Section: General Surgery

Original Research Article

A PROSPECTIVE COMPARATIVE STUDY OF 1 CM VERSUS 5 MM FASCIAL BITE TECHNIQUE IN RECTUS CLOSURE FOLLOWING EMERGENCY EXPLORATORY LAPAROTOMY

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ABSTRACT

Background: Optimal fascial closure technique following emergency exploratory laparotomy remains a critical determinant of postoperative wound-related morbidity. Small-bite fascial closure techniques have shown promising outcomes in elective surgery; however, evidence regarding their effectiveness in emergency laparotomy remains limited. The aim is to compare the clinical outcomes of 1 cm versus 5 mm fascial bite techniques in rectus sheath closure following emergency exploratory laparotomy.

Materials and Methods: This prospective comparative study included 100 patients undergoing emergency exploratory laparotomy at a tertiary care center. Patients were divided into two groups of 50 each. Group A underwent conventional 1 cm fascial bite closure, while Group B underwent 5 mm small-bite closure. Patients were evaluated for postoperative complications including surgical site infection, seroma formation, wound dehiscence, burst abdomen, postoperative pain, duration of hospital stay, and incisional hernia formation. Statistical analysis was performed using SPSS version 26, with $p<0.05$ considered statistically significant.

Results: The 5 mm bite group demonstrated significantly lower overall wound complications compared to the 1 cm group (16% vs 36%; p=0.021). Surgical site infection rates were reduced in the 5 mm group (10% vs 22%; p=0.048). Patients undergoing small-bite closure also showed lower postoperative pain scores, shorter hospital stay, and earlier ambulation. Incisional hernia incidence was lower in the 5 mm group, although statistical significance was not achieved during follow-up.

Conclusion: The 5 mm small-bite fascial closure technique significantly reduces postoperative wound morbidity following emergency exploratory laparotomy and may improve long-term abdominal wall integrity and patient recovery.

Keywords: Emergency laparotomy; Fascial closure; Small-bite technique; Incisional hernia; Surgical site infection.

INTRODUCTION

Midline laparotomy remains a fundamental approach for emergency abdominal surgery; however, the subsequent risk of incisional hernia and wound dehiscence presents a significant clinical challenge.[1] Although recent evidence supports the "small bite" (5 mm) technique for reducing postoperative complications in elective settings, its efficacy and safety profile in the high-acuity, emergency environment remain less clearly defined.[2,3]. While current literature provides conflicting reports on whether results from elective cohorts can be reliably extrapolated to emergency cases, some studies

suggest that standardizing fascial bite size may influence rates of fascial dehiscence and long-term hernia formation.[4,5] Given the documented rates of fascial dehiscence in emergency surgery ranging from 2.4% to 23.5%, establishing a robust, evidence-based closure protocol is critical for mitigating these postoperative morbidities. Despite the surgical consensus favoring small-bite techniques in elective procedures, randomized controlled trials specifically targeting the emergency setting remain sparse, leaving a substantial gap in the current evidence base. Consequently, this study aims to bridge this deficit by prospectively evaluating the clinical outcomes of 1 cm versus 5 mm fascial bite techniques specifically within an emergency surgical cohort.[6] The primary endpoints will focus on the incidence of superficial and deep wound dehiscence, alongside the comparative rates of incisional hernia formation over a 12-month follow-up period.[7,8] By systematically comparing these specific stitch intervals, this research seeks to determine if the 5 mm small-bite technique provides a protective advantage against the mechanical stress inherent in emergency midline closures.[9] Furthermore, the mechanical integrity of the abdominal wall closure is particularly challenged in emergency settings by suboptimal patient nutritional status and the inherent urgency of the procedure.[10]

MATERIALS AND METHODS

This prospective comparative study was conducted in the Department of General Surgery at a tertiary care teaching hospital over a period of 18 months. A total of 100 patients undergoing emergency exploratory laparotomy were enrolled and divided into two groups of 50 each based on fascial closure technique. Group A underwent rectus sheath closure using the conventional 1 cm fascial bite technique, whereas Group B underwent closure using the small-bite 5 mm fascial bite technique. Adult patients aged above 18 years undergoing midline emergency laparotomy were included. Patients with previous midline laparotomy, burst abdomen at presentation, pregnancy, severe immunocompromised status, or those who expired within 30 postoperative days were excluded. In both groups, fascial closure was performed using continuous slowly absorbable monofilament suture with a suture length to wound length ratio maintained above 4:1. Patients were followed postoperatively for wound complications including surgical site infection, wound dehiscence, seroma formation, postoperative pain, and incisional hernia development during follow-up. Statistical analysis was performed using SPSS version 26. Continuous variables were expressed as mean ± standard deviation and compared using independent t-test, while categorical variables were analyzed using Chi-square test. A p-value less than 0.05 was considered statistically significant.

RESULTS

[Table 1] Narrative
The baseline demographic characteristics were comparable between both study groups. The mean age in the 1 cm bite group was 46.8 ± 12.5 years, while it was 45.2 ± 11.9 years in the 5 mm bite group. Male predominance was observed in both groups. There was no statistically significant difference between the groups regarding age, gender distribution, body mass index, diabetes mellitus, smoking status, or indication for laparotomy ($p>0.05$), indicating homogeneity of study population.

Table 1: Baseline Demographic and Clinical Characteristics

Variable	1 cm Bite Group (n=50)	5 mm Bite Group (n=50)	p-value
Mean Age (years)	46.8 ± 12.5	45.2 ± 11.9	0.512
Male Gender, n (%)	34 (68%)	32 (64%)	0.673
BMI (kg/m²)	24.9 ± 3.2	24.5 ± 3.5	0.548
Diabetes Mellitus, n (%)	12 (24%)	10 (20%)	0.629
Smokers, n (%)	15 (30%)	13 (26%)	0.657
Hollow Viscus Perforation, n (%)	28 (56%)	30 (60%)	0.684
Intestinal Obstruction, n (%)	14 (28%)	12 (24%)	0.648
Abdominal Trauma, n (%)	8 (16%)	8 (16%)	1.000

[Table 2] Narrative
Postoperative wound complications were significantly lower in the 5 mm fascial bite group. Surgical site infection occurred in 22% patients in the 1 cm bite group compared to 10% in the 5 mm bite group. Wound dehiscence and seroma formation were also less frequent in the small-bite group. The reduction in overall wound morbidity in the 5 mm bite group was statistically significant ($p<0.05$).

Table 2: Comparison of Postoperative Wound Complications

Complication	1 cm Bite Group (n=50)	5 mm Bite Group (n=50)	p-value
Surgical Site Infection	11 (22%)	5 (10%)	0.048
Seroma Formation	7 (14%)	3 (6%)	0.182
Wound Dehiscence	5 (10%)	1 (2%)	0.091
Burst Abdomen	3 (6%)	0 (0%)	0.079
Overall Complications	18 (36%)	8 (16%)	0.021

[Table 3] Narrative

Operative and postoperative recovery parameters showed favorable outcomes in the 5 mm bite group. Mean closure time was slightly higher in the small-bite technique group; however, postoperative pain scores and duration of hospital stay were significantly lower compared to the 1 cm bite group. These findings suggest improved postoperative recovery associated with the small-bite fascial closure technique.

Table 3: Operative and Recovery Parameters

Parameter	1 cm Bite Group (n=50)	5 mm Bite Group (n=50)	p-value
Fascial Closure Time (min)	14.2 ± 2.8	16.5 ± 3.1	0.001
Postoperative Pain Score (VAS)	5.8 ± 1.2	4.6 ± 1.0	<0.001
Duration of Hospital Stay (days)	10.4 ± 3.5	8.1 ± 2.7	0.002
Time to Ambulation (days)	2.8 ± 0.9	2.1 ± 0.7	0.001

[Table 4] Narrative

During follow-up, the incidence of incisional hernia was lower in patients undergoing 5 mm fascial bite closure compared to the conventional 1 cm bite technique. Although the difference did not reach strong statistical significance due to limited follow-up duration, the trend favored the small-bite technique for long-term abdominal wall integrity.

Table 4: Follow-up Outcomes and Incisional Hernia

Outcome	1 cm Bite Group (n=50)	5 mm Bite Group (n=50)	p-value
Incisional Hernia	6 (12%)	2 (4%)	0.138
Chronic Wound Pain	8 (16%)	3 (6%)	0.112
Readmission Related to Wound	5 (10%)	1 (2%)	0.091
Patient Satisfaction Score	7.1 ± 1.3	8.4 ± 1.1	<0.001

DISCUSSION

The results of this study underscore the superiority of the small-bite technique in mitigating postoperative wound site complications following emergency midline laparotomy.[11,12] By incorporating a higher number of stitches per centimeter, this method ensures a more uniform distribution of tension across the fascial edges, which is critical in preventing incisional hernia formation.[13,14] Furthermore, the meticulous approximation of fascial tissues facilitated by the 5 mm bite technique aligns with evidence suggesting that optimized technical execution is fundamental to reducing both early surgical site infections and delayed fascial dehiscence.[15,16] This improved closure profile suggests that reducing the volume of included tissue per stitch may also decrease the rate of stitch abscess formation, a common clinical indicator of surgical site morbidity.[17] Although the STITCH trial established that small bites effectively reduce incisional hernia rates in elective settings,[18,19] our findings extend this clinical benefit to the high-risk environment of emergency surgery. While concerns regarding potential suture breakage have been raised in the past, the observed decrease in postoperative morbidity suggests that the enhanced mechanical stability of the 5 mm technique outweighs such theoretical risks.[20] The results of this study underscore the superiority of the small-bite technique in mitigating postoperative wound site complications following emergency midline laparotomy, with surgical site infections occurring in 10% of the 5 mm group compared to 22% in the 1 cm group.[11,12] These findings are consistent with previous literature; for instance, Hassan et al. reported significantly lower SSI rates with small-bite techniques in a similar emergency cohort,[12] while Dogra et al. also observed improved outcomes regarding wound dehiscence.[16] By incorporating a higher number of sutures per centimeter of wound length, this technique achieves the recommended suture-to-wound length ratio of at least 4:1, which is essential for ensuring robust abdominal wall closure in patients undergoing urgent operative intervention.[21]

CONCLUSION

The implementation of a 5 mm small-bite fascial closure technique during emergency midline laparotomy significantly reduces the incidence of surgical site infections and postoperative wound morbidity. Furthermore, adopting this standardized approach may enhance long-term patient satisfaction and minimize the requirement for readmissions associated with wound-related complications. Consequently, surgeons should consider adopting this refined technical standard to optimize outcomes in acute surgical settings where tissue integrity is frequently compromised. Future prospective trials should evaluate the long-term impact of suture material elasticity in combination with these small-bite techniques to further mitigate the risk of late-onset incisional hernias. Additionally, investigating the potential synergy between small-bite fascial closure and the prophylactic use of synthetic mesh in contaminated fields may provide further insights into minimizing fascial dehiscence in high-risk patients.

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