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Effect Of Flap Fixation on Seroma Formation After Modified Radical Mastectomy

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ABSTRACT

Background: After breast cancer surgery, seroma development is it's the most frequent problem occurs post-operatively. It happens to the majority of women who have undergone a mastectomy. The development of seroma inhibits wound healing, necrosis of skin flap, increases susceptibility to infection and causes chronic pain. Therefore, several ways to promote primary healing and reduce the formation of seroma have been examined.
Aim of the study: to investigate the impact of surgically closing dead space on seroma formation and postoperative drainage after mastectomy by suturing the mastectomy flaps to underlying chest wall.
Patients and Methods: Thirty women with early-stage breast cancer were scheduled for modified radical mastectomy with axillary lymphadenectomy between January 2021 and July 2021 at Al-Azhar University Hospitals in Cairo, Egypt, in this prospective randomized trial, with a total of 15 people in each group: the study group, and the control group. The two groups were compared using comparative analysis. **Results:** There was a decreased incidence of seroma formation after flap fixation mastectomy when compared to the control group on both clinical and ultrasonographic levels. Additionally, according to this research, this approach significantly reduces drainage time and fluid drainage.
Conclusion: Because of this method's reduced risk of seroma formation, less fluid is drained, and the drains can be removed sooner, making flap fixation a highly beneficial treatment.

Keywords: *Flap Fixation.*

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INTRODUCTION

One in every ten new cancer diagnoses in women is breast cancer, which is the most frequent non-cutaneous malignancy. It is estimated that breast cancer is the second leading cause of mortality for women worldwide Breast conserving surgery and various forms of mastectomies with or without reconstruction play an important part in the therapy of operable breast cancer .[1]

Necrosis of surgical skin flaps, wound dehiscence, surgical site infection, and seroma formation, are all reported postoperatively. The most common post-operative complication following breast cancer surgery is seroma, which is a clinically obvious subcutaneous collection of serous fluid within a surgical cavity which constitutes about 30 percent of overall complications, late wound healing, infection, necrosis of skin flap as well as patient pain all have the potential to exacerbate seroma production.[2]

Repeated punctures of the skin to remove seroma fluid can cause infection in the area where they are performed. In rare cases where infection occurs, a seroma may cause a delay in the initiation of chemotherapy.[3]

Women in Egypt have enormous breasts, which leads to increased fluid outflow following mastectomy because of the large raw areas .[4]

Seroma formation's pathogenesis is a mystery. The emergence of seroma is influenced by a wide range of circumstances. Postoperative seroma production may be facilitated by the establishment of dead space. The main reason for seroma formation is that damaged lymphatics and small blood vessels continue to leak into dead space after surgery.[5]

After breast surgery, accumulation of fluid is more common due to a variety of other circumstances. If the dissection is extensive, for example, there will be a lot of empty space under the flaps. As a result of

abnormalities in the chest wall, flaps have a difficult adhering, particularly in the deep axillary fossa. Shearing forces are created by the constant movement of the chest wall caused by breathing and using the shoulder, which delays the adherence of the flap.[6]

Serum oozing and Lymph leakage should be minimized in an ideal wound closure, as well as dead space being eliminated, and fluid being removed quickly once it occurs. As a result, various flap fixation or wound drainage methods and restrictions on postoperative shoulder movement have been implemented.[7]

Mechanical closure of the dead space after axillary dissection for breast cancer can help to limit seroma formation, but it cannot completely eliminate it. Patients without drains were discharged earlier with flap fixation compared to closed suction drainage, but there was no change in seroma rates between the two methods.[8]

The amount of fluid drained from the flap fixation group was much lower and quilting the skin flaps reduced surgical site infections and seroma formation.[9]

PATIENTS AND METHODS

Thirty breast cancer women who were planned for modified radical mastectomy with axillary lymphadenectomy underwent this prospective randomized study from January to July 2021 at the Department of General Surgery, Al-Azhar University Hospitals. All patients were given a full assessment that included a detailed medical history, a thorough physical exam, laboratory tests, and an imaging study, biopsy to all patients.

Each of the thirty patients was assigned to one of 2 groups: either the study (15 patients) or the control group (15 patients).

Classic known modified radical mastectomy was standardized for all patients of the two groups with the operation being done under general anesthesia

In the study group:

There are numerous stitches in total. Fine absorbable sutures (vicryl 3/0) were used to sew raws of 3 cm apart between the subcutaneous tissues of the skin flaps and the underlying muscles at various points on the flap and at the wound edge.

Closed suction drains were used:

Control group:

Suction drains were also employed to seal the wound conventionally. Every day, the amount of fluid evacuated, and the color of the fluid were noted. Drains were removed when the flow rate dropped below 40 cc/24 hours or the drained fluid became infected, regardless of how much had been drained in the previous days.

Patients were examined clinically for presence of seroma one week after drain removal

Following the removal of the drains, a chest wall ultrasonography was conducted to determine whether any collections had occurred.

Total fluid drained, duration, and formation of seroma have all been tracked down and analyzed.

Statistical methods

SPSS version 15 was used to analyze the collected data (SPSS Inc., Chicago, IL, USA). Statistics such as mean and standard deviation (SD) were used for quantitative information, and percentages were used for qualitative information. For quantitative variables, the independent student test was used to determine the significance of the difference, while the Chi square or Fisher's exact test was used to determine the significance of the difference. P-values of 0.05 and lower were considered statistically significant for this study.

RESULTS

		Cases (N = 15)	Control (N = 15)	Stat. test	P-value
Tumor mass eliminated in terms of volume (ml)	Median IQR	358 335 - 426	435 337 – 465	MW = 93.5	0.436 NS
Area of skin removed (cm^2)	Mean ±SD	816.8 129.5	843.1 138.5	T = 0.53	0.595 NS
LNs removed	Mean ±SD	20.4 3.8	20.7 8.04	T = 0.11	0.909 NS
Number of positive LNs removed	Median IQR	2 1 – 4	2 2 – 12	MW = 79.5	0.174 NS

Table 1: Comparison between studied groups as regard operative data (MW: Mann Whitney U test, T: independent sample T test; NS: p-value higher than 0.05 is non-significant). When it comes to operative statistics, this table doesn't demonstrate any statistically significant differences (p-value > 0.05) between the groups investigated (volume of tumor mass removed, number of positive LNs removed, total number of LNs removed, and area of skin removed).

		Cases (N = 15)		Control (N = 15)		X2	P-value
Histological types	IDC	11	73.3%	10	66.7%	0.38	0.826 NS
	ILC	3	20.0%	3	20%		
	Mixed	1	6.7%	2	13.3%		
Tumor state	Stage II	13	86.7%	12	80%	0.24	0.624 NS
	Stage III	2	13.3%	3	20%		
T stage	T1	1	6.7%	2	13.3%	0.84	0.837 NS
	T2	12	80%	10	66.7%		
	T3	1	6.7%	2	13.3%		
	T4	1	6.7%	1	6.7%		
N stage	N0	11	73.3%	9	60%	0.67	0.713 NS
	N1	3	20.0%	4	26.7%		
	N2	1	6.7%	2	13.3%		
Neoadjuvant chemotherapy	No	13	86.7%	14	93.3%	0.37	0.542 NS
	Yes	2	13.3%	1	6.7%		

Table 2: Comparison between studied groups as regard tumor characteristics. (X2: Chi-square test. NS: p-value higher 0.05 is considered non-significant). There is no statistically significant difference (p-value > 0.05) in tumor features between the groups tested, as shown in this table (histological types, tumor state, T stage, N stage and Neoadjuvant chemotherapy).

		Cases (N = 15)	Control (N = 15)	Stat. test	P-value
Day of drain removal	Mean ±SD	5.4 2.06	11.4 3.5	T = 5.7	< 0.001 HS
Total amount of drained serous fluid (ml)	Mean ±SD	596.9 108.5	1608.7 455.4	T = 8.3	< 0.001 HS
Drained serous fluid in the last 3 days (ml)	Mean ±SD	201.7 16.4	207 21.3	T = 0.76	0.449 NS
Drained serous fluid in the last day (ml)	Mean ±SD	34.3 10.9	48 11.3	T = 3.35	0.002 S

Table 3: Comparison between studied groups as regard post-operative data. (S: p-value lower than 0.05 is considered significant.; HS: p-value lower than 0.001 is considered highly significant.; T: independent sample T-test.NS: p-value > 0.05 is considered non-significant.) This table shows as far as drained serous fluid, there was no statistically significant difference (p-value > 0.05) between the groups tested in the last three days. Difference between groups in terms of drained serous fluid in the last day that is statistically significant (p-value 0.05). The difference between the groups tested in terms of the day the drain was removed and the total amount of serous fluid that was drained was highly significant (p-value 0.001).

Cases group		Seroma formation No (N = 13)		Yes (N = 2)	
Histological types	IDC	9	69.2%	2	100%
	ILC	3	23.1%	0	0%
	Mixed	1	7.7%	0	0%
Tumor state	Stage II	11	84.6%	2	100%
	Stage III	2	15.4%	0	0%
T stage	T1	1	7.7%	0	0%
	T2	10	76.9%	2	100%
	T3	1	7.7%	0	0%
	T4	1	7.7%	0	0%
N stage	N0	10	76.9%	1	50%
	N1	3	23.1%	0	0%
	N2	0	0.0%	1	50%
Neoadjuvant chemotherapy	No	11	84.6%	2	100%
	Yes	2	15.4%	0	0%

Table 4: Association between seroma formation and tumor characteristics in cases group. This table shows that there was no association between the frequency of seroma and tumor characteristics**.** However, this could not be proved statistically due to the small number of cases in the group that developed seroma (n = 2).

Variables	(r)	p-value
Total amount drained serous fluid vs Skin Area Removed	0.62	0.013 S
Total amount drained serous fluid vs Volume of tumor mass removed	0.53	0.038 S
Total amount drained serous fluid vs No. of Positive lymph nodes	0.85	0.022 S
Total amount drained serous fluid vs total number of LNs removed	0.49	0.058 NS
Total amount drained serous fluid vs T stage	0.61	0.015 S
Total amount drained serous fluid vs tumor state	0.47	0.71

Table 5: Correlation study between total amount of drained serous fluid and tumor characteristics in cases group. (r: Pearson correlation coefficient). This table shows: This is statistically significant. Between the total amount of drained serous fluid and the excised skin area, there was a positive association (r = 0.62) . The difference is statistically significant (p-value = 0.038). In case group, there was a positive connection (r = 0.53 between the total amount of drained serous fluid and the total amount of tumor mass removed). Total amount of drained serous fluid and number of positive LNs in cases group showed statistically significant (p-value = 0.022) and Positive correlation (r = 0.85). Total amount of drained serous fluid and total number of LNs removed in cases group showed non statistical significant (p-value = 0.058) Positive correlation (r = 0.49). Between total amount of drained serous fluid and T stage in cases group, there was Statistically significant (p-value = 0.015) Positive correlation (r = 0.61). Between total amount of drained serous fluid and tumor state in cases group, there was No statistical significant (p-value = 0.071) Positive correlation (r = 0.47).

		Cases (N = 15)		Control (N = 15)		X2	P-value
Clinical diagnosis	N0	13	86.7%	7	46.7%	6.08	0.048 S
	G2	2	13.3%	5	33.3%		
	G3	0	0%	3	20%		
U/S diagnosis	N0	12	80%	6	40%	8	0.046 S
	G1	2	13.3%	1	6.7%		
	G2	1	6.7%	5	33.3%		
	G3	0	0%	3	20%		

Table 6: Comparison between studied groups as regard frequency of seroma formation. (X^2: Chi-square test.; S: p-value lower than 0.05 is considered significant. Statistically significant (p-value 0.05) differences between study groups are shown in this table as regards the frequency of seroma development.

DISCUSSION

In the immediate or acute post-operative phase, a seroma is an accumulation of serous fluid formed after the development of skin flaps during mastectomy or in the axillary dead space .[10]

Serum oozing and lymph leakage should be minimized in an ideal wound closure, as well as dead space being eliminated and fluid being removed quickly once it occurs. In order to improve primary healing and reduce seroma formation, Postoperative shoulder immobilization and the use of sticky adhesive have been examined in conjunction with several flap fixation or wound drainage methods.[10]

A total of 33% (10/30) of the patients in this study had a seroma, with the majority having a grade 2 seroma (70 percent). Radiology has found an extra 3% of instances, bringing the overall radiological incidence to 40% (12/30). These 3% of cases are grade 1 mild seromas with no symptoms that the patient was unaware of before being screened. According to most publications, the incidence ranges from 15 to 81 percent.[11]

There is a correlation between flap fixation technique and reduced clinical symptoms following mastectomy, with a P-value of 0.048 when compared to the control group. Flap fixation approach has been found by several researchers to be effective for reducing seroma development.[12]

There was a substantial decrease (P value 0.001) in total fluid drained with a mean drainage volume in the flap fixation group of 596 c.c. compared to 1608 c.c. in the control group according to the results of this study. These findings are in line with those of Madhu et al.[13]

Using this technique, the mean drainage period was 5.4 days in the flap fixation group and 13.4 days in the control group (P = 0.001), according to the results of this study. These findings are in line with those of Haroun et al., who found that, when the daily drainage volume is small, removing the drain takes 13 to 5 days when the suture flap fixation technique is not used.[14]

The results also agree with results achieved by Raghavendra R.T.2019 who reported that By reducing the total drain flow and improving

hemostasis by approximating flaps, flap fixation was successful in eliminating dead space after MRM as seen by the considerable reduction in seroma volume within 2 days.[15]

Also, the results are in line with those of Sakkary et al., who found that reduction of seroma seroma from 40% to 10% after flap fixation[16]

There is a connection between seroma development occurrence and histological tumour type, cancer stage (T-stage and N stage), as well as neoadjuvant treatment or radiotherapy, according to the research: small scale of this study cannot give significant result, due to small number of cases in each group (15 cases in each group).

The total amount of fluid drained and the excised skin area had a positive link, according to this study's analysis of the flap fixation group's results. Additionally, there is a positive link between the total amount of drained fluid and the volume of tumor mass removed, which is in contrast to the findings of (Woodworth et al., 2000), who did not find a significant association between specimen weight or size and seroma formation.[11]

Also in this study; the results indicate positive correlation between total amount of drained fluid and the number of positive lymph nodes which is also against the results found in the study conducted by Browse et al., 1996[17] which claimed that there is no association between positivity of lymph nodes and the incidence of seroma formation, taking in mind that the study by Lumachi et al., 2004 found that existing evidence was inconclusive regarding a correlation between number of positive lymph nodes and the incidence of seroma formation.[18]

When the results of the flap fixation group were analysed, it was discovered that there was a positive correlation between the total amount of fluid drained and the T-stage of the tumour. This is in contrast to the findings of the study conducted by Lumachi et al., 2004 which found that there was no significant association between pathological tumour size and seroma formation.[18]

As regarding the tumor stage; it had shown no correlation with the frequencyof seroma (in this study) thus agreeing with the results achieved by the study conducted by Somer et al., 1992 which revealed that there is no association between the stage of the tumor and seroma formation.[19]

Within the scope of this study, the overall complication rate is 16 percent (5/30) of instances with no fatal outcome. This is a lower rate than that found in the majority of researches.

According to published studies, up to 30% of women who undergo breast or axillary surgery experience surgical morbidity (Hoefer et al., 1990), Additionally, just one case of cellulitis developed in the flap fixation group, while two cases of cellulitis and two cases of partial flap necrosis developed in the control group, indicating that morbidity is reduced with flap fixation.[20]

CONCLUSION

By utilising the flap fixation technique, the likelihood of seroma formation and the frequency with which patients must contact their physician for aspiration of seroma fluid are reduced dramatically, since it reduces the total amount of fluid that needs to be removed, and because it also allows patients to avoid issues from seroma, this procedure looks to have several advantages that outweigh the downside of lost time during surgery.

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