

ORIGINAL RESEARCH

Factors Affecting Seroma Formation after Modified Radical Mastectomy in Patients of Carcinoma Breast: A Prospective Study

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ABSTRACT

Introduction: Seroma formation is the most common complication after breast cancer surgery, especially when axillary dissection is performed.

Aim: This study intends to find out the association between certain pre-operative, intra-operative, and post-operative factors related to MRM and incidence of seroma formation.

Methods: A total of 50 patients with Ca breast undergoing breast surgery were admitted in surgical wards at tertiary care hospital.

Results: The cumulative total seroma volume collected by the end of treatment was higher and the overall time of seroma treatment was longer in patients over the age of 60 years (60.89 ± 9.17 vs 55.25 ± 10.05 years $p < 0.001$) and more obese (BMI, 26.78 ± 5.2 versus 24.86 ± 3.91 ; $p < 0.001$). Higher amount of initial drain volume was directly related to seroma formation. The incidence is decreased by early initiation of arm physiotherapy after surgery (3.21 ± 0.91 days versus 2.08 ± 0.76 days; $p = 0.0001$).

Conclusion: The incidence of seroma is higher in older, obese patients and higher drain output. The incidence is decreased by early physiotherapy. Interventions in the operative period reduce the seroma formation.

Keywords: Axillary Dissection, Breast Cancer, Drain, Mastectomy, Seroma.

INTRODUCTION

Carcinoma of the breast is responsible for 32% of all cancers in women and causes 16% of all cancer-related deaths.¹ Modern therapy for breast cancer has evolved to include both surgical resection for local disease and medical therapy for the systemic disease. Surgery still has a central role to play, but there has been a gradual shift toward more conservative techniques.² First mastectomy was carried out by Halstead in 1882. There are many complications of mastectomy out of which seroma is most common. A clinically evident subcutaneous collection of serous fluid within a surgical cavity is called as seroma. It develops in approximately 30% of cases.³ Seroma formation can be prevented by estimate individual risk by the identification of predictive variables. This study intends to find out the association between certain pre-operative, intra-operative, and post-operative factors related to MRM and incidence of seroma formation to achieve above mentioned objective.

AIM

To evaluate association of certain preoperative status of patients, intraoperative techniques, postoperative observation of patients. Postoperative observations of patients undergoing MRM

METHODS

This was a prospective study conducted on 50 patients with Ca breast undergoing breast surgery who admitted under surgical units during period of 18 months (from Jan 2019-December 2020) and fulfilling the inclusion and exclusion criteria. Approval from institutional research and ethical committee and informed consent form was taken and patients were counselled about the detailed procedure merits and demerits of operation. The sociodemographic data of the patient like age, sex, BMI were noted. Routine investigations, clinically presentations were noted preoperatively in a pre-formed performa. Surgery in all patients was done by modified orr incision. In patients undergoing flap fixation to underlying muscle layer, polyglactin 3-0 absorbable suture and for skin closure, nylon 2-0 sutures or surgical skin stapler were used. All patients will be subjected to a vacuum suction drain placement. The patients were observed postoperatively for seroma formation, diagnosis was confirmed by aspiration and cytological analysis of aspirate. The Drain removal was done when the drainage output reduced to a minimal amount in 5 days or duration of drain removal was also noted.

After tabulating the observations, statistical analysis was done using SPSS Statistics Data Editor Software. Incidence of seroma in the study sample was calculated, and Chi-square test and unpaired Student's t-test were applied to determine whether a particular factor significantly affected the incidence of seroma.

RESULTS

Out of total 50 cases maximum 40% were in 60-69 yr age group, 50% patients were pre obese, 80% were anemic, 22% had diabetes, 20% had hypertension. 14 out of 50 patients, accounting for 28 percent, developed seroma.

Patients with seroma formation in this study tended to be older (Age, 60.85 ± 9.17 years vs. 55.25 ± 10.05 years; $P < 0.001^*$) and more obese (BMI, 26.78 ± 5.20 vs 24.86 ± 3.91 ; $P < 0.001^*$). In our study preoperative Hb level and protein level were not associated with seroma formation.

The hormonal focus versus electrocautery dissection of axillary lymph node was statically significant in relation to seroma formation (7 ± 2.82 Vs 18 ± 1.41 ; $p = 0.0389$) and delay in recovery post operation day hormonal focus versus electrocautery was statically significant ($p < 0.05$).

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 (73.21 ± 32.4 ml vs. 48.05 ± 20.95 ml; $P = 0.0021$). and significantly longer time taken to reach drain volume below < 30 ml. (TTV30, 8.21 ± 1.95 days vs. 4.94 ± 1.72 days; $P = 0.0001$).

The interventions which resulted in a significantly decreased proportions of patients developing seroma were earlier initiation of arm physiotherapy after surgery (3.21 ± 0.91 days vs. 2.08 ± 0.76 days; $P = 0.0001$).

Table 1: Correlation of sociodemography of patients and seroma formation

Age	No Seroma	Seroma	P value
30-39	3	0	$< 0.001^*$
40-49	6	2	

50-59	12	3	
60-69	14	6	
70-79	1	3	
Mean	60.85±9.17	55.25±10.05	
BMI			
<18	2	0	<0.001*
18-22.99	7	3	
22.99-27.98	19	6	
27.98-32.97	8	3	
32.97-37.96	0	2	
Mean	26.78±5.20	24.86±3.91	

Table 2: Clinical presentation and Seroma Formation

Size of primary tumor (cm)	Seroma	No seroma	p value
1-3	1	8	0.0002*
3-5	1	11	
5-7	4	13	
7-9	5	3	
9-11	2	1	
11-13	1	0	
Clinically evident axillary lymph nodes			
Yes	8	15	0.0736
No	6	21	

Table 3: Correlation of routine investigation of patients and seroma formation

Hb level (gm/dl)	No Seroma	Seroma	P value
9-10	6	4	0.4287
10-11	14	5	
11-12	8	3	
12-13	6	1	
13-14	2	1	
Mean	10.79±1.21	11.08±1.16	
Protein level (g%)			
2.2-3.2	1	0	0.9752
3.2-4.2	7	3	
4.2-5.2	9	5	
5.2-6.2	12	4	
6.2-7.2	7	2	
Mean	5.2±1.08	5.18±1.14	

Table 4: Procedure and seroma formation

Method of dissection of flaps	No Seroma	Seroma	P value
Scalpel	5	13	0.014*
Electrocautery	6	14	
Both	3	9	
Method of skin closure			
Simple	8	22	0.1165
Subcuticular	6	14	

Axillary lymph node dissection			
Harmonic focus	5	19	0.0389
Electrocautery	9	17	

Fig 1: Correlation between drain volume first post operative day and seroma formation

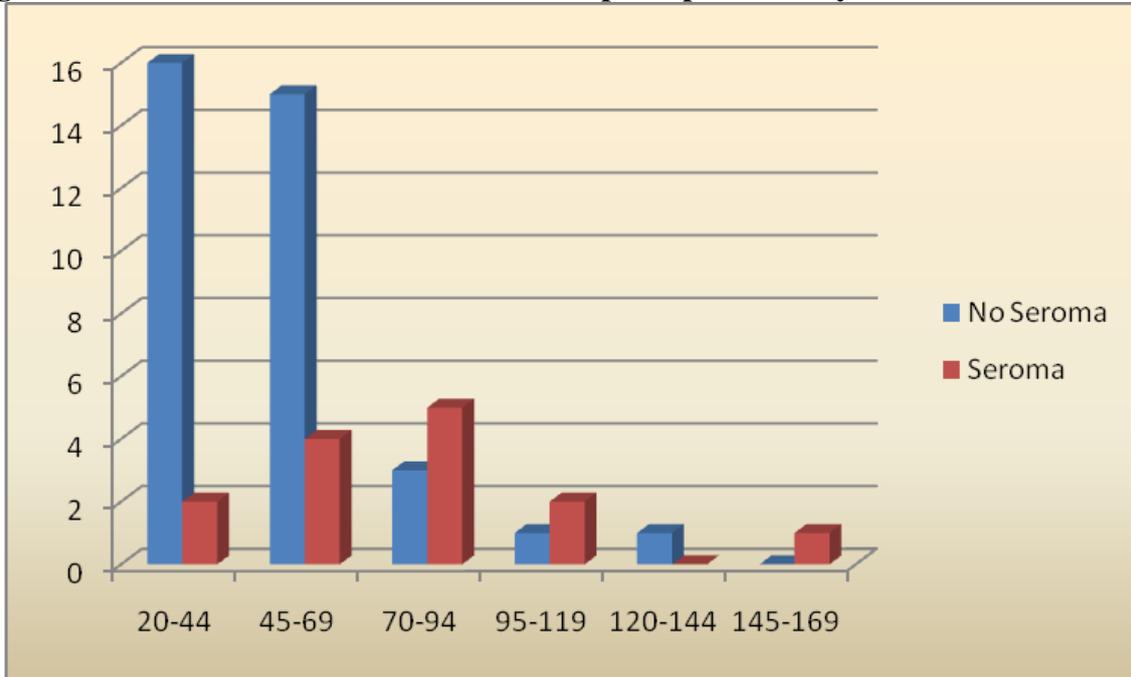


Table 5: Post op variables and Seroma Formation

Seroma Drain removal (day)	No Seroma	Seroma	P value
3-6	24	3	0.0001*
6-9	11	7	
9-12	1	4	
Mean	8.21±1.95	4.94±1.72	
Post op arm physiotherapy day			
1-2	12	1	<0.0001*
2-3	18	3	
3-4	5	7	
4-5	1	3	
Mean	3.21±0.91	2.08±0.76	

DISCUSSION

Seroma is the most common complication of axillary surgery in patients of carcinoma breast.^{3,4} The incidence of seroma has been reported variably as 2.5-51% in different series.^{5,6} In our study, the incidence reported was 28% (N=28) which is consistent in range with most of the studies conducted in this regard.

In our study, we found a significant association of increasing age of the patient with a higher incidence of seroma (60.89±9.17years vs. 55.25±10.05years;p<0.001). This observation was consistent with other contemporary studies conducted by Lin et al.⁷(58.71 seroma group vs 51.00 years non seroma group p<.0019)and Menton and Roemer.⁸ and Anjani et al (seroma formed 18% of total 80 patients, age 65.00±6.10 years seroma group vs 49.05±8.76 years non seroma group p<0.001) and M. Akinci. et al study A total of 40 patients with a mean ± age of 53 ± 11 years was included in this study. Nine patients (27.5%) developed seroma after

mastectomy. Two out of 21 patients less than 50 years of age developed seroma(9.5%) with an incidence statistically similar to older patients(36.8%).

As definite pathogenesis of seroma formation is yet unclear, it is difficult to explain this association, but it can be partly attributed to the increasingly pro-inflammatory nature of tissues with increasing age, and to microvascular senile changes in capillaries and lymphatics. Furthermore, in our study high BMI more obese (BMI 26.95 ± 4.2 vs 24.61 ± 3.61 $p < 0.001$) higher incidence of seroma was noted in obese patients who were in accordance with series of Burak et al.⁹ and van Bemmelet al.¹⁰ and Anjani et al.¹¹ (BMI, 28.33 ± 0.60 seroma group vs 22.81 ± 2.98 non seroma group $p < 0.001$). And other study Suresh B.P. et al study in this study 54 patients have done mrm in patients BMI more than >30 so 19 patients developed seroma and 29 patients BMI is less than 30 in patients 4 patients developed seroma p value < 0.03 which was significant. This can be explained on the basis of increased serous exudation in tissues with higher content of adipose cells, and associated co-morbidities commonly found in obese.

In our study drainage volume on first post-operative days has been analyzed in association with incidence of seroma in any of the studies that we reviewed (73.21 ± 32.44 seroma group vs 48.05 ± 20.95 non seroma group $p < 0.003$), but in general, higher drainage volumes have been significantly associated with higher incidence of seroma in studies by Lin et al.⁷ and Buraket al.⁹ And Anjani et al.¹¹ (drain volume first post operative day 111.11 ± 20.26 seroma group vs 53.39 ± 24.81 non seroma group $p < 0.001$) show significant association in this study. Similar observations were noted for the time duration taken after surgery by the drainage volume to reduce to < 30 ml (TTV < 30) in our study TTV < 30 ml (8.21 ± 1.95 in day in seroma group and 4.94 ± 1.72 days in non-seroma group $p = 0.0001$) This signifies that in patients having more and longer drain outputs are more likely to develop seromas in studies Anjani et al.¹¹ (18.61 ± 1.24 in days in seroma group and 3.77 ± 0.96 days in non-seroma group $p < 0.001$). Also, results of our study show that an earlier mobilization and physiotherapy of ipsilateral shoulder and arm can result in decreased seroma incidence (post operative days after which arm therapy started seroma group 3.21 ± 0.91 and non-seroma group 2.08 ± 0.76 $p = 0.0001$) delayed physiotherapy cause more seroma. In anjani et al.¹¹ study (post operative days after which arm physiotherapy started 3.06 ± 0.64 days seroma group and 2.65 ± 0.77 in non-seroma group $p < 0.03$) This is contrary to results of van Bemmelt et al.¹⁰ while most other studies report an inconclusive relationship between them.

Use harmonic focus show negative influence on seroma incidence in our study then the use of electrocautery. Seroma formation is decrease by use of harmonic in place of electrocautery. The delay in recovery post operation harmonic focus versus electrocautery in axillary lymph node dissection are statistically significant that means use of harmonic post op recovery are better than electrocautery likely in studies Qinging He et al.¹² in this study 64 patients use harmonic focus and other 64 patients use electrocautery for axillary lymph node dissection. 2 patient have developed seroma in harmonic focus and 3 patients developed seroma by electrocautery. In our study in 24 patients done axillary lymph node dissection by harmonic focus in which 5 patients developed seroma and other 26 patients done electrocautery out of them 9 patients developed seroma ($p = 0.0389$) but harmonic focus use for axillary lymph node dissection decreases seroma formation and associated morbidity. Salma khan et al.¹³ study 75 patients done ALND by harmonic 16 patients developed seroma and 75 patients done ALND by electrocautery 25 patients developed seroma p value $.071$ which was not significant. But use harmonic focus decrease seroma formation.

The factors which did not show any significant positive or negative impact on seroma incidence in our study sample were gender, tumor size, clinically detectable axillary lymphadenopathy, pre-operative Hb, pre-operative serum total protein, modality used for

dissection of flaps and method of skin closure, diabetes mellitus and hypertension. similar result found many studies like Anjani et al.

It is obvious that seroma is not just a necessary evil as previously perceived, but a significant contributor to morbidity in carcinoma breast patients. As mastectomy itself is emotionally and physically traumatic experience to the patient, it is imperative to identify the risk factors for seroma formation and stratify the patients in high-risk and low-risk groups to have a high index of suspicion and early diagnosis and appropriate intervention in affected cases, which has been the aim of this study. Furthermore, few interventions in the perioperative period can help minimize the chances of seroma formation, but further ongoing research in this regard is much needed. On above observations and discussion, it is safe to conclude that older, more obese patients with longer and higher drain outputs should be closely scrutinized for seroma.

Since our study was conducted in a relatively small sample, it is recommended to repeat similar studies in larger and more variable study sample to fortify the statistical power of the observations. Furthermore, as our study does not take into account the various chemical and biological additives that have been used in different studies to reduce seroma formation, it is recommended to include their role in further studies.

CONCLUSION

It is obvious from our study that seroma is not just a necessary evil as previously perceived, but a significant contributor to morbidity in carcinoma breast patients. The incidence of seroma is higher in older, obese patients and higher drain output. The incidence is decreased by early physiotherapy. Interventions in the operative period reduce the seroma formation but further ongoing research in this regard is much needed.

REFERENCES

1. Lester SC. The breast. In: Kumar V, Abbas AK, Fausto N, editors. Robbins and Cotran Pathologic Basis of Disease. 7th ed. Philadelphia, PA: Elsevier; 2006. p.1129-30.
2. Sainsbury R. The breast. In: Williams NS, Bulstrode CJ, O'Connell PR, editors. Bailey & Love's Short Practice of Surgery. 26th ed. Boca Raton: CRC Press; 2013. p. 813.
3. Douay N, Akerman G, Clément D, Malartic C, Morel O, Barranger E. Seroma after axillary lymph node dissection in breast cancer. *Gynecol Obstet Fertil* 2008;36:130-5.
4. Dawson I, Stam L, Heslinga JM, Kalsbeek HL. Effect of shoulder immobilization on wound seroma and shoulder dysfunction following modified radical mastectomy: A randomized prospective clinical trial. *Br J Surg* 1989;76:311-2.
5. Barwell J, Campbell L, Watkins RM, Teasdale C. How long should suction drains stay in after breast surgery with axillary dissection? *Ann R Coll Surg Engl* 1997;79:435-7.
6. Bryant M, Baum M. Postoperative seroma following mastectomy and axillary dissection. *Br J Surg* 1987;74:1187.
7. Lin YP, Yin WJ, Yan TT, Zhou LH, Di GH, Wu J, et al. Risk factors for postoperative seromas in Chinese breast cancer patients. *Chin Med J (Engl)* 2011;124:1300-4.
8. Menton M, Roemer VM. Seroma formation and drainage technic following mastectomy. *Fortschr Med* 1990; 20;108:350-2.
9. Burak WE Jr, Goodman PS, Young DC, Farrar WB. Seroma formation following axillary dissection for breast cancer: Risk factors and lack of influence of bovine thrombin. *J Surg Oncol* 1997;64:27-31.
10. Van Bommel AJ, van de Velde CJ, Schmitz RF, Liefers GJ. Prevention of seroma formation after axillary dissection in breast cancer: a systematic review. *Eur J Surg Oncol*. 2011 Oct;37(10):829-35. doi: 10.1016/j.ejso.2011.04.012.
11. Anjani J, Amit O, Kuber S, Achal G. Factors affecting seroma formation after modified radical mastectomy in patients of carcinoma breast: A prospective study. *IJSS Journal of*

Surgery2016;2(1):1-5.

12. Qingqing He, Zhuang D, Zheng L et al. Harmonic Focus Versus Electrocautery in Axillary Lymph Node Dissection for Breast Cancer: A Randomized Clinical Study. *Clinical Breast Cancer*. 2012; 12(6):454-8.
13. Khan S, Khan S, Chawla T, Murtaza G. Harmonic scalpel versus electrocautery dissection in modified radical mastectomy: a randomized controlled trial. *Ann Surg Oncol*. 2014 Mar;21(3):808-14. doi: 10.1245/s10434-013-3369-8. PMID: 24232511.