

Role of Prophylactic Subcutaneous Drain in Obese Patients Undergoing Elective Abdominal Surgery -A Cohort Study

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Abstract: Background: Prophylactic drainage of wounds is aimed to reduce the wound complications and thereby morbidity. Obese patients are at more risk. The objective of the present study was to determine whether subcutaneous drainage can reduce such complications in elective abdominal surgery in obese patients.

Materials and Methods: It is a prospective open comparative study carried over a period of one year. Patients were randomized before surgery and divided into two groups by systemic random sampling. Total sample size 150 with 75 in each group. All patients will receive same preparations. The outcome is measured with the following parameters such as seroma, hematoma, pain and surgical site infection between the two groups

Results: Wound complications observed in 6 patients with subcutaneous drain which forms 8% of the total patients with subcutaneous drain. Wound complications observed in 25 patients without subcutaneous drain which forms 33.3% 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

Conclusion: Subcutaneous drain when kept in obese individuals with more subcutaneous fat thickness who undergo elective abdominal surgeries had lesser incidence of local wound complications and lesser hospital stay when compared to those patients without subcutaneous drain

Key Word: subcutaneous drain, obesity, elective surgery, SSI

Date of Submission: 10-01-2020

Date of Acceptance: 27-01-2020

I. Introduction

We are concerned about the wound healing in post-operative patients, since wound complications will increase the morbidity of patient. Wound management is a basic practice in surgery, especially after an elective abdominal surgery. Our task after surgery is to avoid and thereby to reduce the adverse effects of wound complications. Wound seromas, hematomas and surgical site infections are the most common complications. Obesity is increasing to epidemic proportions throughout the world, especially in developed countries. ¹Obese patients are at risk for the local wound complications. A number of methods have been used by us from time to time to reduce 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 complications². 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 gynaecological³⁻⁶ or breast surgeries⁷, with controversial results. Many elective abdominal surgeries are routinely performed in general surgical units of our institution and a subcutaneous collection in such patients increases the morbidity

II. Material and methods

It is a prospective open comparative study carried over a period of one year in patients of Department of General Surgery, Coimbatore Medical College Hospital. Patients were randomized before surgery and divided into two groups by systemic random sampling. Total sample size 150 with 75 in each group

Study Design: Prospective cohort study

Study Location: This was a tertiary care teaching hospital based study done in Department of General Surgery, Coimbatore Medical College Hospital

Study Duration: January 2018 to December 2018

Sample size: 150 patients

Inclusion criteria

1. Patients with BMI of more than 32.
2. Patients with subcutaneous fat thickness of more than 3 cms
3. Patients undergoing elective abdominal surgeries like ventral hernia repair, gastric surgeries and colo rectal surgeries etc.
4. Patients of either sex with age of between 20-60years.

Exclusion criteria

1. Patients with sepsis and spillage.
2. Patients undergoing laparoscopic surgery.
3. Patients undergoing revision surgeries.
4. Patients with associated comorbidities such as diabetes, advanced malignancy, steroid intake, radiotherapy, hepatic and renal insufficiency.

Procedure methodology

After written informed consent was obtained, Patients were randomized before surgery and divided into two groups by systemic random sampling. All patients will receive same preparations.

1. Enema in morning of day of surgery.
2. Patients should take shower 1 day before surgery and body hair removal
3. Surgical field disinfected by use of povidone iodine.
4. Injection cefotaxime 1g i.v just before skin incision.
5. Skin incision made with scalpel.
6. Subcutaneous fat dissected with electrocautery.
7. Surgical instruments to be exchanged just before muscle Closure.
8. Wound irrigated with saline just before skin closure.
9. Subcutaneous layer closed with chromic catgut.
10. Only closed tube drain is preferred since corrugated drain itself can predispose infections.
11. Subcutaneous drain placed along the entire length of subcutaneous tissue.
12. Exit of the drain should be separated from the main wound.
13. Drain is removed when the output is less than 30 ml/day for 2days.
14. Daily sterile dressing done in the post-operative period.
15. The contents in the drain is measured daily and drain is emptied daily.
16. The outcome is measured with the following parameters such as seroma, hematoma, pain and surgical site infection.
17. All the patients are discharged only after the subcutaneous drain is removed.
18. Seroma is collection of clear fluid in the incision site. It is identified by discharge of clear immature fluid from the wound.
19. Hematoma is abnormal collection of blood in the incision site. It manifests as localized swelling with bluish discoloration of the overlying skin with dark red fluid discharging through the wound.
20. Surgical site infection is identified with drainage of frank pus from the wound with or without clinical features of infection. Culture may be positive or negative.

III. Results

Table 1: Mean Body mass index (BMI) of the study

Mean	N	Mean ±SD
Body mass index(BMI)	150	34.40±1.8

Table 2: Mean Subcutaneous Fat Thickness (Cm) of the study

Mean	N	Mean ±SD
Subcutaneous Fat Thickness(Cm)	150	3.68±.67

Table 3: Wound Complications in patients with Subcutaneous drain

Subcutaneous drain	Wound complications		P value
	Yes	No	
Present	6(8.0%)	69(92.0%)	.000*
Absent	25(33.3%)	50(66.7%)	

*-Statistically Significant (P<0.05)

Table 3 shows the association of Wound Complications in patients with Subcutaneous drain in the study. Among patients with subcutaneous drain wound complications was present in 8% and absent in 92%. Among patients without subcutaneous drain wound complications was present in 33.3%, absent in 66.7% and it is Statistically Significant (P<0.05) using chi-square test.

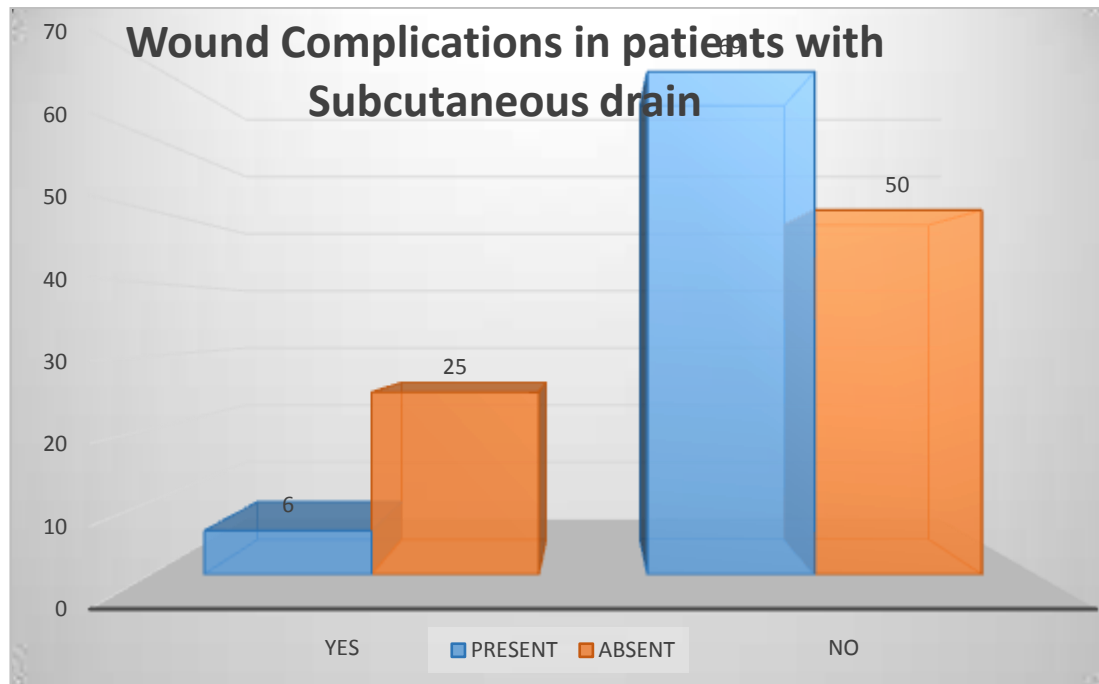


Table 4: Intervention in patients with subcutaneous drain

Subcutaneous drain	Intervention done		P value
	Yes	No	
Present	4(5.3%)	71(94.7%)	.000*
Absent	25(33.3%)	50(66.7%)	

*-Statistically Significant (P<0.05)

Table 4 shows the association of intervention done among the patients with subcutaneous drain in the study. Among patients with subcutaneous drain intervention was done in 5.3% and was not done in 94.7%. Among patients without subcutaneous drain intervention was done in 33.3%, was not done in 66.7% and it is Statistically significant (P<0.05) using chi-square test.

Table 5: Mean duration of hospital stay in patients with subcutaneous drain

Mean	Subcutaneous drain	N	Mean ±SD	P value
Duration of hospital stay	Present	75	5.25±2.3	.000*
	Absent	75	8.6±6.5	

*-Statistically Significant (P<0.05)

Table 5 shows the association of mean duration of hospital stay among patients with subcutaneous drain in the study. Mean duration of hospital stay of the patients with subcutaneous drain was 5.25±2.3 days and mean duration of hospital stay of the patients without subcutaneous drain was 8.6±6.5 days and it is Statistically Significant (P<0.05) using independent 't' test.

Table 6: Wound complications with intervention done among patients with subcutaneous drain (n=75)

Wound complication	Intervention done		P value
	Yes	No	
Yes	4(66.7%)	2(33.3%)	.000*
No	0(0.0%)	69(100.0%)	

*-Statistically Significant (P<0.05)

Table 13 shows the association of Wound complications with intervention done among patients with subcutaneous drain in the study. Patients having subcutaneous drain with Wound complications, intervention was done in 66.7% and was not done in 33.3%. Among patients without Wound complications intervention was done in 0%, not done in 100% and it is Statistically Significant ($P < 0.05$) using chi-square test

Table 7: Wound complications with intervention done among patients without subcutaneous drain (n=75)

Wound complication	Intervention done		P value
	Yes	No	
Yes	25(100%)	0(0.0%)	.000*
No	0(0.0%)	50(100.0%)	

*-Statistically Significant ($P < 0.05$)

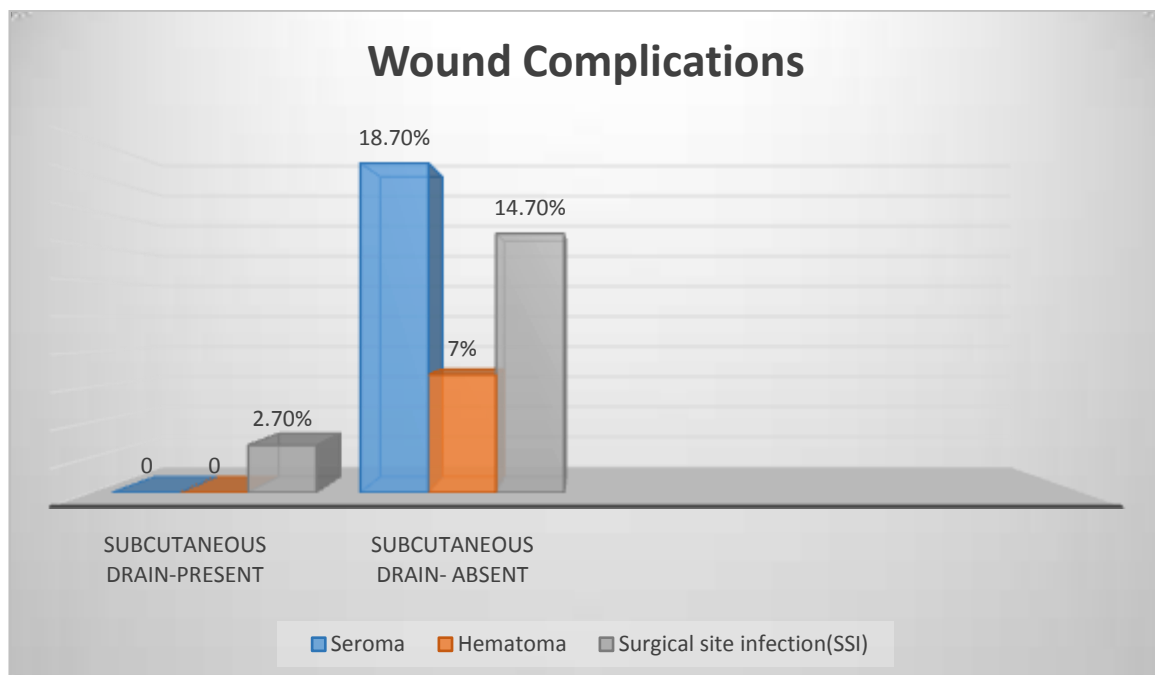
Table 7 shows the association of Wound complications with intervention done among patients without subcutaneous drain in the study. Patients not having subcutaneous drain with Wound complications, intervention was not done in 0% and was done in 100%. Among patients without Wound complications, intervention was not done in 100% done in 0% and it is Statistically Significant ($P < 0.05$) using chi-square test.

Table 8: Wound Complications-Seroma, Hematoma and SSI

Subcutaneous drain	Seroma	Hematoma	Surgical site infection(SSI)
Present	0(0.0%)	0(0.0%)	2(2.7%)
Absent	14(18.7%)	5 (6.7%)	11(14.7%)

*-Statistically Significant ($P < 0.05$)

Table 8 shows the association of Wound complications -seroma, hematoma and SSI among patients with subcutaneous drain in the study. Patients having subcutaneous drain with Wound complications-seroma, hematoma and SSI were found to be less and it is Statistically Significant ($P < 0.05$) using chi-square test



IV. Discussion

Any surgery in obese individuals will have complications whether done electively or emergency. Local wound complications can occur in obese individuals. These include seroma, hematoma, wound dehiscence and surgical site infections. Local wound complications occur more frequently in obese individuals. The increased risk due to obesity has been variously attributed to decreased oxygen tension in relatively avascular adipose tissue, immune impairment, ischemia along suture lines, greater wound area, and difficulties resulting in contamination and prolonged surgery⁸. The risk of incisional SSI increases with obesity and that the most useful predictor of incisional SSI is the thickness of subcutaneous fat (TSF), as evaluated by preoperative CT¹⁰. 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 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 because of the emergence of multidrug resistant organisms. These complications will lead to wound failure or 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 culture and sensitivity reports. All the collections underneath the wound has to be let out. If seroma or hematoma not drained adequately, it could lead to secondary infection with pus formation and foul smelling purulent discharge. Because of these complications, hospital stay of patients prolonged and also mobilization of patients also delayed. So obese patients are encouraged to lose weight before undergoing elective abdominal surgeries like ventral hernias, cholecystectomy for gall stone disease. Patients with abdominal malignancies needs to be operated immediately. There will be no time for these patients to undergo weight loss program. Many methods have been developed to reduce 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 reduce the surgical site infections. Subcutaneous suction drains help to let out the seroma, hematoma and any purulent discharge. This reduces the chance of wound dehiscence. This helps in the faster recovery of the patient and early mobilization of the patient. In 1976 Pitkin³ noted a 29% wound complication rate in obese patients in comparison to 4% in non-obese patients. In another study by Gallup et al.⁴ a wound complication rate of 42.2% was reported in obese gynecological patients compared to 0.9% in nonobese patients. They found that suprafascial suction drainage was a major contributing factor in reducing the wound complication rate

In our study the role of subcutaneous drains in the obese individuals undergoing elective abdominal surgeries have been studied. Obese individuals with body mass index more than 32 kg/m². BMI is measured with quetelet index. subcutaneous fat thickness of more than 3 cm undergoing elective laparotomy were included. In our study we measured the subcutaneous fat thickness with CT, and subcutaneous fat thickness is measured in the midline of the abdomen 1cm caudal to umbilicus. It is a prospective cohort study involving hundred and fifty obese patients with aforementioned criteria. Subcutaneous tube drains kept in seventy-five patients. The drain is removed when the output is less than 30 ml/day for 2 days. Another seventy-five patients without subcutaneous drains were compared for the occurrence of local wound complications such as seroma, hematoma, wound dehiscence and surgical site infections. 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 150 patients. Total male patients in the study group is 86 and the female patients is 64. Mean body mass index of the study group is 34.40 kg/m². Mean subcutaneous fat thickness of the obese patients included in the study is 3.68cm. Subcutaneous drains used in 75 patients and not used in 75 patients. The patients are selected by systemic random sampling.

Wound complications observed in 6 patients with subcutaneous drain which forms 8% of the total patients with subcutaneous drain. Wound complications observed in 25 patients without subcutaneous drain which forms 33.3% 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 14 patients in whom the subcutaneous drain was not kept which represents 18.7% of those without subcutaneous drain. Intervention done in all 14 patients. Seroma evacuated by removing one or two sutures and applying pressure dressing over it. Seroma resolved in all the 14 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 5 patients in whom the subcutaneous drain was not kept, which represents 6.7% of those without subcutaneous drain. Patients presented with localized swelling with bluish discoloration of overlying skin. 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 21 days

In our study It is considered that patients who presents with pus discharge (culture positive or culture negative), who presents with clinical features of infection comes under surgical site infection. In our study 13 patients developed SSI. It is found to be superficial SSI in all 13. Surgical site infections occurred in 2 patients with subcutaneous drain which represents 2.7% of those with drain. And surgical site infections occurred in 11 patients without subcutaneous drain which represents 14.7% of those without drain. Intervention is done in all the 13 patients. Antibiotics are started according to culture & sensitivity and wound cleaning and dressing done three times a day. Among the 13 patients 2 patients developed wound gaping 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 21 days.

Thus seroma and hematoma occurred only in patients without subcutaneous drain. Pain at the wound site is seen in patients with subcutaneous site also. Surgical site infections occurred in less number of patients with subcutaneous drain.

Intervention needed for 25 patients without subcutaneous drains which forms 33.3% of the group without drain. Intervention needed only for 4 patients with subcutaneous drain which forms 5.3% 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 8.6 days for the group of patients without subcutaneous drain.

In the present study the patients were comparable for age and sex in the two groups. No topical antibiotic or irrigation through the drain was used in our patients. In a study by Farnell et al.⁸ it was found that catheter closure technique with antibiotic irrigation in patients with a moderate amount of intraoperative subcutaneous contamination is not superior to primary closure after subcutaneous irrigation with antibiotic solution. The reason for not using irrigation in our study was that none of our patients had wound contamination during surgery. In fact we have tried to eliminate all confounding variables so that the only variable to be tested was the use of subcutaneous drain. Our patients were healthy with no associated medical disease, and all procedures were performed by a standardized and uniform wound closure technique.

Thus subcutaneous drain when kept in obese individuals with more subcutaneous fat thickness who undergo elective abdominal surgeries had lesser incidence of local wound complications and lesser hospital stay when compared to those patients without subcutaneous drain.

V. Conclusion

Obese patients undergoing elective abdominal surgeries 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 obese patients and prolonged hospital stay. These complications can be reduced with the use of subcutaneous drain to let out the collections in the wound. In our study we found that obese patients undergoing elective abdominal surgeries 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 the placement of a subcutaneous drain in obese individuals with increased subcutaneous fat thickness helps in reducing the local wound complications and reducing the hospital stay of the patients and also aids in faster recovery. This study has potential limitations. First, there are other known predictors or plausible factors associated with SSI that were not evaluated in this study, including cardiac disease and anemia^{11,12}. Second, the number of cases in our study was relatively small. Additional research is needed to explore this putative association

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