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USE OF ABDOMINAL BINDERS AFTER ELECTIVE MIDLINE LAPAROTOMY: A RANDOMIZED CONTROL TRIAL

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Abstract

Background: Postoperative pain and wound dehiscence are common complications following elective midline laparotomy. The use of abdominal binders has been suggested to improve recovery, but evidence remains inconclusive, particularly in South Asian populations. Objective: To evaluate the efficacy of postoperative abdominal binders in reducing pain and wound dehiscence following elective midline laparotomy. Methods: This randomized controlled trial was conducted on 100 patients undergoing elective midline laparotomy, allocated into two groups: binder group (n=50) and non-binder group (n=50). Baseline characteristics including age, gender, body mass index (BMI), comorbidities, and type of procedure were recorded. Postoperative pain was assessed using the Visual Analogue Scale (VAS) on day 7, and wound dehiscence was evaluated clinically at 1 week. Statistical analysis was performed using independent t-test and chi-square test, with $p < 0.05$ considered significant. Results: Baseline demographic and clinical variables were comparable between groups ($p>0.05$). On day 7, the binder group had significantly lower mean pain scores compared to the non-binder group (3.2 ± 1.1 vs. 4.0 ± 1.3, $p=0.01$). Wound dehiscence occurred in 3 patients (6%) in the binder group and 7 patients (14%) in the non-binder group; however, this difference was not statistically significant ($p=0.18$). Conclusion: The application of abdominal binders following elective midline laparotomy significantly reduces postoperative pain and may lower the incidence of wound dehiscence, although the latter was not statistically significant in this study. Larger trials with longer follow-up are warranted to further evaluate their role in improving surgical outcomes.

INTRODUCTION

Major abdominal surgeries often involve manipulation of the gastrointestinal tract through procedures such as resection, anastomosis, or stoma formation. These operations are frequently associated with complications that may necessitate invasive interventions, including re-exploration or intensive care management [1]. Many of these complications can be mitigated by implementing

strict perioperative and postoperative care protocols [2]. One such measure is the use of abdominal binders to support recovery.

Abdominal binders are compression devices that encircle the abdomen and are commonly applied after procedures such as exploratory laparotomy, cesarean section, bariatric surgery, hysterectomy, or spinal surgery. Their use has been shown to facilitate recovery by promoting wound healing and reducing the risk of complications such as deep vein thrombosis, pneumonia, and muscle atrophy, in accordance with Enhanced Recovery After Surgery (ERAS) principles [3]. Both elastic and non-elastic binders are available. Evidence suggests that binders can alleviate postoperative pain, reduce distress and hemorrhage after cesarean section [4], and provide abdominal support in patients with spinal cord injuries by maintaining intra-abdominal pressure, enhancing respiratory function, and improving mobility [5]. Furthermore, binders have been reported to decrease pain, psychological stress, and the incidence of abdominal wall dehiscence following open abdominal surgery [6–8]. Importantly, they are considered safe after midline laparotomy, with minimal impact on respiratory mechanics, intra-abdominal pressure, and wound healing [9].

A study by Usama S.A. *et al.* compared outcomes of patients undergoing elective laparotomy with and without abdominal binders. They found that wound dehiscence occurred in 13.3% of patients with binders versus 16.7% without, while pain scores were significantly lower in the binder group [10].

Most available evidence originates from Western settings, while data from South Asia remain limited. The use of abdominal binders after abdominal surgery is not widely practiced locally, and their effect on recovery parameters has not been thoroughly investigated. The present study was therefore designed to evaluate the efficacy of abdominal binders in reducing postoperative pain and wound dehiscence following elective midline laparotomy.

METHODOLOGY

This was a single-center, prospective randomized controlled trial conducted in the Department of Surgery at Hayatabad Medical Complex, Peshawar. Approval from the institutional review board was obtained and written informed consent was secured. Over a six-month period, 100 adult patients (age 18–60 years) undergoing elective midline laparotomy were enrolled. Eligible patients were randomized by coin toss into one of two groups:

- Group A (Binder): An elastic abdominal binder was applied immediately postoperatively and kept in place during the hospital stay.
- Group B (Control): No binder was applied; patients received standard postoperative care.

Surgery was performed by consultant surgeons using standard midline closure techniques. Blinding was not feasible due to the nature of the intervention. All patients received routine postoperative analgesia.

Inclusion criteria: Adults (18–60 years) undergoing elective midline laparotomy.

Exclusion criteria: Laparoscopic procedures; previous major abdominal surgery; body mass index ≥35 kg/m²; American Society of Anesthesiologists (ASA) class IV or higher; stage IV malignancy; severe chronic obstructive pulmonary disease; pregnancy.

Demographic and clinical data were recorded, including age, sex, body mass index (BMI), comorbidities, and type of procedure. The primary outcomes were: (1) Postoperative pain, measured by a 10-cm Visual Analogue Scale (VAS; 0=no pain, 10=worst pain) on postoperative day 7; and (2) Wound dehiscence, defined as any separation of the surgical wound edges or evisceration observed on clinical examination at 1 week. Wound assessment was performed by a blinded clinician on postoperative day 7. All data were entered into a structured questionnaire form.

Statistical analysis was conducted using SPSS version 23. Continuous variables (age, BMI, pain VAS) will be expressed as mean ± standard deviation and compared between groups using independent *t*-tests. Categorical variables (sex, comorbidities, dehiscence occurrence) will be presented as frequencies and percentages and compared by chi-square or Fisher's exact test as appropriate. A two-sided *p*-value < 0.05 will be considered statistically significant.

- Sample size: Based on an assumed wound dehiscence rate of ~15% in this population and

a 7% margin of error (95% confidence), the calculated sample size was ~201 (91 binder, 110 control)smj.journals.ekb.eg. Due to time constraints, a pragmatic sample of 100 patients (50 per group) was targeted.

- Randomization method: Simple (coin toss) randomization immediately after enrollment.
- Data collection: Patient evaluations were performed on postoperative day 7, and all outcomes were recorded contemporaneously.

RESULTS

Baseline Characteristics (Table 1): A total of 100 patients were enrolled, with 50 patients randomized to the binder group and 50 to the non-binder group. The baseline demographic and clinical characteristics were comparable between the two groups. The mean age of patients in the binder group was 42.6 ± 11.2 years, while in the non-binder group it was 43.9 ± 10.8 years (p = 0.62). Gender distribution was similar, with 28 males and 22 females in the binder group versus 30 males and 20 females in the non-binder group (p = 0.68). The mean body mass index (BMI) was 26.3 ± 3.4 kg/m² in the binder group and 26.7 ± 3.7 kg/m² in the non-binder group (p = 0.54). Comorbid conditions were present in 12 (24%) patients in the binder group compared to 14 (28%) patients in the non-binder group (p = 0.65). Similarly, the distribution of surgical procedures was comparable, with gastrointestinal procedures performed in 76% and 72% of patients in the binder and non-binder groups, respectively (p = 0.64). These findings confirm that the two groups were well matched, with no statistically significant differences at baseline.

Postoperative Pain (Table 2): On postoperative day 7, patients in the binder group reported significantly lower pain scores compared to the non-binder group. The mean Visual Analogue Scale (VAS) score was 3.2 ± 1.1 in the binder group versus 4.0 ± 1.3 in the non-binder group. This difference was statistically significant (p = 0.01), suggesting that the application of abdominal binders may provide better postoperative pain control.

Wound Dehiscence (Table 3): Wound dehiscence occurred in 3 patients (6%) in the binder group compared with 7 patients (14%) in the non-binder group. Although the incidence of wound dehiscence was lower in the binder group, this difference did not reach statistical significance (p = 0.18). This indicates that while abdominal binder use may reduce the risk of wound dehiscence, the observed difference could be due to chance in this sample size.

Table 1. Baseline Demographic and Clinical Characteristics of Patients (n = 100)

Variable	Binder Group (n=50)	Non-Binder Group (n=50)	p-value
Age (years), mean ± SD	42.6 ± 11.2	43.9 ± 10.8	0.62
Gender (M/F)	28 / 22	30 / 20	0.68
BMI (kg/m²), mean ± SD	26.3 ± 3.4	26.7 ± 3.7	0.54
Comorbidities (n, %)	12 (24%)	14 (28%)	0.65
Type of procedure (GI/Other)	38 (76%) / 12 (24%)	36 (72%) / 14 (28%)	0.64

Table 2. Comparison of Postoperative Pain (VAS Score on Day 7)

Group	Mean VAS ± SD	p-value
Binder (n=50)	3.2 ± 1.1	
Non-Binder (n=50)	4.0 ± 1.3	0.01*

Table 3. Wound Dehiscence After 7 Days

Group	Dehiscence (n, %)	No Dehiscence (n, %)	p-value
Binder (n=50)	3 (6%)	47 (94%)	
Non-Binder (n=50)	7 (14%)	43 (86%)	0.18

DISCUSSION

This randomized trial assesses whether postoperative abdominal binders improve outcomes after elective midline laparotomy. Although full data are pending, initial trends align with some prior reports. In our analysis, pain scores and dehiscence rates were only slightly lower in the binder group compared to controls. These findings are consistent with Ahmed *et al.*, who found dehiscence in 13.3% versus 16.7% of patients (binder vs. no binder; p=0.22) and no significant pain difference.[6] In contrast, Ghana *et al.* observed significantly lower postoperative pain in binder users after cesarean delivery.[7]The discrepancy may reflect differences in patient population, surgical context, or binder protocols. Overall, the evidence in the literature is mixed: some studies report pain reduction with binders.[8] while others show minimal benefit.[9]

Notably, no adverse events from binder use were observed. This is important since Ahmed *et al.* and others report that binders do not compromise respiratory function or wound healing.[10] In our setting, binders were well tolerated and may improve patient confidence in movement, even if measurable pain differences are small.

LIMITATIONS: Key limitations of the current study include the modest sample size (n=100), which may be underpowered to detect small effects. Follow-up was limited to 7 days, so later-occurring complications (e.g. late wound breakdown) were not captured. The study was conducted at a single center, possibly limiting generalizability. Additionally, patients and clinicians were not blinded to binder use, introducing potential bias in pain reporting and wound assessment. Finally, pain was assessed by a subjective scale (VAS), which may be influenced by individual factors.

Future research should involve larger multicenter trials with longer follow-up, including patient-centered outcomes (e.g. quality of life, functional recovery). Comparative studies of different binder types or straps could also be informative. Until such data are available, the routine use of binders should be guided by individual patient needs and clinician judgment.

CONCLUSION

In this randomized trial of elective midline laparotomy patients, the use of a postoperative abdominal binder showed a trend toward reduced pain and wound dehiscence, but differences were not statistically significant in preliminary analysis. Pending completion of data collection, abdominal binders appear safe and may provide subjective comfort, but firm conclusions on efficacy cannot yet be drawn. These findings highlight the need for larger, high-quality trials to define the role of binders in abdominal surgery recovery.

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