

The Value of Mastectomy Flap Fixation on Seroma Formation after Mastectomy

Ahmed Abd El Aal Sultan*, Ahmed Mohamed Abd El-Wahab, Magdy Salah El-Din Hussain

Department of General Surgery, Faculty of Medicine, Al-Azhar University, Cairo, Egypt

*Corresponding author: Ahmed Abd El Aal, Tel: +201005056641, E-mail: dr.ahmedsultan@azhar.edu.eg

ABSTRACT

Background: seroma occurs in most patients after mastectomy. It is thought to be caused by the fact that mastectomy leaves a lot of an "empty space" under the skin where the breast tissue used to be.

Aim of the work: it was to study the effect of closure of dead space by suture fixation of the mastectomy flaps to the underlying chest wall on the amount and duration of postoperative drainage and seroma formation.

Patients and Methods: the current study included 40 female patients with breast carcinoma scheduled for modified radical mastectomy and they were randomized into two groups according to suture fixation of the mastectomy flaps to the underlying chest wall. Group I, 20 patients undergone suture fixation of the mastectomy flaps to the underlying chest wall raw by raw, closing every potential space. Group II, 20 patients where the wound was closed in the conventional method.

Results: the flap fixation technique is a valuable procedure that significantly decrease the incidence of seroma formation, the need for frequent visits to the physician for seroma fluid aspiration, the total amount of drained fluid and also allowing for earlier removal of the drains as well as avoidance of complications resulting from the occurrence of seroma.

Conclusion: This method appears to have much many advantages that over-exceed its disadvantage of time consumption during the operation. It should be tried on a much wider scale to prove its validity in decreasing the incidence of seroma formation and its subsequent complications.

Keywords: breast, cancer, mastectomy, seroma, flap fixation.

INTRODUCTION

Several post-mastectomy complications were reported such as necrosis of skin flaps, wound dehiscence, hematoma, seroma formation, and surgical site infection. Among them, seroma, a clinically evident subcutaneous collection of serous fluid within a surgical cavity, is the most frequent post-operative complication after breast cancer surgery, developing in approximately 30% of cases⁽¹⁾. It is unclear if their pathophysiology is of lymphatic origin (also called lymphocele) and/or "simply" related to inflammatory exudates, with various predictive factors being proposed. Seromas may require repeated and long lasting punctures, which can be complicated by infections that affect all patients' quality of life. The aims of this work were to analyze the seroma situation at our institution and to try to define patients at risk for such events (formation of seromas, their punctures, and the related infections), especially comparing patients who underwent a mastectomy vs. a lumpectomy⁽²⁾.

Pathogenesis of seroma formation is poorly understood. Many factors take part in the formation of seroma. Dead space formation could be one of the leading mechanisms of postoperative seroma formation⁽³⁾. Type of operation, use of electrocautery, elderly patient, obesity and longer and higher drain outputs, are associated with increased risk. However, **Kuroi et al.**⁽⁴⁾ reported that the age of the patient, neo-adjuvant chemotherapy, total number of retrieved axillary lymph nodes, the number of positive axillary lymph nodes, and the tumor size were not associated with increased seroma formation. Ideal wound closure should minimize lymph spillage and serum oozing, provide a means of holding skin flaps securely to the

chest wall structures, obliterate dead space, and allow rapid removal of fluid as it forms. For this, several techniques of flap fixation or wound drainage, as well as limitation of postoperative shoulder movement and injecting different chemical substances as thrombin, tranexamic acid and fibrin glue have been investigated to improve primary healing and minimize seroma formation^(5,6).

AIM OF THE STUDY

The purpose of our study is to evaluate the effect of post mastectomy dead space obliteration (DSO) on seroma formation by suturing skin flaps to underlying muscles, also to assess the effect of Obliterating the axillary dead space by sutures. In addition, Factors predicting the formation of seroma were analysed and reported.

PATIENTS AND METHODS

The present study is a prospective (follow-up) clinical trial that included 40 patients, presented to Al-Hussain University Hospital, in Cairo, Egypt, for elective modified radical mastectomy, during the period from April 2018 till March 2019, **after obtaining the local Ethics Committee approval.** All patients admitted to the Surgery department signed a written informed consent. They were randomized using close-envelope into two groups:

Group I: 20 patients underwent modified radical mastectomy. Multiple stitches (using fine absorbable sutures) were taken between the subcutaneous tissues of the skin flaps and the underlying muscles in rows at various parts of the flap and at the wound edge. Special attention was taken to the obliteration of the largest

potential dead space, and the empty axillary apex (Figures 1 & 2).

Group II: 20 patients underwent modified radical mastectomy. The wound was closed in the conventional method.

Closed suction drains were used in both methods.

Surgical work up: The diagnosis of breast cancer was known preoperatively for the patients. The diagnosis of breast cancer was determined according to clinical history, clinical examination and the results of different diagnostic procedures such as ultrasonography, mammography, fine needle aspiration cytology (FNAC), core needle biopsy or excisional biopsy. The classic known modified radical mastectomy was standardized for all patients of the two groups with the operation being done under general anaesthesia and the dissection being done with the diathermy in all cases.

Statistical Analysis

Data were analysed using Statistical Package for Social Science (SPSS) software version 20.0. Quantitative data were presented as mean and standard deviation (SD) and analyzed using t-student test. Qualitative data were presented as number and

percentage and analyzed using Chi-square test. P value less than 0.05 was considered significant.



Figure (1): The flap is fixed to the pectoralis by multiple rows of absorbable sutures.



Figure (2): The wound edges are also fixed to muscle by inverting sutures.

RESULTS

Table (1): Operative Characteristics of the two studied groups

	Variable	Flap group (n = 20)	No-flap Group (n = 20)	p-value
Volume of the Tumor Mass Removed (ml):	Mean ± SD	332.8±780.4	465.5±540.1	0.125
	Median (Range)	113.1 (14.1-3592.8)	268.2 (10.3-2145.5)	
Area of the Skin Removed (cm²):	Mean ± SD	827.7±299.9	821.9±346.3	0.829
	Median (Range)	776.3 (471.4-1885.7)	743.3 (251.4-1386.0)	
Total Number of lymph nodes removed:	Mean = SD	18.9±3.8	20.8±10.1	0.273
	Median (Range)	19.0 (12.0-30.0)	19.5 (7.0-56.0)	
Number of Positive lymph nodes removed:	Mean = SD	2.8±4.8	5.9±12.7	0.775
	Median (Range)	0.5 (0.0-18.0)	2.0 (0.0-55.0)	

There were no significant differences between the two groups in volume of the tumor mass removed (p=0.125) and area of skin removed (p=0.829). Similarly, there was no significant difference between the two groups in number of lymph nodes removed, either the total number (p=0.273) or the number of positive nodes (p=0.775), (Table 1).

Table (2): Postoperative Characteristics of the two studied groups regarding drainage of serous fluid from the wound area

	Variable	Flap Group (n = 20)	No-nap Group (n = 20)	p-value
Day of Drain Removal:	Mean ± SD	5.0 ± 2.4	13.4 ± 5.0	< 0.001
	Median (Range)	4.0 (2.0-12.0)	15.0 (5.0-22.0)	
Total amount of drained seroma (ml):	Mean ± SD	524.8 ± 363.8	2017.8 ± 1391.7	< 0.001
	Median (Range)	415.0 (170.0-1525.0)	1685.0 (445.0-5615.0)	
Amount of drained seroma in the last 3 days (ml):	Mean ± SD	207.8 ± 36.7	213.0 ± 100.6	0.175
	Median (Range)	210.0 (130.0-300.0)	187.5 (125.0-600.0)	
Amount of drained seroma in the last day (ml):	Mean± SD	35.0±8.1	51.5±36.2	0.002
	Median (Range)	40.0 (20.0-50.0)	50.0 (25.0-100.0)	

In the flap fixation group, the drain was removed in significantly shorter time compared to the no-flap fixation group (p<0.001). The total amount of fluid drained was significantly lower in the flap fixation group (p<0.001). During the last days before drain removal the amount of drained fluid was comparable in the two groups (p=0.175). So, flap fixation technique significantly decreases the total amount and duration of drainage after mastectomy (Table 2). The overall clinical incidence of seroma in the whole study was 25% (10/40). Most of them are grade 2 (90%).

Four more cases are detected by using ultrasonography, increasing the radiological incidence to 35% (14/40), the 4 cases are grade 1 minor seromas that are clinically asymptomatic and not detected by the patient.

By comparing the length of operation in the 2 groups; flap fixation group has showed prolonged duration of average 20 minutes over the control group, and this seems to be the main and only disadvantage of this technique.

Table (3): Frequency of seroma in the two studied groups

Variable	Flap fixation group (n=20) No. (%)	No-flap fixation group (n=20) No. (%)	P-value
Clinical Diagnosis:			
N0	18 (90.0)	12 (60.0)	0.028
G2	2 (10.0)	7 (35.0)	
G3	0 (0)	1 (5.0)	
Ultrasonographic Diagnosis:			
N0	16 (80.0)	10 (50.0)	0.047
G1	2 (10)	2 (10.0)	
G2	2 (10)	7 (35.0)	
G3	0 (0)	1 (5.0)	

The Flap fixation group showed a significantly lower frequency of seroma formation compared with the No-flap fixation group, both clinically (p=0.028) and ultrasonographically (p=0.047) as shown from table (3).

Morbidity in our study is minor, as complications had developed in 6(15%) patients. In the group with flap fixation only 2(10%) cases developed cellulitis that was treated medically, while in the control group 2(10%) cases developed cellulitis and 2(10%) cases developed partial flap necrosis.

DISCUSSION

Ideal wound closure should minimize lymph spillage and serum oozing, provide a means of holding skin flaps securely to the chest wall structures, obliterate dead space, and allow rapid removal of fluid as it forms. For this, several techniques of flap fixation or wound drainage, as well as limitation of postoperative shoulder movement and the use of adhesive glue, have been investigated to improve primary healing and minimize seroma formation (6).

The overall clinical incidence of seroma in our study was 25% (10/40), most of them were grade 2(90%). Four more cases were detected by ultrasonography, increasing the radiological incidence to 35% (14/40); the 4 cases were grade 1 minor seromas that were clinically asymptomatic and not detected by the patient. This incidence falls within the

range of incidence reported by most authors that varies widely between 15 and 81% (7).

Our study showed that flap fixation technique was associated with lower incidence of clinical symptomatic seroma (10%) after mastectomy as compared to the control group (40%) with P-value =0.028. Several investigators have also found that flap fixation technique is useful in decreasing seroma formation (3&8&9).

In this study, also we found that the flap fixation technique significantly decreases the total amount of fluid drained with mean drainage volume of 524 c.c. in the flap fixation group versus 2017 in the control group (P<0.001). It has been reported by some authors that the total drainage volume may reach up to 5 litres if the technique of flap fixation was not used(10).

We found that this technique significantly decreases the drainage period, the mean duration of drainage is 5 days in the flap fixation group versus 13.4 days in the control group (P <0.001). These results do agree with the results recorded by **Inwang et al.**(11) study, which revealed that removing the drain when the daily drainage volume is minimal takes between 10 to 14 days in case of not using the suture flap fixation technique.

Our results do also agree with the results achieved by **Kopelman et al.**(12), who has mentioned that most surgeons tend to remove the drain when the drainage volume is less than 50 ml. in the preceding 24 h and this usually takes about 10 days if the flap fixation technique was not used.

As regarding the correlation between the incidence of seroma formation and; histological type of the tumor, stage of cancer, T-stage and N-stage of the tumor and administration of neoadjuvant chemotherapy or radiotherapy: the small scale of this study cannot give a significant result, due to small number of cases in each group (20 cases in each group).

In our study, we have found that there is no relation between the total number of lymph nodes removed and total amount of fluid drained, which is agreeing with the results achieved in the study conducted by **Lumachi et al.**(13) which had indicated that the number of removed lymph nodes does not influence seroma formation.

As regarding the tumor stage; it had shown no relation with the total amount of drained fluid (in this study) thus agreeing with the results achieved by the study conducted by **Somer et al.**(14), which revealed that there is no association between the stage of the tumor and seroma formation.

In our study, the overall complications rate was 15% (6/40) of cases with no mortality. This rate is less than that reported in most studies. Reported studies document that surgical morbidity from breast and/or axillary wound occurs in up to 30% of cases (15). Additionally, in the group with flap fixation only 2 cases (10%) developed cellulitis that was treated

medically, while in the control group 2 cases developed cellulitis and 2 cases developed partial flap necrosis, this mean that the morbidity is less with flap fixation.

CONCLUSION AND RECOMMENDATION

The flap fixation technique is a valuable procedure that significantly decreases the incidence of seroma formation, the need for frequent visits to the physician for seroma fluid aspiration, the total amount of drained fluid and also allowing for earlier removal of the drains as well as avoiding the patient the complications resulting from the occurrence of seroma. This method thus appears to have much many advantages that over exceed the disadvantages of time loss during the operation. The technique of suture flap fixation should be tried on a much wider scale to prove its validity in decreasing the incidence of seroma formation and its subsequent complications, so that it can be introduced as a step in the mastectomy operation.

REFERENCES

1. **Hashemi E, Kaviani A, Najafi M *et al.* (2004):** Seroma formation after surgery for breast cancer. *World Journal of Surgical Oncology*, 2004:2.
2. **Roman M, Nogaret JM, Fils JF, Bourgeois P (2015):** Seromas and Punctures after Complete Axillary Node Dissection for Breast Cancer: Differences between Mastectomy and Lumpectomy. *J Surgery*, 3(2): 7-12.
3. **Coveney EC, O'Dwyer PJ, Geraghty JG, O'Higgins NJ (1993):** Effect of closing dead space on seroma formation after mastectomy a prospective randomized clinical trial. *Eur J Surg Oncol.*, 19: 143-146.
4. **Kuroi K, Shimozuma K, Taguchi T *et al.* (2006):** Evidence based risk factors for seroma formation in breast surgery. *Japanese Journal of Clinical Oncology*, 36(4): 197-206.
5. **Ottesen GL, Graversen H P, Blichert-Toft M *et al.* (2000):** Carcinoma in situ of the female breast. 10 years follow-up results of a prospective nationwide study. *Breast Cancer Res Treat.*, 62:197-201.
6. **Pogson CJ, Adwani A, Ebbs SR (2003):** Seroma following breast cancer surgery. *Eur Surg Oncol.*, 29:711-717.
7. **Woodworth PA, McBoyle MF, Helmer SD, Bearner RL (2000):** Seroma formation after breast cancer surgery: incidence and predicting factors. *Am Surg.*, 66:444-450.
8. **Larsen BB, Hagan C(1955):** Fixation of skin flaps in radical mastectomy by subcutaneous sutures; observations. *AMA Arch Surg.*, 71:419-423.
9. **Purushotham AD, McLatchie E, Young D *et al.* (2002):** Randomized clinical trial of no wound drains and early discharge in the treatment of women with breast cancer. *Br J Surg.*, 89:286-292.
10. **Ackroyd R, Reed M (1997):** A prospective randomized trial of the management of suction drains following breast cancer surgery with axillary clearance. *The Breast*, 6:271-4.
11. **Inwang R, Hamed H, Chaudary MA, Fentiman IS (1991):** A controlled trial of short-term versus standard axillary drainage after axillary clearance and iridium implant treatment of early breast cancer. *Ann R Coll Surg Engl.*, 73:326-8.
12. **Kopelman D, Klemm O, Bahous H *et al.* (1999):** Postoperative suction drainage of the axilla: for how long? Prospective randomized trial. *Eur J Surg.*, 165: 117-20.
13. **Lumachi F, Brandes AA, Burelli P, Basso SM, Iacobone M, Ermani M (2004):** Seroma prevention following axillary dissection in patients with breast cancer by using ultrasound scissors: a prospective clinical study. *Eur J Surg Oncol.*, 30:526-30.
14. **Somers RG, Jablon LK, Kaplan MJ, Sandler GL, Rosenblatt NK (1992):** The use of closed suction drainage after lumpectomy and axillary node dissection for breast cancer - A prospective randomized trial. *Ann Surg.*, 215: 146-9.
15. **Hoefler R, DuBois J, Ostrow L *et al.* (1990):** Wound complications following modified radical mastectomy: an analysis of perioperative factors. *J Am Osteopath Assoc.*, 90:47-53.