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Original Research Article

# ROLE OF SUBCUTANEOUS CLOSED SUCTION DRAINAGE IN CANCER PATIENTS UNDERGOING SURGERY THROUGH MIDLINE LAPAROTOMY INCISIONS – A PROSPECTIVE RANDOMIZED STUDY

**Deepa Shunmugam[1], Sundaram Shanmugasundaram[2], M.J.Muralikannan[3], Anitha Gandhi[3]**

[1]Associate Professor, Department of Surgical Oncology, Tirunelveli Medical College, Tamilnadu, India
[2]Professor, Department of Surgical Oncology, Tirunelveli Medical College, Tamilnadu, India
[3]Assistant Professor, Department of Surgical Oncology, Tirunelveli Medical College, Tamilnadu, India

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Corresponding Author:
**Dr. Deepa Shunmugam,**
Email: oncodeepa@gmail.com

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## Abstract

**Background:** Postoperative wound-related morbidity among cancer patients and their relation to the placement of subcutaneous drains have not been studied extensively. Adding to the problem is the immuno-compromised state and malnutrition often found among cancer patients. This study aims to analyse the usefulness of placing subcutaneous drains among cancer patients undergoing midline laparotomy abdominal incisions. **Materials and Methods:** This prospective interventional randomized study conducted in a tertiary care cancer hospital had two groups of patients. Group 1 had a subcutaneous closed suction drain placed underneath the midline laparotomy wound. Group 2 didn't have any drainage system placed. The two groups were analysed about the wound outcomes like clean wound healing, surgical site infections, seroma, dehiscence and resurgery. **Result:** There were 93 patients, 47 in Group 1 with a drain and 46 in Group 2 without a drain. The two groups had no significant differences in baseline characteristics and postoperative wound outcomes. However, analysis of the factors associated with the wound outcomes showed significant surgical site infections in patients with BMI >22.5 and increased dehiscence in patients who underwent bowel resection/anastomosis. None of the other factors were found to be related to any of the wound-related outcomes. **Conclusion:** The placement of a closed suction drainage system does not affect postoperative wound-related morbidity among cancer patients. Also, patients with BMI > 22.5 had a significant association with surgical site infections, and patients who underwent surgeries that involved bowel resection and anastomosis/stoma creation had a significant association with wound dehiscence.

## INTRODUCTION

Post-surgical wound-related morbidity has been a problem of great concern in cancer patients. Adding to the problem, are immuno-compromised status and malnutrition frequently associated with cancer patients are adding to the problem. These wound complications result in increased hospital stay, excessive use of hospital resources and affect patients' quality of life.[1] Gallup DC et al. proposed using a subcutaneous closed drainage system and antibiotics for obese gynecologic patients to reduce the amount of transudate formed during wound healing.[2] Subcutaneous drains had been used several times to drain the transudate seroma to decrease the dead space and aid wound healing.[3] If drains are not used, seroma collection, if any, is drained through sterile needle aspirations. Secondary to the seroma collection, wound infection sets in, wound breakdown happens, and the patient may need secondary suturing of the wounds. The patients end up having weaker scars and later develop incisional hernias.[4] Though there is a lot of debate on the use of drains in the current era, there are not many studies to either support or refute the use of subcutaneous drains in Cancer patients. This study aims to analyse the effect of subcutaneous closed suction drains in cancer patients undergoing surgery through a midline laparotomy incision in decreasing wound-related morbidity. This study also reveals the relation between various other risk factors and complications regarding wound healing.


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## MATERIALS AND METHODS

This prospective interventional study was conducted in a tertiary care centre's Department of Surgical Oncology.

**Inclusion Criteria**

The study included all the patients who underwent cancer surgeries via a midline laparotomy incision.

**Exclusion Criteria**

Patients who were operated for a benign diagnosis were excluded.

Ninety-three patients were enrolled in the study and randomized to either of the groups, with drain or without drain. Their clinical outcomes were analysed based on a computer-generated randomization sequence. All the patients in the study gave informed written consent, and the institutional ethical committee clearance was also obtained before the study. The study participants were not restricted by the type of malignancy or any neoadjuvant therapies. All the patients received similar preoperative bowel preparation, skin preparation with povidone and surgical spirit. All the patients received a single dose of Injection Ceftriaxone 1gm intravenous 30min before induction as a prophylactic antibiotic.

In group 1, a 16Fr, a suction drain was placed in the subcutaneous plane and fixed with 2'0 silk after giving a saline wash for the wound. The drains were removed when the output was <5ml for two consecutive days. No subcutaneous sutures were placed, and the skin wound was closed with 2-0 ethilon. In group 2, except for the drain, the other wound closure methods were the same. Sterile wound dressings were applied in OT, opened on postoperative day three morning, and the wound was assessed regularly for any collection clinically. The sutures were removed on Postoperative day 10 in patients with clean wound healing. In seroma collection patients, it was aspirated under strict aseptic precautions. Pus collections were drained by removing a suture, and a wound wash was given. Antibiotics started as per culture & sensitivity reports. Patients received postoperative antibiotics until day five, which continued only in patients with surgical site infections.

The patients were examined for wound-related morbidity two weeks after surgery, during wound dressing inwards, suture removal, and follow-up in the outpatient department. The Primary endpoint was the incidence of abdomen wound morbidity within two weeks of surgery: the baseline patient characteristics, wound outcomes and clinical factors associated with wound morbidity were analysed. Postoperative wound outcomes included clean wound healing, surgical site infection, seroma, dehiscence and resurgery for dehiscence. Clean wound healing refers to patients who didn't have any of the complications mentioned above. Surgical site infection was defined as in patients with pus discharge (that showed microbes on culture), fever, and elevated total counts. Seroma collection was defined as any significant amount of fluid collected underneath the wound (at least 10ml). Dehiscence of the wound was defined as any gaping in the wound of over 1cm. Resurgery was defined as any wound that required resuturing.

**Statistical Analysis**

All the data were entered into MS Excel, and the demographic data were expressed as frequency and percentage. SPSS software was used to analyse the data, and a P value <0.05 was considered significant.

## RESULTS

Among the 93 patients in the study, 47 and 46 were allotted to groups 1 (with drain) and 2 (without drain), respectively. The mean age group was 52.5 years in Group 1 and 50.5 years in Group 2. There was no statistically significant difference in BMI between the two groups, 23.9 in Group 1 and 24.1 in Group 2. Also, the two groups have no statistically significant differences regarding comorbidities, smoking habits, previous chemotherapy, previous radiation, previous abdominal surgery, and bowel resection/anastomosis/stoma [Table 1].

There was no statistically significant difference between the two groups regarding wound healing (70.2% vs 73.9%, p=0.8726), Surgical site infections (19.1% vs 21.7%, p=0.0634), seroma 29.7% vs 26.0%, p=0.7654), dehiscence (12.7% vs 17.3%, p=0.5920) or resurgery 4.2% vs 2.1% p=0.5822) [Table 2].

The considered factors included obesity (BMI >22.5), bowel resection and anastomosis/stoma, diabetes and placement of a subcutaneous drain. The analysed wound-related complications included Surgical site infections, dehiscence and seroma formation. Patients with a BMI > 22.5 had a significant association with surgical site infections (p=0.0006). Also, patients whose surgery involved bowel resection/anastomosis/stoma creation had a significant association with wound dehiscence (p=0.019). None of the other factors were found to be related to any of the wound-related outcomes [Table 3].

**Table 1: Baseline patient characteristics**

| Parameter | Group 1 – with drain (n=47) (%) | Group 2 – without drain (n=46) (%) |
|---|---|---|
| Mean Age at Surgery (in years) | 52.5 | 50.5 |
| Mean Body Mass Index (kg/m2) | 23.9 | 24.1 |
| Comorbidities<br>Hypertension<br>Diabetes | <br>14 (29.7)<br>23 (48.9) | <br>11 (23.9)<br>24 (52.1) |
| Smoking habits | 24 (51.0) | 26 (56.5) |
| Previous chemotherapy | 3 (6.3) | 3 (6.5) |


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| | | |
|---|---|---|
| Previous radiation therapy | 4 (8.5) | 3 (6.5) |
| Previous abdominal surgery | 1 (2.1) | 2 (4.3) |
| Bowel resection/anastomosis/stoma | 6 (12.7) | 8 (17.3) |

**Table 2: Post-op wound outcomes**

| Outcome | Group 1 – with drain (n=47) (%) | Group 2 – without drain (n=46) (%) | P value |
|---|---|---|---|
| Clean wound healing | 33 (70.2) | 34 (73.9) | 0.8726 |
| SSI | 9 (19.1) | 10 (21.7) | 0.0634 |
| Seroma | 14 (29.7) | 12 (26.0) | 0.7654 |
| Dehiscence | 6 (12.7) | 8 (17.3) | 0.5920 |
| Resurgery | 2 (4.2) | 1 (2.1) | 0.5822 |

**Table 3: Factors associated with wound-related complications**

| Parameter | SSI (n=19) (p-value) | Dehiscence (n=14) (p-value) | Seroma (n=26) (p-value) |
|---|---|---|---|
| BMI > 22.5kg/$m^2$ | 8 (0.0006) * | 6 (0.3283) | 12 (0.2944) |
| Bowel resection/anastomosis/stoma | 5 (0.2173) | 5 (0.0190) * | 4 (0.9556) |
| Diabetes | 10 (0.3011) | 8 (0.5917) | 12 (0.5983) |
| SC Wound drain + | 9 (0.7567) | 6 (0.5328) | 14 (0.6909) |

* Statistically significant., SSI – surgical site infections

## DISCUSSION

Wound-related complications among cancer patients who undergo abdominal surgeries have not been studied much. Moreover, the effects of placement of the Subcutaneous closed suction drainage system have not been studied among cancer patients. A closed suction wound drainage system placed in a subcutaneous plane is used in various other cancer surgeries, including thyroidectomy, mastectomy, inguinal node dissections and others for various reasons.[5-7] The Most important reason is drainage of the seroma fluid that gets collected in the surgical dead space.[8] However, in general, the placement of drain tubes is deteriorating wound healing as they act as a source of infection.

Though there have been recommendations regarding the placement of intraabdominal drains, the placement of subcutaneous closed suction drains doesn't have any specific recommendations. Common wound-related complications include surgical site infections, seroma collection, and surgical wound dehiscence. Kim et al. concluded that subcutaneous drain placement was associated with reduced incidence of wound disruption (p=0.034) and wound infection (p=0.003) after surgery in ovarian cancer patients.[9] In this study, the number of patients enrolled in the drain arm was low (n=36), and only ovarian cancer patients were studied. Our study didn't find any difference in the incidence of wound infection, seroma formation, or wound disruption among patients in the drain group compared to the no-drain group.

Several factors increase the chances of wound-related complications. It has been found that smoking increases the risk of surgical site infections by 30% in patients undergoing major colorectal surgeries, and quitting smoking reduces the risk.[10] Obesity has also increased the risk of surgical site infections from 7-23%.[11,12] In our study, a body mass index of >22.5 is associated with a significant rise in surgical site infections. It is theoretically accepted that surgical wounds have dead space, resulting in seroma/hematoma formation that may act as a culture medium for infective organisms. Subcutaneous drainage would decrease the dead space, decreasing the incidence of wound infections. However, there are no randomized trials to prove the same, at least among cancer patients.

In our study, surgeries associated with bowel resection and anastomosis/stoma creation were associated with wound dehiscence. Kaya et al., a randomized controlled trial, concluded that surgical site infection decreased among patients with a subcutaneous drain, but it was not statistically significant.[13] This study was done on patients who undergo elective abdominal surgeries. Hellumset et al. did a meta-analysis concluding that subcutaneous drainage placement didn't prevent significant wound-related complications among C-sections patients.[14]

## CONCLUSION

The subcutaneous closed suction drainage system placement does not alter the incidence of wound-related complications among cancer patients who undergo abdominal surgeries through laparotomy wounds. Also, patients with BMI > 22.5 had a significant association with surgical site infections, and patients who underwent surgeries that involved bowel resection and anastomosis/stoma creation had a significant association with wound dehiscence. However, larger studies are required to validate the same findings, and the limitation of this study is the small sample size.

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