

Research Article

Incidence and Spectrum of Postoperative Complications Following Modified Radical Mastectomy: A Retrospective Study

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ABSTRACT

Background: Modified radical mastectomy remains an essential surgical procedure for locally advanced breast cancer, but is associated with wound-related, lymphatic, and functional postoperative complications.

Objective: To determine the incidence, spectrum, and predictors of postoperative complications following modified radical mastectomy.

Methodology: This retrospective descriptive study was conducted at Shalamar Hospital Lahore, from-April 2025 to April 2026. Medical records of 85 patients who underwent primary unilateral modified radical mastectomy for breast carcinoma were reviewed. Demographic, clinical, tumour-related, operative, and postoperative data were retrieved using a structured proforma. Patients were followed through available records for three months after surgery. The primary outcome was the occurrence of any postoperative complication.

Results: The mean age was 52.8 ± 10.9 years, and 54 (63.5%) patients were postmenopausal. Diabetes mellitus was present in 19 (22.4%) patients, hypertension in 27 (31.8%), anaemia in 29 (34.1%), and neoadjuvant chemotherapy had been received by 23 (27.1%). Stage III disease was documented in 50 (58.8%) patients. The mean operative duration was 133.6 ± 23.7 minutes, the mean intraoperative blood loss was 258.0 ± 81.0 mL, and the mean drain-retention duration was 8.6 ± 2.4 days. 29 (34.1%) patients developed at least one postoperative complication. Seroma was the most frequent complication, occurring in 15 (17.6%) patients.

Conclusion: Postoperative complications occurred in approximately one-third of patients undergoing modified radical mastectomy, with seroma and prolonged drain output being the most common.

Keywords: Modified Radical Mastectomy, Breast Carcinoma, Postoperative Complications, Seroma, Surgical-Site Infection.

INTRODUCTION

Breast cancer is a common type of malignancy among women and is a major cause of cancer-related death globally [1]. Worldwide, around 2.3 million women were diagnosed with breast cancer in 2022 and almost 670,000 died as a result of the disease [1]. Modified radical mastectomy (MRM) is an important surgical approach in patients with locally advanced disease, multicentric tumours, contraindications to breast conserving surgery or clinically relevant axillary nodal involvement [2] although breast conserving surgery and sentinel lymph

node biopsy are gaining increasing importance in selected patients. For modified radical mastectomy, they will remove the whole breast and then do axillary lymph-node dissection, but they will keep the pectoralis major muscle [3]. However, there is a high risk of postoperative morbidity due to the extensive dissection of tissues, destruction of the lymphatic channels and formation of a large dead space during MRM [4]. The early postoperative complications are seroma, infection, hematoma, necrosis of the flap, wound dehiscence, prolonged drainage and postoperative pain. Late

complications can involve lymphedema, stiffness in the shoulder, numbness or tingling in the upper limb, limited arm movement and chronic pain [5,6]. One of the most common complications after an MRM is the development of seroma. May need to be aspirated several times, delay draining time, can be a source of wound infection, may cause slow healing, and delay starting adjuvant therapy [7]. In addition to hospital stay and treatment expenses, it can lead to further complications such as wound infection, flap necrosis, hematoma, and wound dehiscence that may increase patient discomfort. Furthermore, upper limb function and health-related quality of life can be significantly affected by breast cancer related lymphedema after axillary surgery [8]. Seroma is always reported as one of the most frequent early complications following MRM. It occurs as a result of the collection of serous fluid in the dead space formed following breast and axillary dissection. Discomfort, tension at the wound site, delayed healing, further hospital visits for aspiration, secondary infection and need for surgical drains are all issues associated with seroma [9].

Surgical-site infection is another serious post-operative complication which can extend hospitalisation, result in exposure to antibiotics, wound breakdown and delay in given adjuvant treatment [10]. These include bacterial contamination, devitalised flap tissue, long-term drainage, hematoma, suboptimal glycaemic control, malnutrition, obesity, smoking and immunosuppression [11]. Similarly, formation of hematoma may cause pain, swelling, flap compromise or require surgical evacuation. The concern with skin flap necrosis is that it may lead to wound dehiscence, secondary infection, re-dressing, delayed healing and cosmesis. These complications can also add to the psychological burden of patients facing cancer and body image issues after mastectomy surgery [12]. One of the most important late complications of axillary lymph-node dissection is upper-limb lymphedema. It is caused by the blockage of the lymph system and can manifest as swelling, heaviness, pain, recurrent cellulitis, movement restriction and functional limitation of the arm [13]. Lymphedema may last for years and negatively impact social, work, emotional and health-related quality of life. There is a focus on recent guidance on risk assessment, patient education, early detection, surveillance, and prompt rehabilitation for patients who may be at risk for breast cancer-related arm lymphedema [14].

Objective

To determine the incidence, spectrum, and predictors of postoperative complications following modified radical mastectomy.

METHODOLOGY

This retrospective descriptive study was conducted at Shalamar Hospital Lahore, from-April 2025 to April 2026. Medical records of 85 patients who underwent primary unilateral MRM during the study period were included through total population sampling. All records available for the entire study period were reviewed to determine eligibility. Patients were included if they were female, ≥ 18 years old, had a diagnosis confirmed by histopathology and had undergone a primary unilateral modified radical mastectomy with axillary lymph-node dissection. Records containing only incomplete operative notes and/or only postoperative progress and/or only at least three-month follow-up data were excluded. Patients who had undergone breast-conserving surgery, simple mastectomy, bilateral mastectomy, revision surgery, palliative surgery or immediate breast reconstruction were excluded. Patients with prior breast or axillary surgery, active surgical-site infection before surgery, inadequate preoperative or postoperative documentation, missing follow-up data, or no outcome data were also excluded.

Data Collection

A structured data collection proforma was used to extract data from patient records, surgical reports, nursing notes, discharge summaries, pathology, and outpatient follow-up notes. Demographic and clinical factors were age, body mass index, menopausal status, diabetes mellitus, hypertension, smoking history, haemoglobin level, tumour stage, neoadjuvant chemotherapy, and other relevant comorbidities. Operative variables were duration of surgery, blood loss during surgery, extent of axillary dissection, number of drains placed in the body, drain output, and duration of the drain retention. Medical records were retrieved during the postoperative period up to three months after surgery to look for early and late complications. The main endpoint was the rate of postoperative complications after modified radical mastectomy. The complications evaluated were seroma, surgical-site infection, hematoma, flap necrosis, wound dehiscence, the need for prolonged drainage, persistent postoperative pain, shoulder stiffness, sensory disturbance, and upper-limb lymphedema. The

definition of seroma was a serous fluid accumulation at the operative site identified by the surgeon as requiring aspiration, drainage or further clinical intervention. Surgical-site infection was included if there was a mention of purulent discharge, erythema, warmth, tenderness, induration of the wound, fever, antibiotics, or wound drainage due to infection in the postoperative notes. A hematoma was identified as the swelling, pain, tension at the wound site, or need for aspiration or surgical evacuation of blood from the surgical site after surgery. Partial or complete non-viability of the mastectomy skin flap was noted and indicated by skin-flap necrosis. Wound dehiscence was defined as the separation of the wound edges (partial or complete). If the drainage was kept > 50 mL/24 hours for > 7 days, it was considered prolonged drainage. Documented clinically or at least a 2 cm inter-limb circumference difference with the contralateral arm was defined as having upper-limb lymphedema. When these were documented during follow-up visits, shoulder stiffness and sensory disturbance were recorded.

Statistical Analysis

The data was entered and analysed using SPSS (Statistical Package for the Social Sciences) version 26.0. Means $\pm$ SD or Mdn (IQR) were used to present continuous variables according to their distribution. Categorical variables were given in percentages and frequencies. Each postoperative complication was expressed as the percentage of patients who developed the complication during the follow-up period. The continuous variables were analysed using an independent-samples t-test. The cut-off p-value of ≤ 0.05 was used for statistical significance.

RESULTS

A total of 85 patients were included in the study, mean age of patients was 52.8 ± 10.9 years, with most patients aged 40–59 years (48, 56.5%), followed by those aged 60 years or above (25, 29.4%). The mean body mass index was 27.3 ± 4.5 kg/m². Most patients were postmenopausal (54, 63.5%). Diabetes mellitus and hypertension were documented in 19 (22.4%) and 27 (31.8%) patients, respectively, while anaemia was present in 29 (34.1%). Only 4 (4.7%) patients had a history of smoking. Neoadjuvant chemotherapy had been received by 23 (27.1%) patients.

Table 1. Baseline Demographic and Clinical Characteristics of Patients Undergoing Modified Radical Mastectomy (n = 85)

Variable	Category	n (%) / Mean $\pm$ SD
Age, years	Mean $\pm$ SD	52.8 $\pm$ 10.9
Age group, years	<40	12 (14.1)
	40–59	48 (56.5)
	≥ 60	25 (29.4)
Body mass index, kg/m ²	Mean $\pm$ SD	27.3 $\pm$ 4.5
Menopausal status	Premenopausal	31 (36.5)
	Postmenopausal	54 (63.5)
Diabetes mellitus	Yes	19 (22.4)
	No	66 (77.6)
Hypertension	Yes	27 (31.8)
	No	58 (68.2)
Smoking history	Yes	4 (4.7)
	No	81 (95.3)
Anaemia	Yes	29 (34.1)
	No	56 (65.9)
Neoadjuvant chemotherapy	Yes	23 (27.1)
	No	62 (72.9)

Right-sided breast disease was slightly more common than left-sided disease, occurring in 46 (54.1%) and 39 (45.9%) patients, respectively. Stage III disease was the most frequent presentation, observed in 50 (58.8%) patients, followed by stage II disease in 29 (34.1%).

Invasive ductal carcinoma was the predominant histological type, reported in 74 (87.1%) patients. The mean operative duration was 133.6 ± 23.7 minutes, with a mean estimated blood loss of 258.0 ± 81.0 mL.

Table 2. Tumour and Operative Characteristics of Patients (n = 85)

Variable	Category	n (%) / Mean $\pm$ SD
Laterality	Right breast	46 (54.1)
	Left breast	39 (45.9)
Clinical tumour stage	Stage I	6 (7.1)
	Stage II	29 (34.1)
	Stage III	50 (58.8)
Histological type	Invasive ductal carcinoma	74 (87.1)
	Invasive lobular carcinoma	6 (7.1)
	Other histological types	5 (5.9)
Operative duration, minutes	Mean $\pm$ SD	133.6 $\pm$ 23.7
Estimated intraoperative blood loss, mL	Mean $\pm$ SD	258.0 $\pm$ 81.0
Axillary lymph nodes retrieved	Mean $\pm$ SD	15.4 $\pm$ 5.2
Number of drains placed	One	14 (16.5)
	Two	71 (83.5)
Drain-retention duration, days	Mean $\pm$ SD	8.6 $\pm$ 2.4
Length of hospital stay, days	Mean $\pm$ SD	3.7 $\pm$ 1.4

Postoperative complications occurred in 29 (34.1%) patients, whereas 56 (65.9%) had an uncomplicated postoperative course. Seroma formation was the most frequent complication, affecting 15 (17.6%) patients, followed by

prolonged drain output in 12 (14.1%). Surgical-site infection and sensory disturbance were each recorded in 8 (9.4%) patients, while persistent postoperative pain occurred in 7 (8.2%) and shoulder stiffness in 6 (7.1%).

Table 3. Incidence and Spectrum of Postoperative Complications Following Modified Radical Mastectomy (n = 85)

Postoperative complication	n (%)
Any postoperative complication	29 (34.1)
Seroma formation	15 (17.6)
Prolonged drain output	12 (14.1)
Surgical-site infection	8 (9.4)
Sensory disturbance	8 (9.4)
Persistent postoperative pain	7 (8.2)
Shoulder stiffness	6 (7.1)
Skin-flap necrosis	5 (5.9)
Wound dehiscence	4 (4.7)
Upper-limb lymphedema	4 (4.7)
Hematoma	3 (3.5)
More than one complication	11 (12.9)
No postoperative complication	56 (65.9)

Diabetes mellitus was more frequent among patients with complications than those without complications (37.9% vs 14.3%; p=0.026).

Similarly, neoadjuvant chemotherapy was significantly more common in the complication group (41.4% vs 19.6%; p=0.041).

Table 4. Factors Associated with the Development of Any Postoperative Complication Following Modified Radical Mastectomy

Variable	Complication Present (n = 29)	No Complication (n = 56)	p-value
Age, years, mean $\pm$ SD	55.1 $\pm$ 10.2	51.6 $\pm$ 11.1	0.151
Body mass index, kg/m ² , mean $\pm$ SD	29.3 $\pm$ 4.6	26.3 $\pm$ 4.1	0.005
Diabetes mellitus, n (%)	11 (37.9)	8 (14.3)	0.026
Hypertension, n (%)	13 (44.8)	14 (25.0)	0.086
Neoadjuvant chemotherapy, n (%)	12 (41.4)	11 (19.6)	0.041
Operative duration, minutes, mean $\pm$ SD	148.3 $\pm$ 23.0	125.9 $\pm$ 19.8	<0.001

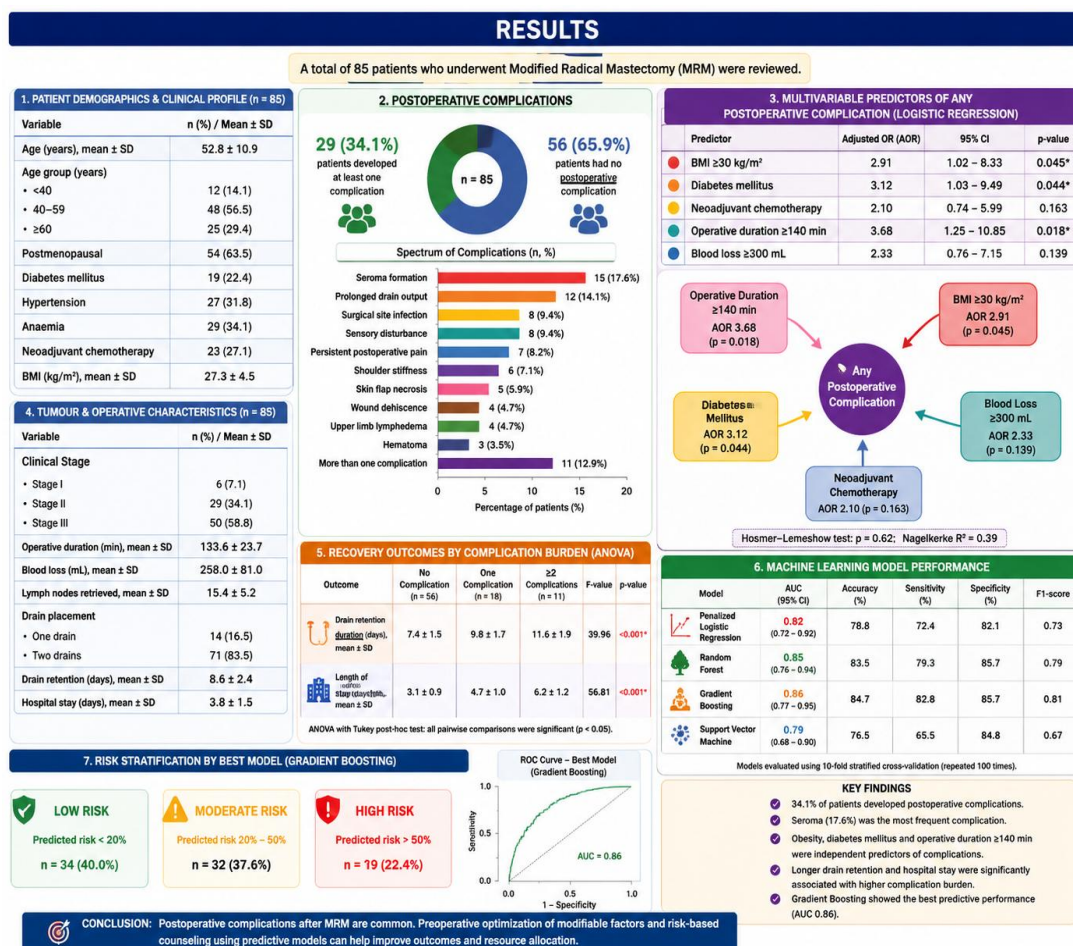
Intraoperative blood loss, mL, mean $\pm$ SD	309.0 $\pm$ 75.0	231.0 $\pm$ 64.0	<0.001
Drain-retention duration, days, mean $\pm$ SD	10.5 $\pm$ 2.3	7.6 $\pm$ 1.7	<0.001

Obese patients had 2.91 times higher odds of developing a complication than non-obese patients (AOR: 2.91; 95% CI: 1.02–8.33; $p=0.045$). Diabetes mellitus was associated with approximately threefold increased odds of

complications (AOR: 3.12; 95% CI: 1.03–9.49; $p=0.044$), while operative duration of at least 140 minutes was the strongest predictor, increasing the odds by 3.68 times (95% CI: 1.25–10.85; $p=0.018$).

Table 5. Multivariable Predictors of Postoperative Complications and Comparison of Recovery Outcomes by Complication Burden ($n = 85$)

Predictor	Adjusted Odds Ratio	95% Confidence Interval	p-value
Body mass index ≥ 30 kg/m ²	2.91	1.02–8.33	0.045
Diabetes mellitus	3.12	1.03–9.49	0.044
Neoadjuvant chemotherapy	2.10	0.74–5.99	0.163
Operative duration ≥ 140 minutes	3.68	1.25–10.85	0.018
Intraoperative blood loss ≥ 300 mL	2.33	0.76–7.15	0.139



DISCUSSION

The incidence and spectrum of postoperative complications were analyzed in 85 patients who underwent modified radical mastectomy in the present retrospective study. In total, 29 of the 85 patients had at least one postoperative

complication (34.1%), reflecting a significant postoperative morbidity rate after this procedure. The most frequent complication was seroma (15 patients, 17.6%), followed by prolonged drain output (12 patients, 14.1%),

surgical site infection (8 patients, 9.4%), sensory disturbance (8 patients, 9.4%), persistent postoperative pain (7 patients, 8.2%), shoulder stiffness (6 patients, 7.1%) and skinflap necrosis (5 patients, 5.9%). Most complications were treated conservatively, but the incidence of these complications increased the outpatient visit, wound care, extended drainage, and rehabilitation requirements. The most common complication in this study was the development of seroma, similar to other regional and international studies. Two Pakistani series from Peshawar reported the incidence of seroma to be 32.4% [15] and 25% after modified radical mastectomy with level II axillary clearance. Another study published recently also found that about 25% of those who underwent modified radical mastectomy developed seroma [16]. Closed suction drainage, meticulous handling of flaps, standardised monitoring of the drains, and prompt follow-up in an outpatient setting may be some of the reasons for the comparatively low seroma rate seen in the present study. However, long-term drain output in conjunction with the above indicates that there remains a high possibility of ongoing leakage from the lymphatics and dead spaces as a postoperative problem.

Surgical-site infection occurred in 9.4% of patients, wound dehiscence and skin-flap necrosis in 4.7% and 5.9%, respectively. The results are clinically relevant since wound complications can be a threat to healing and can delay the commencement of adjunct chemotherapy and/or radiotherapy. The infection rate observed in the current cohort was lower than that seen in the study conducted in Peshawar (20%) [17] but differences in infection rates between studies may be accounted for by differences in the time of infection, obesity, diabetes prevalence, perioperative antibiotic administration, wound care, drain duration and definitions of infection. Following an inadequate flap perfusion, a wide surgical dissection and tension at wound closure, hematoma, seroma or secondary infection may cause flap necrosis and dehiscence. Therefore, careful hemostasis, careful elevation of flaps, maintenance of flap vascularity and early recognition of fluid collection are important factors during postoperative care. Persistent postoperative pain and shoulder stiffness occurred in 8.2% and 7.1% of patients, respectively. Sensory disturbance was also noted (9.4%). These complications are probably associated with

axillary dissection, stretching or damage to the intercostobrachial nerve, postoperative scarring, pain-mediated limitations of range of motion, and delayed rehabilitation [18]. The incidence of sensory disturbance in the present study was similar to that reported in literature from Pakistan where 10% of patients had altered sensation [19]. While sometimes considered minor complications, pain, decreased shoulder mobility and numbness can negatively impact the patient's daily functioning, sleep, self-care and psychological healing following a breast procedure. Early shoulder mobilisation, specific physiotherapy, patient education and structured assessment of pain and arm function should therefore be included in the routine postoperative follow-up. In the current study the longest operation was the most powerful independent predictor, with a adjusted odds ratio of 3.68. These longer procedures may be indicative of more advanced disease, more challenging axillary dissection, more tissue trauma, more blood loss and more contamination exposure. It is, therefore, important to plan ahead, have experienced surgical teams on hand, coordinate during surgery, and avoid unnecessary delays in the postsurgical period in order to minimize postsurgical risks. The crude complications were higher with neoadjuvant chemotherapy and blood loss >300 mL, but not in the adjusted model. This could be confounded by the stage, complexity of surgery or may be due to few events of outcome in the cohort. Findings have implications for surgical practice. Patients who are obese and diabetic should be optimised for surgery with diabetes, nutrition, anaemia correction and counselling regarding the expected recovery after surgery [20]. After surgery, structured drain monitoring, early monitoring of wounds, shoulder exercises, and lymphedema education will assist in early detection of complications and minimize functional effects.

Limitations

There are several limitations in this study. Because of its retrospective, single-centre character, it was based on the level of accuracy and completeness of medical records, which could have caused some postoperative complications to be under-reported and delayed. The number of patients included (85) and the number of events of complications (40) might have affected the precision of regression estimates and limited the adjustments for all possible confounding factors. Follow-up was

limited to a three-month period, which underestimated late complications like persistent shoulder dysfunction, chronic pain, and lymphedema due to breast cancer. Other differences in tumour burden, neoadjuvant therapy, surgeon experience, operating technique, drain use and management, and physical rehabilitation could have also affected complication rates. Furthermore, the results might not be applicable to other hospitals that have various patient types, surgical procedures and resources. These results need to be confirmed with larger multicentre prospective trials with a uniform definition of outcomes and longer follow-up.

CONCLUSION

It is concluded that postoperative complications following modified radical mastectomy were common, affecting approximately one-third of patients in this cohort. Seroma formation and prolonged drain output were the most frequent complications, while obesity, diabetes mellitus, and prolonged operative duration were independent predictors of postoperative morbidity. Patients with a greater complication burden experienced significantly longer drain retention and hospital stay. Preoperative optimisation of modifiable risk factors, meticulous surgical technique, effective drain management, and early postoperative surveillance may help reduce complications and improve recovery after a modified radical mastectomy.

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