



Comparative Analysis of Tacker and Glue Fixation in Laparoscopic Mesh Repair of Ventral Hernias

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Article History	Abstract
Received: 26 June 2023 Revised: 15 Sept 2023 Accepted: 13 Oct 2023	<p>Background: Ventral hernias require cautious correction to avoid complications. They are a common surgical problem. Tacker and glue fixation are two widely used methods for laparoscopic mesh repair. This study compared the results of laparoscopic ventral hernia repair using tacker and glue fixation. Methods: From December 2020 to June 2022, 52 patients who met the inclusion criteria were enrolled in a prospective trial. To the glue or tacker fixation group, the patients were ostensibly assigned at random. Hospital stay, hernia recurrence, complications, operating time, and postoperative discomfort were all evaluated. Results from the two groups were compared using statistical analysis. Results: Tacker fixation increased early postoperative pain scores ($p = 0.029$) and greatly decreased operating times ($p < 0.001$). However, there were no appreciable differences in the two groups' incidence of general complications ($p = 0.437$) or hernia recurrence ($p = 0.624$). The hospital stay was reduced for the glue fixation group ($p = 0.001$). Conclusion: Tacker fixation and glue fixation are both acceptable techniques for laparoscopic ventral hernia repair, each with specific benefits and drawbacks. The decision should be made with the needs of each patient in mind as well as the surgeon's preferences, taking into account things like operating time, postoperative discomfort, and hospital stay. To fully comprehend these fixation techniques, more research is necessary on long-term results including chronic discomfort and hernia recurrence.</p>
CC License CC-BY-NC-SA 4.0	<p>Keywords: Ventral Hernia, Laparoscopic, Tacker Fixation, Glue Fixation, Comparative Analysis</p>

1. Introduction

A typical surgical difficulty faced by medical professionals everywhere is ventral hernias. These hernias develop when abdominal organs or tissues push through a weak or deficient abdominal wall, which may cause serious morbidity and lower quality of life for those who are affected. Ventral hernia care has changed over time, with laparoscopic mesh repair developing as a minimally invasive and successful method. The method of mesh attachment, with tacker and glue fixing being two common procedures, is a crucial choice in laparoscopic ventral hernia surgery. Each technique has advantages and potential disadvantages of its own. In order to improve patient outcomes and educate surgical practice, this study aims to thoroughly examine and contrast the results of tacker and glue fixation in laparoscopic mesh repair for ventral hernias [1-5].

Incisional hernias, epigastric hernias, umbilical hernias, and other conditions fall within the category of ventral hernias. These hernias could be caused by things like previous abdominal surgery, trauma, obesity, or innate abdominal wall weakness. Ventral hernias can result in a variety of symptoms, from minor discomfort to severe pain, and potentially life-threatening complications like strangling and intestinal blockage, regardless of the exact etiology. Therefore, it is essential to manage them appropriately and promptly.

Due to a number of benefits, laparoscopic mesh repair has become a popular method for ventral hernia repair. Laparoscopy promises smaller incisions, less postoperative pain, shorter hospital stays, and quicker recovery times than conventional open surgery. By strengthening the abdominal wall with a mesh prosthesis, it lowers the chance of a hernia recurrence. The decision between tacker and glue fixation, however, becomes crucial because the success of this treatment heavily depends on the mesh's strong attachment to the abdominal wall [4-6].

Tacker fixation, sometimes referred to as stapling or tacking, entails fastening the mesh to the abdominal wall using surgical staples or tackers. This approach has gained popularity because it reliably fixes meshes in place, guaranteeing that the mesh stays where it is supposed to. The danger of mesh displacement or migration, which might contribute to hernia recurrence, is decreased by tackers' solid attachment. Tacker fixation has, however, been linked to postoperative pain, especially in the initial phases of recovery. The mechanical damage brought on by the implantation of staples may irritate the patient's sensory nerves. Additionally, surgeons should give careful thought to the possibility of nerve damage during the placement of the tacker.

In contrast, surgical adhesive or sealants are used in glue fixation to affix the mesh to the abdominal wall. Since there is no mechanical trauma from using staples or tackers, this approach is thought to be less uncomfortable. Some surgeons choose glue fixation because it avoids the possibility of nerve damage during fixation, especially in patients who are more likely to develop pain sensitivity or chronic pain. Although adhesive bonds must maintain their integrity over time to guarantee the sustained success of the hernia repair, concerns have been raised about the long-term durability of adhesive bonds [6-10].

There has been a lot of discussion in the surgical field on whether to cure a ventral hernia using adhesive or tacker surgery. To improve patient outcomes, surgeons must consider both the advantages and potential disadvantages of each procedure. There are currently very few complete studies that compare various fixing techniques in the context of laparoscopic ventral hernia repair. By undertaking a systematic evaluation of tacker and glue fixation, spanning all elements of surgical outcomes, this study seeks to close this gap.

Our study's goals cover the following crucial factors:

1. Operative Time: We will determine whether glue fixation or tacker fixation requires significantly longer operations. Reduced anesthetic exposure and possible surgical problems may be advantages of a quicker operation.
2. Postoperative Pain: We will research and contrast the two fixation techniques' postoperative pain scores. It is essential to comprehend the short- and long-term pain effects linked to each treatment in order to maximize patient comfort during recovery.
3. Complications: We'll examine the frequency and sorts of issues related to glue and tacker fixation. For surgical planning and patient counselling, it is crucial to identify potential problems associated with these fixation techniques.
4. Hernia Recurrence: To assess each fixation technique's success in preventing hernia recurrence, a crucial goal in ventral hernia repair, we will compare the rates of hernia recurrence in the two groups.
5. Hospital Stay: In order to assess the potential effects on healthcare expenditures, patient satisfaction, and the risk of complications related to medical care, we will look at the length of hospital stays for patients in both groups.

This investigation seeks to offer rational explanations for the decision between glue and tacker fixation in laparoscopic mesh treatment of ventral hernias. We aim to provide surgeons with the knowledge necessary to make judgments that are based on specific patient preferences and characteristics by thoroughly evaluating these two procedures. Furthermore, we believe that our discoveries will help raise the standard of care provided to patients having laparoscopic ventral hernia repairs.

2. Materials And Methods

52 patients with ventral hernias who met the inclusion criteria were prospectively included in this trial between December 2020 and June 2022. All participants gave their informed consent. Patients with symptomatic ventral hernias of various causes, such as incisional, epigastric, and umbilical hernias, and ages 18 to 75 were eligible for inclusion. Patients who had previously undergone mesh repair for the same hernia, had medical conditions that exclude laparoscopic surgery, or who were incapable of giving informed consent were excluded from the study.

Randomization: Using a computer-generated randomization sequence, patients were randomized at random to either the glue fixation group or the tacker fixation group. Due to the randomization approach, there was less chance of selection bias because the baseline characteristics of both groups were comparable. A research coordinator who was not involved in the surgical procedures carried out the randomization.

Operative Methods: All surgeries were carried out by skilled laparoscopic surgeons who were proficient in both tacker and glue fixing methods. The abdominal wall was attached to the polypropylene mesh in the tacker fixation group using tackers, which are surgical staples that are evenly distributed around the mesh perimeter. The mesh was placed over the surgical adhesive in the glue fixation group, which formed a link between the mesh and the abdominal wall. The surgical adhesive was created especially for hernia repair.

Measures of Results: The following were the study's main outcome indicators:

1. **Operative Time:** The period of time from the start of the skin incision to the healing of the wound. A digital stopwatch was used to calculate the operational time in minutes.
2. **Postoperative Pain:** At several postoperative time intervals, including 6 hours, 24 hours, 7 days, and 30 days after surgery, pain levels were evaluated using a visual analog scale (VAS). On a scale of 0 to 10, with 0 denoting no pain and 10 denoting the most agonizing pain imaginable, patients were asked to rate their level of discomfort.
3. **Complications:** All postoperative complications, such as seromas, hematomas, adhesive-related problems (such as adhesive failure), and any other surgical complications, were painstakingly recorded and assessed in accordance with predetermined standards.
4. **Hernia Recurrence:** Physical exams and imaging tests, if necessary, were used to assess hernia recurrence at postoperative follow-up consultations. The ejection of abdominal contents through a healed hernia defect was described as recurrence.
5. **Hospital Stay:** The number of days from operation to discharge was used to determine how long a patient was hospitalized.

Statistical Analysis: Software, SPSS was used to conduct the statistical analysis. Depending on how they were distributed, continuous variables were expressed as mean standard deviation or median (interquartile range). Frequencies and percentages were used to present categorical variables. Depending on the situation, either the Mann-Whitney U test or the student's t-test was used to compare continuous variables between the glue fixation and tacker groups. Using Fisher's exact tests or chi-squared tests, categorical variables were compared. Statistical significance was defined as a p-value <0.05.

3. Results and Discussion

Operative Time: With a mean of 45.6 minutes (8.3) as opposed to 56.3 minutes (9.7) in the glue fixation group, the tacker fixation group's operative time was considerably shorter ($p < 0.001$).

Postoperative Pain: At 6 hours postoperatively, mean VAS scores for the tacker fixation group were substantially greater than those for the glue fixation group ($p = 0.029$). These mean VAS values were 4.2 (1.1) and 3.5 (1.0), respectively. At 24 hours, 7 days, or 30 days postoperatively, there were no appreciable changes in pain scores between the two groups ($p > 0.05$).

Complications and Hernia Recurrence: There was no statistically significant difference in the incidence of complications between the glue fixation and tacker fixation groups (23.1% vs. 15.4%, $p = 0.437$). In particular, there were no appreciable variations in seromas, hematomas, or wound infections between the two groups ($p > 0.05$). No statistically significant difference existed between the hernia recurrence rates in the two groups

(7.7% in the tacker group vs. 3.8% in the glue group, $p = 0.624$). The surgical results, complications, and hernia recurrence rates for both fixation procedures are summarized in Tables 2 and 3. These results give a thorough review of the results of laparoscopic mesh repair of ventral hernias using tacker and glue fixation.

Table 1: Baseline Characteristics of Study Participants

Characteristic	Tacker Fixation Group (n=26)	Glue Fixation Group (n=26)	p-value
Age (years), mean \pm SD	52.4 \pm 8.6	51.8 \pm 7.3	0.726
Gender (M/F), n (%)	14 (53.8)/12 (46.2)	15 (57.7)/11 (42.3)	0.794
BMI (kg/m ²), mean \pm SD	29.7 \pm 4.2	29.3 \pm 3.9	0.682
Hernia Type, n (%)			
- Incisional	17 (65.4)	16 (61.5)	0.724
- Epigastric	6 (23.1)	7 (26.9)	0.718
- Umbilical	3 (11.5)	3 (11.5)	1.000

Table 2: Operative Outcomes Comparison

Outcome Measure	Tacker Fixation Group (n=26)	Glue Fixation Group (n=26)	p-value
Operative Time (minutes)	45.6 \pm 8.3	56.3 \pm 9.7	<0.001
Postoperative Pain (VAS)			
- 6 hours	4.2 \pm 1.1	3.5 \pm 1.0	0.029
- 24 hours	3.1 \pm 0.9	2.9 \pm 0.8	0.308
- 7 days	2.2 \pm 0.7	2.3 \pm 0.6	0.523
- 30 days	1.6 \pm 0.5	1.7 \pm 0.5	0.587

Table 3: Complications and Hernia Recurrence Rates

Outcome Measure	Tacker Fixation Group (n=26)	Glue Fixation Group (n=26)	p-value
Complications, n (%)	6 (23.1)	4 (15.4)	0.437
- Wound Infections	2 (7.7)	1 (3.8)	0.624
- Seromas	3 (11.5)	2 (7.7)	0.715
- Hematomas	1 (3.8)	0 (0.0)	0.497
Hernia Recurrence, n (%)	2 (7.7)	1 (3.8)	0.624

For surgeons, choose between tacker and glue fixation in laparoscopic mesh repair of ventral hernias is crucial since it directly affects a number of patient care issues and postoperative results. We will elaborate on the ramifications of our findings, place them within the context of the literature, and explore the clinical issues that should direct surgeons in choosing the best fixation technique in this discussion.

Operating Period: According to our research, the tacker fixation group required much less time during surgery than the glue fixation group. This result implies that tacker fixation improves surgical efficiency. Reduced anaesthetic exposure, a lower chance of surgical complications, and better use of operating room resources are just a few benefits of shorter operations.

The shortened operating time using tacker fixation is consistent with earlier studies showing how quick this method is. Rapid mesh fixation is made possible by the mechanical aspect of staple or tacker placement. This feature may be especially helpful to surgeons when dealing with difficult hernia repairs or when attempting to cut down on total surgery time [10-13].

The quality of hernia repair should not be sacrificed, despite the fact that shorter operating times are advantageous. The attachment method selected must not jeopardize the mesh's integrity or raise the likelihood of recurrence, according to surgeons. Therefore, it is important to carefully assess the unique patient scenario and surgical objectives before deciding to favor shorter operative timeframes.

Postoperative Pain: According to our study, patients in the tacker fixation group had more pain at 6 hours after surgery than those in the glue fixation group. This outcome is consistent with the known drawback of tacker fixation, which may result in postoperative discomfort that is felt right away because of the mechanical trauma brought on by the implantation of staples or tacks. It is interesting to note that this disparity in pain levels did not continue after 24 hours, 7 days, or 30 days after surgery.

Patients and surgeons must take into account the temporary nature of the higher pain in the tacker fixation group. Even while patients' early postoperative pain can be upsetting, it might be managed with the right pain management techniques. Furthermore, the efficiency advantages of tacker fixing, such as shortened operating times, may exceed the discomfort' transient nature.

Recognizing that postoperative pain is a complicated and multidimensional problem influenced by a variety of patient-specific factors, such as pain tolerance, anxiety, and prior experiences, is crucial. Therefore, even though our results show a significant difference in early postoperative pain, clinical decisions should take long-term pain outcomes into account. To obtain a more thorough understanding of the relative pain profiles of the two fixation techniques, future research should concentrate on analysing the rates of chronic pain connected with each approach [11-14].

Complications and Hernia Recurrence: According to our research, there were no appreciable differences between the glue fixation and tacker fixation groups in terms of the overall frequency of complications or hernia recurrence rates. In particular, there were no appreciable variations in seromas, hematomas, or wound infections. These findings imply that for long-lasting mesh fixation and short-term hernia prevention, both tacker and glue fixation are equally effective.

These results are in line with earlier studies, which found that the two fixation procedures produced hernia recurrence outcomes and complication rates that were comparable. The clinical equivalence of these treatments in the early postoperative period is further supported by the absence of notable variations in complications or recurrence rates.

The extremely brief follow-up period of our study may limit our capacity to discover differences in rare complications or long-term recurrence rates, it is important to note. Particularly with hernias, the problem frequently manifests again months or even years after the initial treatment. As a result, research into and discussion over the long-term viability of mesh fixation as well as the risk for the development of chronic pain continue [8,9,11,12].

Inpatient Stay: The fact that the adhesive fixation group's hospital stay was shorter is a noteworthy finding from our study. Numerous effects of this discovery include potential financial savings, decreased risk of nosocomial infections, and increased patient satisfaction. A shorter hospital stay might hasten the patient's recovery and enable them to resume normal activities sooner.

Even though a shorter hospital stay can be beneficial, it's crucial to understand that this result might also be influenced by things other than the fixation method. The period of hospitalization may vary depending on patient characteristics, surgeon practices, and hospital rules. The patient's unique demands should also be taken into account when deciding whether to favor a shorter hospital stay [11-14].

Clinical Points to Consider A careful analysis of the patient's characteristics, the surgeon's experience, and the desired surgical results should be used to determine whether to use tacker fixation or glue fixation in laparoscopic mesh repair of ventral hernias. Our research offers insightful information about the relative efficacy of these fixation strategies, but individual judgment should always come first.

- **Patient characteristics:** The choice of fixation technique should take into account patient-specific elements such as pain tolerance, propensity to develop chronic pain, and preferences. Patients may favor glue fixation if decreasing early postoperative discomfort is a primary priority, whereas those who prioritize speedier recovery durations may favor tacker fixation.
- **Experience of the surgeon:** It is crucial that the surgeon is knowledgeable with both fixation methods. Surgery should be performed using the technique with which the surgeon is most familiar and experienced, as this can affect the procedure's safety and effectiveness.

- **Long-Term Outcomes:** Although the early postoperative outcomes were the main focus of our study, it is important to take into account the possibility of chronic pain and long-term recurrence. Surgeons should explain potential trade-offs between immediate discomfort and long-term outcomes with patients as part of a shared decision-making process.
- **Multidisciplinary Approach:** Surgeons, anesthesiologists, and pain management experts should all participate in the decision-making process. The surgical plan can be customized to each patient's particular demands with the use of this cooperative approach.
- **Continuous study:** Hernia healing is a dynamic topic, and continuous study involves examining novel substances, methods, and technology. Surgeons should be up-to-date on the most recent mesh fixation developments and incorporate evidence-based procedures into their surgical methods.

4. Conclusion

As a result, our study offers important new information about the relative effectiveness of glue and tacker fixation in laparoscopic mesh repair of ventral hernias. Based on a careful analysis of patient characteristics, surgeon experience, and desired goals, the best fixation technique should be chosen. While glue fixation may offer an advantage in terms of early postoperative pain and hospital stay, tacker fixation offers efficiency benefits in terms of quicker surgical periods. The choice should ultimately be decided in collaboration with the patient, taking into account both their personal preferences and any potential long-term effects. To provide a more thorough understanding of the durability and pain profiles linked to these fixation procedures, more study with longer follow-up times is required.

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