



EVALUATION OF AUCHINCLOSS' MODIFIED RADICAL MASTECTOMY IN THE MANAGEMENT OF ADVANCED BREAST CANCER

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ABSTRACT: Background: Mastectomy for breast cancer has progressed from radical approaches in the past to the breast conservative therapies (BCT) of today. Less invasive procedures followed by axillary dissection or radiotherapy achieves better cosmetic and similar prognostic outcome than radical approaches. Auchincloss modified radical mastectomy was originally described for level 1 and 2 axillary node dissection but has since been extended to include level 3 node clearance with variable results. Majority of our patients present late with level 2 and 3 axillary node involvement thereby making BCT impracticable. **Aim:** To evaluate effectiveness of Auchincloss' modified radical mastectomy in loco-regional control of stages II and III breast cancer. **Method:** We recruited consecutive patients presenting to the surgical clinic of our hospital with breast cancer between 2017 and 2018 and administered questionnaires for demographics and clinical stage. They were subsequently counseled and offered mastectomy. **Results** A total of 51 patients were seen. All were females. Age range was between 30 and 70 years. Mean age was 46.8 years; median age 47 years while modal age was 47 years. One patient (1.96%) presented with stage IIB disease, 27 patients (52.94%) with stage IIIA, 8 patients (15.69%) with stage IIIB and 15 patients (29.41%) with stage IIIC disease. Three patients (5.88%) developed postoperative wound infection, 2 patients (3.85%) arm edema, 1 patient (1.96%) axillary node recurrence, 1 patient (1.96%) local chest wall recurrence and 2 patients (3.85%) developed seroma. Forty-two patients (82.35%) had no reportable post-operative complication. **Conclusion:** Auchincloss' modified radical mastectomy is effective in loco-regional control of advanced breast cancer.

KEYWORDS: Auchincloss, Modified, Radical, Mastectomy, Breast Cancer

INTRODUCTION

Mastectomy is a commonly performed procedure for loco-regional control of breast cancer. The technique has progressed from radical approaches in the past to the breast conservative procedures that are widely practiced today.

In November 1894 William Stewart Halsted published his experience at Johns Hopkins hospital, Baltimore, where he gave a detailed description of his radical mastectomy to 'cure' breast cancer among 50 patients. (1) The procedure entailed removal of the breast tissue, overlying skin, and the pectoralis major muscle, together with complete en bloc removal of the axillary lymph nodes (1)



Almost simultaneously (just ten days later) Willie Meyer of New York described a similar procedure in which he removed both the pectoralis minor and major muscles along with en bloc dissection of the axilla.(2)

These heralded the birth of mutilating procedures for 'cure' of hitherto 'incurable' condition and for over 50 years, Halstead procedure (which later was in complete conformity with Meyer's principle) held sway with description of more radical approaches by different authors. Morbidity after radical mastectomy was however of much concern because of troublesome lymphedema, restricted arm movement and large wounds that healed by granulation. This led Patey and Dyson from Middlesex hospital in London to propose a less invasive mastectomy (modified radical mastectomy) where the pectoralis major muscle was spared while removing the pectoralis minor. (3)

In a review comparing their operation with the standard radical mastectomy in 1948, they found no difference in survival or local recurrence rates between the two groups but a reduction in morbidity in their own group. (3) Several modifications of Patey's procedure have been described by different authors since then. (4 -7)

In 1963, Auchincloss described a modified radical mastectomy for stages I and II breast cancer in which the pectoralis major and minor muscles were retracted to dissect levels I and II axillary lymph nodes. (4) Auchincloss stated that in his procedure, he was unable to clear the axilla of level III lymph nodes and suggested that they should only be removed when evidently invaded.(4) John L. Madden also described his technique of modified radical mastectomy in which a total mastectomy and complete axillary dissection was done with preservation of both the pectoralis major and minor muscles in 1965. (5) Seven years later in 1972, he and his colleagues presented results of consecutive series of patients treated by their procedure in which outcomes were similar to those of radical mastectomy. (6)

In 1975, Scanlon and Caprini reported their technique of modified radical mastectomy performed among 20 patients in which the lower lateral fibers of the pectoralis major muscle was incised followed by detachment of the origins of the pectoralis minor muscle. This allows sufficient retraction of these muscles to provide excellent axillary exposure while minimizing the danger of traction injury to the neurovascular structures supplying the muscles. (7) They concluded that the final cosmetic results were superior to those obtained with standard radical mastectomy.

Simple mastectomy combined with radiotherapy was first introduced by McWhirter in Edinburgh in 1948 (8) and in 1969 Kaae and Johansen compared simple mastectomy plus postoperative radiotherapy with extended radical mastectomy plus radiotherapy and found that overall survival rates were similar in both. (9) The advent of mammography which allows early detection of breast cancer coupled with the *Milan* trial (Veronesi et al) (10) and the *National Surgical Adjuvant Breast and Bowel Project (NSABP) B-04* trial (Fisher et al) (11) gave birth to the concept of breast conservative therapy that is the standard practice today.

However, in a developing economy like Nigeria where late detection and presentation is still the norm breast conservative therapy remains impracticable. We therefore evaluated effectiveness of the Auchincloss' modified radical mastectomy in loco-regional control of stages II and III breast cancer.



METHODOLOGY

We prospectively recruited consecutive patients with breast cancer presenting to the surgical clinic of the Usmanu Danfodiyo university teaching hospital, Sokoto, Nigeria between 2017 and 2018 for this study. They were administered validated semi-structured questionnaires for demographics and clinical stage and subsequently counseled and prepared for mastectomy. They all had Auchincloss' modified radical mastectomy under general anaesthesia. Via transverse elliptical incision, flaps were raised to allow for sharp dissection of the entire breast off the underlying pectoral fascia while securing hemostasis in the process. Axillary node dissection commenced with retraction of the pectoralis major muscle for level 1 nodes and pectoralis minor for levels 2 and 3 nodes. All fascial, fatty and glandular structures around the axillary vein were stripped downward by blunt dissection from below the clavicle to the posterior and medial axillary walls below while safe-guarding the nerves to latissimus dorsi and serratus anterior in the process. The dissected axillary tissue in continuity with the detached breast was appropriately labeled before sending to the pathologist. Operative findings, immediate and late postoperative complications were entered into the questionnaires. All the patients were referred to the radio-oncology department for adjuvant chemo-radiotherapy. A combination of clinical assessment and high-resolution ultrasound scan of the axilla were conducted routinely during follow up to detect axillary node recurrences. The follow up period for this study was 12 months. Four patients were lost to follow up after one month and were dropped out of the study.

Quantitative and qualitative variables were assessed for any association using the Pearson chi-square test. A *P-value* of 0.05 was considered significant.

Inclusion/exclusion criteria: All consenting patients with confirmed diagnosis of stages II and III breast cancer were included in the study. (Stages IIIB and IIIC inclusion based on the assumption that the internal mammary chains and deep supraclavicular nodes not accessible by surgery would be subjected to adjuvant chemo-radiotherapy). Patients with stages I and IV diseases were excluded. Also excluded were patients who had undergone neoadjuvant chemo-radiotherapy.

Data analysis: Data was analyzed using the *IBM statistical package for social sciences (SPSS)* version 23.0.

RESULTS

A total of 51 patients were seen. All the patients were females. Age range was between 30 and 70 years. The mean age (\pm standard deviation) was 46.8 (\pm 7.40) years, the median age was 47.0 years while the modal age was also 47.0 years. Table 1 shows age distribution of patients seen. One patient (1.96%) presented with stage IIB disease, 27 patients (52.94%) with stage IIIA, 8 patients (15.69%) with stage IIIB and 15 patients (29.41%) with stage IIIC disease. No patient was seen with stage IIA disease. (Table 2) Intra-operatively, level I axillary lymph nodes were seen in one patient (1.96%), level II nodes in 34 patients (66.67%) and level III nodes in 16 patients (31.37%). (Table 3) Three patients (5.88%) developed postoperative wound infection, 2 patients (3.85%) developed arm edema, 1 patient (1.96%) axillary node recurrence, 1 patient (1.96%) local chest wall recurrence and 2 patients (3.85%) developed seroma. Forty-two patients (82.35%) had no reportable post-operative complication. (Table 4)



There was no reported case of flap necrosis or restricted shoulder movement. All but one patient had 2 units of whole blood transfused to compensate for intraoperative blood loss. There was no significant association between stage of disease and post-operative complications. (Table 5) No operative mortality was recorded in this study.

DISCUSSION

It appears not much has changed regarding the stage at which patients with breast cancer present to our clinic over the years. In this study only 1.96% of the patients were seen with stage II disease while 98.04% presented with stage III disease compared to our earlier study where 0.6% presented with stage II disease and 99.4% with stages III and IV disease. (12) This is however not the overall picture across the sub-region as recent studies have indicated some improvement in disease presentation to some parts of the country and Africa compared to our figures. (13 - 15) Jedy-Agba et al in a multi-center study to determine the stage at diagnosis of breast cancer in Nigerian women reported that 5(1.7%), 92 (30.7%), 157 (52.4%) and 46 (15.3%) were diagnosed at stages I, II, III and IV, respectively. They concluded that factors that were amenable to intervention concerning breast cancer awareness and health care access like illiteracy, disbelief in cure for breast cancer and living in rural area were the strongest determinants of stage at diagnosis in Nigerian women. (13) Awofeso et al in Lagos, south west Nigeria got 4.7%, 22.4%, 38.8% and 34.1% for stages I, II, III and IV respectively. (14) Reasons given for late stage presentation in that study were delay in seeking help, misdiagnosis at the lower levels of healthcare and prolonged time spent for the laboratory investigations and diagnosis. (14) Similarly, McKenzie et al in a multi-country *African Breast Cancer-Disparities in Outcomes (ABC-DO)* study involving Nigeria, Uganda, Zambia, and the multiracial populations of Namibia and South Africa, reported that 61% of patients presented with stage III/IV disease. They found that a more advanced stage was associated with being black, low education level, lack of awareness of breast cancer, an unskilled job and recent pregnancy. (15) It thus appeared therefore that even though there has been some improvement, late stage presentation still remains a common norm in most parts of sub-Saharan Africa with attendant poor outcome.

Sixty-seven percent of our patients had positive level II axillary lymph nodes while 31.4% had metastasis to level III nodes. Majority of patients with breast cancer in Nigeria present with positive axillary lymph node metastasis due to advanced stage presentation. In a sonographic evaluation of axillary lymph nodes in women with newly diagnosed breast cancer at the University College Hospital, Ibadan, Nigeria, Hafiz et al showed that 81.1% of clinically palpable lymph nodes were well correlated with abnormal sonographic longitudinal/transverse ratio. (16) In their opinion, sonographic abnormalities correlates well with tumour stage and spread to regional nodes. Yiangou et al also examined the correlation between axillary lymph node status and primary tumour characteristics in breast cancer and concluded that lymph node metastases were found in 85% of patients with lymphovascular invasion in their tumours as compared to only 15.4% of those without. (17) Their work showed that the more advanced the tumour, the more the likelihood of spread to the axillary lymph nodes. Chand et al carried out a study correlating tumor site and size with the level of axillary lymph node involvement in breast cancer and concluded that as the size of tumor increases, there was an increase in axillary lymph node involvement which suggests that nodal metastasis is indicative of tumor chronology. (18) We had also earlier reported 100% positive axillary lymph node involvement



in consecutive patients managed for breast cancer in Sokoto, Nigeria with 99.4% of them presenting with advanced disease. (12) Ogundiran et al in a detailed retrospective review of surgical management of breast cancer in Ibadan, Nigeria, reported that axillary node involvement was seen in 53.4% (189), absent in 25.1% (89) and not stated in 21.5% (76) of patients seen. Majority of patients in that study also presented with late stage disease. (19)

Advocates of total removal of the pectoralis minor muscle during mastectomy have argued that destruction of neurovascular bundles renders the muscle useless and therefore should be removed; and that the presence of inter-pectoral lymphatic chains (Rotter's) remains sites of frequent recurrences. Patey and Dyson advocated removal of the pectoralis minor muscle to facilitate dissection of the axilla. (3) However several reports have shown that it is possible to preserve the neurovascular bundles during axillary dissection thereby making removal of the pectoralis minor muscle unnecessary. (4 – 7)

Auchincloss described a modification of the conventional radical mastectomy where both pectoral muscles were preserved but axillary nodes removed in continuity with the breast and overlying skin. (4) Even though Auchincloss stated that he was unable to clear the axilla of apical lymph nodes, he however concluded in his speculative study involving 204 patients with advanced breast cancer that complete axillary dissection was unnecessary in clinically negative apical nodes because mastectomy with removal of levels 1 and 2 nodes and preservation of pectoral muscles had disease control and survival rates similar to the more radical procedures. (4, 20) He further observed that the apical nodes should be removed only if clinically involved because of the high rate of recurrence if these nodes were found to be positive and not removed. (4) The argument however is the possibility of presence of occult metastases in the apical nodes which may be missed by Auchincloss' recommendation and therefore becomes foci of recurrences. (20) Madden et al while analyzing results obtained from consecutive series of 94 patients with breast cancer treated by a modified radical mastectomy similar to Auchincloss' approach (but with complete axillary dissection) concluded that the procedure was as satisfactory in outcome as either the standard or extended radical operations. (6) Through a series of pre-operative lymphangiography followed by immediate postoperative radiography, they were able to confirm complete axillary clearance in all their patients. They also found no case of inter-pectoral lymphatic invasion or recurrence in pectoral muscles in all the patients they operated on. (6)

In this study using the Auchincloss procedure for patients with advanced breast cancer, we achieved complete levels 1 to 3 axillary node clearance with only 1.96% (1) lymph node and chest wall recurrences. This is however in contrast to the 22.6% axillary lymph node and local chest recurrence rates reported by Baker et al for stage 3 breast cancer treated by modified radical mastectomy that preserves the pectoral muscles. (21) They concluded on the basis of this high recurrence that Stage III breast cancers should not be treated solely by modified radical mastectomy unless a complete (levels 1 to 3) axillary lymph node dissection, which includes Rotter's nodes as well as the nodes beneath and medial to the pectoralis minor muscle was performed. ²¹ Most surgeons have adopted this as the standard approach for advance stage breast cancer rather than the original procedure described by Auchincloss. (6, 7, 19, 22, 23)

Local chest wall recurrence rates are said to be similar in simple and radical mastectomies. (6 – 8) Scanlon and Caprini reported isolated local recurrence rate of 5.0 % (9) and symptomatic arm lymphedema of 2.2% (4) with no postoperative death in their experience compared to the 1.9% (1) chest wall recurrence we reported. (7) In this study, we got 3.9% (2) arm edema that



responded to conservative management and seroma of 3.9% (2) despite routine postoperative circumferential chest wrap with two 6- inches *crepe* bandages. The seroma however resolved completely following surgical aspiration. Ogundiran et al from Ibadan, Nigeria reported that seroma formation was the most frequently occurring complication following mastectomy at 6.0 % (21) despite routine postoperative insertion of surgical drains. (19) This was followed closely by post-operative wound infection rate of 4.4% (16) similar to the 5.9% infection rate and zero operative mortality we reported. (19)

CONCLUSION

Auchincloss' modified radical mastectomy with complete (levels 1 to 3) axillary lymph node dissection is effective in loco-regional control of stages II and III breast cancer.

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APPENDIX

Table 1: Age distribution of patients with breast cancer

Age(Years)	Frequency	Percentage
21 - 30	1	1.96
31 - 40	9	17.65
41 - 50	27	52.94
51 - 60	12	23.53
61 - 70	2	3.85
Total	51	100.00

Table 2: TNM stage presentation of patients with breast cancer

Stage	Frequency	Percentage
IIA	Nil	Nil
IIB	1	1.96
IIIA	27	52.94
IIIB	8	15.69
IIIC	15	29.41
Total	51	100.00

Table 3: Intra-operative axillary lymph node status of patients with breast cancer

Axillary nodes	Frequency	Percentage
Level 1 nodes	1	1.96
Level 2 nodes	34	66.67
Level 3 nodes	16	31.37
Supraclavicular nodes	Nil	Nil
Total	51	100.00

**Table 4: Post-operative complications following mastectomy**

Post-op complications	Frequency	Percentage
Wound infection	3	5.88
Arm edema	2	3.85
Axillary node recurrence	1	1.96
Chest wall recurrence	1	1.96
Seroma	2	3.85
Nil	42	82.35
Total	51	100.00

Table 5: Breast cancer stage and post-operative complications compared using Pearson chi- square test

Post-op complication	TNM Stage				Total	X²
	IIB	IIIA	IIIB	IIIC		
Wound infection	-	-	1	2	3	0.253
Arm edema	-	-	1	1	2	
Node recurrence	-	-	-	1	1	
Chest recurrence	-	-	-	1	1	
Seroma	-	-	2	-	2	

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