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Original Research Paper

General Surgery

IS THE ROUTINE OF POSTOPERATIVE DRESSINGS A TRADITIONAL RITUAL OR A SCIENTIFIC NECESSITY? A RANDOMIZED CONTROLLED TRIAL IN A GOVERNMENT MEDICAL COLLEGE

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ABSTRACT

Background: Surgical site infections (SSIs) significantly impact postoperative recovery, influencing patient outcomes and healthcare costs. Effective wound management strategies, including the use of postoperative dressings, are essential to optimize care and resource utilization. **Aim:** To evaluate the rate of surgical site infections in postoperative wounds managed with and without dressings at a tertiary care hospital in Maharashtra, India. **Methods:** A parallel randomized controlled trial was conducted over 24 months, involving 266 patients undergoing clean or clean-contaminated surgeries. Patients were randomized into two groups: those with sterile dressings (intervention arm) and those without dressings (control arm). Wound conditions were assessed using the ASEPSIS scoring system on days 3, 5, and 8, and at suture removal. Data on wound complications, hospital stay, and costs of dressing materials and man-hours were analysed. **Results:** The overall proportion of SSIs was 16.9%, with no significant difference between the dressing (15.8%) and no-dressing (18%) groups. Cost savings and reduced man-hours were observed in the no-dressing group. However, satisfactory wound healing was similar in both groups. **Conclusion:** Dressings are not mandatory for preventing SSIs in clean or clean-contaminated postoperative wounds. Adopting no-dressing protocols can save costs and resources while maintaining patient outcomes.

KEYWORDS : Surgical site infections; ASEPSIS score; Clean wounds; Clean-contaminated wounds

INTRODUCTION

The WHO defines surgical care as vital to a functional healthcare system, but it is costly due to the need for skilled personnel, resources, and infrastructure. Most surgeries (59%) occur in high-income countries.[1] Proper post-operative wound care is crucial to prevent complications like infections, dehiscence, and hematomas, which can extend hospital stays, harm patient health, and raise treatment costs.[2,3] However, surgical wounds heal by primary intention when edges are secured. Dressings are commonly used to protect against contamination, absorb exudate, provide support, and meet patient preferences. Sterile dressings are standard post-surgery, but recent practices favor early wound exposure, reflecting improved understanding of infection risks. Preventive antibiotics are now common, and dressings are deemed unnecessary for healing acute wounds, as closure progresses rapidly once edges are aligned.[4]

Dressings range from fully occlusive to lightweight gauze with adhesive strips. However, gauze can absorb sweat, softening wound edges, hindering scab formation, and increasing blood flow through stitches. Frequent dressing changes are needed to keep wounds dry, especially in India's hot summers. Additionally, adhesive tape can cause skin issues like blistering, follicle inflammation, itching, and irritation, complicating wound care.[5,6] While wound dressings offer benefits, they can also cause issues like Medical Adhesive-Related Skin Injury (MARSI).[7] MARSI occurs when adhesives strip the skin's top layers, leading to skin tears, vesicles, discomfort, infection risk, and delayed healing. These injuries impact patient safety across all care settings, highlighting the need for careful dressing selection from the wide variety available.[7-9] Simpler or no wound dressing can be more cost-effective, improving affordability, compliance, and healing time. Limited studies exist in Indian public health settings, prompting this study to evaluate the necessity of postoperative wound dressings for routine surgeries in a tertiary hospital in Maharashtra, India.

MATERIALS AND METHODS

This study was a parallel randomized controlled trial conducted in the Department of Surgery at a tertiary care hospital over a period of 24 months from August 2022 to August 2024. All postoperative patients aged above 2 years were enrolled from both the OPD and inpatient departments of general surgery with clean and clean-contaminated wounds, including hernia surgery, appendicectomy, fresh accidental wounds after wound excision, exploratory laparotomy, benign breast lump, head and neck surgeries, thyroidectomy, lymph node biopsy. Grossly contaminated and dirty infected wound where dressings were otherwise treated, patients below 2 years, immunocompromised patients who were on immunosuppressant drugs, surgical wounds where discharge from wound expected, fresh and accidental wounds treated otherwise, perineal wounds, wounds where pressure compressive dressings were mandatory excluded from the study.

The study participants were randomly allocated to the intervention and control arms using simple randomization. Allocation concealment was done using sealed envelopes. Due to the nature of the intervention (dressing vs. no dressing), blinding was not possible, and this was not an open-label trial. (Treatment/Intervention arm: Basic surgical dressing of postoperative wounds Control arm: No dressing, i.e., postoperative wounds left exposed to environment).

After obtaining permission from the Institutional Ethics Committee, data collection began, including information on wound condition, presence of infection signs, investigation reports, treatment given, and postoperative wound condition. The wounds were scored using an 'Aseptic wound score' based on wound condition, exudate, erythema, and tissue separation. Wound healing was categorized into five types, with points assigned for each wound. For wound closure, non-absorbable monofilament sutures were used in most cases; silk (natural non-absorbable) and polyglecaperone were used in some cases, either in an intermittent or subcuticular manner. In the control group, wounds were left open after applying povidone iodine, allowing it to dry. A sterile gauze was placed over the wound without adhesive tape, allowing it to fall off naturally. In the intervention group, clean sterile dressings were placed over the wounds and held in place with adhesive tape. The first dressing change occurred after 48 hours or if it got soaked. In both groups, sutures for major abdominal surgeries were removed on the 10th day, and sutures for surgeries like appendectomy and hernia were removed on the 8th day.

All wounds were observed for complications, including redness, pus discharge, serous discharge and wound dehiscence. The patients were followed up on the 3rd, 5th, 8th days, and at the time of suture removal. The ASEPSIS scoring system (Additional treatment, Serous discharge, Erythema, Purulent exudate, Separation of deep tissues, Isolation of bacteria, stay duration as inpatient) was used to quantify postoperative wound infections. ASEPSIS scores were recorded on the 3rd, 5th, and 8th days post-surgery, with the highest score used to assess the outcome of the surgical wounds. Points were scored for daily inspection. Given score only on five of seven days. Highest weekly score used.

The category of infection was determined based on the ASEPSIS scoring system. A total score of 0-10 indicated satisfactory healing, while a score of 11-20 suggested disturbance of healing. Scores between 21-30 were classified as minor wound infection, 31-40 as moderate wound infection, and a score above 40 indicated severe wound infection.

Statistical Analysis

The study results were analyzed using the Per-protocol principle. Data were entered into Microsoft Excel and analyzed with categorical variables presented as percentages or proportions, and continuous data as mean (standard deviation) or median (inter-quartile range). The primary outcome, presence of wound infection, was a dichotomous variable.

Comparison of means between the two arms was done using an unpaired t-test for parametric and Kruskal-Wallis test for non-parametric variables. Data at different time intervals were analyzed using ANOVA, and Chi-square and Fisher's exact tests were used to assess associations between categorical variables. The analysis was performed using SPSS version 22. P value <0.05 was considered statistically significant.

Figure 1: a) Post Operative day 8 of Thyroidectomy in study participant without dressing; **b)** Post operative day 8 of Explorative Laparotomy in study participant without dressing

Figure 2: a) Post operative day 5 of Explorative Laparotomy in study participant with dressing; **b)** Post operative day 3 of Appendicectomy with purulent discharge in study participant with dressing

OBSERVATIONS AND RESULTS

After surgery, dressing was done among 133(50%) patients and dressing was not done among 133(50%). In both the group, majority of study participants were from the age group of 41 to 50 years, with male predominance as shown in table 1.

Table 1: Distribution Of Study Participants According To Demographic Profile

Demographic data		With dressing	Without dressing	Total
Age (Years)	2-10	6(4.5%)	5(3.8%)	11(4.1%)
	11-20	23(17.4%)	20(15%)	43(16.2%)
	21-30	20(15%)	16(12%)	36(13.5%)
	31-40	20(15%)	9(6.8%)	29(10.9%)
	41-50	35(26.3%)	52(39.1%)	87(32.7%)
	51-60	17(12.8%)	25(18.8%)	42(15.8%)
	>60	12(9%)	6(4.5%)	18(6.8%)
Gender	Male	84(63.2%)	98(73.7%)	182(68.4%)
	Female	49(36.8%)	35(26.3%)	84(31.6%)

]In both the groups, hernia surgery was the most common procedure performed. Spinal anaesthesia was predominantly used, polyglactin was the most frequently used suture material, and intermittent skin closure was overwhelmingly preferred as shown in Table 2.

Table 2: Surgery And Procedural Details Of Study Participants

Surgery details		With dressing	Without dressing	Total
Type of surgery	Hernia Surgery	58(43.6%)	61(45.9%)	119(44.7%)
	Appendicectomy	38(28.6%)	27(20.3%)	65(24.4%)
	Explorative Laparotomy	20(15%)	22(16.5%)	42(15.8%)
	Benign Breast Lump	08(6%)	11(8.3%)	19(7.1%)
	Thyroidectomy	09(6.8%)	12(9%)	21(7.9%)
Type of Anaesthesia	General Anaesthesia	29(21.8%)	34(25.6%)	63(23.7%)
	Spinal Anaesthesia	96(72.2%)	88(66.2%)	184(69.2%)
	Local Anaesthesia	08(6%)	11(8.3%)	19(7.1%)
Suture material used	Nonabsorbable monofilament	06(4.5%)	05(3.8%)	11(4.1%)
	Ethilon	39(29.3%)	27(20.3%)	66(24.8%)
	Polyglactin	88(66.2%)	101(75.9%)	189(71.1%)
Skin Closure	Intermittent	127(95.5%)	128(96.2%)	255(95.9%)
	Subcuticular	06(4.5%)	05(3.8%)	11(4.1%)

The majority of patients in both groups had no serous discharge (81.2% with dressing and 80.5% without dressing), minimal or no erythema (60.2% with dressing and 60.9% without dressing), and no pus discharge (84.2% with dressing and 82% without dressing). Wound dehiscence was rare, with most patients unaffected in both groups (96.2% with dressing and 97% without dressing) as shown in table 3.

Table 3: Wound Complications Based On ASEPSIS Wound Score On Postoperative Day 3

Wound complications		Wound affected					
		0%	<20%	20-39%	40-59%	60-79%	≥ 80%
Serous Discharge	With dressing	108 (81.2%)	8 (6%)	17 (12.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Without dressing	107 (80.5%)	12 (9%)	7 (5.3%)	4 (3%)	3 (2.3%)	0 (0.0%)
Erythema	With dressing	80 (60.2%)	4 (3%)	27 (20.3%)	1 (0.8%)	21 (15.8%)	0 (0.0%)
	Without dressing	81 (60.9%)	1 (0.8%)	19 (14.3%)	4 (3%)	27 (20.3%)	1 (0.8%)
Pus discharge	With dressing	112 (84.2%)	0 (0.0%)	3 (2.3%)	6 (4.5%)	6 (4.5%)	6 (4.5%)
	Without dressing	109 (82%)	0 (0.0%)	5 (3.8%)	3 (2.3%)	11 (8.3%)	5 (3.8%)
Wound dehiscence	With dressing	128 (96.2%)	2 (1.5%)	2 (1.5%)	2 (1.5%)	0 (0.0%)	0 (0.0%)
	Without dressing	129 (97%)	1 (0.8%)	2 (1.5%)	2 (1.5%)	0 (0.0%)	0 (0.0%)

The ASEPSIS wound score indicated that the majority of patients in both groups had satisfactory wound healing (84.2% with dressing and 82.0% without dressing). A slightly higher percentage of patients without dressing (13.5%) experienced a disturbance of healing compared to those with dressing (9.0%). Minor wound healing issues were observed in 6.8% of patients with dressing and 4.5% of patients without dressing, (figure 1).

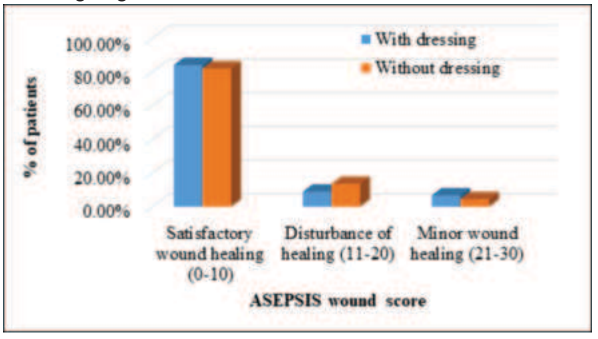

Figure 1: Frequency of distribution of study participants according to ASEPSIS wound score

Among participants, 84.2% with dressing and 82% without dressing had no surgical site infection (SSI), while 15.8% with dressing and 18% without dressing developed SSI. The difference was not statistically significant ($p=0.624$).

There was a statistically significant difference between patients with SSI and Patients without SSI in regard to mean ASEPSIS wound score of Day 3, 5 and 8, (Table 4).

Table 4: Comparison Of ASEPSIS Wound Score According To Surgical Site Infection

Surgical site infection		Mean	SD	P value
ASEPSIS wound score at day 3	Present (n=45)	12.13	3.14	0.0001
	Absent (n=221)	1.0	1.81	
ASEPSIS wound score at day 5	Present (n=45)	20.13	3.14	0.0001
	Absent (n=221)	0.53	1.007	
ASEPSIS wound score at day 8	Present (n=45)	9.13	3.14	0.0001
	Absent (n=221)	0.0	0.0	

The mean hospital stay was significantly longer for participants with dressing (8.31±0.73 days) compared to those without dressing (3.12±0.32 days, $p=0.0001$). The mean time spent on dressing was 20.03±3.14 minutes by doctors, 40.07±7.43 minutes by nurses and attendants each, with a mean dressing material cost of □180.22±22.3.

DISCUSSION

In the present study, the overall proportion of surgical site infections (SSI) was 16.9%, with 15.8% in the dressing group and 18% in the no-dressing group, showing no statistically significant difference ($p>0.05$). These findings align with Setty NKH et al[10], reporting an SSI rate of 21.6%. Globally, SSI rates range from 19.4% to 36.5%, while in India, rates range between 3% and 12%.[11-13]

Hernia surgery was the most common procedure performed in both the groups, followed by appendicectomy, explorative laparotomy, benign breast lump excision, and thyroidectomy. In both groups, the majority of study participants received spinal anaesthesia, followed by general anaesthesia and local anaesthesia. The most commonly used suture material in both groups was Polyglactin, followed by Ethilon and non-absorbable monofilament. Intermittent suturing was predominantly used in both groups, with only a small proportion of participants receiving subcuticular suturing. These findings are consistent with the study by Borkar NB et al.[14]

In current study, post-operative surgical wounds were assessed using the ASEPSIS wound score. Among participants who received dressing, 112 (84.2%) had satisfactory wound healing, 12 (9%) had disturbance of healing, and 9 (6.8%) had minor wound healing. Among those who did not receive dressing, 109 (82%) had satisfactory wound healing, 18 (13.5%) had disturbance of healing, and 6 (4.5%) had minor wound healing. A statistically significant difference was found between patients with and without SSI in terms of the mean ASEPSIS wound score on Days 3, 5, and 8. The mean hospital stay was 8.31 days for participants with dressing, and 3.12 days for those without dressing, with a significant difference observed between the two groups. The increased hospital stay was due to the treatment of wound complications.

The mean time spent by doctors on dressing was 20.03 minutes, while nurses and attendants spent 40.07 minutes each. The mean cost of dressing materials was 203.83 rupees. One limitation of gauze dressings on clean lesions is that they can become saturated with sweat, leading to softened skin margins and an inability to form a solid scab. Frequent dressing changes are necessary to maintain dryness, particularly in hot climates. Additionally, dressing on dry wounds can hinder proper breathing and potentially cause discomfort, especially for thoracic and upper abdominal incisions. Covered wounds require dressing changes that take additional time for both medical and nursing staff during rounds as part of postoperative care.[15] For procedures like appendicectomy or hernia surgery, dressing typically takes 5 to 10 minutes, while dressing an abdominal surgical wound generally takes 10 to 15 minutes. For minor procedures, dressing changes take 15–30 minutes, while for major abdominal surgeries, it takes 30–45 minutes until suture removal. With ten patients hospitalized daily, the house surgeon and nursing staff will spend 1.5 to 2 hours each day on dressing changes. Additionally, time is required for preparing the dressing tray, sterilizing materials, and autoclaving, which adds to the workload.

Nearly 30% of patients reported discomfort due to dressing adhesives, making it the most common adverse event. Pain was often considered an inevitable postoperative issue, leading to its underestimation. Polyurethane and acrylate adhesives were most likely to cause discomfort (9% of patients). About 25% of patients experienced skin issues like peeling, maceration, or contact dermatitis, with polyurethane and acrylates causing more skin peeling and maceration more common with hydrocolloids. Allergies to acrylate and polyurethane are rising, suggesting a need for further research on adhesive-related complications.

Removing adhesive tape can be painful, especially if the dressing stays in place for 5-7 days and hair grows, sticking to the tape. Solvent ether can ease removal, but it's not available in small quantities in our hospital. Surgical wards are prone to pathogenic germs, and understanding wound healing is crucial for preventing complications. Wounds heal faster when their edges are opposed. A study by Borkar NB et al[14] found no significant difference in wound complications between patients with dressings and those without, suggesting that leaving surgical wounds open may not increase infection or dehiscence rates.

Several studies have explored the necessity of dressing on clean surgical wounds. Merei JM et al[16] found no significant difference in infection rates between dressed (1.4%) and undressed (1.7%) pediatric wounds. Chrintz H et al[17] showed no difference in infection rates between prolonged and brief dressing periods, with shorter durations reducing nursing time and costs. Dumville JC et al[18] found no evidence supporting the superiority of any dressing type in preventing surgical site infections. Siah CJ et al[19] noted that silver-containing dressings reduced bacterial colonization but did not significantly lower deep SSIs. Law NH et al[20] and Meylan G et al[21] concluded that dressings did not affect comfort, scar quality, or infection rates, suggesting that they may be unnecessary. In the present study, the mean cost of dressing for various surgeries until suture removal was as follows: Hernia surgeries, 195.34 rupees; Appendectomy surgeries, 198.42 rupees; Exploratory Laparotomy surgeries, 229.5 rupees; Benign breast lump surgeries, 161.25 rupees; and Thyroidectomy surgeries, 262.22 rupees.

After trauma or surgical breach, the host defense system activates, and preventive antibiotics may be essential in preventing infections. The need for dressing might depend on the period after surgery and the use of prophylactic antibiotics. Changing traditional practices of post-surgery dressing can be challenging for surgeons, though the study indicates that patients show significant acceptance towards exposed surgical wounds.

CONCLUSION

The present study concludes that dressing is not mandatory for preventing postoperative surgical wound infections. Clean and clean-contaminated wounds do not develop SSIs even without dressing. There was no significant difference in wound complications between study participants with and without dressing until suture removal. Cost savings from reduced dressing materials and man-hours can be redirected toward managing complex ulcers and severe wounds. Clear parameters for wound management without dressing should include the use of appropriate sterile techniques, elimination of dead space, achievement of hemostasis, and proper appropriation of wound margins.

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