

The biological rationale for this observation is plausible. Mesh fixation can contribute to postoperative pain through tissue penetration, local inflammatory response and mechanical irritation. Permanent fixation devices may theoretically maintain a prolonged local foreign-body stimulus, whereas absorbable tackers gradually degrade after implantation.^{5,6}

However, the present finding should be interpreted in the context of conflicting published evidence.

Bansal et al. performed a randomized study comparing absorbable and non-absorbable tackers in laparoscopic incisional hernia repair and reported no significant difference in chronic pain or quality of life between the groups.⁷ Similarly, Colak et al. reported comparable clinical outcomes in a prospective randomized comparison of absorbable and non-absorbable tackers.⁸

The systematic review and meta-analysis by Khan et al., which included 1,149 patients, also found no significant difference in chronic pain between absorbable and non-absorbable fixation.⁹ These findings indicate that the pain reduction observed in the present study may not necessarily represent a universal effect of absorbable fixation.

More recent evidence reinforces this uncertainty. In the TACKoMesh randomized controlled trial, patients undergoing laparoscopic IPOM-plus repair of primary incisional hernia were randomized to absorbable or non-absorbable tack fixation. No significant differences were observed in pain during activity at the assessed postoperative time points. However, pain at rest on postoperative day 1 was significantly lower in the absorbable-tack group.¹¹

The apparent difference between these findings and those of the present study may be explained by several factors, including differences in hernia type, mesh position, fixation technique, number of fixation devices, analgesic protocols and pain-assessment methodology.

The current study included inguinal, umbilical and incisional hernia repairs, whereas the major randomized comparative studies have predominantly evaluated incisional or ventral hernias. Therefore, the observed reduction in pain should be considered an association within the present cohort rather than definitive evidence of a universal analgesic benefit from absorbable tackers.

4.2 Healing time and hospital stay

The present study demonstrated shorter reported healing time and hospital stay in the absorbable-tacker group.

One possible explanation is that reduced postoperative pain may facilitate earlier mobilization and functional recovery. Reduction in persistent local tissue irritation could theoretically contribute to improved early postoperative comfort.

Nevertheless, these outcomes are susceptible to confounding. Hospital stay is influenced by institutional discharge protocols, postoperative analgesia, comorbidities, complications and social factors. Similarly, healing time may be influenced by age, BMI, diabetes, smoking, hernia type and operative technique.

The existing comparative evidence does not consistently demonstrate a shorter hospital stay with absorbable fixation. Khan et al. found no significant difference in length of hospital stay between absorbable and non-absorbable tack groups.⁹ In the TACKoMesh randomized trial, length of hospital stay and postoperative complications were also comparable between groups.¹¹

Therefore, the shorter hospital stay observed in the present study should be regarded as a potentially relevant finding that requires confirmation in larger prospective cohorts.

4.3 Seroma formation

Seroma formation occurred in 12% of patients in the absorbable-tacker group compared with 28% in the non-absorbable-tacker group. Although this represented a numerical reduction, the difference was not statistically significant.

Seroma formation following laparoscopic hernia repair is multifactorial and may depend on hernia defect size, dissection of the hernia sac, residual dead space, mesh characteristics and surgical technique. It is therefore unlikely that the type of fixation device alone determines seroma formation.

The absence of a significant difference in the present study is consistent with the systematic review by Khan et al., which found no significant difference in seroma between absorbable and non-absorbable fixation.⁹ The TACKoMesh trial likewise reported comparable seroma rates between the two fixation groups.¹¹

Accordingly, the lower seroma rate observed in the present cohort should be interpreted as a numerical trend rather than evidence that absorbable tackers prevent seroma formation.

4.4 Hernia recurrence

Recurrence occurred in 8% of patients receiving absorbable tackers compared with 20% of those receiving non-absorbable tackers. Although the observed recurrence rate was lower with absorbable fixation, the difference was not statistically significant.

The relationship between fixation material and recurrence is biologically complex. Absorbable tackers progressively lose their mechanical contribution as they degrade, raising the theoretical possibility of inadequate long-term fixation. Conversely, once sufficient mesh incorporation has occurred, continued permanent fixation may not be necessary.

The randomized study by Bansal et al. reported comparable long-term outcomes and recurrence between absorbable and non-absorbable fixation.⁷ Similarly, the systematic review and meta-analysis by Khan et al. did not demonstrate a significant difference in recurrence between the two fixation strategies.⁹

However, the large nationwide cohort study by Christoffersen et al. provides an important contrasting finding. Among 816 patients undergoing laparoscopic incisional hernia repair, cumulative recurrence-free survival was lower following absorbable fixation than non-absorbable fixation. In multivariable analysis, absorbable tacks were independently associated with recurrence (HR 1.53, 95% CI 1.11–2.09). Importantly, chronic pain did not differ significantly between groups.¹⁰

The discrepancy between the present findings and the Christoffersen cohort may reflect differences in patient selection, hernia characteristics, mesh overlap, fixation technique, defect size, follow-up duration and other confounding factors. The present study's small sample size also substantially limits its ability to detect differences in recurrence.

Therefore, the lower recurrence rate observed with absorbable tackers in the present study should not be interpreted as evidence that absorbable fixation reduces recurrence.

4.5 Interpretation across different hernia types

An important characteristic of the present study is that it includes inguinal, umbilical and incisional hernia repairs.

This increases the clinical breadth of the study but introduces heterogeneity. These procedures differ considerably in anatomy, operative approach, mesh placement and fixation requirements. Pain following laparoscopic inguinal hernia repair may also have different mechanisms from pain following laparoscopic incisional or umbilical hernia repair.

The baseline distribution of hernia types was relatively similar between the two study groups, which reduces—but does not eliminate—the possibility that major imbalance in hernia type explains the observed differences.

The inclusion of multiple hernia types also means that the overall treatment effect should be interpreted cautiously. A larger study should ideally stratify patients according to hernia type and operative technique and, where sample size permits, perform interaction analyses to determine whether the effect of fixation material differs between procedures.

4.6 Comparison with contemporary evidence

Taken together, the available literature does not demonstrate consistent superiority of absorbable tackers.

The 2018 systematic review and meta-analysis found no significant overall differences in clinically important outcomes between absorbable and non-absorbable tacks.⁹ The Bansal randomized study similarly found comparable long-term outcomes and chronic pain.⁷ The TACKoMesh randomized trial found no difference in activity-related pain, although it identified a reduction in pain at rest on postoperative day 1 with absorbable fixation.¹¹

Conversely, the large Christoffersen cohort identified a higher recurrence risk with absorbable tack fixation in laparoscopic incisional hernia repair.¹⁰

The present study therefore contributes additional observational evidence suggesting a potential early postoperative pain benefit with absorbable fixation, while its findings regarding recurrence and seroma remain inconclusive.

The differences between studies highlight the importance of considering the complete surgical context rather than the fixation material in isolation.

4.7 Clinical implications

The findings of the present study suggest that absorbable tackers may be associated with improved early postoperative comfort. However, the available evidence does not support recommending absorbable tackers universally over non-absorbable tackers.

Current guideline recommendations remain cautious because of the low certainty and heterogeneity of comparative evidence.^{6,12}

Fixation strategy should therefore be individualized according to hernia type, defect characteristics, mesh properties, surgical approach, surgeon experience and patient-specific risk factors.

Furthermore, the relevant clinical question may extend beyond absorbable versus non-absorbable fixation. In selected laparoscopic inguinal hernia repairs, non-fixation or atraumatic fixation strategies are increasingly being evaluated because avoidance of penetrating fixation may reduce postoperative pain. Future studies should therefore consider absorbable fixation alongside other less traumatic fixation strategies.

4.8 Strengths

The present study has several strengths.

First, it directly compares two commonly used mesh-fixation strategies.

Second, the study groups were balanced with 25 patients in each group.

Third, baseline age, sex and BMI were relatively comparable between groups, and the distribution of inguinal, umbilical and incisional hernias was also broadly similar.

Fourth, postoperative pain was assessed longitudinally at three clinically relevant time points.

Finally, both symptomatic outcomes and postoperative complications were evaluated.

4.9 Limitations

The study has several limitations.

First, its retrospective design introduces the possibility of selection bias and residual confounding.

Second, the sample size of 50 patients limits statistical power, particularly for relatively uncommon outcomes such as recurrence and infection.

Third, the study combines three different types of laparoscopic hernia repair. Although the distribution of hernia types was broadly comparable, these procedures are clinically heterogeneous.

Fourth, several potentially important operative variables were not available in the present dataset, including mesh type, mesh size, mesh position, defect size, number of tackers used and operative duration.

Fifth, the duration of follow-up requires explicit documentation. This is particularly important because recurrence and chronic pain may develop after the early postoperative period.

Sixth, pain was measured repeatedly in the same patients. A repeated-measures or mixed-effects statistical model would be preferable to multiple independent comparisons at each time point.

Finally, the present study is not sufficiently powered to establish superiority of one fixation strategy. The findings should therefore be regarded as hypothesis-generating.

4.10 Conclusion of the discussion

The present study demonstrates an association between absorbable tack fixation and lower postoperative pain in patients undergoing laparoscopic hernia repair. This finding is clinically interesting but should be interpreted alongside randomized and systematic-review evidence that has generally failed to demonstrate a consistent superiority of absorbable fixation.

The numerical reduction in recurrence and seroma observed in the present study was not statistically significant and should not be interpreted as evidence of a protective effect.

Overall, the findings support further investigation rather than a change in standard practice. Larger, adequately powered prospective randomized studies stratified by hernia type, with standardized pain assessment and long-term follow-up, are required to determine whether the apparent short-term pain benefit of absorbable tackers translates into clinically meaningful improvement without compromising long-term mesh stability and recurrence outcomes.

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