

Outcomes of Wound Drainage versus No Wound Drainage in the Patients Undergoing Mastectomy

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Abstract

Background and objective: Seroma formation is the most common complication after total mastectomy or axillary lymph node dissection (ALND). The role of drainage is still controversial since some evidence suggests that it does not prevent the formation of seroma. This study aimed to evaluate seroma formation and postoperative complications in patients undergoing mastectomy with or without drainage.

Patients and Methods: A cohort of female patients with breast cancer or other breast conditions were retrospectively studied at the Division of Head Neck and Breast Surgery, Department of Surgery, Siriraj Hospital from November 2018 to August 2019. The patients were divided into drain and no drain groups. Demographic data, seroma formation, and postoperative complications were recorded and compared.

Results: A total of 129 patients were included in this study, 67 patients with drainage and 62 patients without drainage. The incidence of seroma formation was similar between the two groups. The total volume of aspirated seroma was significantly higher in the no drain group ($p = 0.010$). When combining the volume of seroma (drained + aspirated), the volume in the drain group was significantly higher than that in the no drain group ($p = 0.020$). The number of aspirations was higher in the drain group: 2 (0-9) vs 3 (0-14), $p = 0.031$. The patients in the no drain group had a significantly shorter length of hospital stay, 2.0 (1.0-3.0) vs 4.0 (2.0-10.0) days, $p < 0.001$.

Conclusions: No drainage is a feasible option in patients undergoing mastectomy in terms of reducing hospital stay but not increasing the incidence of symptomatic seroma and wound complications compared to routine drain placement.

Keywords: Mastectomy, Seroma, Suction drainage

INTRODUCTION

Breast cancer is the most common female malignancy in Thailand.¹ The treatment for breast cancer is planned based on staging and its subtype. Surgery is the mainstay of the treatment, removing gross tumor and

providing accurate pathological staging. Radical surgery for breast cancer has been replaced with breast conserving surgery in suitable patients.² However, mastectomy is still the major surgical procedure for treatment of breast cancer in our institute.³

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Seroma formation is the most common complication after total mastectomy or axillary lymph node dissection (ALND).⁴ The incidence of seroma formation was reported, ranging from 15 to 81%.⁵ This may cause discomfort, flap necrosis, wound dehiscence, or infection. Furthermore, it may prolong recovery and delay adjuvant therapy.⁶

There are various techniques to reduce seroma formation, such as the use of drains, pressure dressing, flap fixation, fibrin sealants, and harmonic scalpel.^{5,7-10} Application of drains was expected to obtain negative pressure and get rid of the dead space after breast tissue removal and ALND.^{5,7} The timing of drain removal is still a controversy, ranging from within 24 hours to 8 days after surgery or discharge early with the drain *in situ*.^{5,11,12}

On the other hand, the role of drainage is still controversial since some evidence has demonstrated that it does not prevent the formation of seroma.⁵ Use of suction drainage for short periods can prevent seroma or reduce its incidence compared to patients without drainage.¹³ Several recent studies have indicated that there is no difference in seroma formation among no drainage, short, and long interval drainage, while drainage might increase morbidity in patients and length of hospital stay.¹⁴⁻¹⁸ Nevertheless, there were increases in volume, duration, and number of visits for seroma aspiration in the patients without drainage.¹⁶

Closed suction drainage was frequently used in our institute after mastectomy with or without ALND. However, there was no consensus regarding drainage placement and duration of drainage placement. To our knowledge, there was no report that compared seroma formation between mastectomy with and without drainage in Thailand. This study aimed to compare seroma formation and postoperative complications in patients who underwent mastectomy with or without drainage.

PATIENTS AND METHODS

A cohort of female patients with breast cancer or other breast conditions were retrospectively studied at the Division of Head Neck and Breast Surgery, Department of Surgery, Faculty of Medicine, Siriraj Hospital from November 2018 to August 2019. The inclusion criteria were female patients, age 18 years or older, and received total mastectomy with sentinel lymph node biopsy (SLNB) or ALND. The exclusion criteria were: undergoing immediate breast reconstruction, receiving

neoadjuvant treatment, immunocompromised patients, and being discharged with the drain *in situ*. Data including age, body mass index (BMI), antiplatelet or anticoagulant use, preoperative antibiotics, preoperative serum creatinine, preoperative serum albumin, type of surgery, operative time, estimated blood loss, dressing procedure, length of postoperative hospital stay, the weight of the breast specimen, T stage, N stage, incidence of symptomatic seroma, volume of seroma, and duration of seroma were collected. This study was conducted in accordance with the Declaration of Helsinki (as revised in 2013) and approved by the institutional review board of Faculty of Medicine Siriraj Hospital, Mahidol University (certificate of approval number Si 206/2019).

The management of wound drainage in the institution depended on surgeons' preference, ranging from no drain placement, removal of the drains on the third postoperative day, removal of the drains when the volume of drain content is less than 50 milliliters, or discharge the patients with drain *in situ*. The follow-up interval of the patients in both groups depended on symptoms and the volume of aspirated seroma. Symptomatic seroma was diagnosed if the patient had clinically palpated seroma at the time of the outpatient department visit and required aspiration. The duration of seroma was defined as the duration from surgery to the last aspiration.

Two independent proportions formulas were used to calculate sample size. The estimated incidences of seroma formation in the drain group and no drain group were 50% and 75%, respectively. These incidences were estimated according to the incidences of seroma formation and the incidences of seroma requiring drainage reported in the previous retrospective study in patients undergoing total mastectomy with or without axillary surgery.¹⁹ With test significance level 0.05 and 80% power, the number of patients in each group was 58. Categorical data was presented as percentage and analyzed by Chi-square or Fisher's exact test. Quantitative data was presented as mean $\pm$ standard deviation or median (range) and analyzed by a 2-sample t-test or Mann-Whitney U test. All statistical analyses were carried out using SPSS version 21.0 (IBM Corp., NY, USA). A *p*-value of < 0.05 was considered as statistically significant.

RESULTS

A total of 129 patients were included in this study. Closed suction drainage was applied after surgery in 67 patients and classified as the drain group. While 62 pa-

tients did not have drainage and were classified as part of the no drain group. Baseline characteristics of the patients in both groups were not different in terms of age, BMI, antiplatelet or anticoagulant use, preoperative antibiotics, serum creatinine level, type of surgery, operative time, weight of breast specimen, and pathological staging.

Most of the patients had serum creatinine levels within the normal limit (0.51 to 0.95 mg/dL). A few patients had creatinine levels higher than the upper limit. However, the highest creatinine level was 1.3 mg/dL. Three patients in the no drain group had no invasive carcinoma. Two of them had phyllodes tumors and another had atypical ductal hyperplasia. The latter patient had previous contralateral breast cancer, post total mastectomy, and underwent total mastectomy due to the presence of atypical ductal hyperplasia by core needle

biopsy. The majority of patients had T1-T2 stage, 75% in the drain group and 68% in the no drain group. More than half of the patients in both groups had negative pathological nodes.

All of the patients had serum albumin levels within the normal limit (3.5 to 5.2 g/dL). The patients in the no drain group had significantly higher serum albumin levels when compared to those in the drain group ($p = 0.035$). However, the mean difference was 0.11, with a 95% confidence interval of 0.01 to 0.21. All of the patients in the no drain group had external pressure dressings while only 42 patients (63%) in the drain group had pressure dressings after surgery ($p < 0.001$). The median weight of the breast specimen tended to be higher in the no drain group. Estimated blood loss was significantly higher in the no drain group (Table 1).

Table 1 Baseline characteristics of patients

	Drain n = 67	No drain n = 62	p-values
Age (years): mean $\pm$ SD	57.2 $\pm$ 11.8	54.5 $\pm$ 12.1	0.203
BMI (kg/m²): mean $\pm$ SD	23.8 $\pm$ 4.5	24.0 $\pm$ 4.2	0.790
Antiplatelet/anticoagulant: n (%)			
No	61 (91)	60 (97)	0.178
Yes	6 (9)	2 (3)	
Preoperative antibiotics: n (%)			
No	48 (72)	44 (71)	0.933
Yes	19 (28)	18 (29)	
Creatinine level (mg/dL): mean $\pm$ SD	0.72 $\pm$ 0.16	0.71 $\pm$ 0.17	0.552
Albumin levels (g/dL): mean $\pm$ SD	4.42 $\pm$ 0.28	4.53 $\pm$ 0.28	0.035
Pressure dressing: n (%)			
No	25 (37)	0	< 0.001
Yes	42 (63)	62 (100)	
T stage: n (%)			
Tis	13 (20)	8 (13)	0.157
T1	25 (37)	21 (34)	
T2	25 (37)	21 (34)	
T3	4 (6)	9 (15)	
Others	0	3 (4)	
N stage: n (%)			
N0	43 (64)	36 (63)	0.801
N1	17 (26)	13 (23)	
N2	3 (5)	5 (9)	
N3	3 (5)	3 (5)	
Breast weight (g): median (range)	570 (75 - 1,215)	605 (175 - 3,500)	0.138
Estimated blood loss (mL): median (range)	20 (5 - 300)	35 (10 - 850)	0.004
Type of surgery: n (%)			
Total mastectomy $\pm$ SLNB	44 (66)	39 (63)	0.743
Total mastectomy + ALND	23 (34)	23 (37)	
Operative time (min): median (range)	90 (40 - 175)	86.5 (40 - 150)	0.232

The incidence of seroma formation was similar between the two groups. The majority of the patients in both groups had symptomatic seroma requiring aspiration during outpatient department visits. The total volume of aspirated seroma was significantly higher in the no drain group ($p = 0.006$). When combining the volume of seroma that was drained by suction drainage in the drain group with the volume of seroma that was aspirated at the outpatient department, the volume of seroma in the drain group was significantly higher than that in the no drain group ($p = 0.040$).

The duration of seroma resolution was approximately 1 month in both groups. The number of aspirations was higher in the drain group: 2 (0 to 9) vs 3 (0 to 14), $p = 0.031$. The patients in the no drain group had significantly shorter hospital stay, 2 days (1 to 3) vs 4 days (2 to 10), $p < 0.001$, respectively (Table 2). There were no immediate postoperative complications that required reoperation in both groups. Hematoma occurred in one patient without drainage which could be managed conservatively. No patients in either group visited the emergency department due to wound complications.

Table 2 Comparison of outcomes between drain and no drain group

	Drain n = 67	No drain n = 62	p-values
Symptomatic seroma: n (%)			
No	7 (10)	6 (10)	0.885
Yes	60 (90)	56 (90)	
Volume of aspirated seroma, (mL): median (range)	120 (0 - 3,350)	300 (0 - 3,475)	0.006
Drain volume (mL): median (range)	270 (35 - 1,960)	N/A	N/A
Total volume of seroma (drain + aspirated, mL): median (range)	445 (90 - 5,310)	300 (0 - 3,475)	0.040
Time to no seroma (days): median (range)	24 (0 - 163)	25 (0 - 165)	0.346
Number of aspirations: median (range)	2 (0 - 9)	3 (0 - 14)	0.031
Length of postoperative hospital stay (days): median (range)	4 (2 - 10)	2 (1 - 3)	< 0.001

DISCUSSION

Different methods for reducing postoperative seroma formation in breast cancer surgery are currently performed at the authors' institution depending on the surgeon's preference. In this retrospective study, the authors found that closed suction drainage neither reduced the volume of seroma nor the time to no seroma. On the other hand, it resulted in a longer length of hospital stay. The volume of aspirated seroma was significantly higher in the no drain group. In contrast, the total volume of seroma was significantly higher in the drain group.

There were some patients' characteristics that were different between the two groups. The statistically significant higher serum albumin levels in the no drain group had no clinically significant effect on seroma formation since all of the patients had normal serum albumin levels and the mean difference was 0.11 g/dL. The estimated blood loss was higher in no drain group. This might be due to the higher breast weight of the patients in this

group.

The current findings were in concordance with a previous study by Taylor *et al.* The authors found that in the patients with drain placement, the volume of aspirated seroma was lower than in the patients without drainage. However, there was no difference in the incidence of symptomatic seroma, or wound complications.¹⁷ In contrast, the number of aspirations in our study was higher in the no drain group. After the patient with the most aspirations was excluded, the median number of aspirations in the no drain group was 3 (0 to 8). Although the difference was still statistically significant ($p = 0.044$), it might not have clinical significance.

In a systematic review of seven studies that compared wound drainage with no wound drainage in individuals after ALND for breast carcinoma, there was no difference in the wound infection rate between the two groups. The length of the hospital stay was longer in the drain group. Subgroup analysis of the patients who

received mastectomy in 2 studies showed that drainage did not significantly reduce the incidence of seroma formation.¹³ Seroma was formed in response to surgical trauma and the acute phase of wound healing.⁶ Thus, the formation of seroma should be highest in the first 24 hours after surgery and then gradually decrease.

Some studies compared short-term drainage with long-term drainage, but the results were still controversial. Baas-Vrancken Peeters *et al.* reported that short-term drainage (24 hours) after modified radical mastectomy or lumpectomy with ALND did not significantly increase the volume of aspirated seroma. Moreover, it facilitated early hospital discharge compared to long-term drainage, and wound-related complications were quite higher in the patients with long-term drainage.¹² Andeweg *et al.* performed a cohort study to compare the outcome between short-term and long-term axillary drainage after ALND. They found that the patients with short-term drainage had a higher incidence of seroma and a larger volume of aspirated seroma, but this did not lead to wound complications.¹¹

Other techniques were used to reduce postoperative seroma. Application of pressure dressing in patients who underwent modified radical mastectomy resulted in a lower incidence of symptomatic seroma that needed aspiration.²⁰ A randomized controlled trial comparing axillary padding without drainage with closed suction drainage for the axillary wound after ALND in breast conserving surgery showed that axillary padding without drainage was feasible and safe. Postoperative complications and quality of life were similar.²¹ In the present study, while all of the patients in the no drain group received pressure dressings, more than one-third of the patients in the drain group did not receive pressure dressings. When we excluded the patients without pressure dressing, the incidence of seroma in both groups was still similar. This finding might be due to the very low number of patients that did not have seroma.

Jain *et al.* reported that the incidences of seroma formation among the patients with drainage, no drainage, and no drainage with fibrin sealant were not different.¹⁵ However, fibrin sealant in patients without drainage can reduce the volume of aspirated seroma. Purushotham *et al.* compared the patients who underwent conventional mastectomy with drainage and underwent mastectomy with suturing flap without drainage. There was no difference in seroma rates, volume of seroma, fluid aspirated or wound sepsis.¹⁴ This technique was not performed in

our institute. Suturing of the flap might complicate the aspiration of seroma due to multi-loculation created by suturing.

This study had some limitations. The decision to place drains was according to surgeons' preference that might lead to selection bias. This study was a retrospective medical record review with consequent incomplete data retrieval. A randomized controlled trial with an adequate number of patients might be needed to further address this question.

CONCLUSIONS

No drainage is a feasible option in patients undergoing mastectomy in terms of reducing hospital stay, without increasing the incidence of symptomatic seroma and wound complications compared to routine drain placement.

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บทคัดย่อ การศึกษาเปรียบเทียบระหว่างการใส่สายระบายและการไม่ใส่สายระบายที่แผลผ่าตัดในผู้ป่วยที่ได้รับการผ่าตัดเต้านมออกทั้งเต้า

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ความเป็นมาและวัตถุประสงค์: การเกิดน้ำเหลืองที่แผลผ่าตัดเป็นภาวะแทรกซ้อนที่พบบ่อยที่สุดหลังการผ่าตัดเต้านมออกทั้งเต้าหรือการผ่าตัดเต้านมและต่อมน้ำเหลืองรักแร้ ความสำคัญของการใส่ระบายที่แผลผ่าตัดยังคงเป็นที่ถกเถียงกันอยู่ มีการศึกษาที่รายงานว่า การใส่สายระบายไม่สามารถป้องกันการเกิดน้ำเหลืองในแผลผ่าตัดได้ การศึกษานี้มีวัตถุประสงค์เพื่อประเมินการเกิดน้ำเหลืองและภาวะแทรกซ้อนหลังการผ่าตัดในผู้ป่วยที่ตัดเต้านมออกทั้งเต้าโดยมีการใส่หรือไม่ใส่สายระบายที่แผลผ่าตัด

วิธีการศึกษา: ผู้ป่วยมะเร็งเต้านมหรือโรคเต้านมอื่นๆ ถูกคัดเลือกจากสาขาศัลยศาสตร์ศีรษะ คอ และเต้านม ภาควิชาศัลยศาสตร์ โรงพยาบาลศิริราช ตั้งแต่เดือนพฤศจิกายน 2561 ถึง สิงหาคม 2562 โดยผู้ป่วยแบ่งออกเป็นกลุ่มใส่สายระบายและไม่ใส่สายระบาย ทำการเปรียบเทียบข้อมูลทางพยาธิวิทยาคลินิก การเกิดน้ำเหลืองในแผลผ่าตัดและภาวะแทรกซ้อนหลังการผ่าตัด

ผลการศึกษา: ในการศึกษานี้มีผู้ป่วยทั้งหมด 129 ราย ผู้ป่วยที่มีการใส่สายระบาย 67 ราย และผู้ป่วยที่ไม่ใส่สายระบาย 62 ราย อุบัติการณ์การเกิดน้ำเหลืองใกล้เคียงกันทั้งสองกลุ่ม ปริมาตรของน้ำเหลืองที่ดูดได้ในกลุ่มไม่ใส่สายระบายสูงกว่ากลุ่มใส่สายระบายอย่างมีนัยสำคัญ ($p = 0.010$) เมื่อรวมปริมาตรของน้ำเหลืองจากสายระบายและน้ำเหลืองที่ดูดได้เข้าด้วยกันพบว่ากลุ่มที่ใส่สายระบายมีปริมาตรสูงกว่าในกลุ่มไม่ใส่สายระบายอย่างมีนัยสำคัญ ($p = 0.020$) ผู้ป่วยในกลุ่มไม่ใส่สายระบายมีระยะเวลาพักรักษาตัวในโรงพยาบาลสั้นกว่าอย่างมีนัยสำคัญ คือ 2.0 (1.0-3.0) เทียบกับ 4.0 (2.0-10.0) วัน ($p < 0.001$)

สรุปผลการศึกษา: การผ่าตัดเต้านมออกทั้งเต้าโดยไม่ใส่สายระบายสามารถทำได้ สามารถลดระยะเวลาการพักรักษาตัวในโรงพยาบาลโดยไม่เพิ่มอุบัติการณ์การเกิดน้ำเหลืองในแผลผ่าตัดและไม่เพิ่มภาวะแทรกซ้อนหลังการผ่าตัด