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Comparing Surgical Site Infection, between Dressed and Undressed Wound in Patients Undergoing Clean Abdominal Surgeries

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ABSTRACT

Objectives: To compare the frequency of Surgical Site Infection in dressed versus undressed wounds in patients undergoing clean abdominal surgeries.
Study Design: Quasi-experimental study.
Place and Duration of Study: General Surgical Department, Combined Military Hospital, Rawalpindi Pakistan, from Feb to Jul 2024.
Methodology: A total of 246 patients who fulfilled the selection criteria were enrolled in the study after taking written informed consent. The patients were divided into two Groups i.e. 123 each by odd and even number. Patients in Group A received dressing of the abdominal wounds and Group B did not have any dressing and the outcome measure was assessed till the patients were discharged.
Results: A total of 246 patients were enrolled and were divided into two Groups of 123 patients each. The median (IQR) age of the patients was 39.5 (17.2) years, the median (IQR) duration of hospital stay was 3.1 (2.0) days, the median (IQR) duration of surgery was 45.3 (9.0) minutes and the median (IQR) duration of wound closure was 6.0 (2.0) days. SSI was seen in 13(10.6%) patients in Group A and in 7(5.7%) patient in Group B and the difference between both Groups in terms of SSI was statistically insignificant as indicated by a *p*-value of 0.162.
Conclusion: There was no statistically significant difference between the dressed versus undressed clean abdominal wounds in terms of frequency of Surgical Site Infection.

Keywords: Clean Wounds, Dressing of Wounds, General Surgery, Surgical Site Infection.

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INTRODUCTION

Surgical procedures involving the abdomen are among the most frequently carried out operations.[1,2] A surgical site infection (SSI) can cause complications in up to 25% of closed primary wounds.[3] The risk of having an SSI is multifaceted.[4] Abdominal surgery has one of the highest risks of SSI, especially if the procedure includes the colon or rectum.[5] Modifying preoperative, perioperative, and postoperative variables is one possible method to reduce SSI. After most surgeries in adults, it is common practice to cover closed wounds with a dressing that provides support physically, protects it and absorbs exudate.[6] The role of wound dressing technique in reducing SSI is of great interest.[7]

A sterile bandage is often applied to the predominantly sutured surgical wound at the end of an aseptic surgery.[8] Traditional dressings have not been shown to be effective at keeping bacteria out of wounds, and it has not been established that these dressings are necessary for well sutured surgical wounds with hemostasis 24 hours after surgery.[9] This problem has been partially resolved in the past by retrospectively documenting surgical wounds that were not dressed, and partially by doing comparison tests using sparse data. Experiments have shown that surgical wounds, whether dressed or not, heal uniformly.[10] There is little data regarding how wound dressings or none at all affect the risk of SSI in primary surgical wound healing. Therefore, the current study aimed to compare the frequency of SSI in dressed versus undressed wounds in patients undergoing clean abdominal surgeries. The study would guide about a better approach towards wound closure following surgical interventions which is associated with lesser frequency of SSI and thus helps in reducing further morbidity and cost of treatment and improve patient's satisfaction.

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METHODOLOGY

It was a quasi experimental study, which was carried out after taking approval from the Ethical review committee (ERC number 666, 24/8/2024), in the General Surgical Department of Combined Military Hospital, Rawalpindi for a period of 6 months i.e. from February/2024 till July/2024. The sample size of 246 patients (Figure-I) was calculated keeping the expected percentage of SSI in the dressed wound Group as 7.07%[11] and in the undressed Group as 1.88%,[11] with 95% confidence interval and 5% margin of error.

Inclusion Criteria: Patients of age 18 to 60 years, of both genders, with ASA grade I and II, who underwent clean abdominal surgical procedures were included in the study.

Exclusion Criteria: Patients with ASA grade III or more, with contaminated wounds, with a history of systemic diseases (e.g. diabetes, anemia, coagulopathy, hypoproteinemia), immunocompromised status (e.g. malignancy, acquired immunodeficiency disease), use of steroids and burn wounds or those with excessive drainage from the site of drain were excluded from the study.

Clean wounds of the abdomen were classified as those abdominal wounds which were not infectious, showed no indications of inflammation and were closed. If drainage was required, a closed draining method was preferred and the wounds did not affect the respiratory, digestive, vaginal, or urinary tract.[11,12] The primary outcome measure assessed was the surgical site infection (SSI). SSI was defined as infection that arose up to 30 days after surgery and affected either the incision or deep tissue at the surgical site.[13]

All patients were enrolled after taking written informed consent. A full history, physical examination and local inspection, as well as documentation of the operation conducted of all patients was done and findings were noted down. Preoperative preparation involved taking a surgical site sample from the probable incision, which was then sent for culture and sensitivity testing. The incision site was cleared of hairs only in cases where they obstructed the intended course of treatment. After taking the swab, povidone iodine solution was applied to the operative region. Umbilicus was cleansed. A preventive intravenous injection of 1g of ceftriaxone was given in each case right before the incision, and it was repeated six hours later. Strict aseptic techniques, little and careful tissue manipulation, adequate hemostasis, and the complete obliteration of dead regions were all stressed during the surgical procedures. Silk was used to seal all skin wounds. The duration of the procedure and the length of the incision were noted after the wound was closed. Patients were divided into two equal Groups by odd and even numbers i.e. 123 in each Group. Patients with odd numbers were placed in Group A and those with even numbers were placed in Group B. In Group A patients, the incision was covered with sterile gauze and tape strips until the stitches were removed. Group B patients' wounds were left exposed to the environment following the treatment, whereas drain sites were wrapped with sterile gauze. In Group A, wounds were cleaned with 5% povidone iodine and dressed with sterile gauze, which was replaced as needed. However, in Group B, a 5% povidone iodine solution was applied to the lesion on a daily basis. Patients were monitored daily in the ward and discharged with healthy wounds. Patients were instructed to come back in a week if they experienced any prolonged pain, soreness, discharge, bleeding, seroma, hyperemia or the formation of an abscess, which are indicators of a SSI. During the follow-up, a culture swab was obtained and sent for sensitivity testing to detect infection. Antibiotics were administered based on clinical necessity, culture, and sensitivity. Patients were discharged depending on the clinical condition and duration of hospital stay was noted down. Patients' stitches were removed on the eighth postoperative day if the wounds were healthy and clean. Following discharge from the hospital, follow-up was conducted after one week, two weeks and four weeks to look for any signs of infection. Findings were noted down and were subjected to statistical analysis.

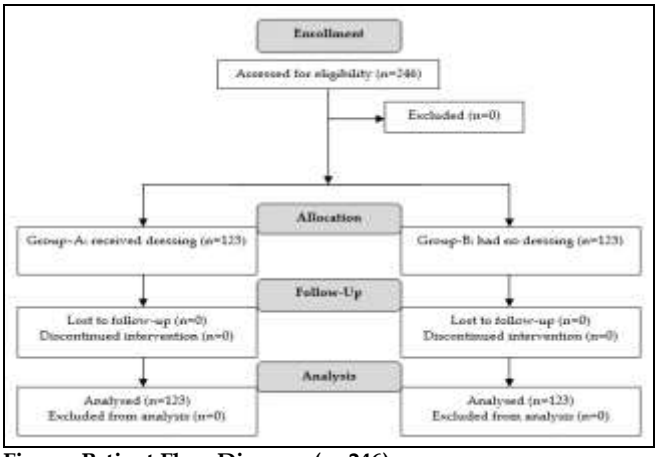

Figure: Patient Flow Diagram (n=246)

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 25.0 Normality of data was checked using Shapiro-wilk test and it was found that all variables that were assessed were non-normal in distribution. Quantitative variables such as age, length of hospital stay, duration of surgery and wound closure time was presented as median and IQR. Qualitative data such as gender, ASA grade, type of abdominal surgery and SSI was presented as frequency and percentage. Comparison of both Groups in terms of SSI was done by using Chi square test as the data was non-normal in distribution and a *p*-value of ≤0.05 will be considered significant.

RESULTS

A total of 246 patients were enrolled. The median (IQR) age of the patients was 39.5 (17.2) years, the median (IQR) duration of hospital stay was 3.1(2.0) days, the median (IQR) duration of surgery was 45.3 (9.0) minutes and the median (IQR) duration of wound closure was 6.0(2) days (Table-I).

Table-I: Descriptive Statistics of Study Sample (n=246)

Variables	Mean±Standard Deviation
Age (in years)	39.5 (17.2)
Duration of hospital stay (in days)	3.1 (2.0)
Duration of surgery (in minutes)	45.3 (9.0)
Wound closure time (in days)	6.0 (2.0)

In terms of age Group, in Group A, there were 19(15.5%) patients of age 18 to 30 years, 71(57.7%) patients of age 31 to 45 years and 33(26.8%) patients of age Group 46 to 60 years, whereas, in Group B, there were 35(28.5%) patients in age Group 18 to 30 years, 52(42.3%) patients in the age Group 31 to 45 years and 36(29.2%) patients in the age Group of 46 to 60 years. In Group A, there were 85(69.1%) males and 38(30.9%) females and in Group B there were 67(54.5%) males and 56(45.5%) females. In Group A, 61(49.6%) patients were of ASA grade I and 62(50.4%) patients were of ASA grade II and in Group B, 43(35%) patients were of ASA grade I and 80(65%) patients were of ASA grade II. In Group A, herniorrhaphy was carried out in 50(40.6%) patients, cesarean section was carried out in 19(15.5%) patients, laparotomy was carried out in 19(15.5%) patients, appendectomy was performed in 15(12.1%) patients, adrenalectomy was done in 7(5.7%) patient and ovarian surgery was carried out in 13(10.6%) patients and in Group B, herniorrhaphy was carried out in 54(43.9%) patients, cesarean section was performed in 21(17.1%) patients, laparotomy was done in 26(21.1%) patients, appendectomy was carried out in 13(10.6%) patients and 9(4.3%) patient had cholecystectomy (Table-II).

Table-II: Frequency of Qualitative Variables in both Groups (n=246)

Variables	Groups	
	Dressed wounds (n=123)	Undressed wounds (n=123)
Age Group:		
18 to 30 years	19(15.5%)	35(28.5%)
31 to 45 years	71(57.7%)	52(42.3%)
46 to 60 years	33(26.8%)	36(29.2%)
Gender:		
Male	85(69.1%)	67(54.5%)
Female	38(30.9%)	56(45.5%)
American Society of Anesthesiologists (ASA) Grades:		
Grade I	61(49.6%)	43(35%)
Grade II	62(50.4%)	80(65%)
Type of surgery:		
Herniorrhaphy	50(40.6%)	54(43.9%)
Cesarean section	19(15.5%)	21(17.1%)
Laparotomy	19(15.5%)	26(21.1%)
Appendectomy	15(12.1%)	13(10.6%)
Cholecystectomy	7(5.7%)	9(7.3%)
Ovarian surgery	13(10.6%)	0(0.0%)

SSI was seen in 13(10.6%) patients in Group A and in 7(5.7%) patient in Group B and the difference between both Groups in terms of SSI was statistically insignificant as indicated by a *p*-value of 0.162 (Table-III).

Table-III: Frequency of Surgical Site Infection in Dressed versus Undressed Clean Abdominal Wounds (n=246)

Variables	Groups		*p*-value
	Dressed wounds (n=123)	Undressed wounds (n=123)	
Surgical Site Infection:			
Yes	13(10.6%)	7(5.7%)	0.162
No	110(89.4%)	116(94.3%)	

DISCUSSION

The current study results revealed that in patients with clean abdominal wounds, the frequency of SSI in the dressing Group was 10.6% and in the undressed wounds Group was 5.7% and this difference was not of statistical significance (*p*=0.162). Majority of the participants in both Groups were of age Group 31 to 45 years, were males, had ASA grade II and the commonest surgical procedure carried out was herniorrhaphy followed by laparotomy and cesarean section.

The primary goal of treating wounds is to avoid infection.[14] Some hospitals continue to treat surgical wounds until the stitches are removed. Dressing

methods range from totally coated with adhesive plaster to light gauze dressings with a few tape strips holding the gauze in place.[15] Some medical professionals use aseptic measures to treat wounds, such as sterile gloves, tools and masks; others, however, just "clean" the wounds with their own hands without wearing gloves.[16] While some hospitals employ dressing carts, others use sterile dressings that are individually packaged.

When the surgical principles of skin preparation, hemostasis, precise manipulation of tissue and obliteration of dead space are followed, dressing clean surgical wounds becomes a ritual.[18] Previous literature has shown that postoperative wound coverage is crucial for preventing infection during healing. However, few researchers discovered that omitting the dressing had no effect on wound healing.[19] Additional research has demonstrated that there is no negative impact on the patient when dressings are changed or removed from wounds without drains.[20] Research has shown that medical personnel can save time and money by having clean surgical areas exposed to them, rather than increasing the risk of wound infection. Additionally, no such study have been conducted so far in Pakistan. Since conflicting evidence has been yielded for whether or not a dressing should be used for clean wounds, and keeping in view paucity of local data, our study was carried out to compare the clean abdominal wounds which were covered with dressing versus those without it.

Our study results revealed that patients whose clean abdominal wounds were dressed had an SSI rate of 10.6% compared to 5.7% in those who did not have any dressing. In their study of non-contaminated elective surgical cases, Law and Ellis discovered a postoperative infection rate of 5.42% in all cases studied, as well as a 7.07% rate of infection of wound in patients who received dressings, compared to 1.88% in patients whose wounds were exposed.[14] Similarly, in another study on clean elective surgical wounds, the infection rate was 11% in patients with occlusive dressing and an 8% infection rate in individuals with open wounds.[15] Grover and colleagues discovered that SSI occurred in 8% of patients who had occlusive dressings, whereas in 6% of patients whose wounds were left exposed to the environment.[16] The rates of SSIs in surgical wounds covered with various dressings and those left exposed did not differ, according to a meta-analysis.[17] These findings support our study findings that there is no significant difference between dressed versus undressed clean abdominal wounds in terms of SSI.

Wound exposure creates a dry environment, which accelerates the production of protective coagulum. The study found that exposing the wound does not lead to an increase in infection. Clean surgical wounds can be safely maintained without dressing and can be easily evaluated by surgeons. This also saves nurses' time and hospital expenditures, which is crucial in impoverished nations.

LIMITATIONS OF STUDY

The current study had few limitations. Firstly, the sample size was small and the study was carried out at a single center so there is an issue of generalizability of the results. Secondly, patients were followed up over a short period of time, so long term complications were not assessed. Thirdly, only those patients were enrolled who had clean abdominal wounds and no such patients were included who had contaminated wounds so the findings cannot be implied over those wounds.

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CONCLUSION

The current study concluded that in patients with clean abdominal wounds, there was no statistically significant difference between the patients who received dressing versus those who did not. The study results proposed that using wound dressings does not significantly reduce postoperative wound complication i.e. surgical site infection. We feel that more surgical wounds than those in our study can be safely kept uncovered.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SA & BS: Data acquisition, data analysis, critical review, approval of the final version to be published.

IA & AS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

LHA & TMQ: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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