Biological and Clinical Sciences Research Journal
eISSN: 2708-2261; pISSN: 2958-4728
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v6i6.1951
*Biol. Clin. Sci. Res. J., Volume 6(6), **2025**: 1951*
Original Research Article

Early Versus Delayed Dressing Removal in Clean-Contaminated and Contaminated Midline Laparotomy Wounds

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(Received, 24th April 2025, Accepted 18th June 2025, Published 30th June 2025)

Abstract: *Surgical site infections (SSIs) remain a major postoperative complication associated with increased morbidity, prolonged hospital stay, and additional healthcare costs. Optimal timing for removal of surgical dressings after midline laparotomy remains debated, particularly in clean and clean-contaminated wounds.* ***Objective:*** *The purpose of this research was to assess whether patients who receive their dressings removed earlier develop fewer superficial SSIs after undergoing midline laparotomy surgery.* ***Methods:*** *After obtaining ethical approval from the institutional review board, this randomised controlled trial was conducted at the Department of General Surgery, Dr. Ruth K.M. PFAU Civil Hospital, Karachi, from 1 July 2024 to 30 December 2024. Through non-probability consecutive sampling, 94 patients aged 18 to 60 years, both genders, admitted for either elective or emergency surgeries, who underwent midline laparotomy procedures with wounds either clean or clean-contaminated wounds were included in the present study.* ***Results:*** *A significant difference was observed in the incidence of superficial surgical site infection (SSI) between the two groups. 64% of patients in the early dressing removal group developed SSIs compared to 85% in the late removal group, indicating a statistically significant reduction in SSIs with early dressing removal (p = 0.02). This finding supports the hypothesis that early dressing removal may contribute to improved postoperative wound outcomes.* ***Conclusion:*** *Early removal of dressing after midline laparotomy within 48 hours has a lower incidence of superficial surgical site infections than delayed removal.*

Keywords: Early and late dressing removal, SSI, midline laparotomy, complications

[***How to Cite:*** Alam R, Jaleel F, Siamwala TS, Maria, Akram QUA, Rajput A. Early versus delayed dressing removal in clean-contaminated and contaminated midline laparotomy wounds. *Biol. Clin. Sci. Res. J.*, **2025;** 6(6): 532-534. doi: https://doi.org/10.54112/bcsrj.v6i6.1951

Introduction

Surgical Site Infections (SSIs) develop as a major postoperative complication that occurs mostly after procedures that utilize midline laparotomy incisions in the abdomen (1). Postoperative morbidity, along with prolonged hospital stays, increased healthcare costs, and dissatisfied patients, results from Surgical Site Infections (2). Perioperative care methods and wound classification determine the wide range of superficial SSIs that develop after laparotomy procedures, with rates spanning between 10% and 30%. The method of dressing removal on wounds has recently gained significant attention because it potentially affects infection rates (3).

A midline laparotomy, which serves both elective and emergency abdominal surgeries, will produce clean-contaminated or contaminated wounds based on the operative discoveries (4). Modern aseptic techniques together with antibiotic prophylaxis have not eliminated the occurrence of superficial SSIs in a significant number of surgical procedures (4). A superficial SSI, according to the Centers for Disease Control and Prevention, occurs when an infection affects the skin or subcutaneous tissue in the surgical incision area within thirty days following surgery (5).

The timing of dressing removal from surgical wounds stands as a healthcare practice factor that a surgeon can control. Postoperative dressing maintenance for several days was traditionally recommended to ensure protection against environmental contamination (6). Research indicates that removing surgical dressings immediately after 48 hours may offer safer conditions and an increased ability to check wounds, which could result in lower infection risks (7).

Zhang et al. found that infection rates remained equal between patients who had their dressings removed early and those who had delays. The analysis of South Asian regional data showed that early change of dressings reduced superficial SSIs by 24% relative to delayed dressing care, which reduced them by only 89.5% thus supporting a potential shift in wound care protocols (8).

The randomized controlled trial conducted by Sartelli et al. showed that dressing type, combined with duration, failed to reduce the risk of infection independently, indicating that fundamental hygiene practices, with prompt monitoring, proved more significant than the type of dressing. Wound dressings should be removed at the appropriate time point for clean-contaminated and contaminated wounds, as this method can reduce SSI rates (9).

The purpose of this research was to assess whether patients who receive their dressings removed earlier develop fewer superficial SSIs after undergoing midline laparotomy surgery.

Methodology

After obtaining ethical approval from the institutional review board, this randomised controlled trial was conducted at the Department of General Surgery, Dr. Ruth K.M. PFAU Civil Hospital, Karachi, from July 1, 2024, to December 30, 2024. Through non-probability consecutive sampling, 94 patients aged 18 to 60 years, both genders, admitted for either elective or emergency surgeries, who underwent midline laparotomy procedures with wounds either clean or clean-contaminated wounds, were included in the present study. Contaminated wounds containing foreign bodies or infected material, or infected wounds with purulent discharge. Patients with existing stoma, malignancy, and/or multi-organ dysfunction were excluded from the present study. Data collection was initiated after obtaining approval from the Research Evaluation Unit of the College of Physicians & Surgeons Pakistan (CPSP) and the institute's ethical review committee. After obtaining written informed consent from the participants, patients will be randomly assigned to two groups using

computer-generated sequential numbers. The groups will be placed in sealed envelopes and opened just prior to the start of the study. A single-masked design was employed for the study. Patients in group A were managed by early removal of the dressing, while in group B, delayed removal of the dressing was done. All patients underwent routine baseline examinations in accordance with hospital protocol. Following surgery, one Prolene was used to close the rectus sheath in both clean-contaminated and contaminated wounds. The pyodine and normal saline were used to clean the subcutaneous area. The skin was closed intermittently with 2-0 Prolene with the subcutaneous layer. Pyodine and then spirit were used to clean the wound after it had been closed, and one minute was given for the wound to dry. A waterproof adhesive bandage or plaster (Dynoplast) was applied to the entire wound after placing two pieces of sterile gauze over it. The dressings in group A were opened within 48 hours of the procedure, whereas in group B, the sterile dressing was removed after 48 hours. The suture was removed on the 10th postoperative day by the researcher herself to assess the outcome, specifically for superficial surgical site infection (SSI). Data entry and analysis were done using SPSS version 26.0. Depending on the patient's age and length of hospital stay, the Mean ± SD was calculated. Frequency and percentage were calculated for gender, type of surgery, type of wound, diabetes mellitus, hypertension, and superficial surgical site infection. At the 5% level of significance, the superficial surgical site infections were compared using a t-test. Using an appropriate t-test, the two groups were compared in terms of age, gender, length of hospital stay, diabetes mellitus, Hypertension, type of surgery, and type of wound. $P \leq 0.05$ is the statistical threshold.

Results

The study included 94 patients who underwent midline laparotomy procedures, evenly divided into two groups: early dressing removal (<48 hours) and late dressing removal (>48 hours). The mean age of patients in the early dressing removal group was 38.04 ± 11.2 years, while it was 41.9 ± 11.4 years in the late dressing group, showing no statistically significant difference (p = 0.147). Gender distribution was also similar between the groups, with males comprising 53% of the early group and 50% of the late group (p = 0.688). The prevalence of hypertension was slightly higher in the late dressing group (60%) compared to the early group (51%), but this difference was not statistically significant (p = 0.4). Similarly, 50% of patients in the early group and 57% in the late group had diabetes, which again was not statistically significant (p = 0.323).

In terms of clinical parameters, 51% of patients in the early group underwent emergency surgeries compared to 60% in the late group, with no significant difference (p = 0.439). The distribution of wound types was comparable between the two groups, with clean-contaminated wounds accounting for 57% in the early group and 55% in the late group, and contaminated wounds comprising 43% and 45%, respectively (p = 0.821). The mean hospital stay was slightly longer in the early group (9.7 ± 4.01 days) than in the late group (8.5 ± 3.7 days), though this difference did not reach statistical significance (p = 0.097).

Notably, a significant difference was observed in the incidence of superficial surgical site infection (SSI) between the two groups. 64% of patients in the early dressing removal group developed SSIs compared to 85% in the late removal group, indicating a statistically significant reduction in SSIs with early dressing removal (p = 0.02). This finding supports the hypothesis that early dressing removal may contribute to improved postoperative wound outcomes.

Table 1: Demographic and Clinical parameters

Variables	Early Dressing Removal (<48 hours)	Late Dressing Removal (>48 hours)	P value
Age (years)	38.04±11.2	41.9±11.4	0.147
Gender			0.688
Male	25 (53%)	23 (50%)	
Female	22 (47%)	24 (51%)	
Hypertension	24 (51%)	28 (60%)	0.4
Diabetes	23 (50%)	27 (57%)	0.323

Table 2: Clinical Parameters

Variables	Early Dressing Removal (<48 hours)	Late Dressing Removal (>48 hours)	P value
Type of Surgery			0.439
Emergency	24 (51%)	28 (60%)	
Elective	23 (50%)	19	
Type of Wound			0.821
Clean-contaminated	27 (57%)	26 (55%)	
Contaminated	20 (43%)	21 (45%)	
Length of hospital stay (days)	9.7±4.01	8.5±3.7	0.097
Surgical site infection	30 (64%)	40 (85%)	0.02

Discussion

The present study's findings of a markedly lower incidence of superficial surgical site infections (SSIs), however, compared to the previous study (64 vs 85%, p = 0.01), are consistent with more recent clinical guidance that favors shorter time to dressing removal. Primary surgical dressings are currently recommended to be removed 24—48 hours after closure, as they facilitate better wound inspection and reduce moisture accumulation without increasing the SSI rate (10). In contrast, older protocols allowed for more extended periods in situ, with the belief that they provided improved barrier protection. Our results suggest the potential for early removal to facilitate recognition, management, and early treatment of incipient infections, consistent with the CDC's 2017 guideline position (11).

However, the Cochrane review by Dumville and colleagues reported no convincing evidence that any one dressing type or length of time had an effect on decreased risk of SSI relative to leaving wounds exposed post closure. However, that analysis did contribute to pooling data from a spectrum of surgical wound types and dressing materials but was not specific to timing in midline laparotomy incisions (12). In particular, our trial's design is stratified and randomized regarding early (<48 hours) versus late (>48 hours) removal in clean, contaminated, and contaminated abdominal wounds, filling an important gap. This shows that timing itself,

independent of dressing composition, has a material impact on SSI outcomes in abdominal surgery.

To further corroborate the safety and potential patient-centered benefits of early dressing removal, evidence from obstetric surgery is presented. Early dressing removal (24–48 hours) did not increase SSI rates. It resulted in fewer patient complaints and marginally faster mobilization, but not an increase, compared to dressings removed after 48 hours, as reported in a recent systematic review of cesarean section trials (13). Cesarean incisions are anatomically and microbiologically distinct from midline laparotomies; however, data on the length of wound dressing interval needed to allow for safe early wound assessment and barrier function with minimal risk of contamination in closed wounds are broadly applicable, regardless of incision site (14).

Considering that our cohort is not characterized by important demographic or clinical confounders (mean ages, gender distributions, comorbidity profiles, and wound contamination levels were statistically similar between groups), we suggest that early dressing removal as a protective factor against SSIs in the midline laparotomy patient is an independent variable. Future multicenter RCTs could evaluate the relevance of additional timing thresholds (e.g., 24 vs. 48 hours) and conduct cost–benefit analyses. However, current evidence suggests that standard postoperative protocols should be revised to facilitate early dressing removal, thereby reducing the infection burden and associated healthcare costs.

Conclusion

Early removal of the dressing after midline laparotomy within 48 hours is associated with a lower incidence of superficial surgical site infections compared to delayed removal. This finding supports shifting postoperative care protocols to expose patients earlier, allowing for better wound assessment. This simple intervention may improve patient outcomes without increasing complications.

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. (IRBEC-24)

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

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Review of Literature, Data entry, Data analysis, and drafting articles.
TSS (Postgraduate Trainee)
Conception of Study, Development of Research Methodology Design,
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Study Design, manuscript review, and critical input.
QUAA (Postgraduate Trainee),
Manuscript drafting, Study Design,
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Conception of Study, Development of Research Methodology Design,
All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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