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Impact of Dressing Removal Timing on Post-Surgical Outcomes in Clean/Clean-Contaminated Wounds: A Retrospective Analysis

Jyotiranjan Mohapatra [1], Snigdharani Choudhury [2], Satyajit Behera [3], Diptish Kumar Sahoo *[4], SashiBhushan Dash [5]

[1]Department of General Surgery, Shri Jagannath Medical College and Hospital, Puri, Odisha, India.
[2]Department of Microbiology, A. H. Post-graduate Institute of Cancer, Cuttack, Odisha, India.
[3]Department of General Surgery, Dharanidhar Medical College and Hospital, Keonjhar, Odisha, India.
[4]Department of Orthopedics, Shri Jagannath Medical College and Hospital, Puri, Odisha, India.
[5]Scientist C, Multidisciplinary Research Unit, Pandit Raghunath Murmu Medical College and Hospital, Baripada, Mayurbhanj, Odisha, India.

*Corresponding Author: Dr. Diptish Kumar Sahoo; *diptish.sahoo@gmail.com*

Abstract

Background: While traditional surgical wound management has often involved leaving dressings undisturbed for several days post-operatively, contemporary research is investigating the potential advantages of earlier dressing removal. This approach may facilitate expedited detection of surgical site infections and enhance patient comfort. However, it is imperative to rigorously evaluate the impact of this practice on wound healing rates and patient satisfaction in comparison to the conventional delayed dressing removal protocol. ***Methods:*** A year-long cohort study was conducted on 157 post-surgical patients to compare the efficacy of early (within 48 hours) versus delayed wound dressing removal. Participants were divided into two groups based on the timing of dressing removal. Statistical software was used to analyze the collected data. ***Results:*** A comparative analysis of early versus delayed removal of wound dressings revealed no statistically significant difference in the incidence of wound complications ($p > 0.05$). However, patient satisfaction scores were lower in the early removal group compared to the delayed removal group. While the study did not demonstrate any objective advantages of delayed dressing removal in terms of wound healing outcomes, it highlights a potential association between early removal and decreased cost. ***Conclusions:*** While no statistically significant difference in outcomes was observed between early and delayed removal of wound dressings, the early removal of dressing was associated with reduced healthcare costs, earlier detection of wound infection, and shorter hospital stays.

Keywords: ***Early dressing removal, post operative wound care, Wound dressing, surgical site infection.***

Background

Operative interventions frequently require a cutaneous breach to achieve access to subjacent anatomical structures. Primary closure of these iatrogenic wounds is commonly accomplished via appositional techniques utilizing sutures or surgical staples [1]. Post-surgical wound management typically involves the application of a protective barrier, such as a sterile dressing or adhesive tape, for approximately 48 hours. This barrier serves to shield the nascent tissue from external insult, absorb wound exudates, and maintain a desiccated and aseptic environment, thereby mitigating the potential for microbial colonization [2].

Surgical wounds are categorized based on the degree of microbial contamination and the presence of pre-existing infection, impacting the subsequent risk of surgical site infection (SSI). These classifications include: 1) Clean wounds: characterized by the absence of inflammation, non-violation of the respiratory, alimentary, genital, or urinary tracts, and an SSI risk of less than 2%; 2) Clean-contaminated wounds: involving entry into the aforementioned tracts without significant spillage, resulting in an SSI risk of less than 10%; 3) Contaminated wounds: encompassing open traumatic wounds, gross spillage from a hollow viscus, and non-purulent inflammation, associated with an SSI risk of less than 20%; and 4) Dirty-contaminated wounds: characterized by pre-existing clinical infection or perforated viscera, with an SSI risk of less than 40% [3].

Surgical site infections (SSIs), as defined by the Centers for Disease Control and Prevention (CDC), are infections manifesting within 30 days of a surgical procedure, or up to one year if an implant is present [4]. These nosocomial infections occur at a

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frequency of 1-3% of surgical interventions and represent a significant clinical burden due to associated morbidity, mortality, prolonged hospitalization, and elevated healthcare expenditures [5-7]. Recent data from the CDC indicates SSIs correlate with a 2-11-fold increase in mortality, a 9.7-day extension of hospital stays, and a $20,000 increase in per-admission costs [8]. A 2023 meta-analysis estimated the global SSI incidence to range from 1.6-3.7% [9]. While factors such as post-operative dressing management are hypothesized to influence SSI risk, conclusive evidence regarding the efficacy of wound coverage in infection prevention and the establishment of standardized dressing removal protocols remains limited [10]. Unnecessary dressing changes contribute to increased healthcare resource utilization, nursing workload, patient discomfort, and potential disruption of the wound healing process [11,12]. Therefore, determining the optimal post-surgical dressing removal timing is critical for minimizing complications and optimizing wound healing outcomes.

The study parameters included the determination of 30-day postoperative SSI and wound dehiscence rates, patient satisfaction scores related to wound management, and the financial expenditure on wound dressings to evaluate the performance of the implemented wound care strategy.

Methods

This retrospective observational study was conducted at the Department of General Surgery, Shri Jagannath Medical College and Hospital (SJMCH), Puri, over a 12-month period, from September 2022 to August 2023. The primary outcome measure was surgical site infection (SSI) assessed on postoperative day 10. The Institutional Ethics Committee of SJMCH, Puri, confirmed that this observational study did not require formal ethical approval.

Inclusion criteria

Patients of all age group with primary closure of clean and clean contaminated wounds.

Exclusion criteria

Patients with wound healing by secondary intention and dirty wounds.

Type of outcome measures

Outcome measures were then assessed: Surgical site infection, wound dehiscence, patient satisfaction and patient's perception on safety, comfort, dehiscence and cost.

Data assessment

Wound assessment was conducted on postoperative days 10 and 30. Surgical site infection was evaluated using the Southampton wound infection grading system. Wound dehiscence was recorded as present or absent. Patient satisfaction was assessed via binary (yes/no) questions. Dressing costs were calculated in Indian Rupees (INR), with a fixed cost of INR 30 per dressing. Data analysis was performed using Data Tab software.

Results

The sample comprised 157 patients, with 32.5% (n=51) aged <40 years, 47.1% (n=74) aged 40-60 years, and 20.4% (n=32) aged >60 years. The cohort consisted of 54.8% (n=86) male and 45.2% (n=71) female participants (**Table 1**).

Table1: Demographic details of the patients.

Demography		No	%
Patient age (years)	<40	51	32.5
	40-60	74	47.1
	>60	32	20.4
Sex	Male	86	54.8
	Female	71	45.2

The result of the present study showed that the difference between early and delayed SSI with respect to the dependent variable SSI grade was not statistically significant.

A Chi-squared (χ^2) test was conducted to evaluate the association between timing of dressing removal and wound dehiscence. As shown in Table 2, no statistically significant relationship was observed between early or delayed dressing removal and the occurrence of wound dehiscence ($p = 0.2$).

Table 2: Number of wound dehiscence in each group.

Wound dehiscence	Absent	Present	Total	P value
Early	71	3	75	0.2
Delayed	75	7	82	
Total	146	10	157	

The relationship between dressing removal timing and patient satisfaction was assessed. No statistically significant difference in patient satisfaction was found between the early and delayed dressing removal groups ($p = 0.2$) (**Table 3**) (**Figure 1**).

Table 3: Relationship between dressing removal timing and patient satisfaction

Patient satisfaction	Dressing Removal			P value
	Total No (%)	Early No (%)	Delay No (%)	
Yes	119 (75.8)	54 (72)	65(79.3)	0.2
No	38(24.2)	21 (28)	17 (20.7)	
Total	75 (100)	75 (100)	82 (100)	

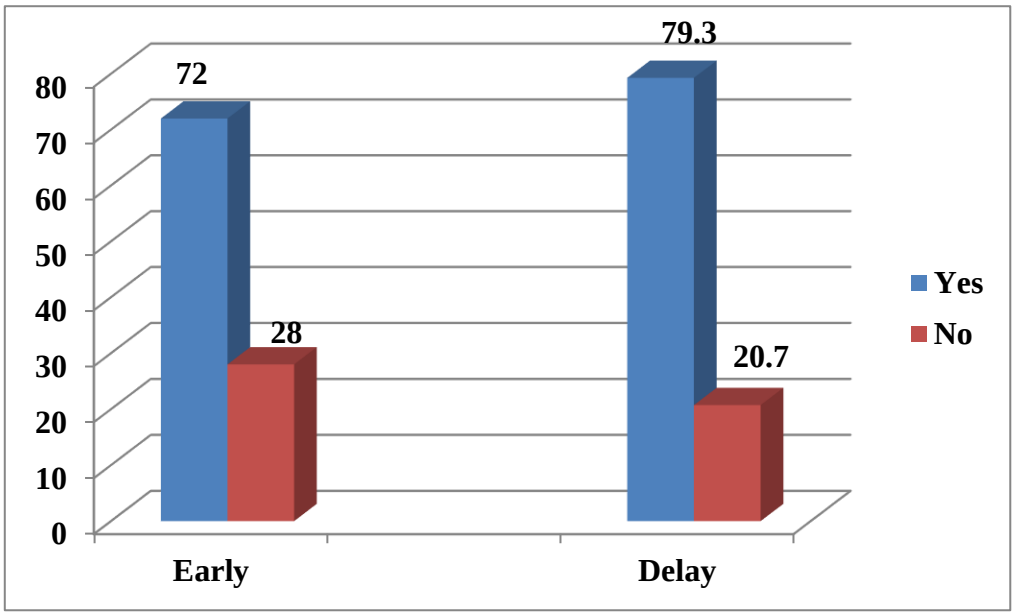

Figure1: Depicting patient satisfaction in each group.

A comparison between early and delayed dressing removal and cost was done. A statistically significant relationship was observed between the timing of dressing removal and the cost of wound care ($p < 0.05$).

Discussion

Following surgical intervention, wound dressings are utilized to provide a protective barrier, with two primary management strategies: early removal or delayed removal until suture removal [13]. Wound dressings serve to shield the surgical site, facilitating epithelization typically within 48 hours, and manage wound exudates, thereby maintaining a dry, clean environment to mitigate the risk of exogenous bacterial contamination [14,15]. Additionally, dressings act as a physical barrier, preventing exudates from irritating surrounding tissue [7]. While certain dressings may promote wound healing through moisture retention, excessive exudate can induce maceration, compromising tissue integrity [16]. Optimal wound management aims to promote infection-free healing with minimal slough, maintained at physiological temperature and pH, requiring infrequent dressing changes. Regular dressing changes facilitate debris removal, wound cleansing, and reduction of bacterial disburden within the occlusive environment, potentially limiting anaerobic pathogen proliferation [17].

A review of existing literature reveals conflicting evidence regarding the optimal timing of dressing removal. While early removal was associated with improved patient perception of safety, and delayed removal with perceived convenience, no conclusive or statistically significant differences were observed for other clinical outcomes, including surgical site infection (SSI), wound dehiscence, and overall patient satisfaction. The confidence intervals for these outcomes crossed the null value, indicating a lack of significant impact of dressing removal timing. These findings are consistent with previous research by Toon et al., which also reported no significant differences between early and delayed removal [2]. However, prior studies were limited by a smaller sample size and did not assess patient satisfaction or perception.

This study suggests that the timing of dressing removal following primary surgical wound closure may not significantly influence clinical outcomes or patient perception. However, it is crucial to recognize that the type of dressing may require adaptation throughout the healing process to optimize wound management. Further research with larger sample sizes and comprehensive assessment of patient-reported outcomes is warranted to refine clinical guidelines.

Conclusion

This study found no significant difference in wound healing or infection rates between early and delayed dressing removal. While early removal reduced costs, patient education is needed to improve satisfaction. Larger RCTs are required to validate these findings and evaluate broader applications, including impact on quality of life.

Declarations

Ethical Approval

The Institutional Ethics Committee has confirmed that no ethical approval was required as it was an observational study.

Funding Statement

None

Author Contributions

Conceptualization, J.M and D.K.M.; Methodology, JM., R.R.S., D.K.S., S.C. Software, J.M., R.R.S. and S.C.; Validation, J.M. and S.C; Formal Analysis, J.M., S.C., R.R.S. Investigation, J.M., S.C., R.R.S.,; Resources, J.M., S.C., R.R.S., and D.K.S.,; Data Curation, J.M., S.C., R.R.S., and D.K.S.,; Writing - Original Draft Preparation, J.M.,S.C.,R.R.S., and D.K.S.,; Writing - Review & Editing, J.M.,S.C.,R.R.S., and D.R.R.R.; Visualization, J.M., and S.C.

Conflicts of Interest

The authors declare no competing interests.

Data Availability

All data generated or analyzed during this study are included in this published article.

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