

# Role of Subcutaneous Suction Drain in Open Laparotomy Wounds

Bandi Satyadeep<sup>1</sup>, Chinachinnagari Nikhil Kumar Reddy<sup>2</sup>, Nagarala Sai Shashank Reddy<sup>3</sup>, Yerrolla Priyanka<sup>3</sup>, Malipreddi Yashaswi Ram<sup>4</sup>

<sup>1</sup>Senior Resident, Department of General Surgery, SVS Medical College & Hospital, Mahabubnagar, Telangana, India

<sup>2</sup>Third Year Post Graduate, Department of General Surgery, SVS Medical College & Hospital, Mahabubnagar, Telangana, India

<sup>3</sup>Second Year Post Graduates, Department of General Surgery, SVS Medical College & Hospital, Mahabubnagar, Telangana, India

<sup>4</sup>MBBS, Kakatiya Medical College, Warangal, Telangana, India

**Abstract:** *Background:* Prevention of Surgical Site Infections (SSI) is of great interest to any practicing surgeon. Our task after surgery is to prevent and thereby to decrease the adverse effects of wound complications. Wound seroma, hematoma and SSI are the most common complications. A number of methods have been used from time to time to decrease these complications. Among many methods to control and prevent SSI, subcutaneous suction drains play a prominent role by draining the debris or serum and removing the empty space below the wound. In this article, the role of subcutaneous drains in open laparotomy wounds will be evaluated. *Conclusion:* Placement of subcutaneous suction drains in patients undergoing open laparotomy helps in decreasing the chances of wound complications, decreasing the hospital stay and aids in faster recovery.

**Keywords:** Open laparotomy, subcutaneous suction drains, wound infection.

## 1. Introduction

We are concerned about the wound healing in postoperative patients, since wound complications will increase the morbidity of patient.

Our task after surgery is to avoid and decrease the adverse effects of wound complications. Wound seromas, hematomas and surgical site infections are the most common complications. A number of methods have been used by us from time to time to decrease these complications. Use of subcutaneous drain in surgical wounds is one among them. The rationale for the use of subcutaneous drain is based on the principle that removal of the collecting serum or debris and elimination of dead space in subcutaneous plane will result in lower rate of infection and wound complications. Only a few studies are available in the literature regarding the role of subcutaneous drain in the prevention of local wound complications and majority of these studies were done in female patients who undergo gynaecological or breast surgeries, with controversial results.

### Aims and Objectives

- 1) To know the role of subcutaneous suction drains in open laparotomy wounds.
- 2) To know whether it
  - a) Decreases role of wound infection
  - b) Decrease overall hospital stay
  - c) Its effectiveness in reducing morbidities related to SSI like delayed wound healing, prolonged dressing, wound dehiscence and secondary suturing.

## 2. Materials and Methods

### Source of patients:

This is a prospective study conducted on 50 patients attending casualty and surgical outpatient clinic during the study period over 2 years. Subjects in this group include all individuals who underwent open laparotomy. Randomization is done by allotting random numbers to all patients, these patients were divided into 2 groups, i. e., patients who had subcutaneous drain and patients who didn't had.

All the patients were studied and clinical findings were recorded as per proforma in the case sheet. Necessary investigations were done and analyzed for etiological factors, precipitating factors and complications.

Name, age, occupation, socioeconomic status, residence were recorded in the proforma case sheet. The presenting complaints and details were recorded in chronological order. Detailed physical examination including nutritional status, built, status of vascular system and neurological system were recorded. Detailed local examination of involved part done.

GROUP 1 was based on patients who had subcutaneous drain (25).

GROUP 2 was based on patients who didn't had subcutaneous drain (25).

**Device:** Subcutaneous suction drains were placed in open laparotomy wounds.

### Inclusion Criteria:

- 1) All age groups
- 2) Both the sexes
- 3) All the patients who underwent open laparotomy surgeries irrespective of their pathologies.

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**Exclusion Criteria:**

Patient who had died immediate postoperative period less than 10 days were excluded.

**3. Results**

**Table 1: Age Group Distribution**

Age Groups		Group 1 (N=25)	Group 2 (N=25)	P value	Total (N=50)
20 - 30	Number (Percentage)	0 (0)	2 (8)	0.24	2 (4)
31 - 40		6 (24)	9 (36)		15 (30)
41 - 50		15 (60)	9 (36)		24 (48)
51 - 60		4 (16)	5 (20)		9 (18)

**Table 2: Gender Distribution**

Gender		Group 1 (N=25)	Group 2 (N=25)	P value	Total (N=50)
Males	Number (Percentage)	11 (50)	11 (50)	1	22 (44)
Females		14 (50)	14 (50)		28 (56)

**Table 3: Type of Surgery**

Type of Surgery		Group 1 (N=25)	Group 2 (N=25)	P value	Total (N=50)
Cholecystectomy	Number (Percentage)	10 (40)	10 (40)	0.006	20 (40)
Incisional Hernia Repair		2 (8)	12 (48)		14 (28)
Right Hemicolectomy		5 (20)	1 (4)		6 (12)
Hysterectomy		4 (16)	2 (8)		6 (12)
GJ with Vagotomy		4 (16)	0 (0)		4 (8)

(Based on Adjusted Standardized Residuals, patients who underwent Incisional Hernia Procedure had significantly lesser percentage of Subcutaneous drain and patients who underwent GJ with Vagotomy had significantly higher percentage of Subcutaneous Drain).

**Table 4: Wound Complication**

Wound Complication		Group 1 (N=25)	Group 2 (N=25)	P value	Total (N=50)
Yes	Number (Percentage)	3 (12)	10 (40)	0.024	13 (26)
No		22 (88)	15 (60)		37 (74)

**Table 5: Intervention Done**

Intervention Done		Group 1 (N=25)	Group 2 (N=25)	P value	Total (N=50)
Yes	Number (Percentage)	2 (8)	10 (40)	0.008	12 (24)
No		23 (92)	15 (60)		38 (76)

**Table 6: Duration of Hospital Stay**

Duration of Hospital Stay	Seroma	Group 1 (N=25)	Group 2 (N=25)	P value	Total (N=50)
Median (IQR)	Yes	5 (3 - 7)	5 (3.5 - 15.5)	0.01	5 (3 - 8)
Mean ± SD	No	5.12 ± 2.05	8.72 ± 6.35		6.92 ± 5.01

**Table 7: Seroma**

Seroma		Group 1 (N=25)	Group 2 (N=25)	P value	Total (N=50)
Yes	Number (Percentage)	0 (0)	6 (24)	0.009	6 (12)
No		25 (100)	19 (76)		44 (88)

**Table 8: Hematoma**

Hematoma		Group 1 (N=25)	Group 2 (N=25)	P value	Total (N=50)
Yes	Number (Percentage)	0 (0)	1 (4)	1	1 (2)
No		25 (100)	24 (96)		49 (98)

**Table 9: SSI**

SSI		Group 1 (N=25)	Group 2 (N=25)	P value	Total (N=50)
Yes	Number (Percentage)	1 (4)	4 (16)	0.349	5 (10)
No		24 (96)	21 (84)		45 (90)

In this study, the statistically significant difference was noted between the 2 groups in terms of Wound complications (p=0.024) with group 1 having 12% of complications and group 2 with 40%. In this study the intervention needed in group 1 was 8% and in group 2 was 40%. In this study the Mean SD duration of hospital stay in group 1 (5.12± 2.05) and in group 2 (8.72 ± 6.35). In this study seroma formation in group 1 was 0% and group 2 it was 24%. In this study the hematoma formation in group 1 was 0% and in group 2 it was 4%. In this study the SSI in group 1 was 4% and in group 2 it was 16%.

**Statistical Analysis:** The Statistical analysis was performed by SPSS 23.0 version. Continuous variables were described as mean and variation of each observation from the mean value (Standard deviation) represented as mean ± SD (analyzed using unpaired T test) or Median (IQR) (analyzed using Mann Whitney U test) if they fail to follow normal distribution. Categorical variables were described by taking percentage and analyzed using Chi Square test. Variables with p value <0.05 was considered as statistically significant.

**4. Discussion**

Any surgery in individuals will have complications whether done electively or emergency. These include seroma, hematoma, wound dehiscence and surgical site infections. Local wound complications increase the morbidity of the patient. These complications will prolong the hospital stay of the patient and cause economic burden to the patient.

Local wound complications occur more frequently in obese individuals due to the increased subcutaneous fat thickness in these patients. So after skin incision with scalpel, during the dissection of subcutaneous plane, the use of diathermy to arrest bleeding points in subcutaneous plane will all lead to the subcutaneous fat lysis and seroma formation. Any bleeding point in subcutaneous plane if not arrested properly

could lead to hematoma formation in wound. These collections in the wound act as a nidus for infection.

Surgical site infections are dangerous due to the emergence of multidrug resistant organisms and will lead to wound dehiscence. Wound dehiscence cannot be sutured secondarily because of persisting wound infection and also discharging seroma or hematoma. They have to be treated daily with cleaning and dressing, intravenous antibiotics according to the culture and sensitivity reports. All the collections underneath the wound must be let out. If seroma or hematoma not drained adequately, it could lead to secondary infection with pus formation and purulent discharge. Because of these complications, hospital stay of patients will be increased and also mobilization of patients will be delayed. This could lead to respiratory complications. So obese patients should be encouraged to lose weight before undergoing elective abdominal surgeries like ventral hernias, cholecystectomy for gall stone disease.

Patients with abdominal malignancies need to be operated immediately as there will be no minimal time for them to undergo weight loss program. Obese patients with huge incisional hernia will have increased risk of abdominal compartment syndrome. This can be addressed with creating sequential pneumoperitoneum to increase the abdominal capacity and respiratory complications in these patients can be addressed by advising respiratory exercises such as incentive spirometry.

Number of methods have been developed to decrease the local wound complications. These methods include the placement of a subcutaneous drain to let out the collections underneath the wound, administration of intravenous antibiotic prior to making the skin incision to decrease the surgical site infections. Subcutaneous drains help to let out the seroma, hematoma and any purulent discharge. This decreases the chance of wound dehiscence. This helps in the faster recovery of the patient and early mobilization of the patient.

In our study the role of subcutaneous drains in the individuals undergoing elective abdominal surgeries have been studied. It is a prospective cohort study involving fifty patients with above mentioned criteria. Subcutaneous tube drains kept in twenty five patients. Another twenty five patients without subcutaneous drains were compared for the occurrence of local wound complications. The parameters such as length of hospital stay, number of patients requiring intervention studied. The results are compared among the two groups. All the patients are discharged only after drain removal. The study group consists of 50 patients. Total number of male patients in the study group is 22 and the female patients are 28. The mean age group of the patients included in the study is around 40 years. The patients are selected by systemic random sampling. Wound complications observed in 3 patients with subcutaneous drain which forms 12% of the total patients with subcutaneous drain. Wound complications observed in 10 patients without subcutaneous drain which forms 40% of the total patients without subcutaneous drain. Comparing these two data found to be statistically significant with P value <

0.05. Thus the incidence of wound complication is low in those with subcutaneous drain than those without drain.

Wound complications such as seroma, hematoma, pain and surgical site infections studied. In our study, seroma occurred in 6 patients in whom the subcutaneous drain was not kept which represents 24% of those without subcutaneous drain. Intervention was done in all 6 patients. Seroma evacuated by removing one or two sutures and applying pressure dressing over it. Seroma resolved in all the 6 patients. The maximum duration of stay in hospital for the patients with seroma is 21 days. Thus, the development of seroma is more with the patients without subcutaneous drain when compared to those with subcutaneous drain.

In our study Hematoma occurred in 1 patient in whom the subcutaneous drain was not kept, which represents 4% of those without subcutaneous drain. Hematoma is evacuated under local anaesthesia with sterile aseptic precautions and daily dressing done. Thus, the occurrence of hematoma is more in patients without subcutaneous drain than compared to those with subcutaneous drain. The maximum duration of hospital stay is 25 days.

In our study it is considered that patients who presents with pus discharge and clinical features of infection comes under surgical site infection. In our study 5 patients developed SSI. It is found to be superficial SSI in all 5 cases. SSI occurred in 1 patient with subcutaneous drain which represents 4% of those with drain and SSI occurred in 4 patients without subcutaneous drain which represents 16% of those without drain. Intervention is done in all the 5 patients. Antibiotics are started according to culture & sensitivity and wound cleaning and dressing done three times a day. Among the 5 patients, 1 patient developed wound gaping without drain for which wound debridement and secondary suturing done.

Thus, the incidence of SSI is more in those without subcutaneous drain than those with subcutaneous drain. The maximum duration of hospital stay is 15 days. SSI occurred in less number of patients with subcutaneous drain. Intervention needed for 10 patients without subcutaneous drains which forms 40% of the group without drain. Intervention needed only for 2 patients with subcutaneous drain which forms 8% of the group with drain. On comparing these two data, P value is found to be less than 0.05 which is statistically significant.

Thus, intervention is done in more number of patients without subcutaneous drain than those with subcutaneous drain. Also the group of patients with subcutaneous drain had mean stay in the hospital of 5 days. Mean stay of the patients with subcutaneous drain is low when compared with the mean stay of 8.7 days for the group of patients without subcutaneous drain. Thus, subcutaneous drain when kept in individuals who undergo elective abdominal surgeries had lesser incidence of local wound complications and lesser hospital stay when compared to those patients without subcutaneous drain.

## 5. Conclusion

Results from the present study show that patients undergoing elective laparotomy suffer from local wound complications such as seroma, hematoma, pain at the wound site, wound dehiscence and surgical site infections. These complications occur because of increased subcutaneous fat thickness, poorly controlled bleeding points in subcutaneous plane, poorly maintained aseptic precautions, improper surgical techniques. These will lead to increased morbidity for the patients and prolonged hospital stay. These complications can be decreased with the use of subcutaneous drain to let out the collections in the wound. In our study we found that patients undergoing elective laparotomy with subcutaneous drains had no seroma, no hematoma and lesser incidence of surgical site infections. Only few patients needed intervention in the form of secondary suturing of the wound when compared with patients without subcutaneous drain. Also the hospital stay of the patients with subcutaneous drain is lower when compared with those without subcutaneous drain. Thus placement of a subcutaneous drain in individuals helps in reducing the local wound complications and reducing the hospital stay of the patients and also aids in faster recovery.

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