A STUDY OF FACTORS INFLUENCING SEROMA FORMATION AFTER MODIFIED RADICAL MASTECTOMY

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ABSTRACT :

Background : Seroma, is the most frequent post operative complication after breast cancer surgery/modified radical mastectomy (MRM), developing in approximately 30% of cases. The pathophysiology and mechanism of seroma formation in breast cancer surgery remains controversial and not fully understood, as little attention has been paid in the literature to etiologic factors. To prevent seroma formation, it is important to estimate individual risk of seroma formation.

Aim: To establish an association between various risk factors of seroma formation and to know whether the risk factors act independently or by synergism.

Methods: Patients with breast cancer undergoing Modified Radical Mastectomy were included in the study. The proportions were compared using Chi-square test of significance and the student‟ „ttest was used to determ ine the statistical difference. The data was analyzed using SPSS package.

Results: 16 out of 50 patients, accounting for 32 percent, developed seroma. compared to patients without seroma formation. 15 of 16 patients who had developed seroma were hypertensive, accounting for 68.2%, pvalue was significant 0.001. The mean BMI in seroma patients was 26.16 +1.79(21.30-28.40) , p value was significant

Conclusion: The factors influencing seroma formation following modified radical mastectomy for carcinoma breast are as follows;hypertension has significant association for seroma formation Higher Body mass index has strong association for seroma formation.Higher drain output on post-operative day 1, pod 2,and pod 3 is likely to predict the increased possibility of seroma formation.Delayed removal of drain showed increased seroma formation.

Keywords: seroma , Modified Radical Mastectomy

INTRODUCTION:

rize the results of different forms of treatment for neck swellings especially tuberculosis. Neck swellings are common in clinical practice and is of various types - congenital, acquired, inflammatory, neoplastic and miscellaneous. The workup of neck mass is different in children and in adults, due to differing etiologies. Neck masses are common in children and most often are due to inflammatory processes or congenital abnormalities. Only 2-15% are malignant. In adults, neck masses more often represents malignancy. Persistent masses larger than 2cm represents cancer in 80% of the cases.

The study is conducted in mookambikai Medical College, during the study period of September 2023–June 2024 in which all the patients with swelling in neck region were included, excluding thyroid and its associated swellings as thyroid and its associated swellings itself are vast topics, needs separate study and so these conditions are excluded from the present study.
The commonest cause of neck swelling is tubercular cervical lymphadenitis. It is known that 1.5% of India's population is affected with tuberculosis. Other commonly encountered swellings are secondaries in the neck, acute lymphadenitis, chronic non specific lymphadenitis and lymphomas. Swellings like cystic hygroma, branchial cyst are seen less frequently.

In this present study, it has been tried to review the literature and to know the disease occurrence and its distribution and to find out the possible etiological factors of the neck swellings with fine needle aspiration cytology and histopathological correlation .

AIM AND OBJECTIVES OF THE STUDY:

- To establish an association between various risk factors of seroma formation.
- To know whether the risk factors act independently or by synergism.

MATERIALS AND METHODS:

The present study involved 50 patients attended to the gerenral surgery department the sree mookambikai Medical College Hospital during the study period from September 2023 and augest 2024. Inclusion criteria are all cases of breast cancer undergoing Modified Radical Mastectomy.Exclusion criteria are Cases of Mastectomy and Axillary dissection for indications other than carcinoma.

All patients underwent a complete clinical examination and relevant investigations required for diagnosis and staging. All participating women were informed about their diagnosis, the surgery to

be performed and about the study before the surgery.The surgery was performed under general anesthesia with patient supine on the operating table with both arms abducted.

A third generation cephalosporin Cefotaxime was used as perioperative antibiotic and perioperative analgesics were used as per standard protocol. The operated side was painted and draped as per protocol. The operative technique was same throughout the study periodin patients undergoing mastectomy, a horizontal elliptical incision was used which included the tumor with at least 2 cm skin margin. The flaps were raised using electrocautery medially up to mid sternum, superiorly up to the clavicle and inferiorly 2 cm below the infra mammary crease. Skin was closed with ethilon.

Axillary node dissection consisted of an en bloc removal of level I& II lymph nodes. Flaps were raised using electrocautery. The axillary contents were cleared from the the axillary vein extending from the chest wall to the anterior border of latissimus dorsi muscle posteriorly & anteriorly lateral border of PM muscle. The inferiorly extended up to 5th intercostal space. The ipsilateral arm was then flexed, the PM and Pm muscles were retracted, and elevated and axillary contents dissected to the apex of the axillary cavity. Care was taken to preserve the nerve to Serratus anterior and thoracodorsal nerves and vessels. A 14 to 16 Fr closed suction drain was placed in the axilla. The wounds were dressed with sterile gauze pads.

The primary endpoint of the study was the incidence of seroma formation. The other parameters that were measured were postoperative day 1 drain output, cumulative postoperative day three drain , Operative details like; use of electro- cautery, suction drains ,axillary padding were also noted, implementation of upper limb (on the side operated) physiotherapy were noted. Histopathological reporting, the number of lymph nodesremoved & wound complications. Analysis of risk factors for seroma formation was also done.Seroma was managed by regular aspirations under aseptic precautions and the drain removal was delayed until the resolution of seroma.

RESULTS:

50 consecutively admitted female patients with the diagnosis of carcinoma breast counseled for MRM were included in the study. Sixteen out of 50 patients, accounting for 32 percent, developed seroma.

Seroma	Frequency	Percentage
Yes	16	32.0
No	34	68.0
Total	50	100.0

Distribution of seroma in study population

DISTRIBUTION OF TUMOUR SIDE IN STUDY POPULATION

	Seroma			**‘p’value**
	Yes	No	Total	

side	Right	Count	6	10	16	**0.805**
		% within side	37.5%	62.5%	100.0%	
	Left	Count	10	24	34	
		% within side	29.4%	70.6%	100.0%	
Total		Count	16	34	50	
		% within side	32.0%	68.0%	100.0%	

6 among the seroma group were found to be right sided tumors accounting for 37.5%,ten among the seroma were found to be left sided tumors (29.4%).P value was insignificant 0.80.

DISTRIBUTION OF HYPERTENSION IN STUDY POPULATION

HTN			Seroma		Total	'p' value
			Yes	No		
	Yes	Count	15	7	22	
		% within htn	68.2%	31.8%	100.0%	
	No	Count	1	27	28	0.001
		% within htn	3.6%	96.4%	100.0%	
Total		Count	16	34	50	
		% within htn	32.0%	68.0%	100.0%	

15 among the seroma group were found to be hypertensive accounting for 68.2%;seven among the non-seroma group were hypertensive, 32.1%.P value was significant 0.001.

DISTRIBUTION OF NEOADJUVANT CHEMOTHERAPY IN STUDY POPULATION

	Seroma		**Total**	**'p'value**
	Yes	**No**		

NAC YES	7	10	17	
NO	9	24	33	0.498
TOTAL	16	34	50	

7 patients who had received neo adjuvant chemotherapy developed seroma, and 9 patients who received no neoadjuvant chemotherapy developed seroma. P value was 0.498, statistically insignificant.

DISTRIBUTION OF PREOPERATIVE RADIOTHERAPY IN STUDY POPULATION

			seroma		Total	'p'value
			Yes	No		
pre_op_r	Yes	Count	1	2	3	1.00
		% within pre_op_r	33.3%	66.7%	100.0%	
	No	Count	15	32	47	
		% within pre_op_r	31.9%	68.1%	100.0%	
Total		Count	16	34	50	
		% within pre_op_r	32.0%	68.0%	100.0%	

Out of 3 patients, who received preop radiotherapy only 1 developed seroma,15 patients who had not received radiotherapy developed seroma. P value was 1.000, statistically insignificant.

DISTRIBUTION OF MEAN TUMOUR SIZE IN STUDY POPULATION

Seroma	N	Mean	SD	Min	Max	'p'value
Yes	16	5.31	2.41	3.00	10.00	0.403
No	34	4.70	2.35	2.00	12.00	
Total	50	4.90	2.36	2.0	12.00	

The mean tumour size of patients who developed seroma was 5.31+2.41(3.0-10.0), whereas the mean tumour size of those without seroma was 4.70+2.35 (2.0-12.0) cm.P value was 0.403, statistically insignificant.

MEAN DRAIN OUTPUT ON POD 1 IN STUDY POPULATION

Seroma	N	Mean	SD	Min	Max	'p'value
Yes	16	200.31	36.44	120	275	
No	34	147.94	29.31	100	200	0.032
Total	50	164.70	39.92	100	275	

The mean drain output on day 1 in seroma group was 200.31+36.44 (120- 275) and in no seroma group was 147.94+29.31 (100-200) milliliters (ml),P value is 0.032, statistically significant.

MEAN DRAIN OUTPUT ON POD2 IN STUDY POPULATION

Seroma	N	Mean	SD	Min	Max	'p'value

Yes	**16**	**190.00**	**23.66**	**170**	**250**	
No	**34**	**127.35**	**35.188**	**70**	**200**	**0.043**
Total	**50**	**147.40**	**43.32**	**70**	**250**	

The mean drain output on day 2 in seroma group was 190.00+23.66 (170- 250) and in no seroma group was 127.35+35.18 (70-200) milliliters (ml),P value is 0.043, statistically significant.

MEAN TOTAL DRAIN OU TPUT IN THE STUDY POPULATION

Seroma	**N**	**Mean**	**SD**	**Min**	**Max**	**'p'value**
Yes	16	800.60	70.88	750.00	1050.00	
No	34	500.45	100.67	300.00	920.00	0.011
Total	50	600.46	200.70	300.00	1050.00	

The mean total drain output in seroma group was 800.60+70.88 (750-1050) and in no seroma group was 500.45-100.67 (300-920) milliliters (ml),P value is 0.011, statistically significant.

MEAN DRAIN REMOVAL DAY IN STUDY POPULATION

Seroma	**N**	**Mean**	**SD**	**Min**	**Max**	**'p'value**
Yes	16	15.50	1.82	13.00	19.00	
No	34	9.41	2.32	7.00	16.00	0.036

Total	50	11.36	3.59	7.00	16.00	

The mean drain removal day in seroma group was 15.50+1.82 (13-19) and in no seroma group was 9.41+2.32 (7-16).P value is 0.036, statistically significant.

DISCUSSION:

Breast cancer is the most common cancer in women and surgical management remains the main line of management. The most common types of breast surgeries are MRM and BCS. Seroma is the commonest sequel following breast cancer surgery. Seroma accumulation elevates the flaps from the chest wall and axilla thereby hampers their adherence to the tissue bed. Although it usually resolves within a few weeks, excessive fluid accumulation will stretch the skin and cause it to sag, resulting in patient discomfort and prolongation of the hospital stay.
It can thus lead to significant morbidity such as wound hematoma, wound infection, flap necrosis, wound break down, prolonged hospitalization, psychological distress, delayed recovery, & delay in starting chemotherapy.[22]

Thus, although a number of factors have been correlated with seroma formation, strong data on factors associated with seroma formation are still rare, and it is difficult to identify patients who will ultimately suffer from seroma. Various studies have shown that s that suturing of skin flaps is a successful means of reducing seroma formation.[7, 17, 23-27] The success of external compression dressings have not yet been validated adequately through randomized studies.[15,21,22] Early drain removal has also been shown not to significantly affect seroma formation while reducing duration of drainage and other postoperative morbidity. Complications due to these methods are not much different from the standard drain method and are not frequent or serious.

Our study included 50 randomly selected patients with the diagnosis of Carcinoma breast undergoing modified radical mastectomy. In our study, 32 %of patients developed seroma. E. Hashemi et al in their study on 158 patients with breast cancer undergoing either modified radical mastectomy or breast preservation, overall seroma rate was 35%. Gonzalez E. A. et al in their study on 359 patients undergoing either modified radical mastectomy or wide local excision and axillary lymph node dissection showed overall seroma rate of 15.8%, 19.9% in modified radical mastectomy group and 9.2% in breast-conserving group. Seroma rate in a study by Unalp H. R. et al was 14.28%.
The mean age of presentation was 55.06 years (6.57), p value was 0.506 no significant association was established between age of the patient and seroma formation. Menton M. et al opine that seroma formation increases with increasing age of the patient. On the contrary, K. Kuroi et al quoted that existing evidence was inconclusive for age with respect to seroma formation, as did E. Hashemi et al.

The mean age in E. Hashemi et al study was 46.3 years (SD+11.9). Unalp et al reported a mean age of 53.13 years (SD+13.26), which is comparable to the mean age of patients in studies from India like Nadkarni et al[9] and Chintamani et al.The mean age is lower than patients in studies from other parts of the world like Gupta et al[16], Purushottam et al [17,], Jain et al[18], Lumachi et al [19], Galatius et al, O'Hea et al and Ruggerio et al.. This underlines the fact that breast cancer occurs at an earlier age in India than in the western countries.

Mean BMI was 26.16 kg/mm^2(SD+ 1.79).In our study BMI of patients fromNoseroma group had a lower BMI (22.64), the difference was statistically significant.Our study opines that there is association between BMI and seroma formation.
Among the seroma group ,15 of 16 patients (68%), were hypertensive, while in non seroma group , 7 of 34 patients were known hypertensives. There was significant association between seroma formation and history of arterial hypertension in the patient. Literature shows that high BMI and arterial hypertension are considered risk factors , Douay et al, Kumar et al found a significant association b/w BW and HTN with seroma.

In the study, 7 of the seroma group patients received neoadjuvant Chemotherapy,Whereas 9 patients who had not received neoadjuvant chemotherapy developed seroma significant reduction in seroma rate could notbe demonstrated from the study as similarly concluded by Unalp H. R. et al. The mean drain output during first 24 hours in seroma group was 200.31 (SD+36.4), that in no seroma group was 147.94ml (+29.31), there was significant difference between both the groups, p value was 0.032. in the following 24 hours seroma group had 190.0ml(SD+23.66) and in no seroma group was 127.35ml(SD+35.18), the observed difference between both the groups was Statistically significant p value was0.043 the drain output on post op Day 3 was 186.25 (SD+120.25) in seroma group and 111.47 ml (SD+35.43) in no seroma group.the difference was statistical ignificance, suggesting the probability of seroma formation in those patients with higher drain output on post op Day 3.k.kuroi et al , suggested that a positive association between drainage volume during the initial 72 hrs and seroma formation was consistent.The mean number of lymph nodes removed in seroma group was 17.34(SD+7.1)and no seroma group was 15.91(SD+4.98). the difference was
not statistically significant p value was 0.498

The mean drain removal day in seroma group was 15.5(sd+1.82) and in no seroma group was 9.41 (SD+4.98). the difference was not statically significant. Although k.kuroi et al showed that seroma formation rate was significantly high in patients following drain removal on post op day 5 when compared to drain removal on post op day 8 . in our study , patients with seroma had drain removed on days ranging from(13-19) and in non seroma group (6-17).

CONCLUSION:

The factors influencing seroma formation following modified radical mastectomy for carcinoma breast are as follows;hypertension has significant association for seroma formation Higher Body mass index has strong association for seroma formation.

Higher drain output on post-operative day 1, pod 2,and pod 3 is likely to predict the increased possibility of seroma formation.Delayed removal of drain showed increased seroma formation.Factors like age of the patient, neo-adjuvant chemotherapy, number of lymph nodes removed have no bearing on seroma rate.

BIBLIOGRAPHY

1. Stewart BW and Kleihues P (Eds) World Cancer Report. IARC Press. Lyon 2003, p-188-93.
2. U. S. Cancer Statistics Working Group. United States Cancer Statistics: 2003 Incidence and Mortality (preliminary data).Department of Health and Human Services, Centers for Disease Control and Prevention and National Vital Statistics Vol. 53, No.5, 2004.
3. Goldhirsch A, Wood WC, Gelber RD, Coates AS, Thürlimann B, Senn HJ. Meeting highlights: Updated international expert consensus on the primary therapy of breast cancer. J Clin Oncol 2003;21:3357-65.
4. Agrawal. A, Ayantunde AA, Cheung KL. Concepts of seroma formation and prevention in breast cancer surgery. ANZ J Surg 2006;76:1088–95.
5. Osteen RT and Karnell LH. The national cancer database report on breast cancer. Cancer 1994; 73: 1994–2000.
6. Kuroi K, Shimozuma K, Taguchi T, Imai H, Yamashiro H, Ohsumi S et al.Pathophysiology of seroma in breast cancer. Breast Cancer 2005; 12:288-93.
7. Classe JM, Berchery D, Campion L, Pioud R, Dravet F, Robard S. Randomized clinical trial comparing axillary padding with closed suction drainage for the axillary wound after lymphadenectomy for breast cancer. Br J Surg 2006; 93(7):820-4.
8. Woodworth PA, McBoyle MF, Helmer SD, Beamer RL. Seroma formation after breast cancer surgery: Incidence and predicting factors. Am Surg 2000; 66:444–50; disc 450–1.
9. Nadkarni MS, Rangole AK, Sharma RK, Hawaldar RV, Parmar VV, Badwe RA. Influence of surgical technique on axillary seroma formation: A randomized study. ANZ J Surg 2007;77:385–
10. Hashemi E, Kaviani A, Najafi M, Ebrahimi M, Hooshmand H, Montazeri A. Seroma formation after surgery for breast cancer. World J Surg Oncol 2004; 2:44.
11. Benjasirichai V, Piyapant A, Pokawattana C, Dowreang J. Reducing Postoperative Seroma by Closing of Axillary Space. J Med Assoc Thai 2007;90(11):2321-5
12. Loo Wings TY and Chow Louis WC. Factors predicting seroma formation after mastectomy for Chinese breast cancer patients. Ind J Cancer 2007;44(3): 99–103.
13. Pogson CJ, Adwani A, Ebbs SR. Seroma following breast cancer surgery.Eur J Surg Oncol 2003;29:711-7.
14. Oertli D, Laffer U, Haberthuer F, Kreuter U, Harder F. Perioperative and postoperative tranexamic acid reduces the local wound complication rate after surgery for breast cancer. Br J Surg 1994; 81: 856–9.
15. Chen CY, Hoe AL, Wong CY. The effect of a pressure garment on post- surgical drainage and

seroma formation in breast cancer patients. Singapore Med J 1998;39:412–5.
16. Gupta R, Pate K, Varshney S, Goddard J, Royle GT. A comparison of 5-day and 8-day drainage following mastectomy and axillary clearance. Eur J Surg Oncol 2001;27:26–30.
17. Purushotham AD, McLatchie E, Young D, George WD, Stallard S, Doughty J, Brown DC et al. Randomized clinical trial of no wound drains and early discharge in the treatment of women with breast cancer. Br J Surg 2002; 89:286-92.
18. Jain PK, Sowdi R, Anderson AD, MacFie J. Randomized clinical trial investigating the use of drains and fibrin sealant following surgery for breast cancer. Br J Surg 2004;91:54–60.
19. Lumachi F, Brandes AA, Burelli P, Basso SM, Iacobone M, Ermani M. Seroma prevention following axillary dissection in patients with breast cancer by using ultrasound scissors: a prospective clinical study. Eur J Surg Oncol 2004;30:526–30.
20. Kontos M, Petrou A, Prassas E, Tsigris C, Roy P, Trafalis D, et al. Pressure dressing in breast surgery: is this the solution for seroma formation? J BUON 2008;13(1):65-7.
21. Halsted WS: Developments in the skin grafting operations for cancer of the breast. JAMA 1913;60:416-451.
22. Larsen BB, Hugan C, Jr. Fixation of skin flaps in radical mastectomy by subcutaneous sutures; observations. AMA Arch Surg (contd. as Arch Surg) 1955;71:419-423.
23. Schuijtvlot M, Sahu AK, Cawthorn SJ. A prospective audit of the use of a buttress suture to reduce seroma formation following axillary node dissection without drains. The Breast 2002;11:94-96
24. Hamy A, Bouchot-Hermouet FB, Bouchot O, Drianno JC, Guillard Y: Wadding of the axilla in the conservative treatment of cancer of the breast. Prevention of lymphocele. J Chir (Paris) 1990;127:99-102
25. Coveney EC, O'Dwyer PJ, Geraghty JG, O'Higgins NJ. Effect of closing dead space on seroma formation after mastectomy- a prospective randomized clinical trial. Eur J Surg Oncol 1993;19:143-6.
26. Sultan MR, Madhere SM. Delayed seroma formation secondary to docetaxel. Ann Plast Surg 2003;50(4):429-32
27. Gilly FN, Francois Y, Sayag-Beaujard AC, Glehen O, Brachet A, Vignal J. Prevention of lymphorrhea by means of fibrin glue after axillary lymphadenectomy in breast cancer: prospective randomized trial. Eur Surg Res 1998;30: 439–43.
28. Halsted WS: Developments in the skin grafting operations for cancer of the breast. JAMA 1913;60:416-451.
29. Larsen BB, Hugan C, Jr. Fixation of skin flaps in radical mastectomy by subcutaneous sutures; observations. AMA Arch Surg (contd. as Arch Surg) 1955;71:419-423.
30. Schuijtvlot M, Sahu AK, Cawthorn SJ. A prospective audit of the use of a buttress suture to reduce seroma formation following axillary node dissection without drains. The Breast 2002;11:94-96
31. Hamy A, Bouchot-Hermouet FB, Bouchot O, Drianno JC, Guillard Y: Wadding of the axilla in the conservative treatment of cancer of the breast. Prevention of lymphocele. J Chir (Paris) 1990;127:99-102
32. Coveney EC, O'Dwyer PJ, Geraghty JG, O'Higgins NJ. Effect of closing dead space on seroma formation after mastectomy- a prospective randomized clinical trial. Eur J Surg Oncol 1993;19:143-6.
33. Sultan MR, Madhere SM. Delayed seroma formation secondary to docetaxel. Ann Plast Surg

2003;50(4):429-32
34. Gilly FN, Francois Y, Sayag-Beaujard AC, Glehen O, Brachet A, Vignal J. Prevention of lymphorrhea by means of fibrin glue after axillary lymphadenectomy in breast cancer: prospective randomized trial. Eur Surg Res 1998;30: 439–43.