International Surgery Journal
Suresh BP et al. Int Surg J. 2019 Jan;6(1):278-282
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20185487

Original Research Article

A study to evaluate the factors influencing seroma formation after breast cancer surgery at tertiary care centre

Suresh B. P., Sachin H. G.*, Madhukar Naidu, Varsha Gopalkrishna

Department of General Surgery, Subbaiah Medical College Hospital and Research Centre, Purule, Shimoga, Karnataka, India

Received: 15 November 2018
Accepted: 11 December 2018

***Correspondence:**
Dr. Sachin H. G.,
E-mail: sachin.hg@gmail.com

ABSTRACT

Background: In the world, breast cancer is the most prevalent malignancy affecting women and stands second in cancer related deaths amongst women. Surgical intervention remains the main stay of treatment. Seroma formation is one of the predominant complications of breast cancer surgery, the cause remaining obscure and with multiple casual provenience. In view of this, we collected data to determine the factors related to incidence of seroma formation in our patients and increase its scope and hence attempt to contravene it.
Methods: A retrospective study of 83 carcinoma breast patients who underwent breast cancer surgery from 1st January 2014 to 31st August 2018. Data regarding the following variables compared with age of the patient, BMI, neoadjuvant chemotherapy, tumor size, postoperative exercises/physiotherapy, use of cautery, number of lymph nodes removed, use of closed suction drainage, initial and 72hrs wound drainage. We used chi square and T test methods for statistical analysis of data in our study.
Results: The overall seroma formation rate was estimated to be 27%. Factors identified to be significantly related to the formation of seroma are the following: age >45 yrs, tumor size >3cm, number of positive lymph nodes, BMI >30 and total lymph nodes removed, type of surgery.
Conclusions: To prevent seroma formation, it is important to identify individual risk factors of seroma formation i.e. the identification of predictive variables which will be vital in designing future trails aimed at reducing the incidence of this common complications of breast cancer surgery.

Keywords: Breast cancer, Post-operative drainage, Seroma

INTRODUCTION

Breast cancer is the most common malignancy in women and second leading cause of cancer death among women. Ever since the time of Halstead, who first carried out mastectomy in 1882, surgeons have faced several predicament such as necrosis of skin flaps, breakdown of the wound ,haematoma , seroma and infection.[1] Among them, seroma is the most rampant post-operative complication after breast cancer surgery.[2] A seroma is a sterile collection of serous fluid at the operative site beneath the skin flaps. The incidence documented ranges from 15-81%.[3,4] Seroma formation increases chances of infection, delays wound healing, flap necrosis, persistent pain, dehiscence of the wound and thus prolong the convalescence period.[5]

This study aims to identify factors that predict the development of seroma in patients with breast cancer after breast cancer surgery. Appropriate preventive measures could then be implemented to minimize seroma formation and its abhorrent sequelae.

METHODS

Our retrospective study was conducted between 1st January 2014 to 31st august 2018 at Subbaiah medical college hospital and research centre, Shivamogga, Karnataka, India.

Around 83 patients who were posted for breast cancer surgery were included in the study. Female patients with cancer breast planned for breast cancer surgery who were enrolled for the study. The following was the inclusion criterion: female patients, no chronic diseases, no known inflammatory conditions, where surgical intervention was the opt line if treatment.

Patients on anticoagulant treatment with altered blood clotting or immune system; having uncontrolled diabetes mellitus, advanced liver disease and any previous surgery on the axillary lymphatic system or immediate reconstructive procedure were excluded from the study.

All patients received 1gm of Taxim preoperatively. Electro cautery was used in all the patients to create flaps and to remove the breast tissue and pectoral fascia from the pectoralis major muscle. Two no.12 Romovac closed, suction drains were placed in all patients undergoing modified radical mastectomy, one under the superior flap and one in the axilla. Drain was retained until the 24 hours. Total output was less than or equal to 30ml; depending primarily on the timing of the postoperative visit. Pressure dressings were secured on all patients postoperatively and maintained until drain removal. Early arm motion was encouraged in all patients immediately after surgery.

The data were analysed for the possible etiologic effect by the patient age, tumor size, the presence of and number of positive lymph nodes, the number of lymph nodes removed, post-operative exercises/physiotherapy, use of cautery, obesity (BMI>30) and neo adjuvant chemotherapy. The data was statistically analysed using chi square and T test methods.

RESULTS

Seroma was identified in 23 of 83 patients (27%). The data are presented in Table 1-7. Factors identified to be significantly related to the seroma are the followings age >40 yrs, tumor size, number of positive lymph nodes, type of surgery performed, BMI>30 and total lymph nodes removed.

In our study shows that there are two peaks in the age at diagnosis of breast cancer at 41-50 years and 51-60 years (Figure 1). Patients older than 40 years had a statistically significant higher chance of developing seroma than younger patients. Out of 21 women under the age of 40, only 1 had seroma; while 22 out of 62 aged older than 40years were found having seroma (Table 1).

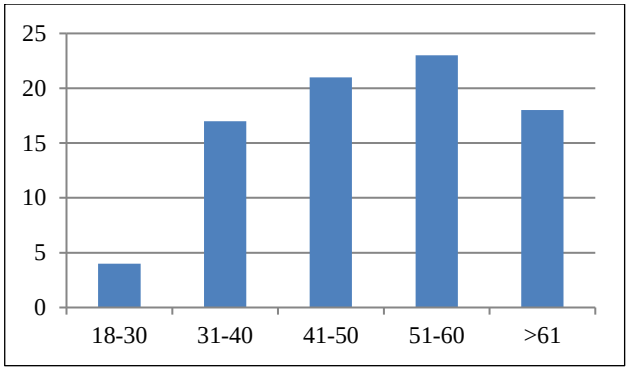

Figure 1: Distribution of age in years.

Table 1: Age (n=83).

Age (in yrs)	Seroma (n=23)	Without seroma (n=60)
<40 yrs	1	20
>40 yrs	22	40

p value 0.006

Table 2: Tumor size (n=83).

Tumor size	Seroma (n=23)	Without seroma (n=60)
<3 cms	9	40
>3cms	14	20

p value 0.01

Table 3: Involved lymph nodes (n=83).

Involved lymph node	Seroma (n=23)	Without seroma (n=60)
<5	11	47
<5	1	13

p value 0.01

Table 4: Obesity (n=83).

Obesity	Seroma (n=23)	Without seroma (n=60)
Yes	19	35
No	4	25

p value 0.03

Table 5: Neoadjuvant chemotherapy (n=83).

Neo adjuvant chemotherapy	Seroma (n=23)	Without seroma (n=60)
Yes	2	20
No	21	40s

p value 0.02

Larger the tumour size, greater was the prevalence of seroma, evident by the seroma present in all the 14 women who had tumour size >3cm and only 9 out of 50 having tumor size <3cm (Table 2). Similar principles

apply to the number of lymph nodes involved (Figure 2). Only 18% with <5 nodes involved had seroma while 48% with >5 nodes involvement had seroma (Table 3). The effect of obesity on the seroma formation was emphasized by the results. Out of 23 cases found with seroma, 19 were categorized as obese (Table 4). Neoadjuvant chemotherapy and its effects are yet to be evaluated on a large scale to give a definitive result. In the small numbers that we observed, its application didn't speculate any promising result. Those independent of its use had 50% chances (Table 5).

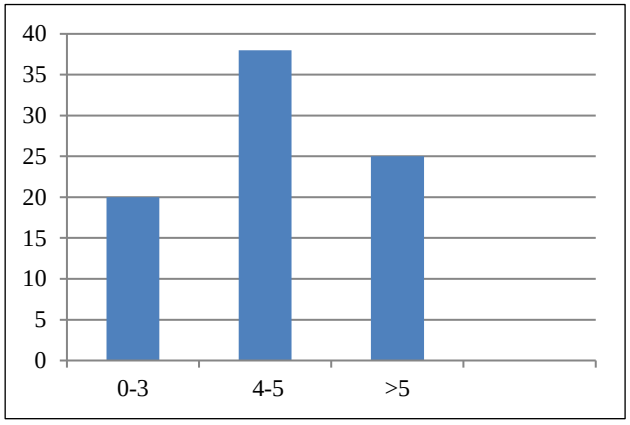

Figure 2: Distribution of total number of positive lymph nodes.

The correlation between the lymph nodes and seroma was reinforced by yet another parameter. There was higher incidence of seroma formation with greater number of nodes resected (Figure 3). In our study we found that only 10/51 had seroma when less than 20 nodes were resected, contrasted to13/32 when the numbers were >20 (Table 6).

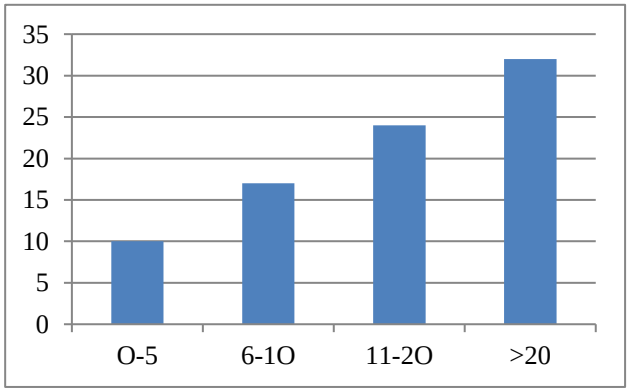

Figure 3: Distribution of total lymph node resected.

Table 6: Total lymph nodes resected (n=83).

Total lymph nodes	Seroma (n=23)	Without seroma (n=60)
<20	10	41
>20	13	19

p value 0.03

Table 7: Surgery (n=83).

Type of surgery	Seroma (n=23)	Without seroma(n=60)
Breast conservative surgery	4	26
Modified radical mastectomy	19	34

p value 0.02

Of patients undergoing MRM, 19 of 53 developed seromas, while 4 of 30 undergoing breast-conservative surgery developed seromas (Table 7). Postoperative exercises/physiotherapy, use of cautery, had no significant association with seroma formation. Chemotherapy was not delayed by the presence of a seroma.

DISCUSSION

Seroma, a subcutaneous collection of serous fluid within a surgical cavity i.e. clinical evident, is the most regnant post-operative complication after breast cancer surgey.[2] 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.[2]

Seroma delays the wound healing, prolongs the hospital stay, delays adjuvant radiotherapy and chemotherapy. Besides the economic loss due to prolonged hospital stay and delay in rehabilitation, seroma formation also adds to psychological trauma. This is in addition, often to the embarrassment of the operating surgeon, whose experience in surgery does not influence the incidence of seroma after mastectomy.[6]

Reasons that may account for the occurrence of seroma include a large operative field, division of lymphatic channels, the loose axillary skin hollow that follows surgical resection and the highly mobile, dependent nature of the area.[7] 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 antecedent factors. Several prophylactic measures have been proven to be effective in decreasing the incidence of seroma formation.

Tranexamic acid was employed by Oertli et al, perioperatively and postoperatively in a dose of 1g three times daily in a randomized double-blind trail. A significant decline in the mean postoperative drainage volume as well as the incidence of seroma formation was observed in the treatment group.[8]

Petrek et al, showed that number and extent of axillary lymph nodes involvement is the most significant factors in causation of seroma.[9] The efficacy of shoulder

immobilization has been investigated by Knight et al.[10] Although seroma resulted in delay in return to normal shoulder mobility, no patient sustained long term musculoskeletal dysfunction.

Emphasizing the importance of draning the axillary space and pectoral flaps, Vinton et al, and Kopelman et al demonstrated that output greater than 30-35ml/day significantly increased the incidence of seroma formation.[11,12]

Convency et al and O'Dwyer et al, demonstrated that both drainage and seroma formation were significantly less when dead space was obliterated by suturing the skin flaps to muscle.[13] A similar flap tackking procedure was advocated by Chilson et al, as of proven valve in seroma prevention.

According to Douay N et al, risk factors isolated were high body mass index, high volume of the first 3 days drainage and arterial hypertension. Techniques like sentinel node biopsy, padding of the axilla and axillary drainage showed a benefit in the reduction of the seroma. Prolongation of the period of retention of drain in situ seems to be a logical measure as formed seroma usually subsides with aspiration.[14]

Estes and Glover et al, described the use of a vacationer suction device as a convenient method of resolving seroma. As is the invariable principle of re-establishment of the operative drain, a suction drain left in-situ for a prolonged period to maintain physical contact between contiguous surfaces so as to facilitate adhesion.[15]

In our study, a direct correlation has been shown to exist between age of the patient and development of seroma. The incidence is significantly high with age >45 years. We have identified that both tumour size and no of positive lymph nodes to be correlating to the incidence of seroma formation. Patients with tumour size >3cms and those with 5-10 positive lymph nodes are at greater risk of developing seroma. It is also found that seroma was a prevalent complication amongst obese patients as compared to their counterparts.

It is logical to suspect the larger the magnitude of surgery, particularly when axillary lymphatics are disturbed, the greater the formation of seroma. This was evidenced by our study when removal of more than 11-20 of total lymph nodes during surgery was substantiated by the greater incidence of seroma and its protracted period. In comparison, modified radical mastectomy surgery proved to have higher incidence of seroma whereas the neo adjuvant chemotherapy was scarely afflicted by it.

CONCLUSION

In conclusion there are identifiable peri-operative risk factors which may help to avert prolonged stay in hospital and consequentially the associated morbidity. The clinician should vigilantly identify the presenting risk factors involved in possible seroma formation following breast cancer surgery and employ suitable preventive measures to reduce the risk of developing seroma as this is an uncommon complication.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Aitken DR, Minton JP. Complications associated with mastectomy. Surg Clin North America. 1983 Dec 1;63(6):1331-52.
2. Douay N, Akerman G, Clement D, Malartic C, Morel O, Barranger E. Seroma after axillary lymph node dissection in breast cancer. Gynecologie, Obstetrique Fertilite. 2008 Feb;36(2):130-5.
3. Woodworth PA, McBoyle MF, Helmer SD, Beamer RL. Seroma formation after breast cancer surgery: incidence and predicting factors/discussions. The American Surg. 2000 May 1;66(5):444.
4. Roses DF, Brooks AD, Harris MN, Shapiro RL, Mitnick J. Complications of level I and II axillary dissection in the treatment of carcinoma of the breast. Annals Surg. 1999 Aug;230(2):194.
5. Stehbens WE. Postmastectomy serous drainage and seroma: probable pathogenesis and prevention. ANZ J Surg. 2003 Nov;73(11):877-80.
6. Funnell IC, Crowe PJ, Dent DM. Does surgical experience influence mastectomy complications?. Annal Royal Coll Surg Eng. 1992 May;74(3):178.
7. Hoefer JR, DuBois JJ, Ostrow LB, Silver LF. Wound complications following modified radical mastectomy: an analysis of perioperative factors. J Am Osteopathic Association. 1990 Jan;90(1):47-53.
8. 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. Brit J Surg. 1994 Jun;81(6):856-9.
9. Petrek JA, Peters MM, Nori S, Knauer C, Kinne DW, Rogatko A. Axillary lymphadenectomy: a prospective, randomized trial of 13 factors influencing drainage, including early or delayed arm mobilization. Archives Surg. 1990 Mar 1;125(3):378-82.
10. Knight CD Jr, Griffen FD, Knight CD Sr. Prevention of seromas in mastectomy wounds: The effect of shoulder immobilization. Arch Surg. 1995;130:99-101.
11. Vinton AL, Traverse LW, Jolly PC. Wound complications after modified radical mastectomy compared with tylectomy with axillary lymph node dissection. Am J Surg. 1991 May 1;161(5):584-8.
12. Kopelman D, Klemm O, Bahous H, Klein R, Krausz M, Hashmonai M. Postoperative suction drainage of

the axilla: for how long? Prospective randomised trial. Euro J Surg. 1999 Jan 1;165(2):117-20.
13. O'Dwyer PJ, O'Higgins NJ, James AG. Effect of closing dead space on incidence of seroma after mastectomy. Surg Gynecol Obst. 1991 Jan;172(1):55-6.
14. Loo WT, Chow LW. Factors predicting seroma formation after mastectomy for Chinese breast cancer patients. Ind J Cancer. 2007 Jul 1;44(3):99.
15. Estes NC, Glover JL. Use of vacutainer suction as a convenient method of resolving postmastectomy seromas. Surg Gynecol Obst. 1982;155(4):561-2.

Cite this article as: Suresh BP, Sachin HG, Naidu M, Gopalkrishna V. A study to evaluate the factors influencing seroma formation after breast cancer surgery at tertiary care centre. Int Surg J 2019;6:278-82.