ORIGINAL ARTICLE

COMPARISON OF THE FREQUENCY OF SEROMA DEVELOPMENT BETWEEN DEAD SPACE CLOSURE WITH QUILTING SUTURES VERSUS WITHOUT QUILTING SUTURES AFTER BREAST SURGERY

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ABSTRACT

Objective: To compare the frequency of seroma development between dead space closure with quilting sutures versus without quilting sutures after breast cancer surgery in CMH Rawalpindi.

Study Design: Quasi-experimental.

Place and duration of Study: Department of Surgery, Combined Military Hospital Rawalpindi, 01 year (May 2020 to May 2021).

Methodology: A Total of 60 patients, subjected to either simple mastectomy or a modified radical procedure for breast cancer, were included in the study. Patients who had undergone breast conservation surgery and advanced breast carcinoma were excluded. Randomisation by lottery was used to allocate patients into two groups: Group A, comprising 30 females who received quilting sutures for dead space obliteration, and Group B, of 30 females who did not receive quilting sutures after breast surgery. Seroma formation on the 7th postoperative day was noted.

Results: The overall age range of participants was 35-50 years with a mean age of 42.25 ± 2.83 years. In our study, the frequency of seroma formation in the dead space closure with quilting sutures group was found in 05 (16.67%) vs 20 (66.67%) patients without the quilting sutures group (p=0.0001).

Conclusion: This study found that the frequency of seroma development is less after dead space closure with quilting sutures as compared to without quilting sutures.

Keywords: *Modified radical mastectomy, Quilting sutures, Seroma.*

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INTRODUCTION

The major chunk of operative work on breast-related diseases is secondary to breast cancer. Despite advances in surgical techniques, breast surgery, especially mastectomy, is marred by a multitude of complications, among which Seroma formation is the most common. Seroma is defined as a pocket of clear serous fluid in dead space created during breast and axillary dissection. Its incidence varies from 2.5 to 51% [1,2,3]. Despite being a benign complication, it leads to problems such as discomfort for the patient, delay in adjuvant chemotherapy, risk of infection, and repeated visits to the clinic. Keeping in view that prevention is better than dealing with complications, many techniques are being practiced to prevent seroma development which include using suction drains, shoulder immobilization, minimal use of electrocautery, fibrin sealants and flap fixation using quilting sutures.

Seroma poses a concern for the patient. Multiple aspirations are associated with a risk of infection, thereby prolonging hospital stay. It also delays wound healing and, hence, a delay in commencing adjuvant therapies. Biological mechanisms

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and associated risk factors studied in seroma formation include the patient's age, obesity, the number of axillary lymph nodes dissected, and the type and extent of breast surgery [4]. In the recent past and presently, many publications are in quest for an effective technique/method for preventing seroma formation, and the overall consensus is to strategically obliterate /minimise potential space after mastectomy to achieve seroma-free results[5]. Various methodologies applied include closed drainage, suturing/quilting or application of tissue adhesive glue, shoulder immobilisation and minimal use of electrocautery[6,7]. Studies have revealed that flap fixation, using suturing techniques, has good results in decreasing seroma formation[8,9,10,11].

This study was conducted to measure the efficacy of flap fixing with quilting sutures after breast surgery in terms of decreased seroma formation in the local population.

CAPSULE SUMMARY

The frequency of seroma development in dead space closure with quilting sutures was compared with closure without quilting sutures after breast cancer surgery. Seroma development was found to be less after dead space closure with quilting sutures.

METHODOLOGY

This quasi-experimental study was carried out at the Department of Surgery, Combined Military Hospital, Rawalpindi. The study was conducted over 01 year, from 27th May 2020 to 26th May 2021, with 60 female patients, 30 in each group. The sample size was based on a 5% significance level and 80% power, considering seroma incidence of 78.3% in the group without quilting sutures and 20.0% in the quilting sutures group, as reported previously[12]. Participants were selected via non-probability, consecutive sampling. Inclusion criteria covered women aged 35-50 years, with a BMI of 25-29, undergoing simple or modified radical mastectomy for breast cancer. Exclusions included redo surgery, advanced carcinoma, multiple comorbidities and breast conservation surgery. Permission from the concerned authority and the hospital ethical committee was obtained before commencing the study. Sixty patients were recruited according to the selection criteria after taking history, clinical examination, and after informed, written consent from the patients. Study participants were stratified into Group A, comprising 30 females, having quilting sutures for dead space obliteration, and Group B, of 30 females without quilting sutures after breast surgery. In both groups, some patients had a simple mastectomy and some patients had a modified radical mastectomy, as shown in Table 1. Group A patients, before closing wound skin flaps, were sutured using Vicryl 2/0 interrupted sutures to the underlying muscles equidistant, multiple layers depending on the size of the flaps. The wound was dressed with a standard dressing. In the Group B patients, quilting sutures were not applied; the wound was closed and dressed with a standard dressing. Drain was placed in both groups. Seroma formation on the seventh post-operative day was noted clinically and confirmed on ultrasound. All this data (age, duration of disease, BMI, marital status , stage of carcinoma, and seroma formation was noted in a proforma.

The compiled data were analysed with SPSS version 25.0. Variables like age, duration of breast cancer, and BMI are

Table 1: Patient distribution according to age, duration of disease, Marital status, BMI & tumor Stage (n=60)

Variables	Group A mean±SD	Group B mean±SD	p-value
Age (Years)	42.13 ± 3.93	42.37 ± 3.79	0.233
Duration of disease (Months)	5.37 ± 2.08	5.30 ± 2.17	0.341
BMI (kg/m²)	26.13 ± 2.15	26.27 ± 1.94	0.541
Variables	Group A n(%)	Group B n(%)	
Marital status			
Unmarried	3(10)	2(6.67)	0.64
Married	27(90)	28(93.33)	
Stage			
II	4(13.33)	5(16.67)	0.93
III	14(46.67)	13(43.33)	
IV	12(40)	12(40)	
Type of Surgery			
Simple	18(60)	19(63.34)	0.79
MRM	12(40)	11(36.67)	

shown as mean/standard deviation. Categorical variables like marital status, stage of carcinoma, and seroma formation are tabulated in the form of percentages and frequencies. Influence exerting factors such as age, duration of breast cancer, marital status, stage of carcinoma, and BMI are tabulated through stratification. The chi-square test and independent samples t-test were applied to see the significance. A p-value ≤ 0.05 was considered significant.

RESULTS

In our study, the overall age range was from 35 to 50 years with a mean age of 42.25 ± 2.83 years. The mean age in group A was 42.13 ± 3.93 years, whereas in group B it was 42.37 ± 3.79 years. Forty seven (78.33%) patients were between 35 to 45 years of age. The average duration of disease remained 5.33 ± 2.11 months. Marital status-wise distribution of patients, mean BMI (26.20 ± 2.01 kg/m2), and patients' distribution according to stage of carcinoma are provided in Table 1.

In our study, the frequency of seroma formation in the dead space closure with quilting sutures group was found in 05 (16.67%) vs 20 (66.67%) patients without the quilting sutures group (p=0.0001) (Table 2). Tabulation of seroma formation age-wise, duration of disease, and seroma formation according to marital status, BMI and tumor stage is depicted in Table 3.

DISCUSSION

Conventionally, the wounds are closed after placing a wound drain, commonly a suction type, after mastectomy in an attempt to prevent seroma, which commonly develops after drain removal [13].

Multiple Studies on dead space obliteration using biochemical/natural ingredients such as tetracycline, fibrinogen, glue, and thrombin sealants show variable results [14,15,16,17,18]. Recent studies demonstrate that quilting sutures reduce the incidence of seroma formation[19,20,21,22,23]. Quilting suture consists of suturing the skin flaps to the underlying musculature, thereby obliterating the dead space, and restoring the integrity of tissue planes.

In this study, we compared the frequency of seroma development among patients in whom dead space was obliterated using quilting sutures versus those without quilting

Table 2: Comparison of the frequency of seroma formation between dead space closure with quilting sutures versus without quilting sutures after breast surgery (n=60).

		Group A (n=30)		Group B (n=30)		p-value
		No. of Patients	%age	No. of Patients	%age	0.001
SEROMA	Yes	05	16.67	20	66.67	
	No	25	83.33	10	33.33	

Table 3: Tabulation of seroma (yes/no) according to age, duration, and stage of cancer, marital status, &BMI

Variable	Strata	Group A (n=30)		Group B (n=30)		p-value
		Seroma		Seroma		
		Yes n(%)	No n(%)	Yes n(%)	No n(%)	
Age of patients (years)	15-20	05 (21)	19 (79)	16 (70)	07 (30)	0.001
	21-25	00 (0)	06 (100)	04 (57)	03 (43)	0.026
Duration of Diease (Months)	≤5	03 (19)	13 (81)	10 (67)	05 (33)	0.007
	>5	02 (14)	12 (86)	10 (67)	05 (33)	0.004
Marital status	Unmarried	00 (0)	03 (100)	02 (100)	00 (0)	0.025
	Married	05 (19)	22 (81)	18 (64)	10 (36)	0.001
BMI (kg/m2)	≤27	03 (43)	04 (57)	04 (67)	02 (33)	0.391
	>27	02 (9)	21 (91)	16 (67)	08 (33)	0.0001
Stage of carcinoma	II	03 (21)	11 (79)	08 (62)	05 (38)	0.034
	III	02 (17)	10 (83)	07 (58)	05 (42)	0.035
	IV	00 (0)	04 (100)	05 (100)	00 (0)	0.003

sutures after breast surgery. Frequency of seroma formation in the dead space closure with quilting sutures group was found in 05 (16.67%) vs 20 (66.67%) patients without quilting sutures group, (p=0.0001). The incidence of seroma formation in our study is at par with studies in literature. A study conducted in Japan, among 176 patients (87 managed with conventional closure and 89 quilted), demonstrated a significant reduction in seroma development, i.e 80.5% in the conventional group to 22.5% in the quilted group, p<0.01, OR=0.26, 95% CI 0.08 to 0.86; p=0.03 [24].

In another study conducted in France, evaluating 119 patients operated for breast cancer, it was noted that the overall seroma rate was 15.2% in the quilting suture group, and in the conventional closure group, it was 51.7% [25]. Purushotham et al study also concluded that in breast surgery, suture fixation of flaps was not associated with increased surgical or psychological morbidity, including seroma formation [26].

Upon categorising both groups into demographic strata, to further assess the seroma formation among subgroups, it was found that there was a significant difference in seroma formation across all the included strata of age, duration of disease, marital status, BMI and stage of carcinoma, with the frequencies being higher in Group B.

Considering the age of the patients, our results indicated that age is significantly associated with the frequency of seroma formation, as it differed across both age subgroups (p-value < 0.05). This finding is contrary to a recent study conducted in Pakistan, which reported no association between age and seroma formation among patients who underwent breast cancer surgery (p-value 0.16) [27]. Some of the studies suggest that the frequency of seroma formation generally increases with age. A study found the mean age of patients with seroma to be 62.6 ± 10.4 years, compared to 56.1 ± 10.3 years [28].

Our findings showed that the rate of seroma formation is significantly linked to Body Mass Index (BMI) and the duration of disease among breast surgery patients, as it varied equally across the shorter duration (≤5 years) and longer(>5 years) duration (p-value < 0.05). This differs from the findings of several recent studies. For example, a multicenter study published in "BMC Cancer" investigated factors such as age, smoking, previous radiation history, and COVID-19 infection as reasons for delayed seroma formation, but it did not mention duration of disease as a factor [29]. Data from Lahore, Pakistan, also showed that seroma formation was more closely linked to BMI, axillary lymph node dissection, and postoperative infection than to the length of the disease [30,31]. The "World Journal of Surgical Oncology" published another study that backed this up by showing that the rate of seromas varied more with the type of surgery than with the length of the disease [29,32]. The difference between our results and these reports could indicate that the mechanisms underlying lymphatic response or wound healing varied depending on the population or comorbidities. Further research is needed to investigate this possible link in various situations.

Our study also reported a novel finding that marital status was significantly associated with seroma formation and differed equally between the two groups. The effect of marital status has not been considered previously in such cases. Literature was only found to be related to the fact that being married is associated with better survival rates in breast cancer patients [33].

Our findings revealed a strong association between the stages of breast carcinoma in surgical patients and the rate of seroma formation, with variations observed between both groups across all stages (p-value < 0.05). On the contrary, a study conducted among 50 Indian women reported no association between stages and grading of breast cancer with seroma formation [34].

LIMITATIONS OF STUDY

The results lack generalizability as this was a single-centre study. A multicenter study should be planned to further explore this issue. We used a quasi-experimental design due to limitations of resources; an RCT would provide a higher level of evidence on this topic.

Short follow-up duration upto 7th post operative day may not have captured late onset seroma. Additionally other outcomes like length of hospital stay, volume aspirated, wound infection rate, and wound healing time were not investigated.

CONCLUSION

This study found that in breast surgery, significantly decreased seroma formation is noted after dead space closure with quilting sutures, compared to closure without quilting sutures. Therefore, we conclude that dead space closure with quilting sutures is beneficial after mastectomy, as it decreases seroma formation, thereby improving the quality of life and facilitating an early start to further treatment.

ETHICAL APPROVAL: *Reference number: SGR-2016-120-7971, Date: 18-08-2017*

CONSENT FOR PUBLICATION: *Written, informed consent was obtained from the study participants.*

AVAILABILITY OF DATA: *Data is available from the corresponding author on a justified request.*

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AUTHORS' CONTRIBUTION

- ***Muhammad Ali:*** *Conception and design*
- ***Farya Aslam:*** *Conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article*
- ***Sadia Farhan:*** *Analysis and interpretation of data*
- ***Sundas Nadeem:*** *Analysis and interpretation of data*
- ***Muhammad Azhar:*** *Drafting the article*
- ***Muhammad Naeem Ashraf:*** *Analysis and interpretation of data, Drafting the article, Critical revision*

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