Seroma Formation After Mastectomy: predictors and prevention

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Abstract: Background: Seroma is the most common complication occurs after mastectomy. It causes anxiety; pain; suture breakdown and may interfere with mobility of arm. The aim of this study was to assess the demographic, clinical and pathological parameters and their effect on seroma formation. Also assess different methods to reduce and prevent seroma formation. **Patients and Methods**: one hundred and twenty patients were randomized into three groups (40 in each group); Group I (Control Group); Group II (Compression-Dressing Group); Group III (quilting Group). The three groups were divided into subgroups (A and B) according to time of removal of the drain. All patients underwent Modified Radical Mastectomy and level II axillary dissection. Closed suction drains were placed. **Results**: Quilting technique significantly decrease the incidence of seroma (p=0.03); Total drain output in the first 7 days and the duration of drainage (p>0.001). Age; lymph nodes and pathological features of the tumor were not affecting seroma formation. Seroma was significantly lower in subgroup B (p= 0.011). Flap suturing, duration of drainage, body mass index (BMI), hypertension and diabetes mellitus were found to be significant Univariate predictors of seroma formation. **Conclusion**: Prevention is the golden key for management of seroma. Flap suturing, duration of drainage, BMI, hypertension and diabetes mellitus are the most important risk factors for seroma formation. Obliteration of dead space play a significant role in reduces post-operative seroma. Removal of suction drain after decrease the drain output to 20-30 ml has significant role in prevention of seroma formation.
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Key words: seroma, breast cancer, mastectomy, predictors

Introduction:

Although oncoplastic breast conserving surgery (O-BCS) is a standard approach for treatment of breast cancer patient; mastectomy is still performed in 20-30% of patients undergoing surgeries [1, 2].

Seroma is the most common and frequent complication occurs after mastectomy. It defined as any fluid collection under mastectomy flaps. It causes anxiety, pain and suture breakdown and may interfere with mobility of arm [3].

Suction drain used routinely after mastectomy till the drain output/24 h decrease to 20-30ml. this long period of drainage causes patient discomfort, increase liability to infection and delay post-operative chemotherapy [4-5].

The aim of this study was to assess the demographic, clinical and pathological parameters and their effect on seroma formation. Also assess different methods to reduce and prevent seroma formation.

Patients and methods:

This prospective randomized controlled study was done at department of surgery in Zagazig University Hospitals between Januarys 2014 and October 2016. One hundred and twenty patients with early breast cancer were included in this study.

All patients were diagnosed as early breast cancer by complete history taking, clinical examination, full investigations and histopathology.

Inclusion criteria:

- Patient with early breast cancer and planned for modified radical mastectomy and not suitable for oncoplastic surgery

Exclusion criteria:

- Patient planned for oncoplastic surgery
- Simultaneous reconstructive surgery
- Shoulder or limb pathology
- Inflammatory breast cancer
- Hepatic patients

A written informed consent was obtained from each patient before surgery.

All patients underwent Modified Radical Mastectomy (MRM) and level II axillary dissection. Closed suction drains (18 Fr) were placed under the flaps and the axilla.

Before surgery our patients were classified into three groups (One control +two study groups):

1- Group I (Control Group =40): in this group the standard dressings were used.

2- Group II (Compression-Dressing Group=40): after complete closure of the wound, the axilla was filled with gauze and a compression dressing applied using elastic adhesive bandage (bonplast) extending from the sternum to the spine. The compression dressing remained in place for 72 hours after which it was replaced with standard dressings.

3- Group III (quilting Group=40): flaps of the wound were sutured to the underlying muscles (pectoralis major and serratus anterior) by multiple parallel rows of sutures (2-0 Vicryl). This technique was obliterating the dead space. The wounds were dressed with standard dressings.

The three groups were divided into subgroups according to removal of the drain:

1- Subgroup A: the drain was removed 7 days after surgery irrespective of discharge amount.

2- Subgroup B: the drain was removed when the drain output was 25-30 mL/day.

All patients were discharged from the hospital after 48 hours with the drains in place. The drain outputs were daily recorded. Active shoulder movements were allowed after the surgery. Cumulative drain outputs, duration of suction drain and wound complications were recorded.

Results

One hundred and sixty-eight patients were included in this study. Forty-eight patients were excluded from the study (40 patients not meeting inclusion criteria and 8 patients declined to participation). One hundred and twenty were randomized into three groups (40 in each group) and underwent MRM. Two patients in group I and III were lost during the post-operative period. One hundred and eighteen patients were analyzed; 39 in group I; 40 in group II and 39 in group III as shown in figure 1.

The mean age of patients in this study was 51.2(±9.7). The mean BMI was 36.15(±7.7). Twenty five patients were with hypertension and 25 with diabetes mellitus.

The clinical features of our patients were summarized in table 1.

The clinical and pathological features of the three groups showed no significance difference as shown in tables 1 and 2.

Table (1): Comparison between studied patients as regard clinical characteristics.

		Group I (N=39)		Group II (N=40)		Group III (N=39)		p-value
		No.	(%)	No.	(%)	No.	(%)	
Age (years)	(Mean ± SD)	50.84	±10.97	51.90	±9.79	50.58	±9.52	0.830*
BMI (kg/m^2)	(Mean ± SD)	35.76	±7.50	34.77	±7.95	37.53	±7.79	0.281*
Hypertension	Absent	29	(74.4%)	30	(75%)	34	(87.2%)	0.294‡
	Present	10	(25.6%)	10	(25%)	5	(12.8%)	
Diabetes mellitus	Absent	31	(79.5%)	29	(72.5%)	33	(84.6%)	0.417‡
	Present	8	(20.5%)	11	(27.5%)	6	(15.4%)	
T stage (cT)	T1	8	(20.5%)	10	(25%)	9	(23.1%)	0.715‡
	T2	28	(71.8%)	29	(72.5%)	26	(66.7%)	
	T3	3	(7.7%)	1	(2.5%)	4	(10.3%)	

N: Total number of patients in each group.
Continues variables were expressed as mean ± SD.
Categorical variables were expressed as number (percentage).
* One Way ANOVA.
‡ Chi-square test.
$p<0.05$ is significant.

The mean tumor size was 3.18(±1.1), 92 patients were IDC, while 26 patients were other pathological types,79 patient were ER positive,78patients were PR positive and 76 patients with LV invasion. the mean lymph nodes dissected was 18.67(±1.9) and the mean of positive lymph nodes was 3.06(±2.9). The pathological features of our patients were included in table 2.

Table (2): Comparison between studied groups as regard pathological characteristics.

		Group I (N=39)		Group II (N=40)		Group III (N=40)		p-value
		No.	(%)	No.	(%)	No.	(%)	
Tumor type	IDC	31	(79.5%)	30	(75%)	31	(79.5%)	0.856‡
	Other	8	(20.5%)	10	(25%)	8	(20.5%)	
Tumor grade	Grade I	15	(38.5%)	14	(35%)	15	(38.5%)	0.966‡
	Grade II	16	(41%)	15	(37.5%)	15	(38.5%)	
	Grade III	8	(20.5%)	11	(27.5%)	9	(23.1%)	
pT size (cm)	(Mean ± SD)	3.25	±1.08	3.07	±1.10	3.29	±1.07	0.632*
Total LN	(Mean ± SD)	18.07	±1.64	19.27	±1.93	18.51	±2.43	0.033*
Positive LN	(Mean ± SD)	2.87	±2.95	3.25	±3.08	3.10	±2.87	0.851*
ER	Negative	10	(25.6%)	16	(40%)	13	(33.3%)	0.398‡
	Positive	29	(74.4%)	24	(60%)	26	(66.7%)	
PR	Negative	14	(35.9%)	10	(25%)	16	(41%)	0.306‡
	Positive	25	(64.1%)	30	(75%)	23	(59%)	
LV invasion	Absent	12	(30.8%)	16	(40%)	14	(35.9%)	0.692‡
	Present	27	(69.2%)	24	(60%)	25	(64.1%)	

N: Total number of patients in each group.
Continous variables were expressed as mean ± SD.
Categorical variables were expressed as number (percentage).
* One Way ANOVA.
‡ Chi-square test.
p<0.05 is significant.

Seroma formation and drain output:

Thirty three patients (27.9%) developed seroma in our study. the incidence of seroma was significantly lower in group III (12.8%, p=0.03) table 3.

Seroma was significantly lower in subgroup B (17.2%, p= 0.011) table 4.

Seroma was lower in group II in relation to group I but not significant.

Aspiration of seroma were occurred in all cases, the mean number of aspirations was 3, culture and sensitivity was done, 9 patients had some bacterial growth and were received antibiotics according to the culture.

Drain output in the first 7 days and the duration of drainage were significantly lower in group III (p>0.001) table 3.

Age; lymph nodes and pathological features of the tumor were not affecting seroma formation.

Table (3): Comparison between studied groups as regard seroma formation and drainage.

		Group I (N=39)		Group II (N=40)		Group III (N=39)		p-value
		No.	(%)	No.	(%)	No.	(%)	
No. of patients with seroma		15	(38.5%)	13	(32.5%)	5	(12.8%)	0.030‡
Initial DO (ml)	(Mean ± SD)	789.74	±53.33	712.75	±39.35	568.84	±67.61	<0.001*
Duration of drainage (days)	(Mean ± SD)	18.73	±2.72	13.55	±1.87	9.00	±1.00	<0.001*

N: Total number of patients in each group.
Continuous variables were expressed as mean ± SD.
Categorical variables were expressed as number (percentage).
* One Way ANOVA.
‡ Chi-square test.
p<0.05 is significant.

Risk factors:

Flap suturing, duration of drainage, BMI, hypertension and diabetes mellitus were found to be significant Univariate predictors of seroma formation as shown in table 4.

Table (4): Univariate analysis for potential predictors of seroma.

		Total (N=118)	No seroma (N=85)		Seroma (N=33)		p-value
			No.	(%)	No.	(%)	
Technique	Group I	39	24	(61.5%)	15	(38.5%)	0.030‡
	Group II	40	27	(67.5%)	13	(32.5%)	
	Group III	39	34	(87.2%)	5	(12.8%)	
Drain removal	Subgroup A	60	37	(61.7%)	23	(38.3%)	0.011‡
	Subgroup B	58	48	(82.8%)	10	(17.2%)	
Group	Group IA	20	10	(50%)	10	(50%)	0.017‡
	Group IB	19	14	(73.7%)	5	(26.3%)	
	Group IIA	20	11	(55%)	9	(45%)	
	Group IIB	20	16	(80%)	4	(20%)	
	Group IIIA	20	16	(80%)	4	(20%)	
	Group IIIB	19	18	(94.7%)	1	(5.3%)	
Age (years)	(Mean ± SD)		51.30	±9.90	50.63	±10.52	0.747*
BMI (kg/m^2)	> 30%	91	58	(63.7%)	33	(36.3%)	0.001*
Hypertension	Absent	93	79	(84.9%)	14	(15.1%)	<0.001‡
	Present	25	6	(24%)	19	(76%)	
Diabetes mellitus	Absent	93	78	(83.9%)	15	(16.1%)	<0.001‡
	Present	25	7	(28%)	18	(72%)	
T stage (cT)	T1	27	19	(70.4%)	8	(29.6%)	0.788§
	T2	83	60	(72.3%)	23	(27.7%)	
	T3	8	6	(75%)	2	(25%)	
Tumor type	IDC	92	68	(73.9%)	24	(26.1%)	0.392‡
	Other	26	17	(65.4%)	9	(34.6%)	
Tumor grade	Grade I	44	33	(75%)	11	(25%)	0.889§
	Grade II	46	30	(65.2%)	16	(34.8%)	
	Grade III	28	22	(78.6%)	6	(21.4%)	
pT size (cm)	(Mean ± SD)		3.24	±1.08	3.12	±1.09	0.607*
Total LN	(Mean ± SD)		18.72	±2.15	18.36	±1.85	0.392*
Positive LN	(Mean ± SD)		3.07	±2.96	3.09	±2.97	0.973*
ER	Negative	39	29	(74.4%)	10	(25.6%)	0.693‡
	Positive	79	56	(70.9%)	23	(29.1%)	
PR	Negative	40	26	(65%)	14	(35%)	0.223‡
	Positive	78	59	(75.6%)	19	(24.4%)	
LV invasion	Absent	42	30	(71.4%)	12	(28.6%)	0.913‡
	Present	76	55	(72.4%)	21	(27.6%)	

N: Total number of patients in each group.
Continous variables were expressed as mean ± SD.
Categorical variables were expressed as number (percentage).
* Independent samples Student's t-test.
‡ Chi-square test. § Chi-square test for trend. $p<0.05$ is significant.

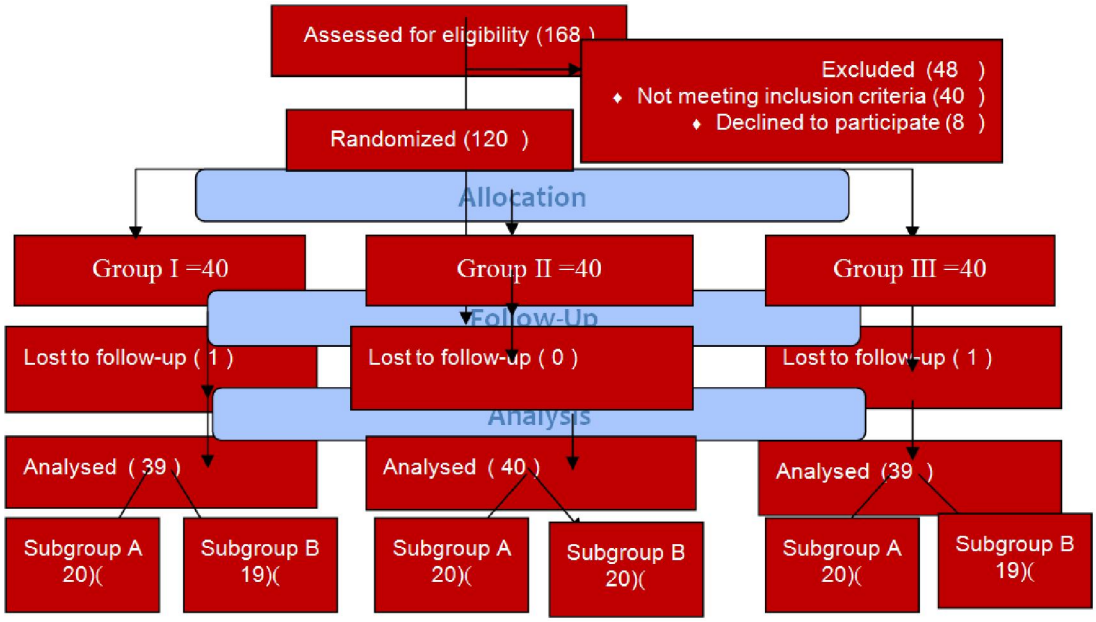

Figure 1: consort flow diagram.

Discussion:

Seroma defined as any fluid collection under mastectomy flaps in the dead space between the flap and underlying muscles. It results from disruption of lymphatic vessels and inflammatory exudation. Seroma may extend to long period after surgery and causes distress for both patient and surgeon and delay post-operative chemotherapy [6]. For these reasons we tried to stand on the predisposing factors and factors helps in prevention of post-mastectomy seroma.

In our study we assessed seroma formation in breast cancer patients underwent MRM with level II axillary dissection, patients underwent oncoplastic techniques were excluded from the study to avoid bias.

We tried to obliterate the dead space, the easiest method is by external compression, in our study it was found that it decrease seroma formation but not significantly, this is in agreement with Seenivasagam et al. [7] and O Hea et al. [8]. Kontos et al. [9] shows significant decrease in seroma formation with external compression, but they used circumferential thoracic dressing that has many disadvantages as it can interfere with respiration and also predispose to chest infection and causes severe patient discomfort. In the current study we used elastic adhesive bandage which cover the half of the chest which is more comfortable and tolerable for patients.

The second method used to obliterate the dead space was the quilting technique, it was found that is decrease seroma formation significantly, this is in agreement with Button et al. [10], Gisquet et al. [11] and Rios et al. [12]. In our study we make two rows of sutures between skin and underlying muscles. This technique was found to be decrease significantly the incidence of seroma and overall drain output.

Time of suction drain removal is a major point of discussion, some surgeons prefer to remove the drain during the first 7 days post-operative to avoid patient discomfort and liability of infection [13], others prefer to remove it when the amount decrease to 20-30 ml per day [14]. In the current study seroma formation is more in sub group A and decreased significantly in sub group B this is in contrast with Seenivasagam et al. [7].

Body mass index more than 30 was found to be associated with seroma formation in comparison with BMI less than 30, this in agreement with Seenivasagam et al. [7], Loo Wings et al. [15] and Unalp et al. [16].

Hypertension was found to be associated with significant increase in seroma formation; this is in agreement with Akinci et al. [17].

In the current study seroma formation is significantly increased in diabetic patients.

Conclusions:

Prevention is the golden key for management of seroma. Flap suturing, duration of drainage, BMI, hypertension and diabetes mellitus are the most important risk factors for seroma formation. Obliteration of dead space play an important and significant role in reduces post-operative seroma. Removal of suction drain after decrease the drain output to 20-30 ml has significant role in prevention of seroma formation.

Disclosure Policy

"The author (s) declare (s) that there is no conflict of interest regarding the publication of this paper."

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