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Research Article

SEROMA FORMATION AND ITS RELATIONSHIP WITH MECHANICAL DEAD SPACE OBLITERATION FOLLOWING MODIFIED RADICAL MASTECTOMY

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ABSTRACT

Objectives: Modified radical mastectomy (MRM), a common approach in breast cancer treatment, often leads to seroma formation, posing challenges to patient recovery. This retrospective study investigates the relationship between flap fixation and seroma formation, focusing on the obliteration of mechanical dead space. Our findings contribute valuable insights into minimizing postoperative morbidity and optimizing patient care.

Methods: A retrospective analysis was conducted on 120 females undergoing MRM, with 60 patients undergoing conventional procedures and 60 with flap fixation. Patient characteristics, operation duration, drainage amount, removal time, flap necrosis, and infection rates were recorded and compared using t-tests.

Results: Flap fixation demonstrated a significant reduction in drained serous fluid and duration of drain removal compared to the control group ($p<0.001$). Infection rates were comparable between the study (25%) and control (18%) groups ($p=0.22$). The study group showed a mean duration of drain removal of 11.18 days, significantly shorter than the control group's 14.22 days ($p<0.001$).

Conclusion: Flap fixation emerges as a promising technique in reducing seroma formation and addressing mechanical dead space after MRM. This study advocates for the adoption of flap fixation in routine surgical practice, offering surgeons an effective strategy to enhance postoperative recovery and minimize patient morbidity.

Keywords: Modified radical mastectomy, Seroma formation, Flap fixation, Dead space obliteration, Breast cancer.

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INTRODUCTION

Carcinoma breast remains the most common site-specific malignancy diagnosed in women [1]. More than a million cases of carcinoma breast are diagnosed worldwide yearly. The overall incidence has been rising because of increased life span, lifestyle changes, and various other concerns. Breast cancer has ranked number one cancer among Indian females with age-adjusted rate as high as 25.8/100,000 women and a mortality 12.7/100,000 women [2].

Modified radical mastectomy (MRM) is a surgical procedure that involves the removal of breast tissue, including the nipple-areola complex, and axillary lymph node dissection (ALND). Seroma formation, characterized by the accumulation of fluid in the surgical site, is the most frequent complication of mastectomy and ALND, reportedly occurring in as many as 35–97% of cases [3]. It can cause discomfort, delayed wound healing, infection, and potential cosmetic issues. The ideal method to reduce seroma formation is not known [4]. Mechanical closure of dead space is one of the strategies employed to minimize seroma formation.

Seromas occur due to persistent drainage from severed lymphatics, local inflammatory response, use of electrocautery, and creation of dead space. Seroma is a collection of liquefied fat, serum and lymphatic fluid under incisions, skin flaps, and cavities formed by tissue dissection. The definition of seroma changes in the literature and frequency of this complication are variable. The etiology of seroma is not clear and is discussed widely in the literature. It is usually in the form of an exudate. Seroma formation is distressing to the patient as it predisposes to infection, flap necrosis, heavy use of antibiotics, increases hospital stay, high economic burden, and thus increases morbidity. It delays the initiation of adjuvant chemotherapy and radiotherapy and thus loses valuable time in arresting the progression and curing the disease process. Seroma needs treatment when it is symptomatic and causes discomfort to the patient. The optimal closure of the wound should decrease seroma formation, by obliterating dead space. The use of closed system suction drainage reduces the influence of this complication. A small amount of serous fluid does not necessitate treatment. More important is the probability of infection as infected seroma is a serious problem for the patient. Pressure wound dressing has no effect on reducing the amount of seroma. Different chemical methods are used for obliterating the dead space, such as fibrin glue, tissue adhesive, and sclerotherapy agents, but the effects are not clear.

Hence, we conducted a retrospective study to assert whether flap fixation reduces the drain amount thereby indirectly assessing whether flap fixation reduced seroma formation and the duration of drains.

METHODS

We conducted this retrospective study on 120 females who underwent MRM in a government medical college in central Kerala. 60 patients were patients who underwent conventional, MRM and the other 60 where the flaps were fixed. We evaluated the average duration of the drain being kept. We also assessed whether a seroma was formed after the removal of the drain.

Patients who were immunosuppressed, had co-morbidities, who had previous surgery in the axilla, or morbidly obese were excluded from the study.

The patients' characteristics, duration of the operation, drainage amount, removal time of the drains, flap necroses, and infection were recorded. The groups were compared by unpaired t-tests. Significance was determined for $p\leq0.05$

RESULTS AND DISCUSSION

The mean age of patients in the study group and control group was comparable 43.6 versus 44.4, ranging from 35 to 71 in the study group and 36 to 73 in the control group. As patients with comorbidities were excluded and as patients were in the same age group and stage of malignancy, they were comparable. The main parameter and the main aim of the study were to find the number of days, the drainage system was required, and to find seroma formation if any (Table 1).

Infection rates with 25% in the study group and 18% in the control group, the difference with a p-value of 0.22 is not significant. There was no seroma formation in either group post drain removal. There was no significant between operating times between the two groups even though the flap fixation group has slightly longer operating times.

Flap fixation techniques have been studied extensively for their impact on seroma formation postmastectomy. El-Sisi and El-Monem [5] and Cong *et al.* [6] found a significant reduction in drained serous fluid and a shorter duration for drain removal, indicating a decrease in seroma development post drain removal.

Almond *et al.* [7] observed that flap anchoring led to a significantly shorter hospital stay compared to routine drainage, without increasing seroma rates. Ouldamer *et al.* [8] and Trefoux-Bourdet *et al.* [9] found that quilting sutures can reduce seroma formation and inpatient stay.

Rao *et al.* [10] found that flap fixation can eliminate the need for a drain. Baker and Piper [11] agree with the findings but say that it will require more postoperative interventions such as repeated aspirations.

Similarly, Vettuparambil and Subramanya [12] highlight that flap fixation effectively obliterates dead space in patients undergoing MRM, reducing fluid drainage volume, seroma development, and the need for seroma aspirations. This is corroborated by Abdelkader [13], who also found flap fixation to be an effective technique to reduce seroma formation. Morarasu *et al.* [14] conducted a systematic review and meta-analysis, quilting sutures are a reliable technique that decreases seroma formation, duration of drainage, and length of hospital stay, and should be considered in mastectomies with or without ALND. Conversely, Velotti *et al.* [15] conducted a meta-analysis that confirmed the efficacy of flap fixation in reducing seroma and surgical site infections. Kuroi *et al.* [16] also support this finding, noting that suture flap fixation not only reduces seroma formation but also simplifies postoperative care, allowing for earlier drain removal and discharge. de Rooij *et al.* [17] after a double-blind trial concluded that flap fixation using sutures leads to a significant reduction in aspirations of postmastectomy seromas.

Ohlinger *et al.* [18] used tissue glue instead of drain and found that it too improves the clinical outcome but needs more postoperative aspirations.

In a retrospective study, van Bastelaar *et al.* [19] suggest that flap fixation using ARTISS tissue glue or sutures can reduce postoperative seroma aspiration, potentially decreasing patient discomfort. Boeer *et al.* [20] found that tissue glue can shorten the inpatient period. However, Najeeb *et al.* [21] reported no significant effect of fixation on seroma formation.

In our study, we had excluded people with comorbidities such as hypertension and obesity and probably are the reason why we did not get any seroma formation which indirectly corroborates the study by Kumar *et al.* [22] who documented that hypertension is associated with an increase in seroma formation. Abdelkader [13] indicates a positive correlation between seroma formation and body mass index and hypertension. Akinci *et al.* [23] also documented that hypertension is associated with an increase in seroma formation while Garzali and El-Yakub [24] did not find a significant association between hypertension and seroma formation. Lumachi *et al.* [25] did not find any significant association between body mass index and seroma formation.

Table 1: Comparison between the two studied groups according to duration of drained serous fluid

Duration of drained serous fluid	Study group	Control	t	p
Min–Max	7–15	7–20	4.34	<0.001
Mean±SD	11.18±2.84	14.22±4.58		
Median	11	16		

The infection rate between the groups was not significantly different and the rate of complication is like what Hoefer *et al.* found (30%) [26]. Ten Wolde *et al.* [27] identified an increase in surgery time and postoperative pain which was not replicated in our study.

This review underscores the potential benefits of flap fixation techniques in reducing seroma formation and postoperative complications, although individual patient factors such as BMI and hypertension may also play a significant role. Both the groups needed drains for many days and from the above studies without drains irrespective of whether one obliterates dead space or not, patients will have seroma and will need repeated aspirations. Hence, we will not advise the obliteration of dead space as an alternative to drain. Obliterate the dead space can reduce the duration of the drain being kept. Flap fixation using sutures is a cheap and freely available method which can obliterate the dead space and allows patients to have fewer days with drains, leading to improved comfort.

CONCLUSION

Drains are commonly used after a MRM to manage fluid accumulation and promote healing. However, drains are considered a major inconvenience for patients recovering from MRM. They can cause discomfort, restrict movement, and require careful management. After MRM, seroma formation is a common issue. Unfortunately, there is no foolproof method to prevent seroma formation after MRM. Despite advances in surgical techniques, seromas remain a challenge. Our study along with many others suggests that flap fixation is an effective strategy to reduce the need for drains and minimize morbidity. Flap fixation involves suturing the skin flaps to the underlying pectoral muscle. By securing the flaps, the dead space is minimized, which in turn reduces the risk of seroma formation. Flap fixation allows patients to have fewer days with drains, leading to improved comfort and faster recovery.

In summary, while drains are necessary post-MRM, flap fixation offers a promising way to mitigate seroma-related issues and enhance patient outcomes. Surgeons should consider this approach to optimize patient care.

AUTHORS' CONTRIBUTIONS

Conceptualization, Final Review: Dr. Renjin R P; Methodology: Dr Renjin R P, Dr Jomine Jose; Formal Analysis: Data collection; Writing–Original Draft Preparation: Dr. Jomine Jose, Dr Anish A V.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest associated with this research.

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