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Correlation between Obesity and Seroma Following Modified Radical Mastectomy

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Abstract

Introduction. Obesity becomes one of concern for surgeon as it provides additional morbidity in breast cancer. It influences the healing process negatively, and increase the complications following mastectomy. The most often found complication is seroma. Its incidence in obese is found higher than non–obese patient. Studies evaluating the correlation between obesity and seroma showed controversy. Hence, we run a study aimed to find out such a correlation in our characteristics.
Method. We conducted cross sectional study. All patients treated with modified radical mastectomy (MRM) during period of 2013 to 2014 were included. Subject characteristics were recorded, including age, body mass index (BMI). Bilateral breast malignancy, diabetes mellitus and hypertension were excluded. Drain production and infection, and length of stay was recorded. Kolmogorov Smirnov test is used to find out normal distribution. In normal distribution, Pearson test or Spearman's is used to find out correlation.
Results. Out of 72 samples underwent MRM and drainage, there were 67 enrolled. The mean age was found of 48.5±8.5 years, and mean BMI of 25.43 kg/m^2 ± 4.08. Length of stay ranged of 3–8 days and mean total seroma production was found of 502.3 mL ± 207.8. We found moderate positive linear correlation between obesity and seroma ($r = 0.581$; $p < 0.01$; $r2 = 0.338$) rolled of 33.8% and strong positive linear correlation between seroma and length of stay ($r = 0.581$; $p < 0.01$; $r2 = 0.542$) rolled of 52.4%.
Conclusion. We found positive linear correlation between seroma and obesity, and positive linear correlation between seroma and length of stay.

Keywords: *seroma, obesity, modified radical mastectomy*

Introduction

Obesity is a common health problem in the modern era. Of 35% adults population worldwide encountered overweight, and 12% referred to obesity.[1,2] In Indonesia, the prevalence of obesity in female in 2013 is about 32.9%, increased up by15.5% compared to 2010.[3] This obesity was found to be one of risk factor in breast cancer, particularly those in post menopause period.[4] Furthermore, it is known that obesity found to be correlated with poor prognosis, delayed healing and postoperative complication.[5–7] This indicate the magnitude of problem since breast cancer referred to the main contributor to mortality with incidence of 38 per 100.000 women, meanwhile in Indonesia there were 26 per 100.000 women reported.[8]

Surgery remain the first of choice in treatment of breast cancer; for those who met operability criteria. Modified radical mastectomy (MRM) is one of modality,[9] and total seroma following mastectomy is then a great deal of problem found. As the natural process of healing, increase of capillary permeability and fluid shifts let the accumulation of serous fluid in interstitial space with consequent seroma formation.[10–12] Postoperative seroma is a common encountered problem following mastectomy.[13] The incidence is varying about 10–85%, and found to be subsided in days or weeks.[13,14] Nevertheless, the incidence of seroma in obesity was found to be increased up. The only explanation for this is that fluid accumulation is complimented by alteration in the lymphatic system.[9–11,15–17] Drain placement postoperatively is then the option to let the fluid out, which is aimed to reduce the negative effect of accumulation and seroma production.[13,18,19] Indeed, this seroma production referred to multifactorial, and obesity is the one, and of course the use of drain itself.[18] However, drain tube as a foreign body induces the inflammatory process with exudation. Thus, long term use of drain let the production of seroma turns up. Patient's discomfort, issue of pain, and length of stay as well as cost will increase up, consequently.[13,18] Drain placement following MRM contributes to hospital stay since drain tube should be removed prior to patient discharge.[18] Obesity which is increased of body mass index (BMI) indeed is thought to be correlated with drain production. Thus, high BMI referred as a risk factor in the development of postmastectomy seroma.[9,16,20]
Studies conducted shows controversy.[21] Hence, we run a study to find out such correlation in our patients with certain characteristics.

Method

We run a study in Department of Surgery, RSUPN dr. Cipto Mangunkusumo. Target population is women who diagnosed as unilateral breast cancer following MRM, and affordable population is women who diagnosed as unilateral breast cancer and treated with MRM followed by drain placement in RSUPN dr. Cipto Mangunkusumo during period of 2013–2014. Bilateral breast cancer, diabetic and hypertensive patients were excluded. Body weight and –height is recorded in measuring BMI as independent variable; so, does drain production and length of stay, both as dependent variable. Data is processed using SPSS ver. 20.0. We presented subject characteristic descriptively. We preceded distribution test using normality test of Kolmogorov Smirnov as n values >50 with $p = 0.05$. If p value >0.05, then the distribution referred to normal, and data is

represented in mean ad standard deviation (± 2 SD). If p value of <0.05, then the distribution is abnormal, and data is represented in median and range. Correlation of BMI value (numerical) and total seroma (numerical), and total seroma (numerical) and length of stay (numerical) are subjected to Pearson correlation test if a variable normally distributed and linearity condition is met. If variables found distributed abnormally, then transformation is preceded. Hypothetical test to be used is depend on the value of transformation. If following transformation procedure then the variable is distributed normally, and the criteria of linearity is met, we proceeded the correlation test of Pearson. In contrast, if the variables distributed abnormally, then Spearman test is to be used. Furthers, when linearity criteria are not met, the correlation test is not to be preceded. In this case, comparative test is should be carried out first through variables categorization. Ethical committee of FMUI and research bureau of RSUPN dr. Cipto Mangunkusumo approved the study (743/UN2.F1 /ETIK/2015, 7 September 2015).

Results

Out of 78 patients who diagnosed as breast cancer, there were 67 subjects enrolled. Eight subjects were excluded, i.e. four were bilateral, two with comorbid i.e. diabetes mellitus and hypertension, and two because insufficient data. Further, three subjects who's formerly included were not enrolled in statistical analysis as it found as an outlier during assessment in the distribution test. There were 2 (3%) subjects with underweight, 15 (22.4%) normal, 13 (19.4%) overweight at risk, 26 (38.8%) categorized as obese I and 11 (16.4%) categorized as obese II. Subject characteristics are seen in table 1. Correlation test of BMI showed a normal distribution (p = 0.2) and so does total seroma production (p = 0.2), but we found the distribution of length of stay showed abnormal one (p = 0.000).

Since both of numerical variables showing a normal distribution, in assessment of the correlation test between obesity and total seroma, we used Pearson method. The linearity of correlation between BMI and total seroma is seen in table 1. The coefficient determinant (R^2) in this study was 0.338, suggesting a moderate correlation. Further, we found the correlation between BMI and total seroma was significant (p = 0.000) with Pearson correlation of 0.581 (see figure 1). Whilst, in assessment of the correlation between length of stay and total seroma we found the coefficient determinant (R^2) in this study was 0.542, suggesting a strong correlation. The correlation was found significant (p = 0.000) with Pearson correlation of 0.736.

Table 1. Subjects characteristic

Variable	Mean (±SD)	Median	Min–Max
Age (years)	48.5 (±8.5)	49	33–69
Body weight (kg)	61.5 (±10,5)	60	40–90
Height (m)	1.55 (±0.06)	1.55	1.43–1.77
BMI (kg/m^2)	25.43 (±4.08)	25.39	16.65–35.59
Length of stay (days)	4.6 (±1.5)	4	3–8
Total seroma (mL)	502.3(±207,8)	504	134–990
Daily seroma (mL)	109.,6 (±32.1)	106.7	44.7–170.8

BMI body mass index.

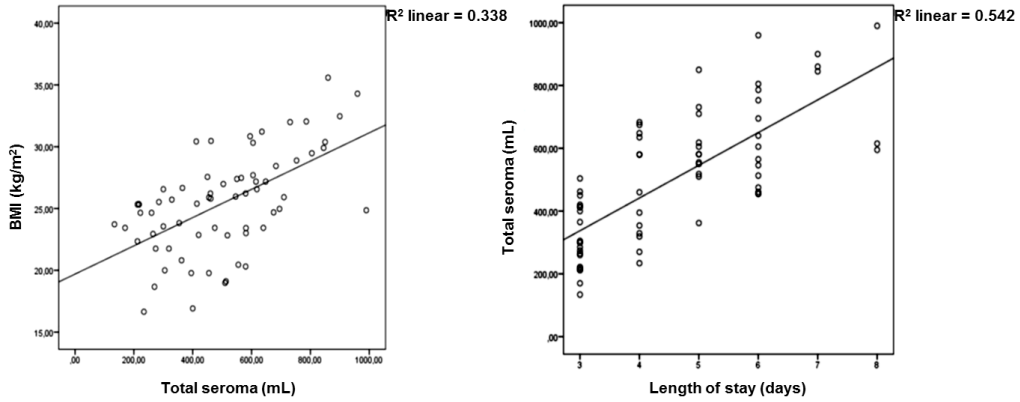

Figure 1. Linear correlation between body mass index (BMI) with total seroma (left) with value of 0.338 (moderate ion) and total seroma with length of stay (right) with value of 0.54 (strong correlation).

Discussion

We enrolled 67 subjects who met the inclusion criteria as we excluded 8 of 78 total population, and three subjects whose were outlier to the distribution. These 67 subjects were found more than the minimal (58) calculated required samples. Those who excluded were subjects that realized to be the confounding factors in seroma production. Although in some literatures were showed and suggested that these entities have no correlation with seroma formation,[9,11,40] anyhow, we decided not to enroll. We were also decided not to be distracted to obtain further information about diabetes and hypertension as the risk factor.

In the study we found mean age of subjects was like those reported by Maria and colleagues (42.56 years ± 8.77 ranged of 30–57 years)[42] and differed to those reported by Banerjee and colleagues (median age of subjects of 62.38 years ranged of 36–90 years).[15] This difference might be related to different subject of population. Banerjee and colleagues investigated the subjects in a well–developed country with high life expectancy compared to developing country as Indonesia. However, reported data shows different incidence of breast cancer in different center.

The mean BMI of subjects in the study somehow more less like the works of Banerjee and colleagues (26.83 kg/m^2 ±4.71) and Maria and colleagues (24.7 kg/m^2 ± 4.2).[15,49] In our study, the subjects was predominantly categorized as obese I with BMI of 25–29.9 kg/m^2 (38.8%), overweight at risk (19.4%) and obese II (16.4%). This data showed that obese subjects are at risk for breast cancer.

The median of hospital stays (4 days, ranged of 3–8 days) found to be differed with those reported by Banerjee and colleagues (median 8.3 days, ranged of 3–17 days).[15] In this study, we found that subjects were discharged following drain removal.

The characteristic of seroma formation was assessed through total drain production during in ward period. Our findings were slightly lower than those reported by Banerjee and colleagues (median total seroma 1146 mL, ranged of 130–3190 mL, median daily seroma 159 mL).[15] This explains why length of stay in this study is less than those reported by Banerjee and colleagues.

Obesity invites special attention to surgeons as a risk factor in breast cancer. Furthermore, obesity plays a role in healing process negatively, and potential of complication following the procedure of mastectomy,[6–8] as those reported by Forouhi and colleagues. He reported 75 subjects of breast cancer who treated with mastectomy, and found significant correlation between obesity and complication after mastectomy ($p = 0.015$).[15] Banerjee and colleagues reported that total drainage volume in those with obesity is higher than those with no obesity (note that he used BMI criteria >30kg/m^2) significantly with p value <0.05.[15] Other study run by Werner and colleagues reported 282 subjects of breast cancer stage I and II who radiated following mastectomy. His investigation found that BMI is a factor strongly correlated to edema formation.[15]

BMI has a positive linear correlation with seroma formation, and it has been predicted that those with high BMI produce seroma more than those with lower BMI.[9,15,41] In the study we found a moderate positive correlation (coefficient correlation of 0.581), a linear correlation statistically significant ($p < 0.01$) between BMI and total seroma with coefficient determinant (R^2) of 0.338 and this indicates that BMI contributed to total seroma formation during hospitalization as much as 33.8%. This was found like those reported by Banerjee, there's positive moderate linear correlation between volume of drainage and BMI in subjects with breast cancer underwent MRM with or without axillary dissection or wide excision.[15]

Indeed, seroma formation is influenced by many factors. This including BMI, surgical techniques and extent of axillary dissection, the use of drain, and negative pressure on drain.[18,37,39,40] Seroma formation in turn will increase morbidity up, longer hospital stays, and cost.[19] In this study, we were focused to find out correlation between obesity and total seroma formation and length of stay; we were not focused to any other risk factor previously mentioned. And what we found was a correlation between obesity and seroma formation. Hence, in dealing with breast cancer in obese, surgeon should be concerned about the possibility of extension of axillary dissection with consequent more postoperative seroma formation.

Drain tube placement following mastectomy is addressed to drain accumulated serous fluid that impacts the healing process as covering flap of anterior chest may be distended. Distended flap compromises the perfusion with consequent flap necrosis as well as infection. In contrast, it should be realized the drain itself is a foreign matter promotes seroma formation. A longer drain placement lead to more seroma formation.[16,19,20] The judgment to place a drain should be based on the information that drain contributed to length of hospital stay. We did believe it as we found all subjects were discharged following drain removal.[19] We found that total seroma has a strong positive correlation to length of stay (coefficient correlation of 0.736) with coefficient determinant (R^2) of 0.542 which is, total seroma contributed to length of stay, with contribution as much as 54.2%. The process of healing is run as total seroma formation decreased, where seroma production reduces significantly.[45] In general, drain removal is preceded when seroma production reach of 35–50 mL per 24 hours.[16,17,46]

Obesity which is assessed through BMI is a predisposing factor and contributed to formation of seroma. Further, it contributed to length of stay of subjects with breast cancer underwent mastectomy. Accumulated serous fluid requires repetitive paracentesis and aspiration to remove seroma out. This is somehow unfavorable since it injured compromised flap, painful, infection susceptive, and induces morbidity. In contrast, drain placement induces pain, subjects' discomfort, activity limitation particularly to emerge postoperative shoulder exercise, and lead to delayed administration of adjuvant therapy. These will let a longer hospital stay.[9,18,20,39]

We conclude that obesity has a moderate positive correlation to total seroma and seroma formation has a strong positive correlation with length of stay in breast cancer with obesity. Hence, obese subjects with breast cancer should be informed, special attention is to be paid to the possibility of seroma formation, the use of drain and long hospital stay. For surgeons, awareness to such problems concern to seroma, a good surgical technique (meticulous dissection, gentle hemostasis, anchor sutures), and the use of compressing external bandage to diminish dead space and seroma production are clues to achieve a successful treatment.

References

1. Arnold M, Pandeya N, Byrnes G, Renehan AG, Stevens GA, Ezzati M, et al. Global burden of cancer attributable to high body mass index in 2012: a population based study. Lancet Oncol 2015;16:36–46.
2. Zieliński J, Jaworski R, Irga N, Kruszewski JW, Jaskiewicz J. Analysis of selected factors influencing seroma formation in breast cancer patients undergoing mastectomy. Arch Med Sci 2013;9(1):86–92.
3. Badan Penelitian and Pengembangan Kesehatan Kementerian Kesehatan RI. Riset Kesehatan Dasar. Jakarta: Badan Penelitian and Pengembangan Kesehatan Kementerian Kesehatan RI; 2013. p.209–23.
4. Assi HA, Khoury KE, Dbouk H, Khalil LE, Mouhieddine TH, El Saghir NS. Epidemiology and prognosis of breast cancer in young women. J Thorac Dis 2013; suppl1:2–8.
5. Kementerian Kesehatan RI. Pedoman teknis pengendalian kanker payudara and kanker leher rahim. Jakarta: Kementerian Kesehatan RI; 2010. p.4–7.
6. Haakinson DJ, Leeds SG, Dueck AC, Gray RJ, Wasif N, Stucky CC, et al. The impact of obesity on breast cancer: a retrospective review. Ann Surg Oncol 2012;19:3012–18.
7. Pierpont YN, Dinh TP, Salas RE, Johnson EL, Wright TG, Robson MC, et al. Obesity and surgical wound healing: a current review. ISRN Obes 2014;1–13.
8. Sood A, Abdollah F, Sammon JD, Majumder K, Schmid M, Peabody JO, et al. The effect of body mass index on perioperative outcomes after major surgery: results from the national surgical quality improvement program (acs–nsqip) 2005–2011. World J Surg 2015; 39(10):2376–85.
9. Raghavendra K. To study the factors influencing seroma formation after modified radical mastectomy. Bangalore: Rajiv Gandhi University; 2011. p.1–83.
10. Luttrell T. Effect of obesity on chronic wound healing. Missouri (USA): UMI Dissertation Publishing; 2012. p.1–57
11. Guo S, DiPietro LA. Factors affecting wound healing. J Dent Res 2010;89(3):219–29.
12. Baxter H. Management of surgical wounds. Nurs Times 2003;99(13): 66–8.
13. McCaul JA, Aslaam A, Spooner RJ, Louden I, Cavanagh T, Purushotham AD. Aetiology of seroma formation in patients undergoing surgery for breast cancer. The Breast 2000;9:144–8.
14. Stanczyk M, Grala B, Zwierowicz T, Maruszynski. Case report: Surgical resection for persistent seroma, following modified radical mastectomy. World J Surg Oncol 2007;5–104.
15. Banerjee D, Williams EV, Ilott J, Monypenny JJ, Webster DJT. Obesity predisposes to increased drainage following axillary node clearance: a prospective audit. Ann R Coll Surg Eng 2001;83:268–71.
16. Weitman ES, Aschen SE, Eisner GF, Albano N, Cuzzone DA, Ghanta S, et al. Obesity impairs lymphatic fluid transport and dendritic cell migration to lymph nodes. PLoS ONE 2013;8(8):1–15.

17. Mehrara BJ, Greene Ak. Lymphedema and obesity: is there a link? Plast Reconstr Surg 2014;134(1):154–60.
18. Chintamani, Singhal V, Singh JP, Bansal A, Saxena S. Half versus full vacuum drain suction age after modified radical mastectomy for breast cancer a prospective randomized clinical trial. BMC Cancer 2005;5(11):1–5.
19. Durai R, Mownah A, Philip CH. Use of drain in surgery: a review. J Perioper Pract 2009;19(6):180–6.
20. Azamris. Perbandingan efektivitas lama pemakaian drain pasif untuk mencegah seroma pasca modified radical mastectomy. Cermin Dunia Kedokteran 2015;42(2):92–5 (article in Bahasa Indonesia).
21. Kuroi K, Shimozuma K, Taguchi T, Imai H, Yamashiro H, Ohsumi S, Saito S. Evidence based risk factors for seroma formation in breast surgery. Jpn J Clin Oncol 2006;36:197–206.
22. Sandjaja S. Prevalensi gizi lebih and obesitas penduduk dewasa di Indonesia. Gizi Indonesia 2005;31:1–7 (article in Bahasa Indonesia).
23. Zimmet SP, Caterson I, Chunning C, Ikeda Y, Khalid Ak. The Asia Pacific perspective: redefining obesity and its treatment. Australia: Health Communication publishing; 2000.p.19–21.
24. Surgical guidelines for the management of breast cancer, association of breast surgery at BASO. Eur J Surg Oncol 2009:suppl.1–22.
25. Manuaba IBTW, editor. Perhimpunan dokter spesialis bedah onkologi: Panduan penatalaksanaan kanker solid. Jakarta: Sagungseto; 2010. (Text in Bahasa Indonesia)
26. Ogundiran TO, Ayandipo OO, Ademola AF, Adebamowo CA. Mastectomy for management of breast cancer in Ibaand, Nigeria. BMC Surg 2013;13(59):1–9.
27. Jatoi I, Kaufmann M, Petit JY. Atlas of breast surgery. German: Springer; 2006.
28. Kass RB, Lind DS, Souba WW. Breast procedure. In: Souba WW, Fink MP, Jurkovic J, editors. ACS surgery principles and practice. 6th ed. New York: WebMD Inc; 2007.
29. Waassung K. The role of inflammation in the healing process. [2012] [cited 2015 Jan 25]. Available from: http://cichirowc.com/uploads/20120130
30. Kumar V, Abbas AK, Fausto N, Robbins SL, Cotran RS. Tissue renewal and repair: Regeneration, healing, and fibrosis. In: Robbins and Cochtran Pathologic basis of disease. Ed.7th Philadelphia: Elsevier Saunders; 2005.
31. Wilson JA, Clack JJ. Obesity: Impediment to postsurgical wound healing. Adv Skin Wound Care 2004;17(8);426–35.
32. Hess CH. Checklist for factors affecting wound healing. Adv Skin Wound Care 2011;24(4):192–5.
33. Greenberg AS, Obin MS. Obesity and the role of adipose tissue in inflammation and metabolism. Am J Clin Nutr 2006;83suppl:461–5.
34. Vachharajani V, Neil D. Adipose tissue: a motor for the inflammation associated with obesity. IUBMB Life 2009;61(4):424–30.
35. Davis LV, Rose DP. The obesity inflammation eicosanoid axis in breast cancer. J Mammary Gland Biol 2013;18:291–307.
36. Alawad AA. Factors predicting seroma formation following breast cancer surgery: a concise review. Int Res Med Sci 2014;2(6):85–91.
37. Kuroi K, Shimozuma K, Taguch T, Imai H, Yamashiro H, Ohsumi S, Saito S. Pathophysiology of seroma in breast cancer. Breast Cancer 2005;12(4):288–93.
38. Vitug AF, Newman LA. Complications in breast surgery. Surg Clin North Am 2007;87:431–51.
39. Dahri FJ, Awan MS, Qazi AR, Khaskheli NM, Soomro IA. Early wound complications following modified radical mastectomy with axillary clearance. J Surg Pak 2011;16(4):165–9.
40. Srivastava V, Basu S, Shukla VK. Seroma formation after breast cancer surgery: what we have learned in the last two decades. J Breast Cancer 2012;15(4):373–80.
41. Prabhu N. Factors that affect total inpatient drainage output after TRAM flap surgery. J Young Investig 2002;6(1):1–5.
42. Maria K, Kurnia A. Evaluasi pembentukan seroma pasca mastektomi: yang dilakukan pencabutan drain dalam 2 hari pertama. Jakarta: Universitas Indonesia; 2012.p.1–26. (Text in Bahasa Indonesia).
43. Abulnagah G, Fayoumi T, Lotfy H, Shehab W, Tarek A. Comparative study between using harmonic scalpel and electrocautery in modified radical mastectomy. Egypt J Surg 2007;26(4):176–80.
44. Hashemi E, Kaviani A, Najafi M, Ebrahimi M, Hooshmand H, Montazeri A. Seroma formation after surgery for breast cancer. World J Surg Oncol 2004;2:44–9.
45. Sakkary MA. The value of mastectomy flap fixation in reducing fluid drainage and seroma formation in breast cancer patients. World J Surg Oncol 2012;10(8):1–6.
46. Hokkam E, Farrag S, Khammash S. Tetracycline sclerotherapy in treating postmastectomy seroma: a simple solution for a frequently occurring problem. Egypt J Surg 2009;28(3):99–104.
47. Cleg–Lamptey JNA, Dakubo JCB, Hodasi WM. Comparison of four day and ten day post mastectomy passive drainage in Accra, Ghana. East Afric Med J 2007;84(12):561–5.
48. Murray JD, Elwood ET, Jones GE, Barrick R, Feng J. Decreasing expander breast infection: a new drain care protocol. Can J Plast Surg 2009;17(1):17–21.
49. Barwell J, Campbell L, Watkins RM, Teasdale C. How long should drain suction s stay in after breast surgery with axillary dissection? Ann R Coll Surg Engl. 1997;79:435–7.