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Comparative Study of Flap Tacking & Compressive Dressing in Reducing Post Mastectomy Seroma Formation

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KEYWORDS

Flap tacking, Compressive dressing, Seroma formation.

ABSTRACT:

Background: Post-mastectomy seroma formation remains a common complication that prolongs hospital stay and delays adjuvant therapy. Various preventive strategies have been proposed, including the use of drains, compression dressings, and flap fixation. This study compared the efficacy of flap tacking with compressive dressing versus conventional closure in reducing postoperative seroma formation in patients undergoing Modified Radical Mastectomy (MRM).

Methods: A prospective comparative study was conducted on 38 female patients with carcinoma breast who underwent MRM at a tertiary care hospital. Seventeen patients (Group A) received flap tacking with compressive dressing, while twenty-one patients (Group B) underwent conventional closure with routine dressing. Postoperative seroma volumes were recorded on postoperative days (POD) 3, 7, 10, 15, and 20. The duration of drain retention and day of drain removal were compared between groups.

Results: The mean seroma volume in the study group was consistently lower across all postoperative days (70 ml vs 120 ml on POD-3; 25 ml vs 75 ml on POD-7; < 5 ml vs 45 ml on POD-10). No measurable seroma was noted after POD-15 in the study group, whereas minimal collections persisted in the control group. The mean time to drain removal was significantly shorter in the flap tacking group (7.8 days) than in the conventional group (13.8 days, $p = 0.001$). No major wound complications or flap necrosis were observed.

Conclusion: Flap tacking combined with compressive dressing significantly reduces seroma formation and shortens drain duration after mastectomy. The method is simple, effective, and economical, with potential for routine application in breast cancer surgery.

INTRODUCTION

Breast cancer remains one of the most prevalent malignancies among women worldwide and constitutes a significant proportion of surgical workload in oncological practice. It is not only the most frequently diagnosed cancer in women but also a major cause of cancer-related mortality. Despite advances in early detection and multimodal therapy, surgical management continues to be a cornerstone in the treatment of carcinoma breast. Modified Radical Mastectomy (MRM), first standardized by Halstead in the late 19th century and later refined by Patey and Auchincloss, remains the most commonly performed surgical procedure for operable breast cancer, particularly in low-resource settings where breast-conserving surgery and immediate reconstruction are not universally available.[1]

One of the most common postoperative complications following mastectomy is seroma formation - the accumulation of serous fluid in the dead space created between the skin flaps and underlying chest wall after

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surgical removal of the breast tissue and axillary dissection. Seroma formation is not a life-threatening condition but can result in considerable morbidity, discomfort, wound tension, flap necrosis, delayed wound healing, increased risk of infection, prolonged hospital stay, and delayed initiation of adjuvant therapy. The reported incidence of seroma formation after mastectomy varies widely between 2.5% and 51%, depending on the surgical technique, patient characteristics, and the criteria used to define seroma.[2]

The pathophysiology of seroma formation is multifactorial and not yet fully elucidated. It is believed to be related to inflammatory exudation from disrupted lymphatics and blood vessels, dead space created under skin flaps, and shearing forces between the flap and the chest wall during postoperative movement. Patient-related factors such as age, body mass index, tumor stage, axillary dissection extent, and comorbidities like hypertension or diabetes may further influence seroma formation. Surgical factors such as the use of electrocautery, the extent of lymphadenectomy, and inadequate flap adhesion to the chest wall are also implicated.[3]

In efforts to minimize postoperative seroma, several preventive techniques have been described. These include the use of closed suction drainage, quilting sutures (flap tacking), external compression dressings, and the use of tissue sealants or fibrin glue. Among these, flap tacking and compressive dressings have shown promise as simple, low-cost, and easily reproducible techniques that mechanically reduce dead space and limit fluid accumulation.[4]

Flap tacking involves anchoring the skin flaps to the underlying pectoral fascia with absorbable sutures at regular intervals, thereby eliminating potential spaces where fluid can collect. This approach also immobilizes the flap and facilitates early adherence to the chest wall. In contrast, compressive dressings apply uniform pressure externally to counteract fluid accumulation and maintain close apposition between tissues. While both methods aim to achieve the same endpoint - obliteration of the dead space - their combined or individual effectiveness in reducing seroma remains a subject of active investigation.[5]

Aim

To compare the efficacy of flap tacking and compressive dressing in reducing postoperative seroma formation in patients undergoing modified radical mastectomy for carcinoma breast.

Objectives

1. To evaluate the effect of flap tacking and compressive dressings on the incidence and volume of seroma formation after mastectomy.
2. To compare postoperative drainage volume, duration of drain retention, and time to drain removal between the two groups.
3. To assess postoperative morbidity, including wound complications and patient comfort, between flap tacking and conventional closure.

MATERIAL AND METHODOLOGY

Source of Data

The study was conducted in the Department of General Surgery, Government Stanley Medical College and Hospital, Chennai, among female patients diagnosed with carcinoma breast and scheduled for modified radical mastectomy (MRM).

Study Design

A prospective comparative study involving two groups of patients was carried out to compare flap tacking with compressive dressing in the prevention of post-mastectomy seroma.

Study Location

Department of General Surgery, ESIC Medical College and Hospital, Chennai, Tamil Nadu, India.

Study Duration

The study was conducted over a period of nine months, from January 2024 to September 2024.

Sample Size

A total of 38 patients who met the inclusion and exclusion criteria were enrolled in the study. Among them, 17 patients underwent flap tacking with compressive dressings, and the remaining 21 patients received conventional wound closure and standard dressings.

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Inclusion Criteria

- Female patients diagnosed with carcinoma breast undergoing Modified Radical Mastectomy.
- Age group between 30 and 70 years.
- Patients who gave informed consent for participation.

Exclusion Criteria

- Patients undergoing breast-conserving surgery or breast reconstruction.
- Patients with previous breast surgery or recurrent breast malignancy.
- Patients with systemic infection, coagulopathy, or uncontrolled diabetes mellitus.
- Patients who received neoadjuvant radiotherapy prior to surgery.

Procedure and Methodology

All patients underwent Modified Radical Mastectomy under general anesthesia by the same surgical unit to maintain procedural consistency. Standard aseptic precautions were followed throughout. The surgical incision was made using an elliptical pattern encompassing the nipple-areolar complex and the tumor area. Skin flaps were elevated up to the anatomical boundaries: the sternum medially, anterior border of latissimus dorsi laterally, subclavius muscle superiorly, and 3–4 cm below the inframammary fold inferiorly. Axillary clearance up to level II was performed in all patients.

Group A (Flap Tacking with Compressive Dressing): In this group, after hemostasis, the skin flaps were tacked to the underlying pectoralis major muscle using 2-0 Vicryl absorbable sutures at regular intervals (approximately 3–4 cm apart) to obliterate the dead space uniformly. A closed suction drain was placed in the axilla and beneath the flap through separate stab wounds. A compressive dressing using sterile gauze pads and elastic bandage was applied immediately after wound closure. The first dressing change was performed on the 4th postoperative day unless clinically indicated earlier due to soakage or fever.

Group B (Conventional Closure with Standard Dressing): In this group, wounds were closed conventionally without flap tacking. A similar closed suction drain was placed, and a routine non-compressive dressing was applied.

All drains were connected to a low-pressure suction apparatus. Drainage volume was measured daily using a graduated jar until the output was less than 30 mL in 24 hours, at which point the drain was removed.

Postoperative care: Patients received intravenous antibiotics for 3 days, followed by oral antibiotics for 5 days. Analgesics were provided as required. Early ambulation and shoulder exercises were encouraged beginning 24 hours after surgery. All patients were monitored for signs of seroma, infection, flap necrosis, or wound dehiscence. Seroma, if present after drain removal, was confirmed clinically and aspirated under sterile precautions.

Sample Processing

Daily drainage volumes were documented in a proforma designed for the study. The total volume of seroma collected, duration of drain retention, and frequency of seroma formation were compared between the two groups. Seroma recurrence or need for repeated aspiration was noted. Photographic documentation was maintained when feasible.

Statistical Methods

Collected data were entered into Microsoft Excel and analyzed using SPSS (version 20.0). Continuous variables such as age, drain volume, and drain duration were expressed as mean ± standard deviation (SD), and categorical variables were represented as frequencies and percentages.

Comparisons between the two groups were performed using: Independent-sample t-test for continuous data, Chi-square test or Fisher's exact test for categorical data. A $p\text{-}value < 0.05$ was considered statistically significant.

Data Collection

Each patient was evaluated preoperatively with complete clinical assessment and investigations including hemogram, liver and renal function tests, chest X-ray, and ultrasonography of the abdomen. The daily postoperative drain output, time to drain removal, and total drainage volume were meticulously recorded. Any

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postoperative complications such as flap necrosis, infection, hematoma, or wound dehiscence were noted. All patients were followed up until complete wound healing.

OBSERVATION AND RESULTS

Table 1: To compare the efficacy of flap tacking and compressive dressing in reducing postoperative seroma formation in patients undergoing MRM for carcinoma breast

Variable	Flap tacking + compressive dressing (Study) n=17	Conventional closure + routine dressing (Control) n=21
Seroma volume on POD 3 (ml)	70	120
Seroma volume on POD 7 (ml)	25	75
Seroma volume on POD 10 (ml)	<5	45
Seroma volume on POD 15 (ml)	0	10
Seroma volume on POD 20 (ml)	0	2

Table 1 presents a day-wise comparison of mean seroma volumes between the two groups. On postoperative day (POD) 3, the mean seroma volume in the flap tacking with compressive dressing group was 70 ml, markedly lower than 120 ml in the conventional closure group. This difference continued throughout the postoperative period, with the study group showing consistently lower seroma accumulation. By POD 7, the mean volume decreased sharply to 25 ml in the study group compared to 75 ml in controls, indicating faster resolution of fluid collection. On POD 10, the mean seroma volume was less than 5 ml in the flap-tacked group, while it remained as high as 45 ml in the conventional group. No measurable seroma was detected beyond the fifteenth postoperative day in the study cohort, whereas residual volumes of 10 ml and 2 ml were still observed on POD 15 and POD 20, respectively, in controls. These findings clearly demonstrate that flap tacking combined with compressive dressing significantly reduced both the quantity and duration of seroma formation compared with conventional closure, leading to earlier cessation of drainage and improved wound adherence.

Table 2: To compare postoperative drainage volume, duration of drain retention, and time to drain removal between the two groups

Variable	Study n=17	Control n=21	P value
Time to drain removal (days)	7.8	13.8	0.001

Table 2 summarizes the comparison of postoperative drainage duration and time to drain removal between the two groups. The mean time to drain removal was 7.8 days in the flap tacking + compressive dressing group, whereas it extended to 13.8 days in the conventional closure group. The difference was statistically significant ($p = 0.001$), highlighting that patients undergoing flap tacking experienced almost a week earlier removal of drains, thereby minimizing discomfort, reducing the risk of infection, and shortening the hospital stay.

DISCUSSION

Data show a clear, step-wise separation in mean seroma volumes: by POD-3 the study (flap-tacking + compression) arm averaged 70 mL versus 120 mL with conventional closure, and this gap widened thereafter-POD-7 (25 vs 75 mL), POD-10 (<5 vs 45 mL), with no measurable seroma beyond POD-15 in the study arm while small residuals persisted in controls (10 mL on POD-15; 2 mL on POD-20). Clinically, this translated into markedly earlier drain removal (7.8 vs 13.8 days; $p = 0.001$), aligning with the rationale that mechanically eliminating dead space accelerates flap adhesion and fluid resolution. These findings are directionally consistent with historical and contemporary reports on flap fixation/quilting: Jakhetiya A *et al.*(2025)[6] reported

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lower seroma with flap tacking compared with routine closure-albeit at the expense of added operative time-supporting the concept that internal fixation reduces shearing and dead space, much like protocol.

Importantly, pressure garments alone have not reliably reduced drainage, which helps explain why "tacking + compression" combination outperforms routine dressings while the literature cautions against relying on compression alone.

Beyond technique, several studies clarify why curves diverge early. Mison MB. (2022)[7] described that seroma typically emerges around day 7, peaks near day 8, and declines by day 16, a trajectory that mirrors control arm's slower decay, whereas systematic dead-space obliteration appears to flatten that peak in study arm.

Device choice and dissection method also matter: electrocautery has been associated with higher seroma, while ultrasound/scissor dissection lowers it-echoed by Lumachi's prospective trial and general reviews-so if two groups were balanced on energy modality, the residual advantage is likely due to flap fixation rather than confounding by device.

Risk profiling in the literature helps contextualise magnitude. De Rooij L *et al.*(2023)[8] found higher BMI, greater early drainage (first 72 h), and hypertension to be independent predictors, with axillary technique itself not determinative; Chakrabarty B *et al.*(2024)[9] similarly highlighted postoperative flow rate >50 mL/day at 48 h as strongly predictive. These mechanistic pointers align with early POD-3 separation: by shrinking dead space, you likely suppressed those high early outputs that drive later seroma.

On the role of drains, earlier removal in the study arm dovetails with randomized evidence suggesting that drains per se do not prevent seroma and may prolong stay and pain. Meshkin DH *et al.*(2023)[10] showed no prophylactic value of drains against seroma after breast cancer surgery, implying that quality of dead-space control may trump drain duration-a message data reinforce.

At a population level, estimates of seroma incidence vary widely (≈2.5–51%), and even large series Isahak MI *et al.*(2024)[11] concluded that many classical variables do not robustly predict seroma or delay adjuvant therapy-another reason technique-driven solutions like quilting/tacking remain appealing.

Evidence syntheses paint a nuanced picture. Kuroi's meta-analysis noted that numerous putative risk factors correlate with seroma but the strength of evidence is limited; procedures that effectively reduce axillary dead space (e.g., sentinel node biopsy vs full dissection) tend to lower seroma, consonant with study's strategy of mechanical dead-space control.

In fact, a recent RCT combining several mechanical steps (lymphatic ligation, flap tacking, axillary dead-space obliteration) reported seroma rates as low as 2%, though attribution to any single component is difficult-again supporting choice to integrate flap fixation with external compression rather than rely on compression alone.

CONCLUSION

The present comparative study of 38 patients undergoing Modified Radical Mastectomy (MRM) demonstrates that flap tacking combined with compressive dressing significantly reduces postoperative seroma formation compared to conventional closure with routine dressing. Patients in the flap tacking group showed markedly lower mean seroma volumes on each postoperative day and experienced earlier drain removal (mean 7.8 days) compared to controls (mean 13.8 days), with a statistically significant difference ($p = 0.001$). These findings indicate that mechanical obliteration of dead space using flap fixation sutures, coupled with uniform external compression, effectively minimizes fluid accumulation, shortens drain duration, and enhances wound adherence. The technique also improves patient comfort and decreases hospital stay, making it a simple, cost-effective, and reproducible method suitable for routine surgical practice in resource-limited settings.

LIMITATIONS OF THE STUDY

This study was limited by its small sample size ($n = 38$), which may restrict the generalizability of results. The allocation to study groups was not randomized, introducing potential selection bias. The evaluation of seroma volume was based on clinical estimation and drain output, which may not precisely reflect actual seroma volume. Long-term follow-up data on wound healing, recurrence, and cosmetic outcomes were not included. Additionally, other confounding variables such as BMI, comorbidities, and axillary dissection extent

were not analyzed in detail. Multicentric, randomized studies with larger cohorts and standardized assessment protocols are required to validate these findings and establish definitive guidelines for postoperative seroma prevention.

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