

## Research



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## Factors affecting seroma formation after mastectomy among West African patients: a single center experience in North West Nigeria

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## Abstract

**Introduction:** seroma is a collection of serous fluid in the dead space of skin flaps or axilla following mastectomy. There have been various methods for preventing seroma, such as prolonged suction drainage, shoulder immobilization, reduction of dead space, among others. We present our experience on factors affecting seroma formation after mastectomy among West African patients.

**Methods:** this was a single centre prospective study conducted on consecutive female patients with breast carcinoma scheduled for mastectomy. Patients were recruited at the surgical outpatient clinic and data was collected using interviewer administered structured questionnaire which reflected the bio data, age, hypertension, diabetes and body mass index. Operative factors like type of mastectomy and instrument used in raising flaps were recorded. The drained fluid was emptied and recorded daily. The drain was removed when the amount became less than 50 mls over the previous 24 hours. Seroma was detected by clinical evaluation at day five or ten after removal of drain.

**Results:** sixty mastectomies were included in the study. The mean age of patients is  $46.3 \pm 7.4$  years. In evaluating the factors associated with seroma formation, we found that age of the patients, presence of hypertension, the type of surgery and instruments used for dissection has no effect on seroma formation. However, body mass index and fixing of flaps to pectoralis major directly affect seroma formation. **Conclusion:** age, hypertension and type of mastectomy have no effect on seroma formation after mastectomy.

## Introduction

Seroma is a collection of serous fluid in the dead space of skin flaps, axilla or breast following mastectomy or breast conserving surgery [1]. It occurs in most patients after mastectomy and is now increasingly being considered side effect of surgery rather than a complication [2]. Other surgeons describe it as a necessary evil that follows mastectomy [3]. The incidence of seroma

formation after breast surgery varies from 3% to 85% [3-5]. It is not a life threatening complication but it is a source of morbidity as it causes flap necrosis, wound dehiscence, predisposes to sepsis, prolonged recovery period, multiple physician visits and possibly delaying adjuvant therapy [3-6]. The pathogenesis of seroma has not been fully understood. Some believe seroma is formed by acute inflammatory exudates in response to surgical trauma and acute phase of wound healing [7, 8] while other attributed it to disruption of lymphatic channels [6, 9, 10]. The morbidity associated with post mastectomy seroma has led to efforts in identifying risk factors so that they can be modified thereby reducing the incidence of seroma, but none of these risk factors have been universally accepted [10]. The role of preoperative factors like age, obesity and hypertension on seroma formation were studied with conflicting results [3, 11, 12]. Intraoperative factors studied include extent of dissection and the choice of dissector. Extensive axillary dissection and the use of electro cautery for dissection has been found to be significant in development of seroma [13-15]. Postoperative factors like short duration of drainage less than 10days and early shoulder exercise have been associated with postmastectomy seroma [1, 2, 6]. There have been various methods for preventing seroma, such as prolonged suction drainage, shoulder immobilization, reduction of dead place, peri-operative use of tranexamic acid, compressive dressing, and fibrin sealants, among others. But these methods for the prevention seroma remain inconclusive as they have shown conflicting results [7, 11, 12]. We present our experience on factors affecting seroma formation after mastectomy among West African patients.

## Methods

This was a single centre prospective study that was conducted on consecutive female patients with breast carcinoma scheduled for mastectomy from August 2017 to July 2019. The study was carried out

in department of surgery, Aminu Kano Teaching Hospital, Kano, northwest Nigeria.

**Protocol for patient recruitment:** patients were recruited at the surgical outpatient clinic and data was collected by an interviewer administered structured questionnaire which was administered preoperatively to reflect the bio data, serial number, age, hypertension, diabetes and body mass index.

**Protocol for surgery:** surgery was done under general anesthesia and endotracheal intubation with a dose of 1g Ceftriazone administered at induction of anesthesia. Mastectomy was performed via an elliptical skin incision encompassing the tumor, biopsy site, overlying skin, and the nipple-areola complex. The incision was deepened to the subcutaneous tissue. The flap was now raised to the clavicle above, upper part of the rectus below, midline of the sternum medially and anterior border of the latissimus dorsi laterally. Finally, the whole of the posterior aspect of the breast was dissected from the pectoralis major from medial to lateral extending into the axilla (if indicated) and axillary lymph nodes cleared before hemostasis secured. Some of the patients had the skin flap fixed to pectoralis major muscle with an interrupted vicryl 2/0 suture. A closed suction drain was inserted beneath the flap and wound was closed in a simple interrupted fashion using nylon 2/0. Operative related factors like type of mastectomy and instrument used in raising flaps were recorded.

**Protocol for post-operative data collection:** the drained fluid was emptied and recorded daily. The drain was removed when the amount became less than 50 mls over the previous 24 hours. Seroma was detected by clinical evaluation at day five or ten after removal of drain. Data was analyzed using SPSS version 20. The clinical characteristics of patients were analyzed using mean and standard deviation. Chi square or Fischer's test was used to determine association between qualitative variable and seroma while t test is used for quantitative variables with  $p < 0.05$  considered significant.

Approval of ethical review committee of Aminu Kano Teaching Hospital was obtained before the study commenced. Written informed consent was obtained from all patients participating in the study. For patients that didn't consent to be part of the study, that decision didn't affect the quality of care they received from the unit.

## Results

A total of 60 mastectomies were done for the duration of the study. The mean age of patients is  $46.3 \pm 7.4$  years. Majority of the participants are Muslims. Most patients that participated in the study are married (Table 1). Majority of the patients had a normal body mass index at the time of surgery while about 43% are overweight. Hypertension is the commonest comorbidity seen in 50% of the patients. Modified radical mastectomy was the most common procedure done to 95% of the patients while only 5% had simple mastectomy. Electrocautery was used for dissection by most surgeons while scalpel was the preferred dissecting instrument in 25% of patients. Half of the patients had skin flap fixation to pectoralis major while the other half didn't (Table 2). In evaluating the factors that are associated with seroma formation, this study revealed that age of the patients, presence of comorbidity like hypertension, the type of surgery and instruments used for dissection has no effect on seroma formation with a P-value of 0.786, 1.000, 1.000 and 0.765 respectively. However, factors like body mass index and fixing of flaps to pectoralis major directly affect seroma formation with overweight and failure to fix flaps significantly increasing the risk of seroma formation (Table 3).

## Discussion

The mean age of the patients in this study was 46.3 years. This is significantly younger than the age of most participants in related studies [3,11,12] this may be related to the mode of occurrence of breast cancer, which is believed to occur earlier in blacks compared to Caucasians. Majority of the patients in

our study have a normal body mass index, unlike the participants in the study by Ozaslan *et al.* and Jabir *et al.* whose body mass index is predominantly in the overweight class [9,16] this may be a reflection of the overall nutritional status of the participants' respective environment. We found that age of the patients doesn't affect seroma formation after mastectomy. This is similar to findings of Unalp *et al.*, Kuroi *et al.*, Hashemi *et al.* and Alawad *et al.* [1, 2, 17, 18,]. We also found that hypertensive patients are not at increased risk of seroma formation after mastectomy. This is similar to the findings by Xiao-Fen *et al.* and Jabir *et al.* [9,19]. Other studies by Wings *et al.*, Van Bommel *et al.* and Katsumasa *et al.* all showed positive association between hypertension and postmastectomy seroma formation [1, 20,21].

We found that BMI of the patients affects seroma formation with overweight patients more likely to develop post mastectomy seroma compared to patients of normal weight. This is similar to findings of Van Bommel *et al.*, Alawad *et al.*, Vivex *et al.* and Katsumasa *et al.* all of whom reported a positive association between BMI and seroma [1, 6, 18, 21]. This is however contradicted by Wings *et al.* and Jabir *et al.* both of which found no association between BMI and seroma formation [9,20]. We also found that patient that had simple mastectomy or modified radical mastectomy showed no difference in term of seroma formation. This is in keeping with findings from Hashemi *et al.* and Wings *et al.* all of which found no significant association between type of mastectomy and seroma formation [2,20]. However, Alawad *et al.*, Vivex *et al.*, Van Bommel *et al.* and Katsumasa *et al.* all found that patients that had modified radical mastectomy have more chance of seroma compared to simple mastectomy [1, 6, 18, 21]. Electrocautery has revolutionized hemostasis during mastectomy but some surgeons have attributed the use to seroma formation [1,8] this was not the finding in our study. Our finding was supported by Unalp *et al.*, Xiao *et al.*, Wings *et al.*, Alawad *et al.* and Akinci *et al.* [11, 18, 19]. Our study revealed that fixation of skin flaps to the pectoralis major muscle is associated with reduction in

seroma formation after mastectomy. This is supported by Ozaslan *et al.*, Jabir *et al.*, Khater *et al.*, Haroun *et al.* and Al-shalah *et al.* among others [5, 9, 16, 22-24].

## Conclusion

We found that factors like age, hypertension and type of mastectomy has no effect on seroma formation after mastectomy. However, overweight patients have higher risk of seroma formation. We also found that flap fixation to pectoralis major is associated with significant reduction in seroma formation.

### *What is known about this topic*

- Seroma is a great source of concern to the patients;
- Seroma is the commonest complication of mastectomy.

### *What this study adds*

- Ability to predict seroma formation preoperatively;
- Ability to reduce the risk of seroma formation preoperatively.

## Competing interests

The authors declare no competing interests.

## Authors' contributions

Conception and design (IUG, AIE); literature search and selection of publications (IUG, AIE); data analysis (IUG, AIE); drafting of the manuscript (IUG, AIE); critical revision of the manuscript (IUG, AIE). All authors read and agreed to the final version of this manuscript and equally contributed to its content.

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## Tables

**Table 1:** clinical characteristics of patients

**Table 2:** operative characteristic

**Table 3:** factors affecting seroma formation

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