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EARLY POSTOPERATIVE COMPLICATIONS FOLLOWING MODIFIED RADICAL MASTECTOMY WITH LEVEL II AXILLARY CLEARANCE

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ABSTRACT
Objective: This study aims to identify the most common early postoperative complications experienced by patients undergoing modified radical mastectomy with level II axillary clearance for early-stage breast cancer and to assess the statistical significance of these complications.
Study Design: Descriptive, retrospective study
Place and Duration: Conducted at the Lady Reading Hospital Peshawar from August 2025 to Feb 2026.
Methods: A total of 125 female patients diagnosed with early-stage breast cancer who underwent a modified radical mastectomy with level II axillary clearance were monitored for up to one month post-surgery. The occurrence of complications was recorded, and statistical analysis was performed using SPSS 24.0, with a p-value of < 0.05 considered statistically significant.
Results: The mean age of the patients was 50.12 ± 7.44 years. The most frequent complication was seroma formation, which occurred in 44 patients (35.2%). This was followed by arm edema in 31 patients (24.8%) and wound infection in 14 patients (11.2%). Other complications included paresthesia in 11 patients (8.8%), hemorrhage and hematoma in 7 patients (5.6%), skin flap necrosis in 6 patients (4.8%), and muscle paralysis of the serratus anterior and Latissimus Dorsi in 4 patients (3.2%). Statistical analysis revealed a significant association between complications and clinical outcomes ($p < 0.05$).
Conclusion: The study highlights that seroma formation, arm edema, wound infection, and paresthesia are the most common early complications following modified radical mastectomy with level II axillary clearance. Less frequent but notable complications include hemorrhage, hematoma, skin flap necrosis, and muscle paralysis. Early detection and effective postoperative care are essential in managing these complications and improving patient outcomes.

KEYWORDS: Early Complications, Modified Radical Mastectomy, Axillary Clearance, Seroma Formation, Postoperative Care

INTRODUCTION

Breast cancer is one of the most common malignancies worldwide, with surgical treatment being a cornerstone of management for early-stage disease. The modified radical mastectomy (MRM) with level II axillary clearance is a well-established procedure for breast cancer patients with early-stage tumors. The goal of MRM is to excise the primary tumor while also removing the axillary lymph nodes that are most likely to harbor metastatic disease. However, despite the clear survival benefits of this approach, it is not without postoperative challenges. Early postoperative complications can significantly affect patient recovery, quality of life, and long-term outcomes.

Postoperative complications in MRM patients can include seroma formation, wound infection, arm edema, paresthesia, hematoma, skin flap necrosis, and muscle paralysis. Among these, seroma formation is one of the most common complications following axillary dissection, observed in up to 40% of patients [1, 2]. Arm edema is another frequent issue that arises due to impaired lymphatic drainage following axillary clearance. In addition to these, wound infection and paresthesia are also prevalent, potentially prolonging recovery and requiring additional medical interventions [3, 4].

The management of these complications is critical to improving patient outcomes, but identifying risk factors for their occurrence remains a challenge. Previous studies have explored these complications individually, but comprehensive risk assessments, particularly using statistical modeling like logistic regression, have not been fully utilized to quantify and predict these outcomes. Logistic regression offers a valuable tool for identifying factors that increase the likelihood of developing these complications, enabling clinicians to adopt more targeted preventive and therapeutic strategies [5, 6].

This study aims to identify the early postoperative complications following modified radical mastectomy with level II axillary clearance in a cohort of 125 patients. Furthermore, it seeks to apply logistic regression analysis to determine the most significant risk factors associated with these complications. We hypothesize that factors such as age, body mass index (BMI), diabetes, and surgical duration will significantly influence the likelihood of complications after surgery [7, 8].

Methods

Study Design and Setting

This study is a retrospective descriptive analysis of 125 female patients who underwent modified radical mastectomy with level II axillary clearance between March 2025 and Feb 2026 at the Lady Reading Hospital Peshawar. The aim was to track the early postoperative complications within the first month after surgery.

Inclusion Criteria

- Female patients aged 30-70 years.
- Diagnosed with early-stage breast cancer (Stage I or II).
- Underwent a modified radical mastectomy with level II axillary clearance.

Exclusion Criteria

- Patients with metastatic breast cancer.
- Patients with other malignancies or serious comorbidities (e.g., advanced diabetes, uncontrolled hypertension).

Data Collection

Data were collected from patient medical records, including demographic details (age, BMI, comorbidities) and information on surgical characteristics (operation duration, type of anesthesia). Postoperative complications were recorded at follow-up appointments and categorized into:

1. Seroma formation
2. Arm edema
3. Wound infection
4. Paresthesia
5. Hemorrhage
6. Hematoma
7. Skin flap necrosis
8. Muscle paralysis

Statistical Analysis

Data were analyzed using SPSS version 24.0. Descriptive statistics were used to present the frequency of complications. Logistic regression analysis was performed to evaluate the association between demographic factors (age, BMI, comorbidities) and the development of postoperative complications. A p-value of <0.05 was considered statistically significant. The odds ratios (OR) with 95% confidence intervals (CI) were calculated to estimate the strength of the associations.

RESULTS

Patient Demographics

The average age of the 125 patients was 50.12 ± 7.44 years, with the majority (58%) falling into the 40-60 age group. The mean BMI was 27.8 ± 4.6 kg/m². A significant proportion of the patients had comorbid conditions, with 15% of the patients being hypertensive and 10% having diabetes. The surgical duration averaged 120 ± 15 minutes, with general anesthesia being used for all procedures.

Table 1: Demographic Details of the Study Participants

Demographic Variable	Category	Frequency (n)	Percentage (%)
Age (years)	30-39	12	9.6

Demographic Variable	Category	Frequency (n)	Percentage (%)
	40-49	33	26.4
	50-59	47	37.6
	60-69	33	26.4
Mean Age (±SD)		50.12 ± 7.44	
BMI (kg/m²)	< 25	55	44.0
	25-29	45	36.0
	≥ 30	25	20.0
Comorbidities	Hypertension	19	15.2
	Diabetes	13	10.4
	None	93	74.4
Surgical Duration (minutes)	< 120	72	57.6
	≥ 120	53	42.4
Type of Anesthesia	General Anesthesia	125	100.0

Incidence of Postoperative Complications

The most common postoperative complications were seroma formation (35.2%), followed by arm edema (24.8%). Other complications included wound infection (11.2%), paresthesia (8.8%), and hematoma (5.6%). Fewer patients experienced skin flap necrosis (4.8%) and muscle paralysis (3.2%).

A detailed breakdown of the complications is provided below:

- **Seroma formation**: 44 patients (35.2%)
- **Arm edema**: 31 patients (24.8%)
- **Wound infection**: 14 patients (11.2%)
- **Paresthesia**: 11 patients (8.8%)
- **Hemorrhage**: 7 patients (5.6%)
- **Hematoma**: 7 patients (5.6%)
- **Skin flap necrosis**: 6 patients (4.8%)
- **Muscle paralysis (Serratus anterior, Latissimus Dorsi)**: 4 patients (3.2%)

Table 2: Frequency of Postoperative Complications

Complication	Frequency (%)
Seroma Formation	44 (35.2%)
Arm Edema	31 (24.8%)

Complication	Frequency (%)
Wound Infection	14 (11.2%)
Paresthesia	11 (8.8%)
Hemorrhage	7 (5.6%)
Hematoma	7 (5.6%)
Skin Flap Necrosis	6 (4.8%)
Muscle Paralysis	4 (3.2%)

Table 3: Logistic Regression Analysis of Risk Factors for Postoperative Complications

Complication	Risk Factor	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Seroma Formation	BMI ≥ 30 kg/m²	2.56	1.22 - 5.38	0.01
	Age ≥ 60 years	1.34	0.87 - 2.08	0.19
	Diabetes	1.89	0.94 - 3.81	0.08
Arm Edema	Age ≥ 60 years	2.34	1.12 - 4.87	0.02
	High BMI (≥ 30)	1.77	0.96 - 3.26	0.07
Wound Infection	Diabetes	2.14	1.03 - 4.47	0.03
	Age ≥ 60 years	1.98	1.05 - 3.74	0.04
Paresthesia	Surgical Duration	1.12	0.97 - 1.31	0.13
	BMI ≥ 30 kg/m²	1.45	0.80 - 2.63	0.23
Hemorrhage	Surgical Duration	1.67	1.01 - 2.72	0.05
Hematoma	Surgical Duration	1.72	1.05 - 2.83	0.03
Skin Flap Necrosis	Age ≥ 60 years	2.01	0.85 - 4.79	0.11
Muscle Paralysis	Age ≥ 60 years	1.91	0.83 - 4.43	0.12

Interpretation:

- **Seroma Formation**: A high BMI (≥ 30 kg/m²) significantly increases the likelihood of seroma formation (OR = 2.56, p = 0.01), suggesting that patients with higher body mass are at greater risk for this complication.
- **Arm Edema**: Age ≥ 60 years is a strong predictor of arm edema (OR = 2.34, p = 0.02), indicating that older patients are more susceptible to lymphatic fluid retention post-surgery.
- **Wound Infection**: Diabetes was found to significantly increase the risk of wound infection (OR = 2.14, p = 0.03), underlining the importance of managing diabetes to reduce surgical risks.
- **Surgical Duration**: Longer surgical durations were associated with a higher risk of **hematoma** and **hemorrhage**, both with p-values near the threshold of significance (p = 0.05 for hemorrhage and p = 0.03 for hematoma), suggesting a need for minimizing operation time when possible.

DISCUSSION

In this cohort of 125 women who underwent modified radical mastectomy (MRM) with level II axillary clearance, seroma was the most commonly reported early complication (35.2%), followed by arm edema (24.8%) and wound infection (11.2%). Seroma rates after breast cancer surgery vary across reports because the extent of surgery, drainage and flap-closure methods, follow-up duration, and definitions of clinically significant fluid collections differ [3,9,13]. The substantial frequency of postoperative arm swelling is consistent with the known morbidity of axillary surgery, although early edema should be distinguished from persistent breast-cancer-related lymphedema [2,4,14]. Paresthesia occurred in 8.8% of patients; sensory changes after MRM may be related in part to intercostobrachial nerve injury, as illustrated by a prospective randomized study evaluating nerve preservation [15]. The present analysis found that age of 60 years or more was associated with arm edema (OR = 2.34, p = 0.02) and wound infection (OR = 1.98, p = 0.04). Breast surgery literature has examined older age among potential contributors to postoperative infection, although individual studies differ in their adjusted findings [5,7]. Large multicenter analyses have demonstrated that wound morbidity also depends on BMI, diabetes, smoking status, comorbidity burden, and operation type [16,17]. Importantly, lymphedema is a multifactorial condition: prospective studies implicate the extent of axillary treatment, patient weight, radiotherapy, and the passage of time after surgery

[4,14,18]. Thus, the observed age associations should be interpreted cautiously rather than as evidence that age alone causes these complications.

An elevated BMI (at least 30 kg/m²) was associated with increased odds of seroma (OR = 2.56, 95% CI 1.22–5.38; p = 0.01). This observation aligns with evidence identifying heavier body weight as a possible seroma risk factor, although the strength of evidence and definitions of obesity vary between studies [3,8,13]. In a randomized study of 120 women undergoing mastectomy with axillary clearance, Khater et al. reported lower seroma occurrence with quilting of mastectomy flaps than with standard closure (20% versus 78.3%) [19]. A more recent randomized trial specifically involving MRM also evaluated quilting sutures as a method of reducing seroma [20]. These studies support consideration of dead-space management, but their intervention effects should not be confused with the patient-level associations estimated in the present retrospective cohort.

Diabetes was associated with postoperative wound infection (OR = 2.14, p = 0.03), a finding consistent with surgical-site-infection studies in breast surgery and the wider surgical literature [5,10,16,17]. The current cohort also showed an association of longer operative duration with hematoma (OR = 1.72, p = 0.03), while the association with hemorrhage was borderline (OR = 1.67, p = 0.05). Operative duration has been studied in relation to breast surgery wound complications [7,17], but postoperative bleeding has a complex risk profile. A nationwide Japanese study of 477,108 breast cancer operations identified several patient and treatment factors associated with bleeding, including obesity, preoperative anticoagulant exposure, and procedure type [21]. The relatively small number of bleeding events in the present study limits confidence in its individual regression estimates.

These findings underscore the importance of preoperative assessment of metabolic and other modifiable risks, careful operative technique, and active follow-up for fluid collections, surgical-site infection, sensory dysfunction, and arm swelling. The possibility of longer-term lymphatic morbidity also supports patient education and appropriate referral for rehabilitation when symptoms arise. A randomized clinical trial reported that an early physiotherapy program, including shoulder exercises and manual lymphatic care, reduced the development of lymphedema after axillary dissection compared with education alone [22]. Such evidence concerns a defined intervention and longer follow-up, and should not be interpreted as proof that all early postoperative arm swelling requires the same treatment.

Other investigators have used multivariable models to study infections and wound complications after mastectomy. In a prospective breast surgery cohort, Adwall et al. assessed perioperative risk factors by logistic regression [7,12], while Olsen et al. developed and validated a patient-specific prediction model for surgical-site infection after mastectomy [23]. These studies illustrate the potential value of structured risk assessment. However, the present analysis is based on a single-center retrospective sample of 125 patients, with particularly few hemorrhage, hematoma, skin-flap necrosis, and muscle-paralysis events. Sparse events can make adjusted odds ratios unstable; the model covariates, handling of missing data, and method of assessing model fit should be described before the reported estimates are regarded as reliable predictors.

Regarding postoperative seroma prevention, systematic reviews and meta-analyses have found that flap fixation or quilting can reduce fluid collections after mastectomy, although individual techniques and study definitions differ [9,11]. Evidence from randomized mastectomy studies supports the feasibility of quilting [19,20], and a recent systematic review considered several preventive strategies and found particularly favorable findings for quilting sutures [24]. The present study did not compare preventive interventions, so it cannot establish the efficacy of a particular closure method. Its one-month follow-up also precludes conclusions about chronic arm lymphedema, persistent pain, late infection, or longer-term functional recovery [4,14,15,18].

In summary, the findings are broadly compatible with published evidence that seroma, arm morbidity, and infection are important concerns after mastectomy with axillary surgery. They emphasize the practical value of recognizing patients with elevated BMI and diabetes, while highlighting the need for larger prospective studies with consistent complication definitions, prespecified regression models, and longer surveillance. Comparisons with external studies should account for variation in case selection, reconstruction status, axillary procedure, and postoperative assessment [3,5,7,13,16,17].

Conclusion

This study provides valuable insight into the early postoperative complications following modified radical mastectomy with level II axillary clearance. By utilizing logistic regression analysis, we were able to identify key risk factors age, BMI, diabetes and surgical duration that significantly influence the occurrence of postoperative complications. Clinicians should focus on these risk factors to improve patient outcomes through personalized preoperative counseling and tailored postoperative care.

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