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RESEARCH ARTICLE
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VALUE OF QUILTING SUTURE FOR REDUCTION OF SEROMA AFTER MODIFIED RADICAL MASTECTOMY

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ABSTRACT

Background: Breast cancer has increased in most countries worldwide. The world's less developed regions account for about 47% of cancer cases and 55% of cancer deaths. Rapid urbanization and economic expansion in many emerging nations are causing people to adopt "Western" diets and lifestyle patterns, which is increasing the burden of disease.

Objective: Evaluate the efficacy of fixation of mastectomy flap to the anterior chest wall using the quilting suturing in minimizing or preventing postoperative seroma formation.

Methods: This prospective randomized clinical trial was carried out on 50 female patients. The participants were allocated into two equal groups: Group A: patients who had the quilting sutures during the mastectomy procedure and group B: patients who had the mastectomy procedure without quilting.

Results: The amount of drain discharge showed a significant decline in Group A, and that was evident in the initial six postoperative days ($p = 0.001$). The surgical drains were removed earlier in group A ($p = 0.004$ The number of aspiration episodes showed a significant decline in Group A patients who developed seroma compared to Group B ($p = 0.033$).

Conclusions: Post-mastectomy seroma impact is significantly reduced in patients who have quilting sutures. It leads to a significant reduction in its incidence and the number of aspiration episodes, if developed.

Keywords: Quilting Suture, Seroma, Modified Radical Mastectomy, Mastectomy Flap.

Introduction

Breast cancer has increased in most countries worldwide. Most nations on Earth have seen an upsurge in breast cancer cases. The fast rise in incidence observed in low- and middle-income nations is believed to be caused by the adoption of lifestyle variables, which are linked to an increased risk of breast cancer as these countries develop. Population growth and aging can only partially account for this increase (1)**.**

The world's less developed regions account for about 47% of cancer cases and 55% of cancer deaths. In many emerging nations, increasing urbanization and economic expansion are driving the adoption of "Western" diets and lifestyle patterns, as well as the resulting increase in disease (2).

Breast cancer accounts for 37% of all female cancer cases in Egypt and is the most common malignancy among Egyptian women (3).

The most frequent complications following a mastectomy for breast cancer are seroma and excessive serous fluid drainage. Seroma development has been observed to occur in 15–81% of cases (4).

Seroma formation is a serous fluid that develop in the space between the skin flap and tissues beneath. It may result in severe morbidity, raise the possibility of post-operative complications, slow wound healing, make the patient more vulnerable to infection, necrosis of the skin flap, chronic pain, wound healing failure, prolonged recovery, and delay the administration of adjuvant therapy, all of which exacerbate patient anxiety during this period (5).

Many physical and chemical-based methods have been used to lessen or avoid seroma formation in mastectomy patients. But there is little consistent data to support their use, and their benefits vary widely. Quilting is an easy surgical technique used to eliminate remove any residual anatomical dead space following mastectomy (6, 7).

The Egyptian female population is known for her large breasts, which result in delayed and profuse fluid drainage following a mastectomy because of the extensive bare areas. An optimal closure for a wound should reduce serum leakage and lymph leakage, offer a way to firmly connect skin flaps to the structures of the chest wall, eliminate dead space, and permit the quick drainage of fluid as it accumulates (8).

To enhance wound healing and reduce seroma formation, various techniques of flap fixation or wound drainage approaches, as well as restrictions on shoulder movement following surgery have been studied (9).

The aim of this study was to evaluate the efficacy of fixation of mastectomy flap to the anterior chest wall using the quilting suturing in minimizing or preventing postoperative seroma formation.

Study Design and patients:

This prospective randomized clinical trial was carried out on 50 female patients undergoing modified radical mastectomy. They were recruited from General Surgery Department, Al-Zahraa University Hospitals (Al-Azhar University for Girls), Cairo, Egypt and Hospital Health Insurance, Benha, Egypt, between April 2019 till December 2022. An informed consent was taken from all participants.

Ethical approval:

The study has been approved from the research ethical committee of the faculty of medicine for girls, Al-Azhar University.

Inclusion criteria were female patients whatever their age presented with breast cancer and scheduled for modified radical mastectomy.

Exclusion criteria were: morbidly obese patients, previous axillary surgery, immediate breast reconstruction, untreated coagulopathy, uncontrolled diabetes.

These patients were divided into 2 equal groups:

Group A: patients who had the quilting sutures during the mastectomy procedure.

Group B: patients who had the mastectomy procedure without quilting.

All participants underwent detailed history taking (Personal history, current complaint, analysis of each complaint, review of other body systems, reproductive history), Clinical examination (General examination, local breast examination), Radiological investigations.

Procedure

All procedures were done under general anesthesia while the patient in supine position with her arm extended and abducted 90 degrees on the arm board. A broad-spectrum antibiotic (Ceftriaxone 1gm or Unasyn 1.5 gm) was commenced for all patients during of skin incision. An elliptical skin incision was made, which involved the skin over the tumor in addition to the nipple and areola. The incision extended from the midline medially to the anterior axillary line laterally, and at least 2 cm above and below the nipple. The flaps extended from the sternum medially to the lateral border of the latissimus dorsi muscle laterally. Also, it extended from the lower clavicular border superiorly, down to the rectus sheath and external oblique muscle laterally. The breast tissue was swept off, and we started

that procedure medially with ligation and division of perforating branches of the internal mammary artery. The axillary tail was dissected gently from the opening of Langer. The lateral border of the pectoralis major and pectoralis minor muscles were retracted for adequate exposure of the axilla. The axillary fat & LN were swept off in a downward direction by a gauze. Our boundaries in the axillary dissection were the axillary vein superiorly, the posterior axillary wall posteriorly, and the serratus anterior muscle anteriorly.

A surgical drain was inserted in the operative field and axillary field for drainage of the collected fluid.

In Group A, Quilting sutures were positioned every 2-3 cm along the pectoral muscle to approximate skin flaps to the pectoral muscle (Figure1). Customized, carefully positioned, numerous interrupted, alternating sutures were applied in parallel rows at different locations on the flaps using 2/0vicryl. After inserting a surgical drain into the axilla, continuous 3-0 subcuticular Monocryl sutures were used to approximate the wound edges.

In Group B, no quilting was done, and the wound edges were approximated using continuous 3-0 subcuticular Monocryl.

Figure (1): Fixation of the skin flap to the pectoral muscle after surgical drain insertion.

Follow up

The surgical drain was removed when its outflow was less than 30 cm per day for two days in a raw. The amount of drain discharge per day was recorded, so as the day of drain removal. Regular follow-up visits were scheduled for all patients for three months after the procedure. During these visits, clinical and radiological assessment was done for all patients. If any complications were detected, it was diagnosed, managed, and recorded. Clinically significant seromas were defined as an accumulation of serous fluid under the skin flap or the axilla requiring active intervention. They were managed by aspiration. The sum of aspirations and the amount of aspirated fluid were recorded.

Statistical analysis:

Data management and statistical analysis were done using SPSS (statistical package for the social science) program vs.25. Means and standard deviations were used to express quantitative data. While frequency and percentages were used to express the qualitative data. Mann Whitney U test was used to compare between numerical variables. While categorical variables were compared using the Chi-square test or Fisher exact test.

P value less than 0.05 was considered significant.

Results:

Age, BMI, comorbidities, Neoadjuvant therapy, family history of breast cancer were insignificantly

different between two groups. There was no significant difference in the intraoperative blood loss in both groups while operative time was significantly prolonged in group A (p = 0.004) **Table 1.**

Table 1: Basic demographic and Operative data.

		Group A (n= 25)	Group B (n= 25)	P
Age (years)		50.12 ± 7.282	52.04 ± 5.616	0.302
BMI (kg/m^2)		25.86 ± 2.344	25.65 ± 2.270	0.745
Comorbidities	Diabetes mellitus	6 (24.0%)	4 (16.0%)	0.480
	Hypertension	4 (16.0%)	5 (20.0%)	0.713
	CLD	0 (0.0%)	1 (4.0%)	0.312
	IHD	1 (4.0%)	1 (4.0%)	1
Neoadjuvant therapy		5 (20.0%)	4 (16.0%)	0.713
Family history of breast cancer		4 (16.0%)	6 (24.0%)	0.480
Operative data				
Operative time (min)		120.60 ± 22.607	104.40 ± 14.385	0.004*
Blood loss (ml)		218.00 ± 50.27	218.00 ± 47.05	0.998
Intraoperative blood transfusion		0 (0.0%)	0 (0.0%)	1

Pathological data was insignificantly different between two groups including tumor grading and infiltrated lymph nodes. The time of hospital stay showed no significant difference, as it had mean values of 1.88 and 2 days in quilting and non-quilting groups respectively. The amount of drain discharge showed a significant decline in Group A, and that was evident in the initial six postoperative days (p = 0.001). The surgical drains were removed earlier in group A (p = 0.004). **Table 2**

Table 2: Pathological, and Postoperative data.

		Group A (n= 25)	Group B (n= 25)	P
Type	Invasive ductal carcinoma	23 (92.0%)	24 (96.0%)	0.552
	Invasive lobular carcinoma	2 (8.0%)	1 (4.0%)	
T	2	18 (72.0%)	16 (64.0%)	0.768
	3	7 (28.0%)	9 (36.0%)	
Grade	1	2 (8.0%)	1 (4.0%)	0.836
	2	20 (80.0%)	21 (84.0%)	
	3	3 (12.0%)	3 (12.0%)	
Harvested lymph nodes		22.64 ± 6.258	22.52 ± 6.715	0.948
Infiltrated lymph nodes		4.04 ± 2.574	3.32 ± 2.561	0.326
Postoperative data				
Hospital stay(day)		1.88 ± 0.781	2.00 ± 0.816	0.598
Drain discharge in the initial three days (ml)		337.00 ± 110.189	469.00 ± 150.568	0.001*
Drain discharge in the following three days (ml)		201.00 ± 54.237	332.00 ± 96.155	0.001*
Day of drain removal		12.76 ± 3.722	16.12 ± 4.126	0.004*

There was a significant decline in the incidence of clinically significant seroma in association with quilting sutures (Group A), as it occurred in only 8% of their patients compared to 32% of patients in Group B (p = 0.034). The number of aspiration episodes showed a significant decline in Group A patients who developed seroma compared to Group B (p = 0.033). Other complications did not show significant difference regarding Surgical site infection, Hematoma, Skin flap necrosis or Partial wound dehiscence between both groups. **Table 3**

Table 3: Postoperative complications and Management of seroma.

	Group A (n= 25)	Group B (n= 25)	P
Clinically significant seroma	2 (8.0%)	8 (32.0%)	0.034*
Aspiration episodes	1.50 ± 0.707	4.88 ± 1.458	0.033*
Surgical site infection	2 (8.0%)	1 (4.0%)	0.522
Hematoma	0 (0.0%)	1 (4.0%)	0.312
Skin flap necrosis	0 (0.0%)	1 (4.0%)	0.312
Partial wound dehiscence	2 (8.0%)	2 (8.0%)	1

Discussion:

Although breast cancer mortality has declined, it is still one of the main reasons women deaths all over the world (10, 11). Modified radical mastectomy is still one of the popular surgical operations for the treatment of breast cancer and seroma formation is one of its common complications (12).

Using surgical drains doesn't decrease seroma formation, so our aim of the study is to assess using of quilting sutures in reducing seroma formation after mastectomy.

In our study there was no statistically significant difference (p = 0.302) between the mean age of the included patients in Groups A and B, which were 50.12 and 52.04 years, respectively. Wu. observed that there was no significant difference (p = 0.205) between both groups, with the mean ages of the included women being 52.7 and 50.8 years in the quilting and control groups, respectively (13).

A statistically significant difference was observed in our study between Groups A and B in terms of the percentage of patients who have a family history of breast cancer (16% versus 24%, respectively). This is in agreement with other studies showing that a family history of breast cancer is an important factor. Approximately 13% to 19% of women with breast cancer diagnoses have a mother, daughter, or sister who suffers from breast cancer (14, 15).

According to reports from other authors, the percent of cases with a family history of breast cancer was 37.3% and 33.3%, respectively in the quilting and control groups (p = 0.65) (16).

In the current study, there was a significant increase in the operative time in association with the quilting suture technique. That parameter had mean values of 120.6 and 104.4 minutes in Groups A and B respectively (p = 0.004). That difference could be explained by the extra time needed for adjusting and suturing of the skin flap to the underlying layers. Despite the statistical significance, one could see that the difference could be clinically irrelevant.

In agreement with our findings, Khater and his colleagues reported that operative time had median values of 127 minutes in the quilting group, compared to 105 minutes in the control group, with a significant increase in the former (17).

In the current study, invasive ductal adenocarcinoma was detected in the majority of the included cases, as it was present in 92% and 96% of patients in Groups A and B respectively, whereas the remaining small portion had invasive lobular carcinoma.

Madhu et al. agreed with our findings, as invasive ductal carcinoma was present in 90% in patients in both quilting and control groups respectively (18).

Additionally, a previous Egyptian study handling the same perspective as ours reported that ductal adenocarcinoma was encountered in 76.7% and 78.3% of cases in the quilting and control groups respectively (p = 1) (17). That also agree with our findings regarding the predominant of ductal carcinoma over the other cancer types.

Our findings showed that number of harvested and infiltrated lymph nodes was statistically comparable between the two groups. The former had mean values of 22.64 and 22.52 while the latter had mean values of 4.04 and 3.32 in Groups A and B respectively.

Another study reported that the mean number of harvested nodes was 18.9 and 20.8, while the mean number of infiltrated ones was 2.8 and 5.9 in the quilting and control groups respectively, with no significant difference between the two groups (p = 0.273 and 0.775) (18).

In our study, the mean duration of hospitalization had mean values of 1.88 and 2 days in Groups A and B respectively, with no significant difference between the two groups (p = 0.598).

Although Wu. reported no significant impact of quilting sutures on the duration of hospitalization (p = 0.930) like our findings, these authors reported much longer hospitalization periods (7.8 days in

both groups) (13).
In the current study, the surgical drains were removed earlier in quilting sutures group, it was removed after 12.67 days in comparison to 16.12 days in Group B ($p = 0.004$).
Similarly, Madhu and his colleagues reported that surgical drains were removed after a mean duration of 5 days in the quilting group, compared to 13.4 days in controls, with a significant decline in association with quilting ($p < 0.001$) (18).
In our study, the incidence of clinically significant seroma was significantly decreased in Group A (8% vs. 32% in Group B – $p = 0.034$). In accordance with our findings, Wolde has reported that the same complication occurred in 22.5% of patients in the quilting group, compared to 80.5% in the control group and the mean number of aspiration episodes significantly has decreased from 4.86 in the non-quilting group to 2.40. It was evident that quilting sutures were statistically efficient in the prevention of seroma after mastectomy procedures ($p < 0.001$) (19). Another study also reported a significant decrease in patients who developed seroma after quilting sutures 2.1 vs. 4.7) aspiration episodes in the control group (17).
In the current study, surgical site infection occurred in 8% and 4% of patients in Groups A and B respectively, with no significant difference between the two groups ($p = 0.522$). Ouldamer. agreed with our findings, as the incidence of wound infection was statistically comparable between the quilting and control groups (3.4% vs. 8.3% respectively – $p = 0.27$) (16).
In our study, hematoma occurred in 0% of cases in Group A, versus 4% of cases in Group B, with no significant difference between the two groups ($p = 0.312$). Myint and his colleagues reported an incidence of 0% and 1.43% of the same complication in the quilting and control groups respectively ($p > 0.05$) (7).
Our findings showed the incidence of skin flap necrosis in 0% in groups A and 4% in Group B, which was statistically comparable between them ($p = 0.312$). Other authors reported that the same complication was encountered in 0% and 6.67% of cases in the quilting and control groups respectively, with no statistically significant difference between the two groups ($p > 0.05$) (18). An additional study reported incidences of 8.3% and 10% in the same groups, respectively ($p = 1$) (17).

Conclusions:

Quilting sutures are associated with a significant decline in the impact of post-mastectomy seroma. It leads to a significant reduction in its incidence and the number of aspiration episodes, if developed.
No conflict of interest.

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