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A study of association of various clinicopathological factors in seroma formation after mastectomy in carcinoma breast

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Abstract

Introduction: Breast Cancer is the most common site specific cancer in women and is the leading cause of death from cancer for women aged 20-59 yrs. Surgery has the major role in the management of Carcinoma Breast. Among all, seroma, a subcutaneous collection of serous fluid is a common complication after mastectomy. However excessive accumulation will stretch the skin resulting in patient discomfort and prolongation of hospital stay. In this study, we carried out a systematic review of risk factors for seroma formation and its association with various clinical pathological and technical parameters with seroma formation. Study has further tried to discuss treatment of seroma formation.

Aims and Objectives: To evaluate influence of clinical, pathological & technical parameters in relation to seroma formation and effectiveness of various modalities in treatment of seroma formation.

Material and Methods: In the Department of General Surgery, VIMSAR, Burla, from July 2018 to June 2020, 50 numbers of female patients with carcinoma breast undergoing mastectomy after taking informed consent are followed post operatively and association of seroma formation with various clinicopathological factors namely Age, obesity and co morbidities, Stage, size, type and grade of tumor, lymph node involvement, Type of surgery, Neo-adjuvant and Adjuvant chemotherapy, Adjuvant radiotherapy, use of electro cautery, application of compression bandage are evaluated along with effectiveness of various modalities in treatment of seroma formation.

Result: Seroma formation occurs in 20% of cases and is not associated with Age of patient or presence of obesity and co morbidities or Stage, size, type and grade of tumor or lymph node involvement or Type of surgery or Neo-adjuvant and Adjuvant chemotherapy or Adjuvant radiotherapy ($p>0.05$). Electrocautery is significantly associated ($p<0.05$) with causation of seroma. Compression bandage has no role in seroma prevention. As per our study for treatment of seroma initially repeated aspiration should be done for treating it, but for persistent seroma reinsertion of drain can be helpful.

Summary and Conclusion: Seroma remains the most common complication after mastectomy and judicious use of electrocautery can prevent significantly in seroma formation. Repeated aspiration is sufficient to treat most of cases.

Keywords: Clinicopathological, seroma formation, mastectomy, carcinoma breast

Introduction

Breast Cancer is the most common site specific cancer in women and is the leading cause of death from cancer for women aged 20-59 yrs. It accounts for 26% of all newly diagnosed cancer in females and is responsible for 15% of cancer related deaths in females. The incidence of breast cancer is increasing primarily in women ≥ 55 years. In India incidence of Ca. Breast is 28 per 1 lakh population with mortality about 8 per 1 lakh population per year. Today we have explored a lot in the pathophysiology and genetics of carcinoma breast that helped a lot in the management protocol. Surgery, Chemotherapy, Radiotherapy, Hormonal therapy, Immunotherapy all have come up in recent times. But surgery has the major role in the management of Carcinoma Breast. MRM still being one of the largely practiced surgeries in the surgical field with great success. Ever since mastectomy was first carried out by Halsted in 1882, surgeons have faced several problems in breast surgery namely injury to axillary vessels, infections, seroma formation, shoulder dysfunction, pain, numbness, flap necrosis, lymphedema, axillary hyperesthesia, winging scapula etc. [1] Among all complications, seroma a collection of serous fluid in the dead space of post-mastectomy skin flap, axilla or breast following modified radical mastectomy (MRM) or breast conserving surgery (BCS) is the commonest early sequel

[2]. Seroma usually resolves within a few weeks. Many surgeons view this problem as an unavoidable nuisance rather than a serious complication. However excessive accumulation will stretch the skin resulting in patient discomfort and wound hematoma, delayed wound healing, wound infection, wound dehiscence, prolonged hospitalization, delayed recovery and initiation of adjuvant therapy [3]. In this study, we carried out a systematic review of risk factors for seroma formation and its association with various clinical, pathological and technical parameters with seroma formation. Study has further tried to discuss treatment of seroma formation.

Aims and Objectives

To evaluate influence of clinical, pathological & technical parameters in relation to seroma formation and effectiveness of various modalities in treatment of seroma formation.

Materials and Methods

This study was conducted in the Department of General Surgery, VIMSAR, Burla during June 2018 to June 2020, with study population being all the female patients admitted with the diagnosis of breast cancer to our department. The sample size was 50. The inclusion criteria was all female patients of any age undergoing mastectomy for carcinoma of breast in our department irrespective of their earlier chemotherapy and radiotherapy status and are willing and are able to keep follow up for 6 weeks after surgery. The exclusion criteria were patients with complications after mastectomy but undergone mastectomy outside of our hospital and who are unwilling or unable to keep follow up for 6 weeks following mastectomy for carcinoma of breast and male patients.

The study has been prospective observational study. Carcinoma breast patients who fit into inclusion criteria are included in study after proper informed consent, history taking and clinical evaluation. Intra-operative technique of mastectomy was observed along with daily observations of patients during hospital stay to notice any complication of procedure until her discharge and follow up were done at 2 weeks, 4 weeks, 6 weeks following mastectomy and complications if any were recorded. The clinicopathological and technical aspects that were observed

are age, comorbidities like obesity, diabetes, hypertension, history of chemotherapy or radiotherapy, Use of scalpel or cautery to raise the skin flap, Type of malignancy, Tumor size (Staging of tumor done from clinical and pathological examination), Grade of tumor, Lymph node status (Presence of involvement of lymphnode was confirmed after histopathological examination only), Time of drain removal, adjuvant chemoradiation. Further observation on treatment for seroma formation was done. We did aspiration with wide bore needle from dependent part of collection. If seroma formation persisted even after 4 different settings of aspiration, then we did reinsertion of drain using closed suction system and allowed it to drain till it drained completely. The outcome of all patients were tabulated and analyzed.

Results and Analysis

In our study we found in 10 (20%) cases there were seroma formation following mastectomy. The age distribution is depicted in table 1, where in age group of < 45 years out of 12 cases only 2(4%) cases developed seroma and in the age group ≥45 only 8(16%) patients developed the same out of 38 cases. The rest observations are shown in table no 2. The table dictates only method of dissection i.e. scalpel v/s cautery is significantly associated with seroma formation (p- value < 0.05) where scalpel dissection being the culprit. The rest parameters have insignificant association as found out in our study. Regarding treatment only aspiration has been sufficient for treatment for 8/ 10 patients. Reinsertion of drain after 4 aspirations was done for 2 patients. In both the cases reinserted drain allowed to be there till it drained completely. After taking reinserted drain out patients were followed up every week till 1 month to detect recurrence of seroma, in neither case there was recurrence.

Table 1: Demography

| Age in Yrs | No. of patients in study population (%) | No. of Patents with Seroma (%) |
|------------|---|--------------------------------|
| <45 | 12(24%) | 2(4%) |
| ≥45 | 38(76%) | 8(16%) |
| Total | 50(100%) | 10(20%) |

Table 2: Associations of Seroma Formation with Various Clinicopathological Factors

| Factors | No of patients with seroma | No of patients without seroma | P-value |
|---------------------------|-------------------------------------|-------------------------------|---------|
| Age | <45years | 2 | 0.7405 |
| | ≥45 years | 8 | |
| Obesity | OBESE | 3 | 0.9340 |
| | Non-OBESE | 7 | |
| Hypertension | Hypertensive | 2 | 0.7405 |
| | Nonhypertensive | 8 | |
| Diabetes mellitus | Diabetic | 0 | 0.6958 |
| | Nondiabetic | 10 | |
| Neo adjuvant chemotherapy | H/O NACT | 1 | 0.9231 |
| | NO H/O NACT | 9 | |
| Stage of tumour | Stage-I | 0 | 0.5828 |
| | Stage II | 8 | |
| | Stage III | 2 | |
| | Stage IV | 0 | |
| Type of tumour | Infiltrating Duct Cell Carcinoma | 10 | 0.4448 |
| | Infiltrating Lobular Cell Carcinoma | 0 | |
| Size of tumour | T1 | 0 | 0.8201 |
| | T2 | 7 | |
| | T3 | 3 | |
| | T4 | 0 | |
| Grade of tumour | Grade I | 1 | 0.6376 |

| | | | | |
|--|----------------------|----|----|---------|
| | Grade II | 5 | 14 | |
| | Grade III | 4 | 24 | |
| Lymphnode status | Present | 7 | 31 | 0.9340 |
| | Absent | 3 | 9 | |
| Type of surgery | MRM | 7 | 31 | 0.9340 |
| | Simple Mastectomy | 3 | 9 | |
| Method of dissection | Cautery | 6 | 28 | 0.00531 |
| | Scalpel | 4 | 12 | |
| Use of post op occlusive dressing or arm compression bandage | Given | 5 | 19 | 0.8874 |
| | Not Given | 5 | 21 | |
| Drain removal | <7 TH DAY | 7 | 25 | 0.556 |
| | ≥7 TH DAY | 3 | 5 | |
| Adjuvant chemotherapy | Received | 10 | 36 | 0.6958 |
| | Not Received | 0 | 4 | |
| Adjuvant radiotherapy | Received | 6 | 29 | 0.6996 |
| | Not Received | 4 | 11 | |

Table 3: Modalities of Treatment of Seroma Formation

| Modalities Of Treatment | | |
|---|--|---|
| Aspiration | Once | 0 |
| | Twice | 1 |
| | Thrice | 4 |
| | Four times | 3 |
| Reinsertion of Drain (After 4 TH Aspiration) | 2 (In both the cases reinserted drain allowed to be there till it drained completely. After taking reinserted drain out patients were followed up every week till 1 month to detect recurrence of seroma, in neither case there was recurrence.) | |

Discussion

Seroma is defined as a serous fluid collection that develops under the skin flaps during mastectomy or in the axillary dead space after axillary dissection. Incidence of seroma formation after breast surgery varies between 2.5% and 51%. Seroma is not life threatening and usually resolves within a few weeks. Many surgeons view this problem as an unavoidable nuisance rather than a serious complication. However excessive accumulation will stretch the skin resulting in patient discomfort and elevates the flaps from the chest wall and axilla there by hampering their adherence to the tissue bed and thus can lead to significant morbidity such as wound hematoma, delayed wound healing, wound infection, wound dehiscence, prolonged hospitalization, delayed recovery and initiation of adjuvant therapy [3].

The pathogenesis of seroma has not been fully elucidated. Seroma is formed by acute inflammatory exudates in response to surgical trauma and acute phase of wound healing [3]. Oertli *et al.* [4] believed that the fibrinolytic activity contribute to seroma formation. With surgical ablation of the breast, the intervening lymphatics and fatty tissues are resected en bloc, thus the vasculature and lymphatics of the gland are transected. Thereafter, transduction of lymph and the accumulation of the blood in the operative field are expected which in turn leads to seroma [5, 6].

In our study, as depicted in table no. 1, seroma was found to be in 20% of our patients which agrees well with Kumar *et al.* [1], Akinci *et al.* (15-18%) [7] Suresh *et al.* (27%) [8], Hashemi *et al.* (35%) [9]. As our sample size was small, to know the real extent of this problem, larger size of sample and long term follow up are essential.

Chow Louis, Loo Wings [10], found in their study of factors predicting seroma formation after mastectomy that age above 45 is significantly associated with seroma formation after mastectomy, which are supported by Suresh *et al.* [8]. In our study the association is insignificant and in correspondence with Hashemi *et al.* [9], Petrek *et al.* [11] and Gonzalez *et al.* [12].

Kumar S *et al.* [2] found in their study that there is significant

association between obesity hypertension and diabetes mellitus and seroma formation after mastectomy supported by the reports of Douay N *et al.* [6] and Suresh *et al.* [8]. But in our study as shown in table No.2 according to chi square test p value of association between obesity and seroma formation is $p = 0.9340$ (i.e. $p < 0.05$), so also with hypertension and seroma ($p = 0.7405$) and diabetes mellitus and seroma formation ($p = 0.6958$) which are all statistically non significant. These findings of our study also matches with, study done by Burak WE *et al.* [13], Akinci *et al.* [7] and Say CC *et al.* [14] which finds inconclusive association between obesity, hypertension and diabetes mellitus and seroma formation individually. Chow Louis, Loo Wings [10] however finds a correlation with hypertension but not with diabetes mellitus.

Earnest A. and *et al.* (22) found in their study that there is no statistical significant association of neo-adjuvant chemotherapy and seroma formation. Our study also reveals the same ($p = 0.9231$). This finding is also supported by Suresh *et al.* [8]. However the contrary is reported by Woodsworth *et al.* [15].

Somers *et al.* [16], Tejler G. *et al.* [17] found in their studies that there is no significant association between any stage of tumor and seroma. Lumachi F. *et al.* [18] in their study found no significant association between seroma formation pathological tumor size and tumor grade and type of tumor. Suresh *et al.* [8] had found a relation between tumor size >3cm and seroma formation. Suresh *et al.* [8], Petrek *et al.* [11], showed that number and extent of axillary lymph nodes involvement is the most significant factors in causation of seroma, but Kumar S. *et al.* [2] and Somers RG *et al.* [16] deny the claim so as our study.

Though logically we can think type of surgery e.g.larger the magnitude of surgery, particularly when axillary lymphatics are disturbed, the greater the formation of seroma, and reports of Suresh *et al.* [8], Gonzalez *et al.* [12] support it, we did not find any association between type of surgery i.e, MRM v/s simple mastectomy, so are Chow Louis, Loo Wings [10], K Porter *et al.* [19]. But the dissection method i.e. use of scalpel v/s cautery definitely affects the seroma formation as reported by our study and previous data by Hashemi *et al.* [9] and K Porter *et al.* [19].

The association of coagulating mode of electrocautery and seroma formation following mastectomy is, may be due to the fact that use of coagulating mode of electrocautery leads to (1) temporary sealing of lymphatic channels, which open up later on, (2) Extensive fat necrosis due to tissue burn leads to further seroma formation. However, we feel that a comparison study using cutting mode of electrocautery to raise the skin flaps and coagulating mode of electrocautery for hemostasis purpose verses scalpel to raise the skin flap and coagulating mode again for purpose of hemostasis, is necessary. This is because scalpel dissection, though it decreases incidence of seroma but makes field more oozing and blood loss is more, above that except of expertise scalpel dissection may have variable flap thickness. Beneficial role of alternative dissection techniques using ultrasonic scissors and laser scalpel over electrocautery or sharp dissection needs to be studied.

Early removal of drains might lead to increased incidence of seroma^[10, 20] whereas others have shown that drains removal time had no influence on seroma formation^[21]. The findings from our study also indicated that the length of time drains are left did not influence the seroma rate. External compression dressing to the chest wall and axilla to obliterate the dead space has been traditionally used to reduce the incidence of seroma formation. Compression dressing generally has been abandoned, as there is paucity of evidence in support of its use. O'Hea *et al.*^[20] in their randomized trial found that compression dressing failed to reduce the seroma formation and instead increased its incidence. Besides conflicting efficacy the other problems with compression dressing are discomfort and low tolerance by the patients. These facts are reflected in our study. Adjuvant chemoradiation also seems to be not affecting the seroma formation as per our study and supported by Say CC *et al.*^[14].

Regarding treatment only aspiration has been sufficient for treatment for 8/ 10 patients. Reinsertion of drain after 4 aspirations was done for 2 patients. In both the cases reinserted drain allowed to be there till it drained completely, in neither case there was recurrence. Because of small number of patients we could not compare which modality of treatment of seroma, was better over other but patients who had reinsertion of drain as treatment part of seroma did not develop recurrence of seroma after allowing it to drain entirely and after taking out reinserted drain. This suggests that perhaps for persistence of seroma after repeated aspirations it should be allowed to drain completely and freely till it drains in order to avoid its recurrence. Obviously larger sample size is necessary to confirm our observation.

Conclusion

Seroma remains the most common complication after mastectomy and it is inevitable in certain number of patients and its exact etiology remains obscure, even today. Electrocautery is significantly associated with causation of seroma. And as evident in our study and other literatures there should not be an injudicious use of electrocautery for breast, use should be optimum, rather than abandoning it completely. Persistent drain output for more than 7 days should alert to possibility of seroma formation after discharge. In our study seroma formation is not associated with Age of patient or presence of obesity and co morbidities or Stage, size, type and grade of tumor or lymph node involvement or Type of surgery or Neo-adjuvant and Adjuvant chemotherapy or Adjuvant radiotherapy. Though statistically our study could not find an association of these Parameters with seroma formation still because of a smaller number of sample sizes we cannot rule out the association of some parameters with seroma, e.g. association of type of surgery

and type of tumor with seroma formation. So a study with a larger number of sample sizes is necessary in this regard. Special mention has to be made that compression bandage has no role in seroma prevention. As per our study for treatment of seroma initially repeated aspiration should be done for treating it, but for persistent seroma reinsertion of drain can be helpful.

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