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An Evaluation of Post-Modified Radical Mastectomy Wound and Related Complications

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Abstract

Background: Mastectomy is the resection of part or the whole of the breast with or without axillary dissection to treat or prevent breast cancer. It is the mainstay of loco-regional therapy for operable breast cancer. It may be attended by infective and non-infective post-operative complications.

Aim: To evaluate for wound (surgical site infection, flap necrosis, dehiscence) and other post-operative complications (chronic scar pain, limb lymphoedema, numbness and restricted shoulder movement) of mastectomy in patients with stages I and II breast carcinoma.

Methods: A prospective randomized study in two institutions involving females with histologically diagnosed stages I & II breast cancer undergoing modified radical mastectomy. patients were randomized into two arms; group A had flaps raised with electrocautery while group B had flaps raised with scissors. Wound drains were left in the mastectomy bed and the wound closed primarily. The patients were examined as per the study protocol for specific complications. Shoulder exercises were done pre- and postoperatively. Each patient underwent modified radical mastectomy and randomized to have flaps raised either by electrocautery or scissors. Wounds were drained and closed primarily. Patients were examined weekly and then fortnightly over twelve weeks for specific complications.

Results: Forty-six females were studied; 23 in each group. Wound infection (7, 15.2%), dehiscence (4, 8.7%) and flap necrosis (2, 4.3%) were the overall primary complications. Infection and dehiscence occurred more in the cautery group, 5 (21.7%) against 2 (8.7%) and 3(4.3%) against 1 (4.3%) respectively. Flap necrosis occurred equally in both groups. One patient in the cautery group developed lymphoedema of the arm. There were no cases of chronic scar pain, numbness or restricted shoulder movement.

Conclusion: Wound infection and dehiscence occur in post-mastectomy patients; their occurrence was more frequent in the group that had flap dissection using cautery compared to scissors.

Keywords: Breast cancer, Mastectomy, Wound and Related complications.

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Introduction:

Modified radical mastectomy is the most commonly practiced surgical modality for the treatment of stages I and II carcinoma of the breast in our practice; conservative breast surgery is infrequently done because of paucity of facilities for radiation therapy and its cost. Absence of complications is desired as it produces the best functional outcome in post-mastectomy patients,[1] however, mastectomy is associated, to varying degrees, with complications like wound infection and dehiscence, flap necrosis, shoulder pain, limited range of shoulder movement, lymphoedema, numbness and scar pain.[2] These complications may arise over varying periods after the surgery and negatively impact the physical functions and emotional wellbeing of the patients and reduces their quality of life.[3]

Multiple factors contribute to the occurrence of these and other complications in surgery and are usually an aggregate of patient, procedure or surgeon related factors. The stage of the disease and BMI are considered important patient factors.[4, 5] The extent of axillary dissection or irradiation determines the formation of lymphoedema of the arm while removal or conserving the pectoralis major muscles affects shoulder mobility. Pre- and postoperative physical therapy to the shoulder and adequate analgesia improves shoulder function.

Institution of effective and adequate preoperative measures to avoid or reduce the occurrence of these complications is an important aspect of the patient care. These measures include patient counselling on the risk of post-operative complications, commencing physical therapy to the shoulder, maintaining strict antisepsis and ensuring dissection along oncoplastic plane of the breast while raising the skin flaps.

The current study examines the incidence of other complications including shoulder, wound and pain complications. The results of the outcome of these studies will determine our future practice of breast surgery for malignancy.

Patients and methods:

Setting: The breast care units of the Universities of Uyo and Benin Teaching Hospitals in the South-South geo-political region of Nigeria with a combined capacity of 1500 beds and serving a population of approximately six million.

Inclusion criteria: Females histologically diagnosed with stages I and II (and selected cases of stage III breast cancer who were down-staged and whose wounds could be primarily closed) who volunteer to participate in the study. A

biopsy was done to confirm breast carcinoma at histology.

Exclusion criteria: Patients with clinical and radiological evidence of distant metastasis, who cannot have primary wound closure or have multiple co-morbidities.

Method: A prospective randomized study carried out in two university affiliated hospitals in Southern Nigeria involving females with stages I & II breast carcinoma undergoing modified radical mastectomy. The patients were randomly assigned into two groups: group A (underwent flap dissection using electrocautery) and B (underwent flap dissection with scissors). Patients with stage III disease received neoadjuvant chemotherapy with a combination of doxorubicin and cyclophosphamide to downstage the tumour. Skeletal survey of the lumbar spine, hip, upper femur and skull were done where there was clinical suspicion of metastasis. Active and passive shoulder exercises (extension, flexion and abduction) was prescribed and taught to each patient and accompanying caregiver pre- and postoperatively. The ipsilateral upper limbs were examined for evidence of lymphoedema.

Procedure: Each patient underwent modified radical mastectomy with the flaps raised with either electrocautery or scissors based on the assigned group. The procedures were performed by two lead surgeons; one in each centre. The axillary aspect of the procedure being either sampling or level II node dissection. Haemostasis was secured by pressure, ligation or electrocoagulation in both groups. Prophylactic intravenous ceftriaxone (1 gm) was administered at induction of anaesthesia and repeated in 24 hours. Wounds were drained with a Redivac® drain and closed primarily with nylon 3/0.

Post-operatively, the operation site was examined on the fourth and tenth day for evidence of early wound infection (erythema in the wound margins and/or serous discharge), flap necrosis and wound dehiscence. Shoulder exercise was recommenced on the second postoperative day. The ipsilateral upper limb was inspected for any evidence of lymphoedema at one week and presence of limitation of shoulder motion or pain was assessed also on the fourth and tenth day during physical therapy.

Patients were discharged upon removal of the drain on the tenth day and followed-up in clinic initially weekly for a fortnight and then two-weekly for twelve weeks. Presence of areas of numbness on the adjacent chest wall and pain in the operation scar was enquired from the patients at every visit. A simple range of shoulder motion was assessed at the second and sixth weeks.

For the purpose of this study, wound dehiscence was considered when the wound in part or whole gapes from its original well apposed position during the operation while flap necrosis was considered when any portion of the flap becomes more darkly pigmented and or sloughs. The wound was considered infected when there was erythema, serous discharge and tenderness on the fourth day.

Ethical approval: Approval was sought and obtained from the relevant committees of both institutions (University of Uyo Teaching Hospital UUTH/AD/S/96/VOL.XXI/275 and University of Benin Teaching Hospital ADM/E 22/A/VOL. VII/1483034) to conduct the study.

Data analysis: Data was analyzed using SPSS for Windows version 25 (IBM Inc. Chicago, Illinois, U.S.A). Results are presented in tables and percentages.

Results:

Forty-six females were studied; 23 in each group. Wound infection (7, 15.2%), dehiscence (4, 8.7%) and flap necrosis (2, 4.3%) were the overall primary complications rates. Infection and dehiscence occurred more in the cautery group, 5 (21.7%) and 3(4.3%) respectively (Table 1).

Table 1: Age distribution of patients undergoing modified radical mastectomy

Variable	Total (n = 46)	Electrocautery (n = 23)	Scissors (n = 23)
Age (Mean ± SD) in yrs.	47.0 ±12.2	49.1 ± 11.4	45.0 ± 12.8
Range	25 - 73	27 - 66	25 - 73

Wound infection and dehiscence were more frequent in the electrocautery group but showed no significant difference from the scissors group (p = 0.218 and 0.295 respectively). All the wound cultures grew *Staphylococcus aureus*. These were managed with antibiotics and daily wound dressings and resolved. Flap necrosis was partial; involving only the epithelium and occurred equally in both groups. They were managed by bedside/clinic dressing and all resolved without surgical debridement or grafting. One patient in the cautery group developed lymphoedema of the arm within twelve weeks. There were no cases of chronic scar pain, numbness or restricted shoulder movement.

Table 2: Comparison of secondary outcome measures (complications)

	Electrocautery (n=23)	Sharp (n=23)	Total (n=46)	fisher's exact	P-value
Wound infection	5(21.7 %)	2(8.7 %)	7(15.2 %)	1.517	0.218
Wound Dehiscence	3(13.0 %)	1(4.3 %)	4(8.7 %)	1.095	0.295
Flap Necrosis	1(4.3 %)	1(4.3 %)	2(4.3 %)	0.000	1.000
Chronic Pain	0(0.0 %)	0(0.0 %)	-	-	-
Lymphoedema	1(4.3 %)	0(0.0 %)	1(2.2 %)	1.022	0.312
Reduction in shoulder movement	0(0.0 %)	0(0.0 %)	0(0.0 %)	-	-

Discussion

Modified radical mastectomy for breast carcinoma is a common procedure undertaken by the breast surgeon globally[6]. This study reveals wound complications to be common among the different post-mastectomy complications studied, with wound infection being the most common followed by dehiscence and flap necrosis. These wound complications were however, considered to be of mild severity because they were managed conservatively to resolution, most healing prior to discharge from hospital.

Wound infection remains a common complication of modified radical mastectomy despite being a clean procedure not requiring antibiotic prophylaxis. It was the most common wound complication in our study and responded to routine dressing. Its incidence was higher among patients who had flaps raised by electrocautery; which technique is linked with a higher tendency to forming seroma. Wound infection in surgery has severally been attributed to multiple factors including obesity, smoking, recent breast biopsy and seroma formation,[7] which factors cause a reduced systemic or local immunity and predispose to infection.

Neoadjuvant systemic therapy is often administered to downstage advanced breast cancer and convert same to an operable disease. Some however consider this practice to increase the risk of intra- and post-operative complications like haemorrhage and infection;[8] but a study by Nussbaumer[9] and colleagues did not find an increased complication rate among patients undergoing mastectomy for breast cancer in the short term. Seroma and vacuum drain tube were considered the primary reason for the post-operative wound infection.

Dehiscence was the next wound complication we encountered and it was again more frequently observed in the electrocautery group who are known to have a higher probability of seroma formation and wound infection. Factors associated with dehiscence are similar to those for wound infection and include the type of incision, suture type, emergency surgery, patient factors (age, nutritional status and presence of co-morbidities like hypertension and diabetes).[4] The definition for flap necrosis remains contentious and it was the least wound complication encountered. It occurs when the vascular supply to the flap fails to meet its metabolic demands and may be partial or full thickness and is more common with immediate breast reconstruction with implant.[10], [11] Instruments used intraoperatively to grasp the edge of the flap can potentially produce tissue ischaemia if the application pressure is high and necrosis of the wound edge may subsequently ensue. We considered this as a possible cause of flap necrosis in this study. All the cases of flap necrosis we encountered were partial, involving only the epithelium and did not require operative intervention.

Limitation of shoulder range of movement and pain, skin numbness and pain on or surrounding the scar are other common complications encountered in patients undergoing mastectomy, but no patient developed any of these. Shoulder and arm pain in post-mastectomy patients occur in 30% and 21% respectively[12] leading to a marked reduction in range of movement even after a month.[13] This complication was common in patients who had more extensive axillary surgery on account of a higher nodal status.[9] We did not find much limitation of shoulder motion or pain partly because we limited our procedures to axillary sampling/ level II node dissection which, coupled with our approach of counselling each patient early of the possibility of this complication and encouraging them to exercise the ipsilateral shoulder, may have contributed to our observation of reduced incidence of limitation of shoulder mobility. Similar findings were reported by Chau[14] and colleagues among Asian women. Pre- and postoperative physical therapy is a very effective measure which is known to improve shoulder function, reduce shoulder pain, as well as the emotional and psychological outlook of patients.[15, 16]

Chronic operation site/ scar pain was previously reported as common among patients undergoing mastectomy.[9] We previously encountered post mastectomy patients with complaints of chronic pain in the scar but did not find any in the current study. This we consider may be due to the short follow-up period; we continue to assess for pain on the long term.

Oliviera and colleagues examined factors associated with chronic pain among patient undergoing breast surgery and found no association between the degree of postoperative acute pain with chronic pain;[17] but found younger age at surgery and axillary surgery as independent factors associated with chronic pain.

Conclusions: The incidence of post-operative complications is low among patients undergoing modified radical mastectomy in our practice. Wound infection, wound dehiscence and flap necrosis are the common wound complications. Early institution of shoulder exercise and reduction in the extent of axillary surgery reduces the incidence of shoulder and arm complications.

Limitations: This study was done in two centres sharing similar geographic and demographic characteristics and has a small sample size, which factors limit its conclusions. Failure to employ validated tools for classifying post-operative breast complications is also considered a limitation. These limitations will be addressed with a larger national study.

References

[1] Vincent SMA, Gallagher M, Johnston A, Djohan R, Varzgalis M, Sugru M. The keys to optimizing breast wounds: A meta-analysis. Advances in breast cancer research. 2019; 8:87-111

[2] Klein I, Kalichman L, Chen N, Susmallian S. A comprehensive approach to risk factors for upper arm morbidities following breast cancer treatment: a prospective study. BMC Cancer 2021; 21: 1251

[3] Nesvold I, Dahl AA, Lokkevik E, Mengshoel AM, Fossa SD. Arm and shoulder morbidity in breast cancer patients after breast conserving therapy versus mastectomy. Acta Oncologica. 2008; 47:835-842

[4] Chun JJ, Yoon SM, Song WJ, Jeong HG, Choi WJ, Wee SY. Causes of surgical wound dehiscence: A multicenter study. J Wound Manag Res 2018; 14:74-79

[5] Spiliotis J, Tsiveriotis K, Datsis AD, Vaxevanidou A, Zacharis G, Giafis K, Kekelos S, Rogdakis A. Wound dehiscence is still a problem in the 21st century: A retrospective study. World J Emerg Surg 2009; 4: 12

[6] Ogundiran TO, Ayandipo OO, Ademola AF, Adebamawo CA. mastectomy for management of breast cancer in Ibadan, Nigeria. BMC Surg. 2013; 13: 59

[7] Obadiel YA, Al-Ba'adani. MN, Haidar QH. Early complications following modified radical mastectomy. Open Access Library Journal. 202; 7: e6992

[8] Kubecek O, Paterova P, Novosadova M. Risk factors for infections, antibiotic therapy and its impact on cancer therapy outcomes for patients with solid tumors. Life 2021; 11: 1387

[9] Nussbaumer RL, Maggi N, Castrezana L, Zehnpfennig L, Scwab FD, Krol J, Oberhauser I, Webber P, Kurzeder C, Haug MD, Kappos E. The impact of neoadjuvant systemic treatment on post-operative complications in breast cancer surgery. Breast Cancer Research and Treatment. 2023; 19: 333-341

[10] Robertson SA, Jeevaratnam JA, Agrawal A, Cutress RI. Mastectomy skin flap necrosis: challenges and solutions. Breast Cancer. 2017:9 :141-152

[11] Paglaria D, Schiavone I, Garganese G, Bove S, Montella RA, Constantini M, Rinaldi PM, Bottosso S, Grieco F, Rubino C, Salgarello M, Rubiffo D. predicting mastectomy skin flap necrosis a systemic review of preoperative and intraoperative assessment techniques. Clinical Breast Cancer. 2023; 23: 249-254

[12] Hauerslev KR, Madsen AH, Overgaard J, Damsgaard TE, Christiansen P. Long-term follow-up on shoulder and arm moebidity in patients treated for early breast cancer. Acta Oncologica 2020; 59: 851-858

[13] Min J, Kim JY, Yeon S, Ryn J, Min JJ, Park S, Kim SI, Jeen JY. Change in shoulder function in the early recovery phase after breast cancer surgery: A prospective observational study study. J Clin Med 2021; 10: 3416

[14] Chau KS, Zeng D, Leung JH, Ooi BS, Kong KT, Yeo YI, Goo JT, Chia CL. Measuring upper limb function and patient reported outcome s after major breast cancer surgery: a pilot study in Asian cohort. BMC Surgery 2020; 20: 108

[15] Adesina MA, Olajire TI. Physical and psychological complications of mastectomy. world News of Natural Sciences (WNOFNS) 2020; 29: 212-224

[16] Ahmed EM, Mekkawy MI, Sayed AA. Effect of applying shoulder exercise on shoulder function after modified radical mastectomy. Assuit Scientific Nursing Journal (asnj). 2017; 5:74-77

[17] Oliviera GS, Chang R, Khan SA, Hansen NM, Khan JH, McCarthy RJ, Akparian AV. Factors associated with the development of chronic pain after surgery for breast cancer: A prospective cohort from a tertiary center in the United States. Breast J 2014; 20: 9-14