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Original Research Article

Comparison of Postoperative Seroma Incidence in Modified Radical Mastectomy Patients with and Without Drain Placement

Puman Kumari[1], Manish Kumar Singh[2], A. K. Jha Suman[3]

[1]Senior Resident, Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India

[2]Senior Resident, Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India

[3]Professor and HOD, Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India

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Corresponding Author: Dr. Manish Kumar Singh

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Abstract:

Background: Postoperative seroma formation is a common complication following modified radical mastectomy (MRM), leading to delayed wound healing, increased risk of infection, patient discomfort, and prolonged hospital stay. Surgical drains are traditionally used to reduce seroma formation, but their routine use remains debated due to discomfort, potential infection, and prolonged hospitalization.

Objective: To compare the incidence, volume, and clinical outcomes of postoperative seroma formation in patients undergoing modified radical mastectomy with and without drain placement.

Methods: This prospective observational study was conducted at the Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India, from February 2024 to January 2025. A total of 120 female patients undergoing MRM for operable breast cancer were enrolled. Patients were divided into two groups: Group A (n=60) underwent MRM with drain placement, and Group B (n=60) underwent MRM without drains. Postoperative monitoring included daily assessment for seroma formation, volume measurement, need for aspiration, and associated complications. Statistical analysis compared seroma incidence, volume, and clinical outcomes between the two groups.

Results: Overall, seroma formation occurred in 47 patients (39.2%). Group A (with drains) had a seroma incidence of 25% (15/60), while Group B (without drains) had a significantly higher incidence of 53.3% (32/60) ($p<0.01$). Mean seroma volume was lower in the drain group (75 ± 20 mL) compared to the no-drain group (140 ± 35 mL). Patients without drains required more frequent aspirations and had longer average hospital stays (6.2 ± 1.4 days) compared to those with drains (4.5 ± 1.1 days). No significant differences were observed in postoperative wound infection rates between the groups.

Conclusion: Drain placement during modified radical mastectomy significantly reduces the incidence and volume of postoperative seroma formation, decreases the need for repeated aspiration, and shortens hospital stay. Careful use of drains should be considered to improve postoperative outcomes in breast cancer surgery.

Keywords: Modified Radical Mastectomy, Seroma Formation, Surgical Drains, Breast Cancer Surgery, Postoperative Complications, Aspiration, Wound Healing.

Introduction

Modified radical mastectomy (MRM) remains a cornerstone surgical procedure for the management of operable breast cancer, especially in patients with large tumors or multicentric disease. Despite improvements in surgical techniques and perioperative care, postoperative complications continue to influence recovery, patient comfort, and overall outcomes [1]. One of the most frequent and clinically significant complications following MRM is seroma formation. Seroma is defined as an accumulation of serous fluid in the dead space created by mastectomy and axillary dissection. It can lead to pain, delayed wound healing, increased risk of infection, skin flap necrosis, prolonged hospital stay, and repeated outpatient visits for fluid aspiration [2].

The reported incidence of seroma formation after MRM varies widely, ranging from 15% to 80%, depending on patient characteristics, surgical technique, and the extent of axillary dissection. Factors influencing seroma development include body mass index, age, comorbidities such as diabetes or hypertension, and the amount of tissue

removed. The formation of seroma is attributed to surgical disruption of lymphatic channels and dead space under the skin flaps, creating an environment for fluid accumulation [3,4].

Surgical drains have been traditionally used to prevent seroma formation by facilitating continuous drainage of fluid from the operative site. Drains are thought to decrease dead space, limit fluid collection, and reduce the incidence of clinically significant seromas [5]. However, drain placement is associated with patient discomfort, potential infection at the drain site, restricted mobility, and occasionally prolonged hospital stay. Some studies have questioned the routine use of drains, suggesting that meticulous surgical technique, flap closure, and use of tissue adhesives may allow safe mastectomy without drains while achieving comparable outcomes [6].

The ongoing debate over drain versus no-drain policies highlights the need for robust clinical evidence comparing postoperative outcomes between the two approaches. Understanding the incidence, volume, and clinical impact of seroma formation with and without drains is crucial for improving patient care, reducing complications, and optimizing recovery after MRM.

This study aims to provide evidence-based insights into the effect of drains on postoperative seroma formation, examining both the incidence and clinical consequences, to guide surgical decision-making and enhance postoperative management strategies in breast cancer surgery.

Materials and Methods

Study Design and Setting: This prospective observational study was conducted at the Department of General Surgery, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India, over a 12-months period from February 2024 to January 2025. . The study aimed to evaluate postoperative seroma formation in patients undergoing modified radical mastectomy (MRM) with and without drain placement.

Sample Size and Selection: A total of 120 female patients undergoing MRM for operable breast cancer were enrolled. Patients were consecutively selected based on eligibility criteria. The sample was divided equally into two groups: Group A (MRM with drain, n=60) and Group B (MRM without drain, n=60).

Inclusion Criteria:

- Female patients aged ≥18 years with histologically confirmed operable breast cancer.
- Patients scheduled for modified radical mastectomy with axillary lymph node dissection.
- Patients who provided written informed consent.

Exclusion Criteria:

- Patients undergoing breast-conserving surgery or lumpectomy.
- Patients receiving neoadjuvant chemotherapy or radiotherapy.
- History of previous breast or axillary surgery.
- Patients with coagulopathy or uncontrolled comorbidities affecting wound healing.

Surgical Technique: All procedures were performed under general anesthesia by experienced surgeons. Standard MRM was performed with removal of breast tissue, overlying skin, nipple-areola complex, and level I–II axillary lymph nodes. Hemostasis was meticulously achieved, and skin flaps were closed with interrupted or continuous sutures. For Group A, a closed suction drain (10–16 F) was placed in the axillary region and exteriorized through a separate stab incision. Group B underwent identical procedures without drain placement.

Postoperative Monitoring:

- Patients were monitored daily for seroma formation, defined clinically as a palpable or visible fluid collection under the mastectomy flaps or in the axilla.
- Seroma volume was measured via aspiration when clinically significant (tension, discomfort, or flap elevation).
- Frequency of aspirations, total aspirated volume, duration of hospital stay, and any wound complications, including infection or flap necrosis, were recorded.

Outcome Measures:

- Primary outcome: Incidence of postoperative seroma.
- Secondary outcomes: Total volume of seroma, number of aspirations required, duration of hospital stay, and incidence of wound-related complications.

Data Analysis: Data were analyzed using SPSS software (version 26). Continuous variables were expressed as mean ± standard deviation (SD), and categorical variables as frequencies and percentages. The Chi-square test or Fisher's exact test was used for categorical comparisons, while the Student's t-test or Mann–Whitney U test was used for continuous variables. A p-value <0.05 was considered statistically significant.

Results

A total of 120 patients undergoing modified radical mastectomy were included, with 60 in the drain group (Group A) and 60 in the no-drain group (Group B). The mean age was 49.2 ± 9.8 years.

Seroma formation was observed in 47 patients (39.2%) overall, with significantly higher incidence in the no-drain group. Other postoperative outcomes, including aspiration frequency, seroma volume, and hospital stay, were compared between the groups.

Table 1: Age distribution of patients

Age group (years)	Number of patients	Percentage (%)
18–30	10	8.3
31–40	32	26.7
41–50	38	31.7
51–60	28	23.3
>60	12	10.0

Table 1 shows the majority of patients were between 41–60 years.

Table 2: Tumor location distribution

Tumor location	Number of patients	Percentage (%)
Upper outer quadrant	50	41.7
Upper inner quadrant	24	20.0
Lower outer quadrant	20	16.7
Lower inner quadrant	10	8.3
Central/Nipple region	16	13.3

Table 2 demonstrates tumor distribution across breast quadrants.

Table 3: Histological type of tumor

Histological type	Number of patients	Percentage (%)
Invasive ductal carcinoma	96	80.0
Invasive lobular carcinoma	18	15.0
Other types	6	5.0

Table 3 shows invasive ductal carcinoma was the most common histology.

Table 4: Tumor grade distribution

Tumor grade	Number of patients	Percentage (%)
Grade I	22	18.3
Grade II	74	61.7
Grade III	24	20.0

Table 4 indicates most tumors were grade II.

Table 5: Incidence of seroma formation by group

Group	Number of patients	Patients with seroma	Percentage (%)
With drain (A)	60	15	25.0
Without drain (B)	60	32	53.3

Table 5 demonstrates higher seroma incidence in the no-drain group.

Table 6: Total volume of aspirated seroma

Group	Mean seroma volume (mL) ± SD
With drain (A)	75 ± 20
Without drain (B)	140 ± 35

Table 6 shows seroma volume was significantly higher in patients without drains.

Table 7: Number of aspirations required per patient

Group	Mean number of aspirations ± SD
With drain (A)	1.2 ± 0.5
Without drain (B)	2.8 ± 1.1

Table 7 indicates more frequent aspirations in the no-drain group.

Table 8: Duration of hospital stay

Group	Mean hospital stay (days) ± SD
With drain (A)	4.5 ± 1.1
Without drain (B)	6.2 ± 1.4

Table 8 shows shorter hospital stay in patients with drains.

Table 9: Wound infection rates by group

Group	Number of patients	Patients with infection	Percentage (%)
With drain (A)	60	4	6.7
Without drain (B)	60	5	8.3

Table 9 demonstrates no significant difference in infection rates between groups.

Table 10: Seroma formation by tumor location

Tumor location	Patients with seroma	Percentage (%)
Upper outer quadrant	22	44.0
Upper inner quadrant	10	41.7
Lower outer quadrant	6	30.0
Lower inner quadrant	3	30.0
Central/Nipple region	6	37.5

Table 10 shows upper outer quadrant tumors had the highest seroma incidence.

Table 11: Seroma formation by tumor grade

Tumor grade	Patients with seroma	Percentage (%)
Grade I	6	27.3
Grade II	28	37.8
Grade III	13	54.2

Table 11 shows higher-grade tumors were more prone to seroma.

Table 12: Correlation between drain placement and seroma volume

Variables	Correlation coefficient (r)	p-value
Drain placement vs seroma volume	-0.58	0.001

Table 12 demonstrates a statistically significant negative correlation between drain use and seroma volume.

Table 1 shows that most patients were aged 41–60 years. Table 2 indicates the upper outer quadrant was the most common tumor location. Table 3 demonstrates invasive ductal carcinoma as the predominant histology. Table 4 shows most tumors were grade II. Table 5 highlights a significantly higher seroma incidence in patients without drains. Table 6 demonstrates larger mean seroma volumes in the no-drain group. Table 7 shows more frequent aspirations were required in the no-drain group. Table 8 indicates shorter hospital stay with drains. Table 9 shows comparable wound infection rates between groups. Table 10 shows tumor location influences seroma formation, with the upper outer quadrant most affected. Table 11 indicates higher-grade tumors are more prone to seroma, and Table 12 confirms a significant negative correlation between drain placement and seroma volume.

Discussion

Postoperative seroma formation is a common and clinically significant complication following modified radical mastectomy (MRM), often leading to patient discomfort, delayed wound healing, repeated hospital visits for aspiration, and prolonged hospital stay [7]. The present study evaluated 120 patients undergoing MRM, comparing outcomes between those with drain placement (Group A) and those without drains (Group B). The findings highlight that drain placement significantly reduces both the incidence and volume of postoperative seromas [8].

In this study, seroma formation occurred in 39.2% of patients overall, with 25% in the drain group and 53.3% in the no-drain group. This aligns with previous reports indicating that drains effectively reduce fluid accumulation by providing continuous drainage from the axillary dead space and mastectomy flaps [9]. Patients without drains required more frequent aspirations, and the mean volume of aspirated seroma was significantly higher (140 ± 35 mL vs. 75 ± 20 mL), demonstrating the clinical importance of drain use in reducing postoperative morbidity [10].

Hospital stay was also influenced by drain use. Patients with drains had a mean stay of 4.5 ± 1.1 days compared to 6.2 ± 1.4 days for those without drains, consistent with the notion that reduced seroma formation facilitates faster recovery and earlier discharge. Wound infection rates did not differ significantly between the groups, suggesting that the presence of a drain does not inherently increase infection risk when proper aseptic techniques are employed [11,12].

Tumor-related factors also influenced seroma formation. Upper outer quadrant tumors were associated with higher seroma incidence (44%), possibly due to the larger tissue dissection and proximity to axillary lymphatic pathways. Additionally, higher-grade tumors demonstrated increased seroma formation, likely reflecting more extensive surgical manipulation and tissue exudate. These findings underscore the multifactorial nature of seroma development, where both surgical and tumor-related factors play a role [13].

The significant negative correlation between drain placement and seroma volume ($r = -0.58$, $p = 0.001$)

supports the efficacy of drains in reducing fluid accumulation. However, drains may be associated with patient discomfort, restricted mobility, and anxiety. Careful patient counseling and monitoring can mitigate these drawbacks while optimizing postoperative outcomes [14].

Limitations of this study include its single-center design and moderate sample size, which may limit the generalizability of findings. Additionally, the study did not evaluate long-term outcomes such as flap necrosis, lymphedema, or quality of life measures. Future multicenter trials with larger cohorts and standardized assessment protocols could provide more robust evidence on the optimal management of postoperative seroma in breast cancer surgery.

In conclusion, drain placement during modified radical mastectomy significantly reduces the incidence and volume of postoperative seroma, decreases the need for repeated aspirations, and shortens hospital stay. Patient- and tumor-specific factors should also be considered in postoperative management planning.

Conclusion

The study demonstrates that the use of drains during modified radical mastectomy significantly reduces postoperative seroma formation, lowers seroma volume, decreases the number of aspirations required, and shortens hospital stay. Tumor location and grade also influence seroma development, with upper outer quadrant tumors and higher-grade tumors showing higher incidence. Careful consideration of drain placement, combined with meticulous surgical technique, can optimize postoperative outcomes and improve patient recovery following breast cancer surgery.

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