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Original Research Article

Seroma formation after modified radical mastectomy: analysing risk factors and incidence

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ABSTRACT

Background: Breast cancer is a prevalent form that affects women and is a leading cause of death among women. The development of seroma is a frequent complication that can arise after breast cancer surgery, and its underlying mechanisms are still not fully understood. Consequently, data was collected to analyze the occurrence and factors that contribute to the development of seroma in patients. We aimed to enhance our comprehension and ultimately discover methods to mitigate it.
Methods: A prospective group research study was conducted on a sample of 86 female patients who underwent mastectomy from August 2020 to August 2023. This study was carried out as part of the senior residency program at Nalanda Medical College and Hospital in Patna, Bihar, India. Patients who develop seroma within four weeks of surgery are usually recommended to undergo, specifically ultrasonography, and radiological evaluation to determine the size.
Results: 27 out of 86 patients (31%) were found to have seroma. Several factors are closely linked to the development of seroma. Factors that may contribute to increased risk The minimum age at which seroma production occurs following MRM ≥56 or older, having a BMI of 26.50 or higher, a tumour measuring 4 cm or larger undergoing the removal of more than 12 lymph nodes, and having a level 3 axillary dissection.
Conclusions: After surgery, a certain group of people in the study experienced seroma formation within four weeks. These individuals had undergone MRM. Age, BMI, tumour size, level 3 axillary dissection, the removal of more than 12 lymph nodes during surgery, and the occurrence of seroma after MRM were found to be positively correlated. There was no observed connection between seroma production and a range of factors, such as neoadjuvant chemotherapy, the timing of drain removal, shoulder workouts, and the use of breast bandages.

Keywords: Tumor, Seroma, MRM, Breast cancer

INTRODUCTION

Breast carcinoma is a serious type of cancer that affects women and sadly remains the most common cause of death among women with cancer.[1] For patients facing this circumstance, the suggested surgical options include a modified radical mastectomy or breast preservation, contingent upon the disease's stage. Seroma is a common complication that can occur shortly after cancer treatment surgery. Seroma is the buildup of serous fluid below the skin flap following a mastectomy, commonly found in the axilla or breast region. The reported occurrence varies widely, with documented rates ranging from 15% to 81%.[2] The development of seroma can increase the risk of infection, impede wound healing, result in flap necrosis, cause prolonged discomfort, and raise the chances of wound dehiscence, ultimately increasing the recovery period. Post-mastectomy occurrence is

increasingly acknowledged as a surgical side effect instead of a concern. However, not all patients experience clinical symptoms. Complications like seroma can hurt the patient's recovery process, leading to longer hospital stays, increased healthcare expenses, and potential delays in receiving necessary treatment.[3] Several factors contribute to the formation of seroma, including the extent of the lymph node being removed, the presence of positive nodes, the use of postoperative radiation, and the application of intraoperative lymphatic channel ligation. However, there is ongoing debate about the precise contribution of each factor to the formation of seroma.[3,4] We have yet to fully understand the cause of seroma. Seroma is a consequence of acute inflammatory exudates that develop as a response to surgical trauma throughout the initial stage of wound healing. Following mastectomy and axillary lymphadenectomy, the thorough dissection leads to harm to various blood arteries and lymphatics. As a consequence, blood and lymphatic fluid may leak from an expanded exposed area, potentially resulting in the development of seroma.[4] The build-up of fluid causes the flaps to detach from the chest wall and armpit, making it difficult for them to properly adhere to the bed of the chest wall. As a result, the healing process is slowed down.

Another frequent complication that may occur following a mastectomy is the formation of a hematoma. The exact cause of seroma remains unclear. Seroma is a consequence of acute inflammatory exudates that develop as a response to surgical trauma during the early phase of wound healing. The complex procedure of mastectomy and axillary lymphadenectomy can lead to the unintended disruption of various blood vessels and lymphatic channels.[5] There may be an unintentional leak of blood and lymphatic fluid from a wider area that has been exposed. Consequently, a seroma develops. Fluid buildup causes the flaps to detach from the chest wall and armpit, making it difficult for them to properly heal. It is not uncommon for a hematoma to develop following a mastectomy.[6] The causes of seroma development are still unknown, making it difficult to find effective methods for reducing its occurrence. Extensive research has been conducted to identify factors that contribute to the development of post-mastectomy seroma and to find ways to minimize its occurrence. However, there is still no consensus on the recognition of these risk factors. Various approaches have been proposed to reduce the likelihood of seroma formation.[7] The procedures involve various techniques and tools used in surgical and medical treatments. Some of the techniques used in the medical field involve external compression dressing, wound drainage, ultrasound, argon, diathermy during surgery, laser, endoscopic procedures, harmonic scalpel, various methods for axillary space closure, fibrin glue, sclerotherapy utilizing tetracyclines, and application of tranexamic acid. Yet, traditional methods have not yielded a solution for successfully lowering the possibility of developing seroma after axillary dissection.[8]

Aim and objectives

The study sought to examine the occurrence and potential causes of seroma formation in female patients who had undergone modified radical mastectomy (MRM) for breast cancer. The objective was to ascertain the frequency of seroma occurrence within four weeks after surgery and examine its association with several parameters, such as age, body mass index (BMI), tumour size, degree of axillary dissection (level 2 and level 3), and the number of lymph nodes excised during the surgical procedure.

METHODS

A study was conducted on a group of 86 female patients who had mastectomy surgery between August 2020 and August 2023. The study was part of the senior residency program at Nalanda Medical College and Hospital in Patna, Bihar, India. Patients who experience developing seroma within four weeks after surgery are asked to have a radiological assessment, especially ultrasonography (USG), to estimate the size of the seroma.

Inclusion criteria

Inclusion criteria were; patients undergoing modified radical mastectomy: Participants must have undergone a modified radical mastectomy as part of their breast cancer treatment. Age Criteria: patients above 50 years were included. Consent for Participation: Informed consent from the participants. Postoperative Period: Patients who agree to take chemo-radio therapy. No History of Prior Mastectomy: Participants without a history of prior mastectomy were included to focus on the specific context of modified radical mastectomy.

Exclusion criteria

Exclusion criteria were; history of radiation therapy: Participants who have received or are currently undergoing radiation therapy as part of their breast cancer treatment will be excluded due to its potential influence on seroma formation. History of chemotherapy: Individuals undergoing or with a history of chemotherapy for breast cancer will be excluded to minimize confounding factors. Bilateral mastectomy: Patients who have undergone bilateral mastectomy will be excluded to focus specifically on the impact of modified radical mastectomy on seroma formation.

Sample size

The number of patients who were included in the study was 86.

Statistical analysis

Analyzing the data was done using SPSS statistical software version 22. The quantitative variables were

analyzed using the mean and standard deviation (SD). Frequency and percentage measures were used to represent categorical variables. An analysis was conducted using the independent sample t-test to evaluate the statistical significance of the mean differences among variables among independent groups.

RESULTS

27 out of 86 patients (31%) were found to have seroma. Several factors have been found to have a significant correlation with the occurrence of seroma. These include having a tumour size of 4 cm or larger, being 55 years of age or older, having a BMI of 26.50 or higher, undergoing the removal of more than 12 lymph nodes, and having a level 3 axillary dissection. The results of patients with and without seroma, considering all relevant factors, are shown in (Table 1-5).

Table 1: Age (n= 86).

Age (years)	Seroma present (N=27)	Seroma absent (N=59)
≥55	16	24
<55	11	35

Table 2: BMI (n=86).

BMI	Seroma present (N=27)	Seroma absent (N=59)
≥26.50	16	20
<26.50	11	39

Among the patients diagnosed with seroma, 59.02% were aged 56 or older, while 40.06% were under 56. This research indicates that advancing age is a risk factor for the development of seroma (Table 1). Patients with a higher BMI exhibited a considerably greater incidence of seroma development. Out of the 27 patients who developed seroma, 16 of them had a BMI of 26.50 or above (Table 2). The number of cases of seroma increased proportionally with the size of the tumor. Among the 27 individuals who experienced seroma, 22 of them had a tumor size equal to or more than 4 centimeters. The remaining 08 patients who experienced seroma after modified radical mastectomy had tumor sizes less than 4 centimeters (Table 3).

Table 3: Tumor size (n=86).

Tumor size (cm)	Seroma present (N=27)	Seroma absent (N=59)
≥4	22	11
<4	05	48

Among patients who underwent level 3 axillary dissection, 03 out of 27 patients we developed seroma, suggesting that this type of dissection increases the likelihood of seroma production (Table 4). Among the group of 27 patients who underwent the removal of more than 12 lymph nodes, a total of 12 patients experienced the development of seroma. Only 15 individuals with less than 12 lymph nodes affected experienced the development of seroma. This confirms that the risk of seroma formation increases when a greater number of lymph nodes are removed (Table 5).

Table 4: Type of axillary dissection (n=86).

Type of axillary dissection	Seroma present (N=27)	Seroma absent (N=59)
Level 2	24	59
Level 3	03	00

Table 5: Number of lymph nodes removed (n=86).

Number of lymph nodes removed	Seroma present (N=27)	Seroma absent (N=59)
<12	15	25
>12	12	34

Figure 1: Seroma formation after 2 weeks of MRM.

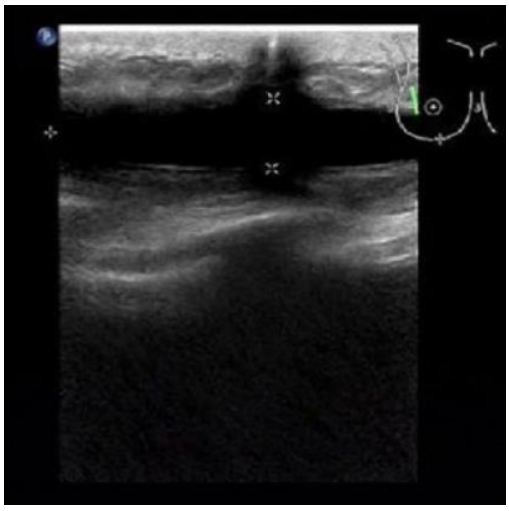

Figure 2: An ultrasound image of seroma after removal of the drains who underwent MRM.

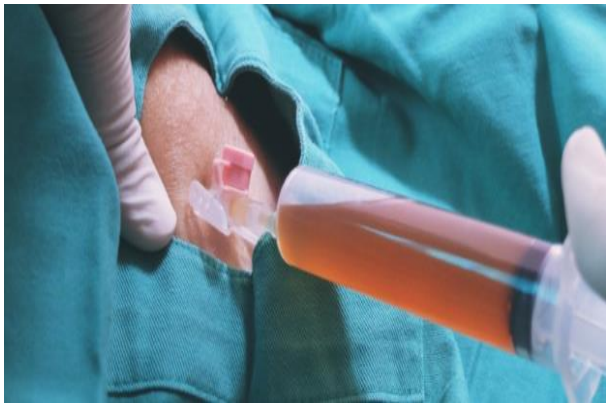

Figure 3: Aspiration of seroma.

DISCUSSION

The development of seroma is a common complication that often occurs after breast cancer surgery. Understanding the particular risk factors and predictive variables connected with seroma development after breast cancer surgery is crucial to minimize its occurrence, as it is a common complication.[9] This information will be crucial for organizing future clinical trials with a focus on reducing the occurrence of seroma formation. The presence of seroma can impede the healing process of wounds, leading to longer hospital stays and potentially delaying important treatments like radiotherapy and chemotherapy. Aside from the financial implications of prolonged hospitalization and a slower healing process, the development of seroma can also lead to emotional strain. Occasionally, the operating surgeon may feel embarrassed when they realize that their surgical skills have no impact on the development of seroma after a mastectomy.[10]

A range of surgical techniques and tools can affect the development of seroma. Over the past few years, the remarkable efficacy of suction drainage has been the sole practical remedy for addressing the issue of seroma. Lately, there has been a noticeable shift in research focus towards the strategy of closing the empty area.[11] While there may be some differences, research indicates that the exclusion of drainage can be performed without exacerbating the development of seroma and its related complications. Using Ligasure led to a reduction in the amount and length of drainage until removal, although it did result in longer operative time. Suresh et al conducted a research study to analyze the factors that affect the development of seroma formation after breast cancer surgery at a specialized medical facility.[11]

An aggregate of 83 individuals who had been identified as having breast carcinoma and had undergone breast cancer surgery participated in the study. Approximately 27% of patients experienced seroma formation. Several factors have been identified as having a notable correlation with the occurrence of seroma.[12] Several factors contribute to this, such as being above the age of 45, having a larger tumour size, having a BMI over 30, having a higher number of positive lymph nodes, undergoing a specific type of surgery, and having a greater number of lymph nodes removed. A research investigation was conducted by Zielinski and his colleagues.[8] A study was done to examine the impact of certain factors on the frequency of seroma extension in breast cancer individuals who had undergone mastectomy surgery. An aggregate of 150 patients who received diagnoses of breast cancer were included in the study.[13] Individuals who were 60 years or older experienced a greater amount of seroma after medication, and their seroma therapy lasted for a longer period. Patients who were obese experienced a notably extended period of seroma, with a statistically significant p value of 0.036. A potential case-control research study conducted by Faisal et al aimed to examine the efficacy of axillary exclusion in decreasing the incidence of seroma immediately after MRM.[14] The study involved a total of 64 individuals, with 32 patients assigned to the study group and another 32 patients assigned to the control group. Age, BMI, and tumour size did not show any notable variations when examining the impact of axillary exclusion. In the control group, the drain removal took an average of 17.8 days, with a total drain output averaging 4525.6 ml. On the other hand, the study group had an average drain removal duration of 11.3 days (range: 10-13), and a total drain output of 1476.2 ml on average (range: 620-2200 ml). There was a statistically significant distinction between the two groups ($p<0.001$).

CONCLUSION

According to the study, it was found that around 31% of patients experienced seroma formation within four weeks after undergoing mastectomy with axillary lymph node dissection. Several factors, including age, level 3 axillary dissection, BMI, tumour size, and the removal of more than 12 lymph nodes during surgery, were found to be associated with the development of seroma after modified radical mastectomy. To summarise, seroma formation continues to be a common and important complication that occurs after surgery for breast cancer, especially in cases where modified radical mastectomy is performed. It is essential to identify specific risk factors and determine predictive characteristics to effectively manage this frequent complication and develop future studies to lower its occurrence. The significance of seroma on patient outcomes is notable, as it leads to delayed wound healing, extended hospital stays, and hindrances in the commencement of adjuvant radiotherapy and chemotherapy. The economic losses and psychological suffering that are linked to this issue highlight the significance of implementing efficient preventative efforts.

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