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Original Research Article

COMPARISON OF WOUND DEHISCENCE IN CASES OF LAPAROTOMY CLOSED BY CONTINUOUS AND INTERRUPTED TECHNIQUE

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ABSTRACT

Background: *Wound dehiscence is a serious postoperative complication following emergency laparotomy, associated with high morbidity and mortality. The choice of abdominal wall closure technique — continuous or interrupted — plays a key role in preventing this complication.* ***Objective:*** *To compare the frequency of wound dehiscence in cases of laparotomy closed by continuous versus interrupted techniques.* ***Study Design:*** *randomized controlled trial.* ***Setting:*** *The department of surgery, Saidu Sharif Medical College, Swat, Pakistan.* ***Duration of Study:*** *10-01-2024 to 10-07-2024.* ***Methods:*** *A total of 184 patients undergoing emergency laparotomy were included and divided into two equal groups. Group A (n = 92) underwent closure with a continuous technique, while Group B (n = 92) underwent closure with an interrupted technique. Wound dehiscence was defined as the disruption of abdominal wall layers with serosanguinous discharge or evisceration within 15 postoperative days. Data were analyzed using SPSS, with a p-value <0.05 considered significant.* ***Results:*** *The mean age was 45.24 ± 16.02 years in Group A and 46.95 ± 15.43 years in Group B. In Group A, 57 (62.0%) were males and 35 (38.0%) females, while Group B included 54 (58.7%) males and 38 (41.3%) females. Wound dehiscence occurred significantly more frequently in the continuous group (16 patients, 17.4%) compared to the interrupted group (6 patients, 6.5%) (p < 0.05).* ***Conclusion:*** *The interrupted technique of laparotomy closure was associated with a significantly lower frequency of wound dehiscence compared to the continuous technique, suggesting it may be a safer option in emergency laparotomy cases.*

Keywords: Wound Dehiscence; Laparotomy; Continuous Suture; Interrupted Suture; Emergency Surgery; Randomized Controlled Trial

INTRODUCTION

The risk of surgical wound dehiscence associated with laparotomy remains serious. The healing process begins with surgical incisions and encompasses inflammation and proliferation (1, 2). Effective wound healing requires a supply of cytokines as well as developmental factors, which are supplied by macrophages and neutrophils. Shortly after surgery, the proliferation stage begins, during which granulation tissue grows within the wound space. At this stage, fibroblasts are crucial as they migrate to the injury site and synthesize collagen (3, 4). Paramedian, along with vertical midline incisions, are commonly employed, frequently acting as an approach for these laparotomies. The midline laparotomy is the most frequently utilized abdominal incision method due to its ease of execution, effective access to all quadrants, rapid opening capability, and usually blood-sparing nature (5, 6).

Surgeons generally favor delayed-absorbable sutures; nevertheless, non-absorbable Prolene sutures remain the standard practice. The application of non-absorbable suture has been shown to have advantages in various studies (7). During the course of facial healing, the tensile strength of such sutures is preserved (8) in light of improvements in perioperative as well as postoperative care, along with the significant growth in wound healing over the decades. The dimension and length of suture used, along with continuity of suture, are all factors in available closure procedures (9). The most effective way of wound closure should provide sufficient tensile strength for the incision while preserving stability against both local and systemic infections. The tolerance of suture material, both in the short term as well as the long term, is satisfactory, and the procedure is intended to be efficient and straightforward (10). A study examined wound dehiscence rates in the continuous closure group (13.75%) compared to the interrupted closure group (2.50%) following laparotomy (11). Continuous suturing offers the benefit of needing only a single suture line to secure fascia. However, it is prone to compromise if it is cut at any one location. The interrupted suture method is favored due to its association with a reduced risk of wound dehiscence, despite being time-consuming and potentially resulting in the formation of stitch sinuses (12).

A limited amount of literature exists on this subject; however, the serious nature of this morbidity prompted us to conduct a study comparing wound dehiscence in cases of laparotomy closed using continuous and interrupted techniques. Ongoing research into wound closure techniques underscores the importance for surgeons to remain informed about contemporary methods. This study aims to evaluate the significance of both closure techniques by examining the incidence of early and late wound complications. The optimal abdominal closure method should be efficient, straightforward, and economical, while minimizing the risk of both early and late complications.

METHODOLOGY

This randomized controlled trial was conducted in the Department of Surgery at Saidu Sharif Medical College, Swat. The study was conducted from January 10, 2024, to January 10, 2024, after securing ethical approval from the hospital.

One hundred and eighty-four patients were selected for this trial. This sample size was determined using 80% power and 95% confidence level, along with anticipated wound dehiscence rates of 13.75% for the continuous closure and 2.50% for the interrupted closure (11). Participants were allocated into two groups of 92 patients each using a blocked randomization technique.

Patient selection was conducted via non-probability consecutive sampling. Patients between 18 and 70 years of age of either gender who required an emergency midline laparotomy for conditions including blunt or penetrating abdominal trauma, intestinal

obstruction, perforation, or an acute abdomen were selected. Patients presenting with a pre-existing burst abdomen, those with severe malnutrition, and pregnant women were excluded.

All patients admitted through the emergency department who met the inclusion criteria provided consent. A predefined proforma was used to record demographic and clinical data, including age, gender, body mass index, educational status, occupation, socioeconomic status, area of residence, and smoking status. A thorough medical history was taken, and a physical examination was performed for every patient.

The surgical procedure involved a standard vertical midline incision. After prepping the abdomen with a povidone-iodine solution, the skin was incised with a scalpel, and deeper tissues were dissected using electrocautery and scissors. Following the completion of the necessary intra-abdominal procedure, fascial closure was performed according to the assigned group. In Group A, the continuous technique was employed, which involved suturing the wound edges with a single uninterrupted suture without the use of knots. In Group B, the interrupted technique was employed by suturing the wound edges with a knot tied to each loop, and then the remaining suture was cut.

Wound dehiscence was assessed in all patients, as the disruption of all layers of the abdominal wall within the first 15 postoperative days. This was identified clinically by the presence of serosanguinous discharge from the wound site and evisceration of abdominal contents. All postoperative assessments were conducted under the supervision of an experienced consultant surgeon having a minimum of five years of post-fellowship experience.

IBM SPSS 25 was used for data analysis purposes. Numerical variables were calculated using mean and standard deviation. Categorical variables were assessed in terms of frequency and percentages. We stratified demographics and clinical variables by the outcome using the Chi-Square test, keeping the P value notable at ≤ 0.05.

RESULTS

Our study included 184 patients, divided into two groups: 92 patients in Group A (continuous closure) and 92 patients in Group B (interrupted closure). The mean age of patients in Group A was 45.24 ± 16.02 years, while in Group B it was 46.95 ± 15.43 years. Body mass index was 24.93 ± 1.58 kg/m² in Group A and 25.11 ± 1.65 kg/m² in Group B.

There were 57 (62.0%) males and 35 (38.0%) females in Group A and 54 (58.7%) males and 38 (41.3%) females in Group B. Indications for laparotomy included abdominal trauma in 11 (12.0%) cases, obstruction in 33 (35.9%), perforation in 35 (38.0%) and penetrating trauma in 13 (14.1%) cases in Group A. In Group B, abdominal trauma was 6 (6.5%), obstruction was 31 (33.7%), perforation was 41 (44.6%), and penetrating trauma was 14 (15.2%). (Table 1)

A notable difference was observed in the rate of wound dehiscence between the two groups. In Group A, 16 patients (17.4%) had wound dehiscence. In Group B, only 6 (6.5%) cases of wound dehiscence were observed (P = 0.02)—Table 2. Tables 3 and 4 present the stratifications.

Table 1: Demographics and clinical characteristics of the patients

Demographics and clinical characteristics		Groups			
		Group A		Group B	
		n	%	n	%
Gender	Male	57	62.0%	54	58.7%
	Female	35	38.0%	38	41.3%
Education status	Literate	43	46.7%	38	41.3%
	Illiterate	49	53.3%	54	58.7%
Occupation status	Employed	45	48.9%	43	46.7%
	Unemployed	47	51.1%	49	53.3%
Area of residence	Urban	50	54.3%	47	51.1%
	Rural	42	45.7%	45	48.9%
Socioeconomic status	Lower class	23	25.0%	33	35.9%
	Middle class	44	47.8%	37	40.2%
	Upper class	25	27.2%	22	23.9%
Smoking status	Smoker	27	29.3%	18	19.6%
	Non-smoker	65	70.7%	74	80.4%
Laparotomy indications	Abdominal trauma	11	12.0%	6	6.5%
	Obstruction	33	35.9%	31	33.7%
	Perforation	35	38.0%	41	44.6%
	Penetrating trauma	13	14.1%	14	15.2%

Table 2: Comparison of wound dehiscence in both groups

Wound dehiscence	Groups				P value
	Group A		Group B		
	n	%	n	%	
Yes	16	17.4%	6	6.5%	0..02
No	76	82.6%	86	93.5%	

Table 3: Stratification of comparison of wound dehiscence in both groups with demographics

Demographics				Groups		P value
				Group A	Group B	
Gender	Male	Wound dehiscence	Yes	19.3%	5.6%	0.02
			No	80.7%	94.4%	
	Female	Wound dehiscence	Yes	14.3%	7.9%	0.38
			No	85.7%	92.1%	
Education status	Literate	Wound dehiscence	Yes	18.6%	2.6%	0.02
			No	81.4%	97.4%	
	Illiterate	Wound dehiscence	Yes	16.3%	9.3%	0.28

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			No	83.7%	90.7%	
Occupation status	Employed	Wound dehiscence	Yes	24.4%	9.3%	0.05
			No	75.6%	90.7%	
	Unemployed	Wound dehiscence	Yes	10.6%	4.1%	0.21
			No	89.4%	95.9%	
Area of residence	Urban	Wound dehiscence	Yes	18.0%	4.3%	0.03
			No	82.0%	95.7%	
	Rural	Wound dehiscence	Yes	16.7%	8.9%	0.27
			No	83.3%	91.1%	
SES	Lower class	Wound dehiscence	Yes	8.7%	3.0%	0.35
			No	91.3%	97.0%	
	Middle class	Wound dehiscence	Yes	18.2%	5.4%	0.08
			No	81.8%	94.6%	
	Upper class	Wound dehiscence	Yes	24.0%	13.6%	0.36
			No	76.0%	86.4%	
Age groups (Years)	18 to 35	Wound dehiscence	Yes	19.4%	4.0%	0.08
			No	80.6%	96.0%	
	36 to 50	Wound dehiscence	Yes	4.5%	8.7%	0.57
			No	95.5%	91.3%	
	51 to 70	Wound dehiscence	Yes	23.1%	6.8%	0.03
			No	76.9%	93.2%	
BMI (kg/m2)	18.5 to 24.9	Wound dehiscence	Yes	15.7%	4.2%	0.05
			No	84.3%	95.8%	
	> 24.9	Wound dehiscence	Yes	19.5%	9.1%	0.16
			No	80.5%	90.9%	

Table 4: Stratification of comparison of wound dehiscence in both groups with clinical characteristics

Clinical characteristics				**Groups**		**P value**
				Group A	**Group B**	
Smoking status	Smoker	Wound dehiscence	Yes	14.8%	5.6%	0.33
			No	85.2%	94.4%	
	Non-smoker	Wound dehiscence	Yes	18.5%	6.8%	0.03
			No	81.5%	93.2%	
Laparotomy indications	Abdominal trauma	Wound dehiscence	Yes	9.1%	0.0%	0.44
			No	90.9%	100.0%	
	Obstruction	Wound dehiscence	Yes	9.1%	9.7%	0.93
			No	90.9%	90.3%	
	Perforation	Wound dehiscence	Yes	22.9%	2.4%	0.006
			No	77.1%	97.6%	
	Penetrating trauma	Wound dehiscence	Yes	30.8%	14.3%	0.30

DISCUSSION

Regarding patient demographics, our groups were equally matched in terms of mean age. Group A had a mean age of 45.24 ± 16.02 years, and Group B had a mean age of 46.95 ± 15.43 years. The distribution of gender and smoking status in our study was comparable between groups.

Our results showed a notably lower incidence of wound dehiscence in the interrupted closure group (6.5%) compared to the continuous closure group (17.4%), with a statistically significant difference (P = 0.02). A similar finding has been reported by Zabd et al. in their study, where they documented a 2.5% rate of wound dehiscence in the interrupted group and 13.75% in the continuous group (11). This observation aligns with Tahir et al., who reported a statistically significant difference in dehiscence rates of 7% for interrupted closure and 18% for continuous closure (13). Similarly, a study by Akbar et al. found that the interrupted X-suture technique resulted in only 3% of patients experiencing dehiscence, compared to 15% in the continuous suture group (14).

The trend of interrupted technique performing better than continuous technique in terms of wound dehiscence was also observed, although not statistically significant, in the work of Nasir et al., where dehiscence was noted in 11.5% of patients undergoing interrupted closure versus 21.2% in the continuous group (15). The consistency of this trend across multiple studies, including our own, strongly suggests a clinical benefit favoring interrupted suturing in reducing this serious complication.

However, in contrast, Polychronidis et al. found no potential difference in their composite primary endpoint of burst abdomen or incisional hernia between continuous and interrupted closure techniques. This discrepancy may be attributed to the different suture materials used by Polychronidis et al. for each technique: they employed a slowly absorbable monofilament for continuous closure and a rapidly absorbable braided suture for interrupted closure. The choice of rapidly absorbable material in the interrupted group may have compromised the advantage of the interrupted technique by failing to provide long-term support during the critical phase of wound healing.

We also observed that in both groups, non-trauma cases had a higher frequency than trauma cases. Similar findings have been reported by a study conducted in Pakistan by Syed et al. They reported that out of 501 cases of laparotomies, 80.24% were patients with non-trauma etiologies and 19.76% had trauma-based etiologies (17).

A notable advantage of the continuous technique, often cited, is the reduction in operative time. Polychronidis et al. reported significantly shorter fascial closure time for continuous sutures (12.8 ± 4.5 min) compared to interrupted sutures (17.4 ± 6.1 min) ($p<0.001$) (16). Although our study did not measure closure time, this is an important variable, particularly in critically ill patients who require surgery. The conflicting results of Polychronidis et al. underscore the importance of suture material selection, highlighting that technique and material are also significant factors.

CONCLUSION

In conclusion, we observed that the rate of wound dehiscence in cases of laparotomy closed by the interrupted technique was significantly lower than in cases of laparotomy closed by the continuous technique.

DECLARATIONS

Data Availability Statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned. (IRB-99/ERB/023)
Consent for publication
Approved
Funding
Not applicable

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTION

ZIA UL ISLAM (Postgraduate Resident)
Data Collection, Review of manuscript, Manuscript revisions, Manuscript drafting. and final approval of manuscript
MUHAMMAD HUSSAIN (Assistant Professor)
Critical Input, Supervision, and final approval of manuscript

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