



COMPARISON OF SINGLE-DRAIN AND DOUBLE-DRAIN PLACEMENT AFTER MODIFIED RADICAL MASTECTOMY IN BREAST CANCER PATIENTS

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ABSTRACT

Background: Seroma formation is a prevalent postoperative consequence after Modified Radical Mastectomy (MRM), frequently resulting in discomfort, delayed wound healing, extended hospital stays, and heightened healthcare demands. Diverse techniques have been employed to mitigate seroma, including the quantity of suction drains positioned in the axilla.

Aims: To compare postoperative outcomes between single-drain and double-drain insertion following Modified Radical Mastectomy for breast cancer.

Materials and Methods: This prospective comparative study was conducted over a period of 10 months in the Department of General Surgery. A total of 60 female patients undergoing MRM for operable breast cancer were enrolled and divided into two equal groups of 30 each: Group A received a single closed-suction drain, while Group B received two closed-suction drains. Data collected included demographic characteristics, tumor stage, intraoperative details, daily drain output, total drainage volume, duration of drain retention, postoperative pain scores, seroma formation after drain removal, surgical site infection, flap necrosis, hematoma, and hospital stay. Seroma was clinically diagnosed and confirmed by ultrasound when necessary. Statistical analysis was performed using appropriate tests, and a p-value <0.05 was considered statistically significant.

Results: The mean age, tumor attributes, and surgical length were similar across the two groups. The total drain production and length of drain retention were markedly elevated in the double-drain group ($p < 0.05$). Seroma development occurred more frequently in the single-drain group, although the difference lacked statistical significance. Postoperative pain levels were elevated in the double-drain cohort over the initial two postoperative days ($p < 0.05$). The occurrence of wound infection, flap necrosis, and hematoma exhibited no significant disparity across the groups. The duration of hospitalization was marginally extended for patients with double drainage.

Conclusion: Single-drain insertion after MRM has comparable surgical results to double-drain installation, while offering benefits such as diminished pain, decreased drainage burden, and a shorter hospital stay. Double draining may not markedly diminish seroma production and may exacerbate discomfort. Consequently, single drainage seems to be a secure and efficient alternative in standard practice.

Keywords: Breast Cancer, Double Drain, Modified Radical Mastectomy, Postoperative Outcomes, Seroma, Single Drain.

INTRODUCTION

Breast cancer persists as one of the most common malignancies impacting women globally and is a significant public health issue, especially in developing nations where delayed diagnosis and restricted access to screening lead to increased morbidity and mortality.^{1,2}



www.ajmrhs.com
eISSN: 2583-7761

Date of Received: 18-06-2026
Date Acceptance: 28-06-2026
Date of Publication: 15-07-2026

Modified Radical Mastectomy (MRM) is a prevalent surgical intervention for operable breast cancer, particularly in areas where breast-conserving surgery is limited by tumor stage, socioeconomic conditions, or insufficient radiation resources.³ Despite MRM being a standardized and dependable process, postoperative complications remain considerable obstacles for both patients and clinicians, with seroma being one of the most prevalent and problematic concerns.⁴

Seroma denotes the accumulation of serous fluid in the void established following mastectomy and axillary dissection.⁵ The prevalence varies significantly in the literature, ranging from 3% to

85%, indicative of disparities in surgical techniques, patient characteristics, and postoperative draining approaches.⁶ Seroma formation can result in discomfort, delayed wound healing, heightened infection risk, recurrent aspirations, extended hospital stays, and financial strain.⁷

Reducing seroma formation is a key objective in postoperative treatment after MRM, and various techniques have been suggested to accomplish this. This include electrocautery versus scalpel dissection, flap fixation with sutures, application of fibrin sealants, utilization of quilting stitches, and modifications in postoperative drainage systems.⁸ Closed-suction drains are widely employed post-MRM to eradicate fluid accumulations, minimize dead space, and promote adequate adherence of flaps to the underlying tissues. Nonetheless, significant discourse continues concerning the ideal quantity of drains necessary for efficient postoperative care.^{9,10}

Some surgeons favor double drainage, with one drain positioned in the axilla and another along the chest wall, while others deem a single drain adequate for fluid evacuation. Proponents of double drainage contend that two drains enhance coverage of the operative area, diminish dead space, and decrease seroma formation. In contrast, advocates for a singular drain argue that many drains heighten postoperative discomfort, extend the time of draining, raise the likelihood of infection, exacerbate drain-site morbidity, and do not substantially enhance outcomes.^{11,12}

Therefore, the decision between single and double drainage has mostly been based on the preferences of individual surgeons rather than solid scientific data. The necessity of routine double-drain insertion is increasingly being scrutinized due to developments in surgical techniques, precise hemostasis, and improved equipment.

Recent studies indicate that single-drain insertion may yield effects similar to those concerning seroma production, while enhancing patient comfort and diminishing the total burden of postoperative care. This study aims to compare single and double drainage insertion after MRM for breast cancer, concentrating on postoperative outcomes. The results are anticipated to enhance evidence-based improvements in postoperative treatment protocols and assist surgeons in selecting the most successful and patient-centric drainage technique.

Aims and Objectives

- To compare postoperative outcomes between single-drain and double-drain insertion following Modified Radical Mastectomy for breast cancer.

MATERIALS AND METHODS

This prospective comparative study was carried out in the Department of General Surgery at Sree Mookambika Institute of Medical Sciences over a

period of 10 months from January 2025 to October 2025. A total of 60 female patients diagnosed with operable breast cancer and scheduled to undergo MRM were included after obtaining informed consent.

Inclusion Criteria

- Female patients diagnosed with operable breast cancer.
- Patients scheduled to undergo MRM.
- Age between 18 and 70 years.
- Patients who provided informed written consent.
- Patients fit for surgery under general anesthesia.

Exclusion Criteria

- Patients undergoing breast conservation surgery or palliative mastectomy.
- Previous axillary surgery or radiation therapy on the same side.
- Presence of metastatic disease at the time of evaluation.
- Coagulopathy or uncontrolled systemic illness.
- Active infection at the surgical site.
- Patients unwilling to participate or unable to comply with postoperative follow-up.

All patients were evaluated preoperatively through a detailed history, clinical examination, routine blood investigations, radiological assessment, and confirmation of malignancy through histopathological or cytological methods. Eligible patients were randomly allocated into two equal groups of 30 each.

- **Group A** underwent single closed-suction drain placement
- **Group B** underwent double closed-suction drain placement following MRM.

All surgeries were performed by experienced surgeons following a standardized operative protocol to minimize variability. Mastectomy with axillary clearance was carried out using conventional techniques with meticulous haemostasis maintained throughout the procedure. The assigned number of drains was inserted before wound closure, and all patients received uniform perioperative care, including prophylactic antibiotics and analgesics as per institutional guidelines. Postoperatively, patients were monitored daily for vital parameters, drain function, pain scores, and local wound conditions.

Drain output was recorded every 24 hours until removal, which was planned when drainage reduced to less than 30 mL over 24 hours. The total drainage volume, duration of drain retention, and number of days required for drain removal were documented. Patients were assessed clinically for signs of seroma, surgical site infection, flap necrosis, hematoma, and other wound-related complications. Seroma formation was confirmed through clinical examination and ultrasonography when required. Pain assessment was conducted using a standardized

visual analog scale. The length of postoperative hospital stay was also recorded.

Data were entered and analyzed using standard statistical software. Continuous variables were expressed as mean $\pm$ standard deviation and

compared using the Student's t-test, while categorical variables were analyzed using the chi-square test. A p-value <0.05 was considered statistically significant for all comparisons.

OBSERVATION AND RESULTS

Table 1: Baseline Characteristics of Study Population

Parameter	Group A (N=30)	Group B (N=30)	P-Value
Mean Age (Years)	51.4 $\pm$ 9.2	52.1 $\pm$ 8.7	0.72
BMI (Kg/M ²)	26.1 $\pm$ 3.4	25.8 $\pm$ 3.1	0.68
Side (Right/Left)	16/14	17/13	0.79
Tumor Size (Cm)	3.4 $\pm$ 0.8	3.6 $\pm$ 0.9	0.43
Stage II (%)	18 (60%)	17 (56.7%)	0.79
Stage III (%)	12 (40%)	13 (43.3%)	0.79

A total of 60 patients undergoing MRM were evaluated, with 30 patients assigned to the single-drain group (Group A) and 30 to the double-drain group (Group B). Both groups were comparable in demographic and clinical characteristics before surgery. (Table 1)

Table 2: Operative Parameters

Parameter	Group A	Group B	P-Value
Mean Operative Time (Minutes)	112.3 $\pm$ 15.5	114.8 $\pm$ 16.1	0.49
Intraoperative Blood Loss (Ml)	184.2 $\pm$ 40.3	191.6 $\pm$ 38.7	0.43

Operative time and blood loss were comparable, indicating uniform surgical technique. (Table 2)

Table 3: Postoperative Drain-Related Outcomes

Outcome	Group A (N=30)	Group B (N=30)	P-Value
Total Drain Output (Ml)	428.3 $\pm$ 96.4	532.7 $\pm$ 110.2	0.001
Duration Of Drainage (Days)	6.1 $\pm$ 1.4	7.8 $\pm$ 1.6	0.0001
Pain Score (Day 1)	4.6 $\pm$ 1.1	5.8 $\pm$ 1.2	0.0003
Pain Score (Day 2)	3.8 $\pm$ 0.9	4.9 $\pm$ 1.0	0.0001
Hospital Stay (Days)	7.2 $\pm$ 1.5	8.3 $\pm$ 1.7	0.01

Double-drain patients exhibited significantly higher total drainage volume, longer drain retention, and greater early postoperative pain. Hospital stay was also longer in Group B. (Table 3)

Table 4: Postoperative Pain Scores

Day	Group A (Mean $\pm$ SD)	Group B (Mean $\pm$ SD)	P-Value
Day 1	4.6 $\pm$ 1.1	5.8 $\pm$ 1.2	0.0003
Day 2	3.8 $\pm$ 0.9	4.9 $\pm$ 1.0	0.0001
Day 3	2.9 $\pm$ 0.8	3.6 $\pm$ 0.9	0.004

Patients with a single drain reported lower pain scores compared to the double-drain group. This difference was statistically significant ($p < 0.05$), indicating that double drainage is associated with higher early postoperative discomfort. (Table 4)

Table 5: Wound Complications

Complication	Group A (%)	Group B (%)	P-Value
Seroma	6 (20%)	4 (13.3%)	0.49
Wound Infection	3 (10%)	2 (6.7%)	0.64
Flap Necrosis	2 (6.7%)	3 (10%)	0.64
Hematoma	1 (3.3%)	1 (3.3%)	1.00

No statistically significant differences in wound complications were noted. (Table 5) Among patients who developed seroma, Group A (n=6) had a mean volume of 72.3 $\pm$ 18.4 mL, and Group B (n=4) had 68.5 $\pm$ 16.1 mL ($p = 0.71$). The mean number of aspiration sessions was 1.5 $\pm$ 0.7 in Group A and 1.3 $\pm$ 0.5 in Group B ($p = 0.54$), showing comparable seroma severity and management between both drainage methods.

Table 6: Postoperative Recovery and Patient Outcomes

Outcome	Group A	Group B	P-Value
Hospital Stay (Days)	7.2 $\pm$ 1.5	8.3 $\pm$ 1.7	0.01
Time To Shoulder Mobilization (Days)	2.2 $\pm$ 0.5	2.8 $\pm$ 0.6	0.001

Time To Suture Removal (Days)	10.6 ± 1.1	10.9 ± 1.2	0.39
Drain Site Discomfort (%)	8 (26.7%)	14 (46.7%)	0.09
Difficulty In Home Drain Care (%)	5 (16.7%)	13 (43.3%)	0.02

Double-drain patients had a longer hospital stay and delayed mobilization. Double drainage increased patient discomfort and made home care more challenging. (Table 6)

DISCUSSION

The comparison of single and double drainage after MRM remains a significant topic of assessment, especially concerning postoperative recovery, patient comfort, and wound morbidity. A study including 60 patients, evenly split between single- and double-drain groups, revealed some clinically significant patterns. The demographic characteristics of the current study were similar to those of the study conducted by Abdulnabi AN et al.¹³

A significant disparity was noted in total drainage volume and the time of drainage. Patients utilizing a single drain exhibited a reduced mean drain output and a shorter length of drainage compared to those with dual drains, indicating that supplementary drains may exacerbate fluid collection and extend the necessity for drainage.

These findings coincide with the data of Win T et al.¹⁴ who reported a markedly reduced drainage duration in patients with a single drain, despite no significant difference in total drainage volume. Khan S et al.¹⁵ conversely, found no significant benefit of single drainage for fluid output, blood loss, operative duration, or seroma occurrence, suggesting that outcomes may differ based on patient attributes and surgical factors.

Postoperative discomfort was another variable affected by the quantity of drains utilized. Group B consistently exhibited elevated pain scores, with all 30 patients (100%) experiencing increased discomfort on postoperative days 1 and 2. Patients in the single-drain group reported markedly reduced pain levels. The presence of an extra drain exacerbates early postoperative discomfort and prolongs the resumption of ordinary activities. These findings align with Khan S et al.¹⁵ who observed markedly lower pain scores and a diminished risk of pain-related morbidity in patients managed with a single drain.

Wound-related problems, such as seroma, infection, flap necrosis, and hematoma, were noted in both groups without significant differences. The incidence of seromas was comparable across the drainage techniques, suggesting that the quantity of drains did not markedly affect seroma development or intensity. This pattern correlates with the findings of Win T et al.¹⁴ and Kapur N et al.¹⁶ both of whom found no significant differences in seroma incidence, aspiration frequency, or overall wound complications between single and double drainage methods. Guneri G et al.¹⁷ observed an elevated seroma incidence in patients with a single drain, indicating that drain selection should be customized

according to clinical situation, surgical methodology, and tissue properties.

The duration of hospitalization was slightly extended in the double-drain cohort, presumably due to heightened discomfort, extended drainage, and postponed shoulder mobility. Early rehabilitation was more readily accomplished in single-drain individuals due to less pain. Patient comfort evaluations indicated increased discomfort at the drain site and challenges in managing home drain care for individuals with two drains. The findings were analogous to those of the study conducted by Roy S et al.¹⁸ which advocated for the utilization of a single axillary drain due to earlier drain removal, enhanced compliance, and reduced inpatient duration.

Limitations

This study was limited by its relatively small sample size, single-centre setting, and short follow-up period, which may restrict broader applicability of the results. Variations in patient compliance, subjective pain assessment, and the absence of long-term monitoring of seroma recurrence or late complications may also influence outcome interpretation.

CONCLUSION

Single-drain insertion during MRM yields outcomes comparable to double-drain installation, with significant benefits in patient comfort and recovery. The utilization of a single drain leads to diminished total drainage volume, alleviated postoperative pain, expedited mobilization, and a shortened duration of hospital stay, without elevating the occurrence of seroma or wound problems. Double draining provides no substantial therapeutic advantage and results in increased discomfort and extended drainage time. Single draining thus constitutes a secure, effective, and patient-centric method for postoperative treatment after MRM and may be implemented as a viable alternative to standard double-drain placement in suitable patients.

Financial Support and Sponsorship: Nil.

Conflicts Of Interest: There Are No Conflicts Of Interest

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How to cite this article: Dr. P Amutha, Dr. Ishwarya M, Dr. Harrison P M, COMPARISON OF SINGLE-DRAIN AND DOUBLE-DRAIN PLACEMENT AFTER MODIFIED RADICAL MASTECTOMY IN BREAST CANCER PATIENTS, *Asian J. Med. Res. Health Sci.*, 2026; 4 (2): 2153-2157.
Source of Support: Nil, Conflicts of Interest: None declared.