Section: General Surgery

Original Research Article

A COMPARATIVE STUDY BETWEEN HAND SUTURE AND VERESS NEEDLE TECHNIQUE CLOSURE OF PORT SITES IN LAPAROSCOPIC SURGERIES

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ABSTRACT

Background: Proper closure of 10 mm port sites in laparoscopic surgery is essential to prevent wound-related complications. Hand suturing is the conventional method, while the Veress needle technique has been adapted as an alternative to reduce tissue handling and closure time. **Aim:** To compare the efficacy and safety of hand suturing and the Veress needle technique for closure of 10 mm port sites in elective laparoscopic surgeries. **Materials and Methods:** This prospective comparative study was conducted over one year at Government Thoothukudi Medical College and Hospital. Sixty patients undergoing elective laparoscopic procedures were randomly allocated into two equal groups. Group A underwent port-site closure by hand suturing, and Group B by the Veress needle technique. Port closure time, postoperative pain on days 1 and 3 using the Visual Analogue Scale, and wound-related complications such as infection and dehiscence were assessed during a three-month follow-up period. **Results:** The mean port closure time was significantly longer in the hand suturing group (6.2 ± 1.5 minutes) compared to the Veress needle group (4.8 ± 1.2 minutes; $p < 0.001$). Postoperative pain scores were higher in the hand suturing group on postoperative day 1 (4.5 ± 1.3 vs. 3.8 ± 1.1; $p = 0.021$) and day 3 (2.8 ± 0.9 vs. 2.3 ± 0.8; $p = 0.048$). Wound infection (40%) and wound dehiscence (26.7%) were observed in the hand suturing group. **Conclusion:** The Veress needle technique allows faster port-site closure with lower postoperative pain and fewer wound-related complications, making it a practical alternative to hand suturing.

INTRODUCTION

Laparoscopic surgery is now commonly practised in general surgery and is routinely used for many abdominal procedures. It has replaced open surgery for several conditions because of advantages such as smaller incisions, less postoperative pain, early mobilisation, shorter hospital stay, and better cosmetic outcome.[1,2] Due to these advantages, laparoscopic techniques are widely preferred for procedures such as cholecystectomy, appendectomy, hernia repair, and diagnostic laparoscopy.[2]

Even with these advantages, certain technical factors during laparoscopic surgery continue to affect postoperative outcomes, one of the most important being proper port-site closure. Formation of port sites creates defects in the abdominal wall, and when these defects, especially those measuring 10 mm or more, are not properly closed, complications such as wound infection and wound dehiscence may occur.[3,4] These complications increase patient discomfort, prolong hospital stay, and reduce the overall benefit of invasive surgery. Therefore, careful closure of larger port sites is considered an essential step in laparoscopic procedures.[3,4]

Different methods have been described for port-site closure. Conventional hand suturing is the most commonly used technique and allows direct closure of the fascial layer with good control.[5] However, hand suturing can be time-consuming and technically difficult, especially in obese patients or in those with a thick abdominal wall.[5,6] Increased tissue handling during suturing may also contribute to postoperative pain and wound-related complications.[5]

The Veress needle, best known for creating pneumoperitoneum, has also been used for port site closure. This method is simple, inexpensive, and can be performed under laparoscopic vision, which may help reduce closure time and tissue trauma. However, the Veress needle technique is not routinely practised for port-site closure in many centres.[7]

There is limited literature directly comparing hand suturing and Veress needle techniques for port-site closure, particularly in resource-limited settings.

Most available studies focus mainly on port-entry techniques rather than closure-related outcomes.[8] Hence, the present study was undertaken to compare hand suturing and Veress needle techniques for closure of 10 mm laparoscopic port sites, with reference to closure time, postoperative pain, and wound-related complications.

Aim

To compare the efficacy and safety of hand suturing versus the Veress needle technique in the closure of 10 mm port sites in elective laparoscopic surgeries, with efficacy assessed based on port closure time and successful closure without wound-related complications.

Objective

The objectives of this study are to compare the time taken to close 10 mm laparoscopic port sites using hand suturing and the Veress needle, and to compare the postoperative pain experienced after port-site closure by the two methods on the first and third postoperative days. The study also aimed to observe wound-related problems, including wound infection, following port-site closure by both methods during the follow-up period, and to note the occurrence of wound dehiscence after port-site closure using hand suturing and the Veress needle.

MATERIALS AND METHODS

Study Design and Setting

This prospective comparative study was done in the Department of General Surgery at Government Thoothukudi Medical College and Hospital, Thoothukudi, Tamil Nadu, India, over a period of 12 months.

Study Population

We included patients who came for elective laparoscopic surgeries (non-infectious cases) during the study time. A total of 60 patients were taken, 30 in each group. They were randomly divided into Group A: port closure by hand suturing, and Group B: port closure by Veress needle technique

Inclusion Criteria

Patients who were 18 years or older, and who were scheduled for elective laparoscopic surgeries for non-infective problems (things like cholecystectomy, appendectomy, hernia repair, or diagnostic laparoscopy), and where the port sites were 10 mm or bigger (because these larger ports really need good fascial closure to stop hernias or other troubles) were included in the study.

Exclusion Criteria

Port size less than 10 mm, Surgeries done for infective causes because infection risk is already high, Patients who cannot undergo laparoscopy (serious bleeding problems, unstable condition), Patients who did not give consent were excluded from the study.

Ethical Considerations

Approval was obtained from the Institutional Ethical Committee before the commencement of the study. Written informed consent was obtained from all participants.

Methods

All patients had the routine pre-op checkup: history, exam, blood tests (CBC, RFT, LFT, coagulation), and USG abdomen. Surgeries were under general anaesthesia. After completion of the laparoscopic surgery and pulling out the trocars, we closed the 10 mm ports using one of the two methods. For hand suturing, we used the standard approach, widened the skin cut a little, then closed the fascia (under view or blind) with absorbable suture like Vicryl 1-0 or PDS in figure of eight or interrupted stitches, followed by skin closure with sutures or staples. For the Veress needle group, we kept the scope inside for vision, passed the needle through the port site to grab the fascia, threaded PDS or Vicryl through the eye, pulled it into a loop, and tied it extracorporeally or intracorporeally to close the defect quickly, no extra tools needed. We timed closure from start to skin finish for each 10 mm port (taking the main one or the average if multiple). Efficacy was assessed by the time taken for port-site closure and by the ability to achieve secure closure without wound-related complications. Post-op care was identical for both: standard pain meds, antibiotics per protocol, and early mobilisation. Pain was scored on VAS (0–10) on day 1 and day 3. Wounds were checked at 1 week, 1 month, and 3 months in OPD for infection (pus, redness, fever needing treatment) or dehiscence (breakdown requiring intervention). All details, age, gender, surgery type, comorbidities, closure time, pain scores, and complications were recorded on a proforma.

Statistical Analysis

Data were analysed using SPSS or similar software. Time and pain scores are shown as mean ± SD, compared with an unpaired t-test. Complications such as Infection and dehiscence are shown as numbers and percentages, compared with the chi-square or Fisher's exact test. P value less than 0.05 is taken as significant.

RESULTS

Sixty patients were included, with 30 in each group. Most patients were aged 31–40 years (30%), and females slightly predominated (53.3%). 53.3% patients had no comorbidities. Cholecystectomy (35%) was the most common procedure, followed by hernioplasty (30%) and diagnostic laparoscopy (26.7%), with similar distribution between groups.

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Table 1: Baseline Characteristics and Indications for Laparoscopy

Variable	Hand Suturing (n=30)	Veress Needle (n=30)	Total (n=60)
Age group (years)			
18–30	6 (20%)	6 (20%)	12 (20%)
31–40	9 (30%)	9 (30%)	18 (30%)
41–50	8 (26.7%)	7 (23.3%)	15 (25%)
51–60	5 (16.7%)	5 (16.7%)	10 (16.7%)
>60	2 (6.7%)	3 (10%)	5 (8.3%)
Gender			
Male	14 (46.7%)	14 (46.7%)	28 (46.7%)
Female	16 (53.3%)	16 (53.3%)	32 (53.3%)
Comorbidities			
None	16 (53.3%)	16 (53.3%)	32 (53.3%)
Hypertension	8 (26.7%)	7 (23.3%)	15 (25.0%)
Diabetes	6 (20%)	4 (13.3%)	10 (16.7%)
Indication for laparoscopy			
Laparoscopic cholecystectomy	12 (40%)	9 (30%)	21 (35.0%)
Diagnostic laparoscopy	8 (26.7%)	8 (26.7%)	16 (26.7%)
Laparoscopic hernioplasty	8 (26.7%)	10 (33.3%)	18 (30.0%)
Laparoscopic appendectomy	2 (6.6%)	3 (10%)	5 (8.3%)

Mean port closure time was longer with hand suturing (6.2 ± 1.5 minutes; range 4–9) compared to the Veress needle (4.8 ± 1.2 minutes; range 3–7). The difference was statistically significant, with a p-value <0.001, showing faster closure using the Veress needle.

Table 2: Port Closure Time Across Study Groups

Group	Mean Time (minutes) ± SD	Range (minutes)	P-value
Hand Suturing	6.2 ± 1.5	4 – 9	<0.001
Veress Needle	4.8 ± 1.2	3 – 7	

On postoperative day 1, the mean pain score was higher with hand suturing (4.5 ± 1.3) than with the Veress needle (3.8 ± 1.1). By day 3, pain decreased in both groups but remained higher with hand suturing (2.8 ± 0.9 vs 2.3 ± 0.8), with significant differences.

Table 3: Postoperative Pain Scores

Postoperative Day	Hand Suturing (Mean VAS ± SD)	Veress Needle (Mean VAS ± SD)	P-value
POD 1	4.5 ± 1.3	3.8 ± 1.1	0.021
POD 3	2.8 ± 0.9	2.3 ± 0.8	0.048

Wound infection occurred in 12 patients (40%) in the hand suturing group, while none were seen in the Veress needle group (p <0.001). Wound dehiscence was noted in 8 patients (26.7%) with hand suturing and in none with the Veress needle (p = 0.005).

Table 4: Wound-related Complications During 3-Month Follow-up

Complication	Hand Suturing n (%)	Veress Needle n (%)	P-value
Wound infection	12 (40%)	0 (0.0%)	<0.001
Wound dehiscence	8 (26.7%)	0 (0.0%)	0.005

DISCUSSION

The technique used for laparoscopic port-site closure can influence operative efficiency and postoperative recovery. Various closure methods are available, each with advantages and limitations related to closure time, patient comfort, and wound complications. Hand suturing is commonly practised but may involve greater tissue handling and longer closure time. Needle-assisted techniques have been developed to simplify fascial closure and potentially reduce postoperative morbidity.

In our study, most of the patients belonged to the 31–40-year age group, with female predominance, and more than half of the patients had no associated comorbidities. Laparoscopic cholecystectomy was the most common procedure performed, followed by laparoscopic hernioplasty and diagnostic laparoscopy. Shetty et al. compared needle-assisted port closure with conventional hand suturing in patients undergoing laparoscopic surgeries. Their study population was largely middle-aged, with no significant differences in demographic variables between the groups. Laparoscopic cholecystectomy was among the commonly performed procedures in both studies.[9] Similarly, Kumar et al. found laparoscopic cholecystectomy to be the most frequently performed operation (39%), followed by hernia repair and appendectomy in their study of port-site complications.[10] Additionally, Arora et al. described a predominantly middle-aged patient population undergoing elective laparoscopic

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cholecystectomy, reflecting a comparable demographic profile.[11] This similarity in patient age, gender distribution, and operative indications across these studies supports the validity of comparing postoperative outcomes and strengthens the relevance of the present study findings.

In our study, the port closure time was shorter in the Veress needle group when compared to the hand suturing group. Postoperative pain was higher in patients who underwent hand suturing on both postoperative day 1 and day 3, although pain scores reduced over time in both groups. Similarly, Yacoub et al. reported that patients who underwent fascial closure after laparoscopic bariatric surgery experienced significantly higher pain in the early postoperative period compared to those in whom the port was not closed.[12] This finding aligns with our study, where techniques involving less tissue manipulation and shorter closure time were associated with better early postoperative comfort, supporting a reduction in pain with the Veress needle technique.

In our study, wound-related complications were more commonly seen in the hand suturing group. Wound infection and wound dehiscence were observed in a considerable number of patients in this group, whereas no such complications were noted in the Veress needle group. Singh et al., who compared different port site skin closure techniques in laparoscopic surgery, found that wound dehiscence occurred more often with certain methods, and port site infections were also noted in a small proportion of patients.[13] Similarly, Kumar et al. observed a notable incidence of wound infection and dehiscence following conventional suturing. Although their study was not limited to laparoscopic port sites, it highlights that suturing itself can contribute to wound problems.[14] The higher wound infection (40%) and dehiscence (26.7%) rates observed in this study may be due to the small sample size, presence of comorbidities such as diabetes and hypertension, strict criteria used to define wound complications, and local patient-related or postoperative care factors in this single-centre study.

In our study, the Veress needle technique was associated with faster port closure, lower postoperative pain, and fewer wound-related complications compared to hand suturing. Donmez et al. showed that needle-assisted closure was easier to perform, required less time, and effectively prevented port site complications.[15] Similarly, Chaudhary et al. found that the Carter-Thomason needle closure device provided significantly shorter port-site closure time and a trend toward fewer port-site infections compared to conventional hand suturing, without increasing other complications such as wound dehiscence.[16] Although the techniques differed, both studies highlight the advantages of needle-based methods over conventional suturing, with reduced tissue handling and greater efficiency likely contributing to better postoperative outcomes and supporting the findings of the present study.

Limitations

This study has a few limitations. The relatively small sample size and single-centre design may limit how widely the results can be applied. The short follow-up period allowed assessment of only early postoperative outcomes. The higher wound complication rates seen in the hand suturing group may also reflect patient-related factors such as existing comorbidities, the use of strict criteria to define wound complications, and variations in postoperative care. Further multicentre studies with larger sample sizes and longer follow-up are needed to confirm these findings.

CONCLUSION

The Veress needle technique is a simple and effective method compared to conventional hand suturing for closure of 10 mm laparoscopic port sites. The Veress needle method required less time for closure and was associated with lower postoperative pain, showing fewer wound-related complications such as infection and dehiscence. These better outcomes are likely related to reduced tissue handling and the ability to perform closure under direct laparoscopic vision. Because of this, it can be a useful option, especially in busy operating theatres and in hospitals with limited resources. The findings of this study are based on a single-centre experience with a limited sample size and follow-up period, which should be considered while interpreting the results.

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