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ORIGINAL ARTICLE

Comparing The Effectiveness And Use Of Active Versus Closed Passive Drains In Post-Auchincloss Mastectomy Seroma Prevention In Female Breast Cancer Patients At The University Of Benin Teaching Hospital

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Abstract

Background: Seroma formation is a surgical challenge to most contemporary breast surgeons. It increases post-operative morbidity and hospital stay after modified radical mastectomy especially in low resource countries where active drains are not readily available or affordable.

Aim: To compare the effectiveness and use of active versus closed passive drains in preventing post-Auchincloss mastectomy seroma in female breast cancer patients at the University of Benin Teaching Hospital.

Methods: 48 operable breast cancer patients who had Auchincloss modified radical mastectomy were randomized into two groups to have suction drain (group A) and closed passive drain (group B). The suction drain was a size 18FG Romovac closed wound suction unit. The passive drain was an improvised drain fashioned by fenestrating 10 outlets on a size 18FG nasogastric tube connected to a drainage bag. The data was collected with a structured questionnaire and analyzed using SPSS version 22. P-value <0.05 was considered significant.

Results: The mean ages were 47.1 ± 10.9 and 45.9 ± 10.0 (P=0.691) for groups A and B respectively. The duration of drainage was comparable in both groups, 10.3 ± 3.2 and 9.0 ± 2.1 (P=0.118) for groups A and B respectively. Seroma formation occurred in 1 patient (4.2%) in group A and B respectively. Wound infection occurred in 3 patients (12.5%) and 4 patients (16.7%) in groups A and B respectively (P=1.000).

Conclusion: Closed passive drain is as effective as suction drain. The former is readily available and reproducible, and it may be an alternative appliance for the prevention of post-mastectomy seroma in low resource countries.

Keywords: Seroma, suction drain, passive drain, Auchincloss, mastectomy

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Introduction

World-wide, breast cancer is the most commonly diagnosed malignancy in women and it is a leading cause of cancer-related deaths. [1,2,3] Diagnosis of breast cancer rests on a tripod of clinical, radiological and pathological assessment. Management of breast cancer is multimodal and multidisciplinary.[3] Modified radical mastectomy is the most frequently performed surgical treatment for operable breast cancer in low-income countries due to late presentation, and paucity of facilities for radiotherapy.[4,5,6]

Post-mastectomy seroma is accumulation of serous fluid in the potential space beneath the mastectomy flaps or axilla after mastectomy.[5] It is the most common complication of mastectomy occurring in 3% to 90% of cases. [5,7,8]

Post-operative seroma increases morbidity and hospital stay post-mastectomy and it is a source of psychological and cosmetic concern to the patient. It increases the risk of flap necrosis and surgical site infection and can cause a delay in commencement of adjuvant treatment.[5,9]

Peri-operative use of fibrin sealants, tranexamic acid, sclerosants, reduction in dead space, post-operative shoulder immobilization and compression dressing are some of the measures that have been used to prevent seroma formation post-mastectomy.[10,11] None of these measures have been adopted universally as their effectiveness remains a subject of controversy. Active drains are perhaps the most frequently used measures in post-mastectomy seroma prevention.[12,13] Active drains are however not readily available or affordable in low-income countries. Hence, there is the need for an alternative drain which is more readily available and affordable for use in low-income countries.

This study was designed to compare the effectiveness and use of active versus closed passive drains in post-Auchincloss mastectomy seroma prevention and treatment in adult female patients at the University of Benin Teaching Hospital.

Materials and Methods

The study was a prospective comparative randomized trial in the department of surgery, University of Benin Teaching Hospital, Benin City, South-South, Nigeria.

Forty-eight consecutive adult females histologically diagnosed breast cancer patients scheduled for Auchincloss modified radical mastectomy were randomized using a computer-generated table of random numbers into two groups to have active drain (group A) and closed passive drain (group B). The type of active drain used was a Romovac closed wound suction unit number 16072234 with a size 18FG tube manufactured by Romsons scientific and surgical industries Pvt. Ltd, India. The closed passive drain was an improvised drain fashioned from a size 18FG nasogastric tube made of plastic and connected to a drainage bag manufactured by Huaian Angel Medical Instruments Co. Ltd, China with ten improvised fenestrations 1.0cm apart, beginning 1cm away from the fenestration at the tip of the nasogastric tube.

Patients who had ulcerated or fungating breast cancer were excluded from the study.

Ethical approval was obtained from the University of Benin Teaching Hospital ethics and research committee (protocol number: ADM/E 22/A/VOL. VII/14653) and

informed consent obtained from the patients who were willing to be included in the study.

Data was collected using a structured questionnaire and analyzed using Statistical Package for Social Sciences (SPSS) version 22. P<0.05 was considered statistically significant in the study.

Results

There were 48 patients in the study, 24 patients in each group. The age range was 31 to 65 years with mean ages of 47.1 ± 10.9 years and 45.9 ± 10.0 years respectively for the active and closed passive drain groups (P=0.691); table 1. The body mass indices were comparable in both groups, 30.4±5.6 kg/m2 and 28.1±5.7 kg/m2 for the active and closed passive drain groups respectively (P=0.164). The majority of patients had a histologic diagnosis of invasive ductal carcinoma 46 (95.8%). The left breast was more commonly involved in 28 patients (58.3%). The majority of patients presented with advanced disease; 9 patients (18.8%) and 31 patients (64.6%) presented with stages 111A and 111B disease respectively.

Seventeen patients (35.4%) had controlled hypertension while 7 patients (14.6%) had controlled diabetes.

The weights of the mastectomy specimen were comparable; 1779.2gm ± 559.7 and 1557.9gm ± 458.5 respectively for the active and closed passive drain groups (P=0.141). Total volume of effluent drained was 1391.7 ml ± 1022.8 and 1030.7 ml ± 435.0 for the active and passive drain groups respectively (P=0.118). There was no statistically significant difference in the average daily drainage for the active drain group (125.0 ml/day± 49.9) and passive drain group (111.1 ml/day ± 33.7), P=0.266. Duration of drainage was 10.3 days ± 3.2 and 9.0 days ± 2.1 for the active and closed passive drains respectively (P=0.118). Seroma occurred in 1 patient (4.2%) in either group. Wound infection occurred in 3 patients (12.5%) from the active drain group and 4 patients (16.7%) from the closed passive drain group (P=1.000). One patient in the closed passive drain group had wound dehiscence which healed following serial wound dressings.

Table 1. Mean age, body mass index and peri-operative characteristics

Characteristics	Total n=48	Active drain (n=24)	Closed passive drain (n=24)	Stat test	P value
Mean age (years)	46.5±10.4	47.1±10.9	45.9±10.0	t =0.400	0.691
Body mass indices (kg/m^2)	29.2±5.7	30.4±5.6	28.1±5.7	t =1.414	0.164
Mean age in groups A AND B *P = 0. 691*					
Histologic diagnosis					
Invasive ductal carcinoma	46 (95.8%)	24 (100%)	22 (91.7%)	X^2 = 4.000	0.135
Medullary carcinoma	2 (4.2%)	0 (0.0%)	2 (8.3%)		
Commonest histopathology is invasive ductal carcinoma					
Breast involved					
Right	20 (41.7%)	7 (29.2%)	13 (54.2%)	X^2 =3.086	0.079
Left	28 (58.3%)	17 (70.8%)	11 (45.8%)		
Left breast is the most commonly affected					
Stage					
IIA	1(2.1%)	0(0.0%)	1(4.2%)	X^2= 4.943	0.293
IIB	5(10.4%)	4(16.7%)	1(4.2%)		
IIIA	9(18.8%)	5(20.8%)	4(16.7%)		
IIIB	31(64.6%)	15(62.5%)	16(66.7%)		
IV	2(4.2%)	0(0.0%)	2(8.3%)		
Majority of patients presented with advanced disease					
Comorbidity					
Hypertension	17 (35.4%)	10 (41.7%)	7 (29.2%)	X^2 =0.820	0.365
Diabetes	7 (14.6%)	4 (16.7%)	3 (12.5%)	X^2 =0.167	0.683
Most common comorbid condition is hypertension					
Weight of specimen (gm)		1779.2±559.7	1557.9±458.5	t=1.498	0.141
The weight of specimen is comparable in both groups					

Table 2. Comparison of post-operative events between the active and closed passive drain groups

Drain	Active drain Mean ± SD	Closed passive drain Mean ± SD	t test	*P value*
Total volume drained *(ml)*	1391.7±1022.8	1030.7±435.0	1.591	*0.118*
Duration of drainage*(days)*	10.3 ± 3.2	9.0 ± 2.1	1.592	*0.118*
Average daily drainage *(ml/day)*	125.0 ± 49.9	111.1 ± 33.7	1.127	*0.266*
Duration of hospitalization*(days)*	11.5 ± 3.2	11.6 ± 4.1	-0.117	*0.907*

Table 3: Comparison of post-operative complication rate between the active drain group and the closed passive drain group

Complications	Active drain	Closed passive drain	Total	Stat test	P value
Seroma	1 (4.2)	1 (4.2)	2 (4.2)	Fishers	1.000
No of aspirations	2	4			
Others					
Wound infection	3 (12.5)	4 (16.7)	7 (14.6)	Fishers	1.000
Wound dehiscence	0 (0.0)	1 (4.2)	1 (2.1)	Fishers	1.000

Discussion

The mean ages, body mass indices and peri-operative characteristics of the active and closed passive drain groups were comparable (p>0.05), table 1. The mean age of 46.5 years ± 10.4 is similar to the findings of Garzali et al[5], Ezeome et al[14] and Hashemi et al[15] who reported peak age incidence of breast cancer in the fifth decade of life. Most of the patients were overweight, 30.4 kg/m^2±5.6 and 28.1 kg/m^2±5.7 respectively for the active and closed passive drain groups. However, there was no statistically significant

difference between the body mass indices of the two groups.

Invasive ductal carcinoma was the predominant histologic subtype accounting for 95.8% of cases while medullary carcinoma accounted for 4.2% of the cases studied. Invasive ductal carcinoma is the more common histologic subtype of breast cancer.[1,16] The left breast was involved in the majority of cases, 28 patients (58.3%) while the right breast was involved in 20 patients (41.7%). This finding is consistent with the findings in a study by Ezeome et al who reported involvement of the left breast in 62% of 50 breast cancer cases studied.[14] Late presentation was the finding in the majority of cases studied with 40 patients (83.4%) presenting with stage III disease while 2 patients (4.2%) had stage IV disease. This finding is in keeping with the reports from other studies.[13,15] Factors that may account for late presentation are poverty, ignorance, fear and denial.

Hypertension was the predominant comorbid condition amongst the cases studied. Seventeen (35.4%) of the patients had hypertension while 7 (14.6%) of the patients had diabetes. It is the authors' opinion that the high incidence of hypertension in the study population may be related to the stress induced by the awareness of breast cancer in the patients. In addition, the incidence of breast cancer reaches a peak in the middle age which corresponds to the age of onset of intercurrent medical diseases. There was, however, no statistically significant difference in the distribution of hypertension or diabetes between the active and closed passive drain groups ($p>0.05$). The weights of the mastectomy specimen were 1779.2gm ±559.7 and 1557.9gm ±458.5 for the active and closed passive drain groups respectively. There was no statistically significant difference in the weights of the mastectomy specimen ($p=0.141$).

The active drains drained slightly larger volumes than the closed passive drains, 1391.7mls ± 1022.8 and 1030.7mls ± 435.0 respectively ($P=0.118$) and were retained for a longer period, 10.3 days ± 3.2 and 9.0 days ± 2.1 respectively ($P=0.118$). The higher body mass index and larger mastectomy specimen size may account in part for the slightly larger volume drained in the active drain group. Higher weight and body mass index increase the risk of post-mastectomy seroma.[10] Furthermore, suction may encourage persistent opening of lymphatics which may lead to increased serous drainage.[17] Morris reported a higher total volume of effluent drained with suction drain compared to passive drain.[18] This finding was also consistent with that of Oommen et al[19] who reported higher total drain output with suction when compared to passive drain. Ezeome et al[14] reported higher total volume of effluent drained with simple drain and comparable average duration of drainage. The mean duration of hospital stay in the active and closed passive drain groups were comparable; 11.5 days ± 3.2 and 11.6 days ± 4.1 respectively ($p=0.907$).

There was no case of post-operative hematoma in the cases studied. Seroma collection occurred in 1 patient in either group accounting for 4.2% of cases studied. The low incidence of seroma in the study population may be because the drains were retained for a longer duration (10.3 days ± 3.2 and 9.0 days ± 2.1 for the active and closed passive drain groups respectively). Whitfield et al[20] reported a seroma incidence of 20% but the distribution of cases with seroma between

the active and passive drain groups was comparable. The drains in this latter study had been left in place for 6.8 days ± 3.7 and 7.9 days ± 3.4 for the passive

and active drain groups respectively. A related study[14] reported a higher incidence of post-mastectomy seroma (36%) which was more in the suction drain group. However, there was no statistically significant difference in seroma rate between the suction and passive drain groups. There was comparable incidence of wound infection in the active drain group; 3 patients (12.5%) compared with the closed passive drain group; 4 patients (16.7%), P=1.000. Whitfield et al[20] reported wound infection in 3 of 24 cases (12.5%) in the suction drain group and 2 of 26 cases (7.7%) in the passive drain group. In this current study, 1 patient in the closed passive drain group had wound dehiscence which was managed with serial wound dressings.

Conclusion

Closed passive drain is as effective as suction drain in preventing hematoma or seroma collection in Auchincloss mastectomy patients. It is the authors' opinion that closed passive drain may serve as an alternative to suction drain in low resource settings. Surgical site infection rate is comparable to suction drain. It is easily improvised, readily available and affordable.

Conflict of Interest

The authors have no conflict of interest.

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