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Original Research Article

Active versus passive drainage after modified radical mastectomy in breast cancer

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ABSTRACT

Background: Active drains are routinely used after Modified Radical Mastectomy (MRM) and is an important factor contributing to increased hospital stay as the patients are often discharged only after their removal. Amongst various factors that influence the amount of post operative drainage, the negative suction pressure applied to the drain has been reported to be of great significance. Against this background a study was conducted to compare the amount and duration of drainage between suction and dependent drainage in patients following Modified Radical Mastectomy.
Methods: Patients were randomised using randomly ordered sealed envelopes, which were opened immediately before the closure of the wound, to decide on whether suction or dependent drain was to be given. Drains were removed when output was less than 30 ml per day. Patients were followed up from the day of surgery till the day of drain removal. Statistical analysis was performed with SPSS.
Results: There is significant increase in the drain per day in post MRM patients with active suction drain. But, there is no relation between the type of drain and either total drain output or the total number of days of drain. The study also revealed that there is no significant difference in the number of days of hospital stay in both groups of patients.
Conclusions: Suction drains do not have any significant advantage over dependent drains after Modified Radical Mastectomy in breast cancer patients.

Keywords: Drain output, Modified radical mastectomy, Passive drains, Suction drains

INTRODUCTION

Worldwide, breast cancer is the leading type of cancer in women, accounting for 25% of all cases.[1] In those who have been diagnosed with cancer, a number of treatments may be used, including surgery, radiation therapy, chemotherapy, hormonal therapy and targeted therapy. Surgical intervention ranges from wide local excisions to palliative mastectomy.

Modified Radical Mastectomy involves removal of the entire breast including the breast tissue, skin, areola, nipple and most of the axillary lymph nodes.

Outcomes for breast cancer vary depending on the cancer type, extent of disease, and person's age. Survival rates in the developed world are high, with between 80% and 90% of those in England and the United States alive for at least 5 years.[2] In developing countries survival rates are poorer.[3]

Drains remove blood, serum, lymph, and other fluids that accumulate in the wound bed after a procedure. If allowed to build, these fluids put pressure on the surgical site as well as adjacent organs, vessels, and nerves. The decreased perfusion delays healing and the increased pressure causes pain. In addition, fluid collection serves

as a breeding ground for bacteria. Fluid can be removed from a wound using either a passive or active surgical drain. Passive drains rely on gravity to evacuate fluid, while active drains are attached to a vacuum device. A surgeon chooses a drain that both fits the operative site and can handle the type and amount of drainage expected.

Suction drainage in the management of mastectomy patients was used for the first time in 1947.[4] The mechanism proposed is that the suction helps skin flaps to adhere to the chest wall and axilla sealing off all the leaking lymphatics.[5,6] This reduces the incidence of post-operative seromas, hematoma formation and flap necrosis, which are recognized complications of Modified Radical Mastectomy.[5,6]

Prolonged drainage on the other hand, may increase the hospital stay and increase the risk of infection by allowing retrograde migration of bacteria.[7] If kept for longer periods it has been observed that drain itself might contribute to increased drainage and the risk of infection in addition to the increased hospital stay resulting in wasteful utilization of the hospital resources.

The amount of postoperative drainage is influenced by various factors like the clinical profile of the patient including the body mass index, extent of axillary lymph node dissection, number of lymph nodes dissected, use of elctrocautery, comorbid conditions and also the negative pressure on the suction drain.[7-13]

Against this background a clinical study was conducted to compare the amount and duration of drainage between a suction and non- suction dependent drainage in patients following Modified Radical Mastectomy..

METHODS

This is a prospective cohort study conducted in the Dept of general surgery, Govt Medical College, Kozhikode, Kerala, India. The study included 100 patients who have undergone Modified Radical Mastectomy in the department of general surgery at the hospital from January 2016 to July 2017.

Inclusion criteria

- All female patients who have histopathologically proven carcinoma breast and have undergone Modified Radical Mastectomy.

Exclusion criteria

- Patients who have undergone breast conservation surgery.
- Patients who underwent spontaneous expulsion of drains and those who were discharged with their drains.

Both axillary and chest drains were kept and connected to a single Romovac suction drain. Patients were randomized using randomly ordered sealed envelopes, which were opened immediately before the closure of the wound, to decide on whether suction or dependent drain was to be given. Tight breast bandages were applied within two hours of surgery. Exercises were started within 24 hours of surgery and continued daily. Daily drain output was monitored by the investigator. Drains were removed when output was less than 30 ml per day. Patients were followed up from the day of surgery till day of drain removal. Using a printed proforma, patient details, surgical details, details of the treatment and daily drain output was recorded. Statistical analysis was performed with SPSS version 10.

RESULTS

There was statistically significant decrease in the mean drain per day in the group with dependent drain compared to the group with suction drain. (p = 0.021). (Table 1)

Table 1: Comparison of mean drain output per day (ml/day) between dependent drain and suction drain group.

	Mean drain per day (ml)
Dependent drain	74.08
Suction drain	86.41

Table 2: Comparison of mean total drain output between dependent drain and suction drain group.

	Mean total drain (ml)
Dependent drain	658.44
Suction drain	683.40

Table 3: Comparison of average number of days of drain between dependent drain and suction drain group.

	Minimum	Maximum	Mean
Dependent Drain	4	15	8.48
Suction Drain	2	14	7.28

There was no statistically significant difference in the total drain output between the two groups (p = 0.765) (Table 2)

There was no statistically significant difference in the number of days of drain between the two groups (p=0.063) (Table 3).

The major baseline characters that were studied includes age and Body Mass Index of the patient, presence of co morbidities like diabetes and hypertension in the study group, history of neoadjuvant chemotherapy in the patient, stage of the disease at diagnosis and the total

number of lymph nodes harvested during surgery. These parameters were selected by the investigator based on review of literature of previous studies which have already found association between the aforementioned characteristics and drain output. On statistical analysis it was found that there is no significant difference in base line characteristics between the two groups and that they are fairly comparable. (Table 4).

Table 4: Comparison of baseline characters.

Character	Dependent drain	Suction drain	P value
Age	52.64	55.76	0.661
Body mass index	23.44	23.13	0.683
Presence of diabetes	16%	20%	0.603
Presence of hypertension	26%	28%	0.822
Neoadjuvant chemotherapy	20%	14%	0.603
Stage of disease			0.269
No of lymph nodes	11.32	10.92	0.397

DISCUSSION

In this study, we have collected data from 50 patients with suction drain and 50 patients with dependent drain and compared the both groups to assess the advantage of suction drain over dependent drain.

In this study it was found that the mean total drain output of patients with dependent drain was 658.44ml and that of patients with suction drain was 683.40ml. There is no statistically significant difference in the total drain output between the two groups (p = 0.765).

However, the mean drain per day was 74.08 ml in the dependent group and 86.41 ml in the suction group. There is statistically significant decrease in the mean drain per day in the group with dependent drain compared to the group with suction drain. (p = 0.021).

The mean number of days a patient had the drain was 8.48 in the dependent group and 7.28 in the suction group. There is no statistically significant difference in the number of days of drain between the two groups (p=0.063)

A study conducted by Nadkarni et al in 2007 "Influence of surgical technique on axillary seroma formation: a randomized study" a prospective randomized study including 160 patients with breast cancer who underwent surgery. The main outcome measure was postoperative seromaformation defined as a postoperative axillary collection requiring more than one aspiration after removal of the drain. There was no influence on the incidence of seroma formation whether suction drain (84.6%) or corrugated drains (86.1%) were used (p=0.822). The use of different drainage techniques has no bearing on the postoperative seroma formation.[14]

Another study conducted by Chintamani et al in 2005 "Half versus full vacuum suction drainage after modified radical mastectomy for breast cancer- a prospective randomized clinical trial", 85 fine needle aspiration cytology proven cases of locally advanced breast cancer were randomized into 50 patients with full vacuum suction (pressure = 700 g/m^2) and 35 cases in to half vacuum suction drainage (pressure = 350 g/m^2) groups. The two groups were comparable in respect of age, weight, and technique of operation and extent of axillary dissection. Surgery was performed by the same surgical team comprising of five surgeons (two senior and three resident surgeons) using a standardized technique with electrocautery. The mean volume drained by the full suction group was 525 (s.d = 66.282) and that drained by the half suction group was 325 (s.d = 39.612) and it was found to be statistically significant.[15]

The mean hospital stays (days) was 10.8 (s.d = 1.603) in the full suction group and 6 (s.d = 1.414) in the half suction group and this was found to be statistically significant.

The study conducted by Somers et al conducted a prospective randomized study from 1987 to 1990 of 227 axillary dissections titled "The use of closed suction drainage after lumpectomy and axillary node dissection for breast cancer. A prospective randomized trial" 108 were randomized to a drain group (dg) and 119 to a no drain group (ndg). Drains were removed on the first postoperative day just before patient discharge. Postoperatively, all palpable axillary collections were aspirated on each follow-up visit. The volume aspirated, the number of aspirations, the time to seroma resolution, and all complications were recorded. The mean number of aspirations in the dg was significantly lower than the ndg (2.2 + 2.2 versus 3.3 + 2.1; p less than or equal to 0.002). Mean volume aspirated in the dg (146.3 + 181.1 ml) was less than the ndg (266.1 + 247.6 ml; p less than or equal to 0.003), and the time to seroma resolution was decreased in the dg as compared with the ndg (11.5+10 days versus 18 + 10.1 days; p less than or equal to 0.0002). Closed suction drainage after lumpectomy and axillary node dissection is advantageous in decreasing the incidence and degree of seroma formation and need not delay early hospital discharge.[16]

The study "evidence-based risk factors for seroma formation in breast surgery" conducted by Katsumasa Kuroi et al published in April 2006 were based on articles published in English obtained from searches of medline and additional references were found in the bibliographies of these articles. Risk factors were graded according to the quality and strength of evidence and to the direction of association. One meta-analysis, 51 randomized controlled trials, 7 prospective studies and 7

retrospective studies were identified. There was no risk factor supported by strong evidence, but there was moderate evidence to support a risk for seroma formation in individuals with heavier body weight, extended radical mastectomy as compared with simple mastectomy, and greater drainage volume in the initial 3 days. On the other hand, the following factors did not have a significant influence on seroma formation: duration of drainage; hormone receptor status; immobilization of the shoulder; intensity of negative suction pressure; lymph node status or lymph node positivity; number of drains; number of removed lymph nodes; previous biopsy; removal of drains on the fifth postoperative day versus when daily drainage volume fell to minimal; stage; type of drainage (closed suction versus static drainage); and use of fibrinolysis inhibitor. In contrast, sentinel lymph node biopsy reduced seroma formation. Evidence was weak, or unproven, for other factors that were commonly cited in the literature. They concluded that although a number of factors have been correlated with seroma formation, strong evidence is still scarce. However, there is evidence showing that sentinel lymph node biopsy reduces seroma formation.[17]

The study conducted by van Heurn and brink in 1995 on 40 patients concluded that low vacuum drains were removed earlier than high vacuum drains. However, seroma production was not significantly different between the two groups.[18]

CONCLUSION

To conclude, there is significant increase in the drain per day in post MRM patients with suction drain. But, there is no relation between suction drain and either total drain output or the total number of days of drain compared to dependent drain. Hence there is no significant difference in the number of days of hospital stay. Thus this study proves without doubt that suction drains do not give any advantage over the dependent drain and on the other hand, it does increase the financial burden.

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