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The Impact of Subcutaneous Vacuum Suction Drains on Abdominal Wound Complications in Rural Indian Patients Undergoing Emergency Laparotomy

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ABSTRACT

Surgical Site Infection and wound healing are reported more commonly in abdominal surgeries. Wound dehiscence following SSI is a significant concern. Subcutaneous negative suction drainage will reduce the incidence of SSI and wound dehiscence by draining seroma, promoting wound healing.

Objective:

This study's objective is to assess and evaluate the impact of subcutaneous drains on the incidence of surgical site infections following an emergency laparotomy procedure.

Methodology:

A total sample size of 50 patients within the inclusion criteria for 12 months was taken. Patients are followed for 15 days after surgery and are divided into 2 groups as Group A (study group): Emergency surgeries were done with subcutaneous drains. Group B (control group): Emergency surgeries were done without subcutaneous drains. Central randomization was performed.

Results:

50 patients were included in the study, with 25 in each group. Hematoma formation was significantly higher among group B (24.0%) than among group A (4.0%). Seroma formation (p-value =0.03917), SSI rate (p-value =0.039), and wound dehiscence/burst abdomen (p-value =0.0415) were more in group B than in group A. The mean wound healing time (days) and mean hospital stay (days) were significantly more in group B.

Conclusion:

Surgical site infection is commonly due to abdominal cavity infection rather than nosocomial infection. The subcutaneous suction drainage tube is an effective method of abdominal wall closure in cases of peritonitis compared to conventional primary skin closure without drain as it

significantly reduces the incidence of wound infection, dehiscence, wound secondary suturing and duration of hospital stay in SSI.

Keywords : Subcutaneous Vacuum Suction Drains Abdominal Wound, Wound Complication, Emergency Laparotomy, Post Laparotomy Complication, Suction Drain

I. INTRODUCTION

The layers of the anterior abdominal wall are as follows: peritoneum, extraperitoneal fascia (deep fascia), muscle, superficial fascia, subcutaneous tissue, and skin. [1] It is critical to understand the different layers and levels of tissue for abdominal wound closure. An abdominal wound can form due to a disruption in the anterior abdominal wall caused by trauma or surgical intervention to obtain entry to the peritoneal cavity. The most frequent incision for laparotomy is a vertical midline incision. Surgical complications after emergency laparotomy are classified as early and late complications. Early wound complications include hematoma formation, wound infection, burst abdomen (evisceration of bowel/abdominal fluids), and wound dehiscence (fascial disruption without evisceration). Suture sinus, incisional (ventral) hernia, and chronic wound pain are all late complications. [2]

One of the major complications of abdominal surgery is the formation of a hematoma. Hematoma formation renders the wound susceptible to secondary infection. [3] Another complication after abdominal surgery is seroma formation, which can result in wound infection, wound dehiscence, seroma calcification, a poor cosmetic outcome, and an unsatisfactory image of a surgical scar. [4] One of the most prevalent post-operative complications is surgical site infection (SSI), occurring in at least 5% of all surgical patients and 30-40% of patients having abdominal surgery, depending on the percentage between the 5th and 10th post-operative days. The most common sources of post-operative morbidity in abdominal surgery are infectious complications. The most prevalent type of infection is superficial wound infection, which occurs within the first week of surgery. [5] SSI is associated with a longer hospital stay, which leads to higher healthcare expenses. [6-9] Determining prevention strategies could thus improve patient care while reducing the length and expense of hospital stay in at-risk patients. Complications of abdominal operations include abdominal wound dehiscence and burst abdomen. Burst abdomen happens in 1.03% of operations, has a 15-20% mortality rate, and necessitates immediate reoperation. Various patient and surgical variables influence the outcome of a laparotomy wound. Several interventions have been suggested to reduce abdominal wound complications. A number of them are used daily. Hand washing, shaving as little as possible, skin preparation, preoperative prophylactic antibiotics, and the type of incision, suture material used, and closure technique have all gained recognition in the surgical community. [11-14] It has been demonstrated that the insertion of a subcutaneous drain provides no benefit following cholecystectomies, hernia repair, and other types of elective surgery. However, using a subcutaneous vacuum suction drain may help reduce abdominal wound complications in emergency laparotomy patients. [15]

II. MATERIALS AND METHODS

This prospective observational comparative study was conducted at GEMS Medical college and hospital,

Srikakulam, a tertiary care center. All the patients undergoing emergency laparotomy were entertained in the study. The total sample size was 50 and divided randomly into two groups of 25 each by closed envelop technique. By this sampling technique, both groups are statistically similar in terms of various variables and thus comparable. Group A consists of patients in which subcutaneous vacuum suction drain placement is done. Group B contains patients in which subcutaneous vacuum suction drain placement was not done.

Criteria for Inclusion:

Patients of any gender or age who are undergoing an emergency laparotomy and are ready to undergo investigations and treatment were eligible.

Criteria for Exclusion:

Cases undergoing laparotomy for gynecological reasons, accidental removal of subcutaneous vacuum suction drain, death of the patient in the post-operative period, patient not giving permission, and the patient needing re-exploration after first surgery were excluded.

All laparotomy patients underwent a thorough history, physical examination, and appropriate routine investigation. All patients received nasogastric suctioning, fluid and electrolyte correction, and a suitable antibiotic.

All subjects received a preoperative antibiotic. In both groups, laparotomies were done through a vertical midline incision. In both groups, the rectus was closed with a straightforward continuous polypropylene suture. During abdominal closure, group A used a suitable vacuum suction drain in the subcutaneous plane. During the post-operative time, both groups received the same antibiotic combination.

Post-operatively, surgical site incisions were regularly examined for hematoma formation, seroma formation, surgical site infection, wound dehiscence/burst abdomen, hospital stay, and wound healing time.

The amount and content of the drains were also monitored daily. The drain is removed when the output is zero or 5 ml in 24 hours. The outcomes of the two groups were compared and evaluated.

III.RESULTS

Group A (drain group) and Group B (non-drain group) are statistically similar and thus equivalent in various variables. As shown in (Table 1), there was no significant variation in patient distribution by gender between drain and non-drain groups.

Table 1: Distribution of gender between both groups.

GENDER	Drain group N (%)	Non-drain group N (%)
MALE	11(44)	13(52)
FEMALE	14(56)	12(48)

There was no significant difference between the drain and non-drain groups in the distribution of patients with a history of diabetes mellitus, steroid use, or smoking. The unpaired t-test compared the mean hemoglobin, serum albumin, and BMI (Kg/m2) between the drain and non-drain groups. There was no difference in mean serum urea and creatinine levels and systolic and diastolic blood pressure between the drain and non-drain groups.

Table 2: Distribution of post-operative wound complications.

Complication	Drain group N (%)	Non-drain group N (%)	P value
Hematoma formation	1 (4)	6 (24)	0.041
Seroma formation	2 (8)	8 (32)	0.039
Wound infection/SSI	2 (8)	8 (32)	0.039
Wound dehiscence/burst abdomen	1 (4)	6 (24)	0.0415
Mean wound healing time	6.04 days	10.32 days	<0.0001
Duration of	6.52 days	8.96 days	0.004

hospital stay			

The distribution of various post-operative wound complications such as hematoma, seroma, wound infection, wound dehiscence, and mean wound healing time. Hospital stay among the two groups was examined in Table 2, and these variables were found to be statistically significant. The drain was maintained in the drain group for an average of 3.48 days, with a standard deviation of 1.08.

IV. DISCUSSION

One of the most frequent complications of an abdominal wound after an emergency laparotomy is SSI. This research aims to use drains to clear blood and serous fluids from the wound before they become infected. [19]

As specified by the Centers for Disease Control and Prevention (CDC) criteria, SSI cases were identified within 30 post-operative days using ICT (information and communications technology): Purulent drainage from the superficial incision, with or without laboratory confirmation; organisms isolated from a culture of fluid or tissue obtained aseptically from the superficial incision; at least one of the following indications or symptoms of infection: pain or tenderness, localized swelling, redness, or heat; and the superficial incision was deliberately opened by the surgeon unless the incision was culture negative; and s-SSI diagnosis by the surgeon or ICT.

The incidence of s-SSI is believed to be linked to the amount of bacterium in the wound, the formation of hematoma, the pool of serous effusion, potential subcutaneous dead space, disturbance of the local circulation, and the amount of bacterium in the surgical organ. [20] A subcutaneous drain lowers the amount of bacteria around the wound and removes residual effusion and blood from the wound, which serves as a breeding ground for bacteria. A closed drain is an active drain that uses suction force. [21] Negative suction drains also provide a moist and protected environment, decrease edema around the wound, and improve circulation around the wound, resulting in faster wound healing.

In our research, SSI was significantly higher in the non-drain group (32.0%) than in the drain group (8.0%). According to Gupta and Kumar's study, 50% and 24% of patients developed surgical site infection in the non-drain and drain groups, respectively; Razavi et al. where discovered 139 patients (17.40%) suffered from SSI, Renvall et al., where SSI rate in acute surgery was 12.4%, Tanzania (15.6%), Pakistan (13.5%), and Vietnam (14.9%). [20,22-26] According to Vaghani et al., the surgical site infection incidence was 25% in the study group and 57.7% in the non-drain group. [27]

In the research by Patel et al., of 31 patients in the study group (with drain) who had undergone surgery for perforation peritonitis, only 2 patients (6.45%) had wound infection, compared to 16 patients (51.61%) in the non-drain group. [30] This was lower than the infection rate reported in the study by Adejumo et al., where SSI was found in 85 patients, giving an incidence rate of 38.1%. [28] Fujii et al. included high-risk patients, including emergency laparotomies and patients with thick subcutaneous fat, and the risk ratio revealed that the drain group had a lower SSI rate (RR 0.37). (0.15-0.9). [29]

Our research found Seroma formation was significantly higher in group B than in group A (32% in the non-drain group and 8% in the drain group). This was comparable to the Chowdri et al. study. [31] In our research, the non-drain group had a longer average hospital stay than the drain group. The average hospital stay in the study by Vaghani et al. was 121.5 days for group A and 181.5 days for group B (standard simple closure without any drain). [27] In our research, the non-drain group had a significantly longer average wound healing time (10.322.19 days) than the drain group (6.041.95 days). According to Vashist et al. (2013), the typical duration of wound healing time was 10 days in the drain group and 14 days in the non-drain group. [32]

V. CONCLUSION

The most prevalent surgical site infection cause is abdominal cavity rather than nosocomial infection. Compared to other methods of abdominal wall closure in instances of peritonitis, a subcutaneous suction drainage tube is more successful. Conventional primary skin closure without drain because it decreases the incidence of wound infection, dehiscence, wound secondary suturing, and hospital stay in SSI. Using a subcutaneous suction drainage tube allows for a faster healing rate, as well as reduced morbidity and early rehabilitation. As a result, in patients undergoing emergency laparotomy surgery, a subcutaneous suction drainage tube should be considered in abdominal wall closure.

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