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A STUDY OF FACTORS AFFECTING SEROMA FORMATION AFTER MODIFIED RADICAL MASTECTOMY IN PATIENTS OF CARCINOMA BREAST

General Surgery

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ABSTRACT

Background: Developing in approximately 30% of cases. To prevent seroma formation, it is important to estimate individual risk of Seroma, a clinically evident subcutaneous collection of serous fluid after breast cancer surgery, seroma formation, i.e.. In designing of future trials aimed for reducing the incidence of seroma, predictive variables identification will be helpful. Our research aims to find out the reletion between pre-operative, intraoperative, and post-operative factors in MRM and seroma formation incidence. **Methods:** Patients were observed It was an retrospective on 100 females undergoing MRM at Department of Surgery, Mahatma Gandhi medical college and hospital,Jaipur postoperatively for seroma formation and factors affecting it. **Results:** patients with seroma formation in this study tended to be older age (age, 62.60±10.40 years versus 56.13±10.31 years; p<0.001) and more obese (BMI, 26.95±4.2 versus 24.61±3.61; p<0.001). Higher amount of initial drain volume was directly related to seroma formation. Initiation of arm physiotherapy after surgery (3.14±0.23 days versus 2.17±0.74 days; p=0.043). **Conclusions:** The incidence of seroma is higher in older and in more obese patients. The incidence is decreased by flap fixation under muscles and early physiotherapy. Furthermore, few interventions in the operative period can help minimize the chances of seroma formation.

KEYWORDS

Carcinoma breast, Modified radical mastectomy, Seroma

INTRODUCTION

Breast cancer is one of the most common types of cancer. Every year, about a million new instances of breast cancer are diagnosed worldwide.[1] It accounts for 30% of all cancers in women and accounts for 16-17% of all cancer-related fatalities.[2] In 1979, the Breast Cancer Consensus Development Conference declared that the modified radical mastectomy (MRM) was the standard of care for stage I and II breast cancer.[3] Since Halstead's first mastectomy in 1882, surgeons have confronted various issues such as necrosis of skin flaps, wound collapse, haemorrhage, seroma, and infection. Surgeons should be cognizant of the morbidity particular to mastectomy and axillary node dissection. Seroma, a clinically visible subcutaneous collection of serous fluid within a surgical cavity, is the most common post-operative complication following breast cancer surgery, occurring in around 30% of patients.[4]

To prevent seroma formation, it is critical to forecast the individual risk of seroma formation; thus, identifying predictive characteristics would aid in the design of future trials targeted at minimising the occurrence of this common complication of mastectomy. To achieve the aforementioned goal, this study was conducted to determine the relationship between pre-operative, intra-operative, and post-operative parameters associated to MRM and the incidence of seroma formation.

METHODS

This was a retrospective study, hospital-based study enrolling 100 female patients with histopathologically verified carcinoma breast who underwent MRM from 2017 to 2020 (during a 2.5-year period) at the Department of Surgery, Mahatma Gandhi Medical College and Hospital, Jaipur, India. Before selection, each patient received a complete history-taking, clinical examination, and a series of investigations as per the proforma, with approval from the institutional ethics committee and individual patient consent. Patients were observed from admission through the final outcome of management at discharge or death. A preliminary ultrasound of the breast was performed. Finally, all of the information gathered was combined and presented in the tables.

Age, nutritional status (defined by body mass index), pre-operative haemoglobin (Hb) level, pre-operative serum protein level, presence or absence of clinically palpable lymph nodes, size of primary tumour were observed preoperatively in these patients, while intraoperatively they were observed for the modality used for flap dissection (scalpel or electrocautery), axillary lymph node dissection by harmonic focus and electrocautery, mechanical closure of dead space

These patients were checked for seroma formation after surgery, which was defined as clinically visible swelling in the subcutaneous space in the axilla or under the flaps. The post-operative days on which seroma was initially noticed were also recorded. Aspiration and cytological examination of the aspirate confirmed the diagnosis. Drain removal was performed when the drainage output was decreased to a minimum in 48 hours or when the length of drain removal was recorded.

Criteria for inclusion

This study included all female patients over the age of 18 who were undergoing elective breast MRM surgery, as well as individuals who were ready for evaluation and therapy for their disease and agreed to participate in the study.

Criteria for exclusion

Patients under the age of 18, those who refused investigation and treatment, and those undergoing conservative breast surgeries, immediate breast reconstruction, metastatic disease, pregnancy, lactation, medical contraindications for surgery, metabolic disorders, or in whom primary skin closure could not be achieved were all excluded from this study. Male individuals with breast cancer were also excluded.

After tabulating the observations, SPSS Statistics Data Editor Software was used to conduct statistical analysis. The prevalence of seroma in the study sample was determined using the Chi-square test and unpaired t tests. The Student's t-test was used to examine whether a particular factor had a significant impact on the incidence of seroma.

Operational strategy

The skin incision and flap design were carefully designed in relation to the quadrant in which the main tumour was placed in order to provide adequate margins and primary closure. Laterally, the anterior margin of the latissimus dorsi muscle was marked, medially by the sternal border, superiorly by the subclavius muscle, and inferiorly by the caudal extension of the breast roughly 3 to 4 cm below the inframammary fold. The breast was removed from superior to inferior, with the pectoralis major fascia included. The breast was lifted as a whole, including the skin and the elevated pectoralis fascia. Following meticulous identification of the axillary vein's lateral extent, the loose areolar tissue of the lateral axillary area was lifted. To avoid

disturbance of lymphatics in the axilla, the axillary nodes were resected all at once. The costoclavicular ligament (Halstead's ligament) was the medial limit of dissection, while the latissimus dorsi (LD) tendon and thoracodorsal pedicel (containing the thoracodorsal nerve, artery, and subscapular vein) were the reliable anatomical end points laterally. The axillary vein was regarded to be the superior limit of axillary dissection, while the floor is formed by the subscapularis muscle, and the angular vein (that joins the thoracodorsal vein to form the subscapular vein) to be a reliable and constant landmark. Dissection of axillary lymph node level 1 with removal of central (level 2) groups and, in some cases, apical nodal (level 3) groups. For reliable prognosis, at least ten lymph nodes were obtained. The thoracodorsal neurovascular bundle, which sits deep in the axillary area and is entirely invested with loose areolar tissue and lateral group nodes, was carefully identified and preserved. The long thoracic nerve was discovered and preserved until the chest wall and medial axillary area were reached. The wound flap was then quilted (quilting technique in the upper flap from medial to lateral by a continuous suture that secures the bottom surface of the top flap to the pectoral fascia with care to avoid entangling the dermis, resulting in ugly dimpling). The second row was completed using the same continuous suture from lateral to medial until the medial angle was reached. The lower flap received the same treatment. Finally, the axilla was destroyed by suturing its lateral wall to the fascia of the serratus anterior and medial axillary wall) and some wounds were closed without quilting after appropriate hemostasis and with two suction drains in place.

These observations were statistically analysed using chi-square and the student's t-test, and p values were produced. P0.05 was deemed significant.

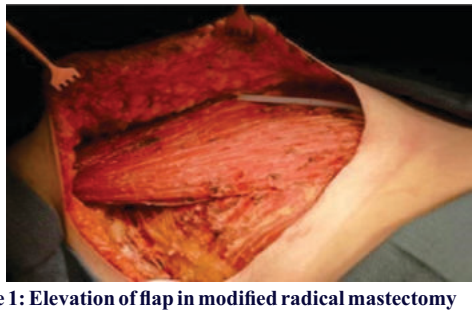

Figure 1: Elevation of flap in modified radical mastectomy

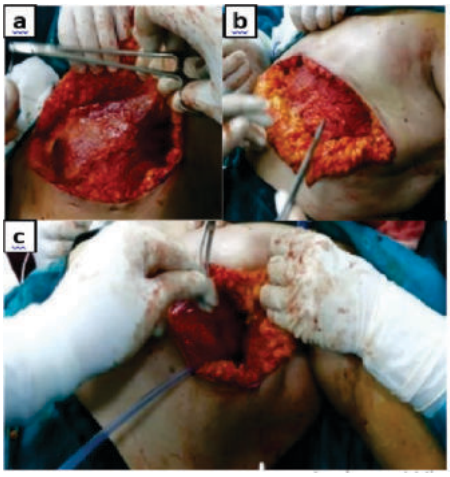

Figure 2: (a) Quilting of upper flap, (b) the lower flap, and (c) the axilla.

RESULTS

Tables represent that patients with seroma formation in this study tended to be older (age, 62.60±10.40 years versus 56.13±10.31 years; p<0.001) and more obese (BMI, 26.95±4.2 versus 24.61±3.61; p<0.001).

This graph is directly correlated with seroma formation. Besides, there was a trend of increasing post-operative seroma formation in patients having initially higher amount of drainage volume on first post-operative day has longer significant drainage volume (72.36 ±29.42 ml versus 48.40±19.20 ml; p<0.001).

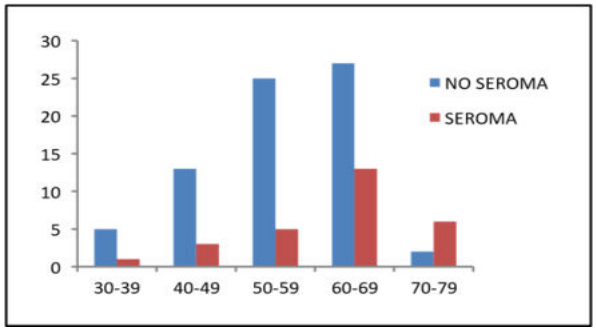

Figure 3: Correlation between age and seroma formation

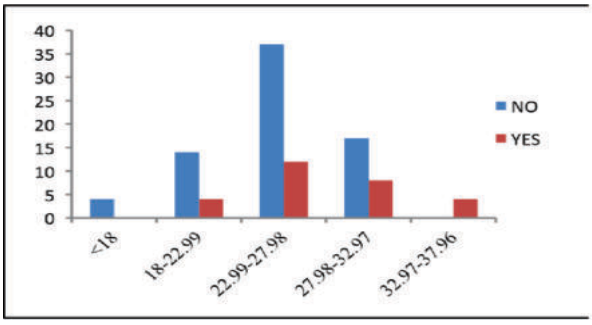

Figure 4: Correlation between BMI of patients and seroma formation

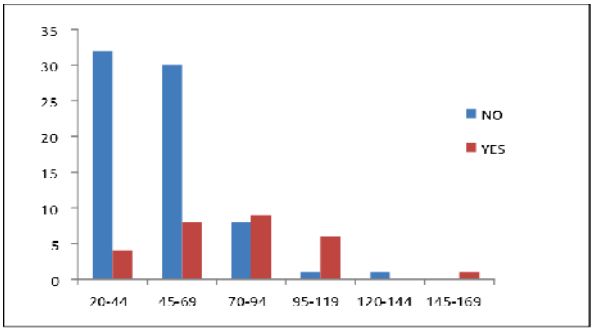

Figure 5: Correlation first post-operative day drain volume and seroma formation

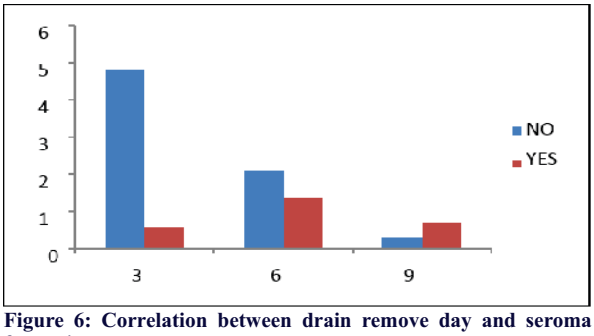

Figure 6: Correlation between drain remove day and seroma formation

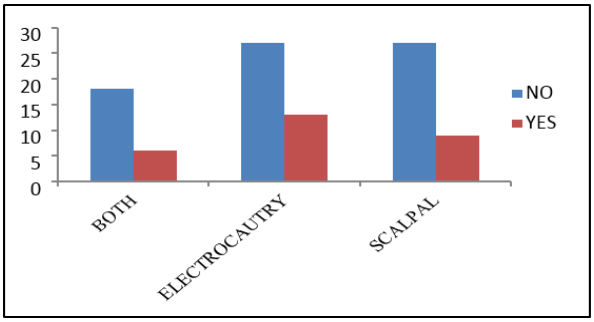

Figure 7: Correlation between method of dissection of flap and seroma formation

First post-operative days has been analyzed in association with incidence of seroma in any of the studies that we reviewed (72.32±29.4 seroma group versus 48.40±19.20 nonseroma group p<0.003) (Figure 5) and significantly longer time taken to reach drain volume below <30 ml (TTV30, 7.14±2.03 days versus 5.22±1.65 days; p<0.001) (Figure 5).

The interventions which resulted in a significantly decreased proportions of patients developing seroma were suture fixation of skin flap to the underlying muscle layer (6.67% versus 42.86%; p<0.001) and earlier initiation of arm physiotherapy after surgery (3.14±0.23 days versus 2.17±0.74 days; p=0.043). Figure 7 suggests that seroma formation is more with the use of electrocautery.

Table 1: Correlation between method of flap fixation to underlying structure and seroma formation.

Seroma quilting	Seroma formed	
	No	Yes
No	34	17
Yes	38	11

Suture fixation with muscles also known as quilting is associated with lower incidence of seroma formation.

Table 2: Correlation between post op arm physiotherapy day and seroma formation.

Post op arm physiotherapy day	Seroma formed	
	No	Yes
1-2	25	1
2-3	36	7
3-4	9	14
4-5	2	6

Early induction of physiotherapy is associated with reduced risk if seroma formation.

Table 3: Correlation between harmonic focus versus electrocautery ALND dissection and seroma formation

Seroma formed		
Modality used	No	Yes
Electrocautery	35	17
Harmonic	37	11

The hormonic focus versus electrocautery dissection of axillary lymph node was statically not significant in relation to seroma formation (p>0.05) and delay in recovery post operation day hormonic focus versus electrocautery was statically significant (p<0.05).

Table 4: Observations and statistical analysis for categorical variables

Characteristic	Seroma	No Seroma	P value
Size of primary tumor (cm)			
1-2	2	15	0.704
3-5	1	23	
5-7	8	26	
7-9	11	7	
9-11	5	1	
11-13	1	-	
Clinically evident axillary lymph nodes			
Yes	15	31	0.442
No	13	41	
Method of dissection of flaps			
Scalpel	9	27	0.422
Electrocautery	13	27	
Both	6	18	
Suture fixation of flap to muscle layer done			
Yes	11	38	<0.001*
No	17	34	
Method of Skin Closure			
Simple	14	43	0.396
Subcutilar	14	29	
Axillary lymphnode dissection			
Harmonic focus	11	37	>0.05
Electrocautery	11	35	

*Indicates significant association (p<0.05)

DISCUSSION

Seroma is the most prevalent complication following axillary surgery in breast cancer patients.4 In several studies, the incidence of seroma has ranged from 2.5 to 51%.6. The incidence reported in our study was 28% (N=28), which is comparable with the majority of investigations. In our investigation, we discovered a significant relationship between rising patient age and a greater incidence of seroma (62.60±10.4 years seroma group against 56.13±10.13 years non seroma group, p0.001). This finding was similar with other recent research by Lin et al (58.71 years seroma group vs 51.00 years non seroma group, p.0019).8 In a separate study trail (seroma developed 18% of total 80 patients, age 65.00±6.10 years seroma group versus 49.05±8.76 years non seroma group, p0.001) and Akinci et al study.

This study included 40 individuals, with an average age of 53±11 years. After mastectomy, nine patients (27.5%) developed seroma. Seroma developed in two of 21 patients under the age of 50 (9.5%), a rate statistically comparable to older patients (36.8%).

As in our study, a higher BMI, i.e. more obese (BMI, 26.95±4.2 versus 24.61±3.61 p0.001), was associated with a higher incidence of seroma in obese patients, as reported by Burak et al, van Bemmel et al, and Anjani et al (BMI- 28.33±0.60 seroma group versus 22.81±2.98 non seroma group p0.001).10-12 Other research Suresh et al research.

In this study, 54 patients had MRM with a BMI greater than 30, 19 of whom had seroma, and 29 with a BMI less than 30, four of whom acquired seroma (p value 0.03), which was significant. This can be explained by greater serous exudation in tissues with higher adipose cell composition, as well as concomitant comorbidities frequent in obese people.

In our study, drainage volume on the first postoperative day was analysed in relation to incidence of seroma in any of the studies that we reviewed (72.32±29.4 seroma group versus 48.40±19.20 non seroma group p0.003), but in general, higher drainage volumes have been significantly associated with higher incidence of seroma in studies by Lin et al, Burak et al, and Anjani et al (drain volume first postoperative day 111.8,10,12

Similar findings were made about the time required after surgery for the drainage volume to be reduced to 30 ml (TTV30). TTV <30 ml (7.14±2.03 per day in the seroma group and 5.22±1.65 days in the non-seroma group, p0.001). This means that in studies, patients with higher and longer drain outputs are more likely to develop seromas. Anjani et al. (18.61±1.24 days in the seroma group versus 3.77±0.96 days in the non-seroma group, p0.001).In our investigation, the third intervention had a detrimental impact on the incidence of seroma. Suture anchoring of skin flap to underlying pectoral muscles resulted in significant and dramatic seroma avoidance, most likely by eliminating dead space under the flaps.In our study, 49 patients had flap fixation, 11 of whom developed seroma, and 51 patients had no flap fixation, resulting in 17 patients developing seroma (p0.001). Anjani et colleagues studied 45 patients who had flap fixations, three of whom had seroma, and 35 patients who did not have flap fixations, 15 of whom developed seroma (p0.001).12 This agrees with the findings of Ozaslan et al. and van Bemmel et al.11,13

Furthermore, our findings show that earlier mobilisation and physiotherapy of the ipsilateral shoulder and arm can result in a lower incidence of seroma (postoperative days after which arm therapy began seroma group 3.14±0.23 and non-seroma group 2.17±0.74 p0.043) while delayed physiotherapy causes more seroma. Anjani et al studied post-operative days after which arm physiotherapy began 3.06±0.64 days in the seroma group and 2.65±0.77 days in the non-seroma group, p0.03.This contradicts the findings of van Bemmel et al., and most other investigations reveal an ambiguous link between them.11

In our study, the use of harmonic focus had a greater detrimental impact on seroma occurrence than the use of electrocautery. The use of harmonic instead of electrocautery reduces the production of seroma. The time it takes to recover after an operation In the study by Qinging He et al., hormonic focus versus electrocautery in axillary lymph node dissection are statistically significant, which suggests that using harmonic post-op recovery is superior than electrocute.14 Harmonic

focus was employed on 64 patients in this study, and electrocautery was performed on another 64 patients in axillary lymph node dissection. In the harmonic focus group, two patients acquired seroma, and three patients had seroma after electrocautery. In our study, 48 patients had harmonic focus axillary lymph node dissection, and 11 of them got seroma; 58 patients had electrocautery ALND, and 17 developed seroma (p value >0.05). Although not statistically significant, using a harmonic focus for axillary lymph node dissection reduced seroma development and related morbidity. In the Khan et al study, 75 patients had harmonic ALND and 16 had seroma; 75 patients had electrocautery ALND and 25 developed seroma (p=0.071), which was not significant. However, using harmonic focus reduced seroma formation.

Gender, tumour size, clinically detectable axillary lymphadenopathy, preoperative Hb, preoperative serum total protein, modality used for flap dissection and method of skin closure, diabetes mellitus, and hypertension were the factors that had no significant positive or negative impact on seroma incidence in our study sample.

CONCLUSION

Seroma is not only an unneeded complication, but it also contributes significantly to morbidity in patients with carcinoma breast. Because mastectomy is an emotionally and physically traumatic procedure for the patient, it is critical to identify risk factors for seroma formation and stratify patients into high-risk and low-risk groups in order to have a high index of suspicion and early diagnosis and appropriate intervention in affected cases, which is the goal of this study. Furthermore, a few therapies in the perioperative period can help reduce the likelihood of seroma formation, but more continuing research in this area is desperately needed. Based on the foregoing data and discussion, we suggest that older, more obese individuals with longer and greater drain outputs should be carefully examined for seroma.

Because our study used a limited sample size, it is recommended that comparable studies be repeated using a bigger and more variable study sample to strengthen the statistical power of the findings. Furthermore, because our study does not account for the many chemical and biological additives that have been utilised in previous studies to prevent seroma production, it is suggested that their contribution be included in future studies.

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