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Literature search results

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Search details

Drainage of seroma following breast cancer surgery-wide local excision, or mastectomy, or axillary node sampling/clearance or sentinel lymph node biopsy. Updates since 2007.

Resources searched

NHS Evidence; TRIP Database; Cochrane Library; AMED; BNI; CINAHL; EMBASE; HMIC; Health Business Elite; MEDLINE; PsychINFO; Google Scholar; Google Advanced Search

Database search terms: seroma, seroma drainage, breast cancer

Evidence search string(s):

Google search string(s): (seroma drainage)AND(breast cancer OR mastectomy OR axillary node sampling/clearance OR sentinel lymph node biopsy)

Summary

There are a number of updates which have been published since 2007. Some deal more with the surgical aspects rather than any thing which might be soley regarded as a nurse-led activity, but these items are included for interest as well.

Guidelines and Policy


Clinical standards for working in a breast speciality, RCN, 2007 (I’m sure you will have this!)
Evidence-based reviews

1. Whether drainage should be used after surgery for breast cancer? A systematic review of randomized controlled trials.

Citation: Medical Oncology, December 2011, vol./is. 28 Suppl 1/(S22-30), 1357-0560;1559-131X (2011 Dec)
Author(s): He XD; Guo ZH; Tian JH; Yang KH; Xie XD
Language: English
Abstract: A systematic review of randomized controlled trials (RCTs) was conducted to evaluate whether patients benefit from the suction drainage after axillary lymph node dissection (ALND) in breast cancer surgery. RCTs of drainage versus no drainage after ALND in women with breast cancer were retrieved from PubMed, EMBASE, Cochrane Library and Chinese Biomedical database. Two authors independently assessed the quality of included trials and extracted data. Odds ratio (OR) for dichotomous outcomes and mean difference (MD) for continuous outcomes were presented with 95% confidence intervals (CI). A total of 1115 titles were indentified from the databases; 1109 obvious irrelevant studies were excluded by examining the titles, abstracts, full texts because of duplicates, no RCT, different modality of drainage, drain for lymphedema, application of fibrin sealant and so on. And then, only 6 RCTs to compare drainage with no drainage after ALND in breast cancer surgery were included in the systematic review and a total of 585 patients were included in the pathological diagnosis of breast cancer in women before surgery, management by ALND with or without addition surgical procedures. The study demonstrated that insertion of a drain in the axilla after breast cancer surgery resulted in a statistically significant reduction in the rate of seroma (OR = 0.36, 95% CI, 0.16 to 0.81, P = 0.01), the volume of aspiration (MD = -100.10, 95% CI, -174.36 to -25.85, P = 0.008), or the frequency of seroma aspiration (MD = -1.03, 95% CI, -1.35 to -0.71, P < 0.00001), but prolonged the length of hospital stay (MD = 1.52, 95% CI, 0.36 to 2.68, P = 0.01). There was no statistically significant difference in the incidence of wound infection (OR = 0.67, 95% CI, 0.34 to 1.32, P = 0.25) between drainage group and no drainage group. Based on the current evidence, insertion of a drain in the axilla following ALND in breast cancer surgery effectively decreased seroma formation, volume of aspiration as well as the frequency of seroma aspiration without increasing the incidence of wound infection, but extending their stay in hospital.
Publication Type: Journal Article; Review
Source: MEDLINE


Citation: European Journal of Surgical Oncology, October 2011, vol./is. 37/10(829-35), 0748-7983;1532-2157 (2011 Oct)
Author(s): van Bemmel AJ; van de Velde CJ; Schmitz RF; Liefers GJ
Language: English
Abstract: BACKGROUND: The most common complication after breast cancer surgery is seroma formation. It is a source of significant morbidity and discomfort. Many articles have been published describing risk factors and preventive measures. The aim of this paper is to provide a systematic review of studies and reports on risk factors and preventive measures. Surgery lies at the core of seroma formation; therefore focus will be placed on surgical ways of reducing seroma.METHODS: A computer assisted medline search was carried out, followed by manual retrieval of relevant articles found in the reference listings of original articles.RESULTS: 136 relevant articles were reviewed. Though the level of evidence remain varied several factors, type of dissection, tools with which dissection is carried out, reduction of dead space, suction drainage, use of fibrin glue and octreotide usage, have been found to correlate with seroma formation and have been shown to significantly reduce seroma rates.CONCLUSION: Seroma formation after breast cancer surgery cannot be avoided at present. There are however several methods to minimize seroma and associated morbidity. Future research should be directed towards the best ways of reducing seroma by combining proven methods. Copyright 2011 Elsevier Ltd. All rights reserved.
Publication Type: Journal Article; Review
Source: MEDLINE
Full Text: Available from European Journal of Surgical Oncology

Wound drainage after axillary dissection for carcinoma of the breast (Protocol)
### Published research – Databases

#### 4. Prevention of seroma formation after axillary dissection-a comparative randomized clinical trial of three methods.

**Citation:** Breast Journal, September 2013, vol./is. 19/5(478-84), 1075-122X;1524-4741 (2013 Sep)

**Author(s):** Kottayasamy Seenivasagam R; Gupta V; Singh G

**Language:** English

**Abstract:** Seroma is a frequent complication after breast cancer surgery. Closed suction drainage for several days is the standard procedure to reduce seroma formation. The aim of this study was to compare the efficacy of external compression dressing, suture flap fixation, and the conventional method of closed suction drains in the prevention of seroma formation. A total of 161 patients were prospectively randomized in a three groupsxtwo subgroups design into control (n=48), compression dressing (n=53) and suturing groups (n=49), and two subgroups, conventional drain removal (n=75) and early drain removal (n=75). All patients underwent ALND as part of MRM or BCT. The primary end point was the incidence of seroma. Suture flap fixation significantly reduced the incidence of seroma (p=0.003), total drain output (p=0.005), and duration of drainage (p=0.001) without increase in wound complications. Compression dressing reduced duration of drainage significantly (p=0.03), but not the total drain output (p=0.15) or seromas (p=0.58). Early drain removal on postoperative day 7 irrespective of drain output does not significantly increase seroma formation (p=0.34) or wound complications. On multivariate analysis, BMI>=30 (p=0.02) and longer duration of drainage (p=0.04) were identified as independent predictors for seroma formation. Obliteration of the dead space after breast cancer surgery by suture flap fixation is a safe and easy procedure, which significantly reduces postoperative seroma formation and duration of drainage. Compression dressing offers no advantage over normal dressing. Drains can be removed safely on postoperative day 7 irrespective of output without significant increase in complications. 2013 Wiley Periodicals, Inc.

**Publication Type:** Journal Article

**Source:** MEDLINE


**Citation:** European Journal of Surgical Oncology, September 2013, vol./is. 39/9(1036), 0748-7983;1532-2157 (2013 Sep)

**Author(s):** Wielogorska N

**Language:** English

**Publication Type:** Letter

**Source:** MEDLINE

**Full Text:** Available from European Journal of Surgical Oncology

#### 6. Seroma formation after breast cancer surgery: what we have learned in the last two decades.

**Citation:** Journal of Breast Cancer, December 2012, vol./is. 15/4(373-80), 1738-6756;1738-6756 (2012 Dec)

**Author(s):** Srivastava V; Basu S; Shukla VK

**Language:** English

**Abstract:** Formation of a seroma most frequently occurs after mastectomy and axillary surgery. Prolonged drainage is troublesome as it increases the risk for infection and can significantly delay adjuvant therapy. Seroma has been defined as serous fluid collection under the skin flaps or in the axillary dead space following mastectomy and/or axillary dissection. Because the true etiology of a seroma is unknown, a multifactorial-causation hypothesis has been accepted. Surgical factors include technique, extent of dissection and the surgical devices used for dissection. Obliteration of dead space with various flap fixation techniques, use of sclerosants, fibrin glue and sealants, octreotide, and pressure garments have been attempted with conflicting results and none have been consistent. Early movement of the shoulder during the postoperative period may increase the
formation of seroma, although delayed physiotherapy decreases the formation of seroma. A detailed analysis of the use of drains showed that use of single or multiple drains, early or late removal, and drains with or without suction are not significantly different for the incidence of seroma. Although there is evidence for reduced seroma formation after early drain removal, very early removal within 24 hours seems to increase formation of seroma. No patient or tumor factors seem to affect seroma formation except body mass index and body weight. Consensus is lacking among studies/trials with different groups producing conflicting evidence. Besides a few established factors such as body mass index, the use of electrocautery for dissection, early drain removal, low vacuum drains, obliteration of dead space, and delayed shoulder physiotherapy, most of the hypothesized causes have not been demonstrated consistently. Thus, seroma remains a threat to both the patient and surgeon. Recurrent transcutaneous aspiration remains the only successful management.

**Publication Type:** Journal Article  
**Source:** MEDLINE

**7. Effectiveness of OK-432 (Sapylin) to reduce seroma formation after axillary lymphadenectomy for breast cancer.**  
**Citation:** Annals of Surgical Oncology, May 2013, vol./is. 20/5(1500-4), 1068-9265;1534-4681 (2013 May)  
**Author(s):** Yang Y; Gao E; Liu X; Ye Z; Chen Y; Li Q; Qu J; Dai X; Wang O; Pan Y; Zhang X  
**Language:** English  
**Abstract:** BACKGROUND: The occurrence of seroma formation after axillary lymphadenectomy for breast cancer cannot be ignored. Various approaches have been used in an effort to reduce it, but these results are still controversial. We aimed to describe a new method of application of OK-432 (Sapylin, heat-treated Su strain of Streptococcus) to reduce seroma formation after axillary lymphadenectomy for breast cancer and to verify the safety and efficacy of it as a beneficial supplement for conventional surgery. METHODS: A prospective, randomized analysis of consecutive quadrantectomy or mastectomy plus axillary lymphadenectomy using or not using OK-432 was designed. From July 2010 to November 2011, a total of 111 patients were enrolled in this prospective, randomized study and completed the follow-up. OK-432 applied to the axillary fossa plus placement of closed suction drainage was used in 54 patients (the experimental group); placement of closed suction drainage was used in 57 patients (the control group). RESULTS: There were no statistical significance between the two groups in terms of age, body mass index, treatment received, tumor size, number of removed lymph nodes, and lymph node status. Postoperative drainage magnitude and duration were significantly reduced in the experimental group (P = 0.008 and 0.003, respectively). One week after hospital discharge, fewer patients developed a palpable seroma in the experimental group: 10 in the experimental group versus 28 in the control group (P = 0.001). Fewer seromas needed aspiration (mean 1 [range 0-3] in the experimental group vs. mean 4 [range 1-5] in the control group; P < 0.001). There were no significant differences in terms of the incidence of complications associated with axillary lymphadenectomy (P = 0.941). CONCLUSIONS: OK-432 is a feasible and safe option for axillary lymphadenectomy for breast cancer. The use of it does not always prevent seroma formation, but it can reduce drainage magnitude and duration, as well as decrease the incidence of seroma after the removal of drainage. It may be increasingly conducted in day surgery clinics.

**Publication Type:** Journal Article; Research Support, Non-U.S. Gov't  
**Source:** MEDLINE

**8. Breast cancer surgery without suction drainage: the impact of adopting a 'no drains' policy on symptomatic seroma formation rates.**  
**Citation:** European Journal of Surgical Oncology, April 2013, vol./is. 39/4(334-8), 0748-7983;1532-2157 (2013 Apr)  
**Author(s):** Taylor JC; Rai S; Hoar F; Brown H; Vishwanath L  
**Language:** English  
**Abstract:** AIM: To determine the effect of a 'no drains' policy on seroma formation and other complications in women undergoing breast cancer surgery. MATERIALS AND METHODS: Before May 2010 drains were routinely used in our unit following mastectomy +/- axillary surgery and axillary lymph node dissection (ALND) +/- wide local excision (WLE). Since then, a 'no drains' policy has been adopted. Data was collected prospectively between 01/12/06 and 30/11/11 to compare symptomatic seroma,
wound infection, re-admission and re-operation rates in women treated with a drain and those without. RESULTS: 596 women were included in the study. 247 women underwent modified radical mastectomy (MRM) and ALND (Group 1), 184 MRM +/- sentinel lymph node biopsy (SLNB)/axillary node sampling (ANS) (Group 2) and 165 ALND +/- WLE (Group 3). In group 1, 149 had a drain, in group 2, 62, and in group 3, 50. Within each group, the presence or absence of a drain did not significantly affect the rate of symptomatic seroma, number of aspirations performed, wound infection rates or the incidence of complications requiring re-admission. Having a drain was associated with lower volumes of seroma aspirated. In all three groups, the presence of a drain was associated with a longer hospital stay (p < 0.001). CONCLUSION: This study suggests that MRM +/- ALND/SLNB/ANS and ALND +/- WLE can be performed without the use of suction drains without increasing seroma formation and other complication rates. Adopting a 'no-drains' policy may also contribute to earlier hospital discharge.

**Publication Type:** Journal Article

**Source:** MEDLINE

**Full Text:** Available from *European Journal of Surgical Oncology*

9. Preventing seroma formation after axillary dissection for breast cancer: a randomized clinical trial.

**Citation:** American Journal of Surgery, June 2012, vol./is. 203/6(708-14), 0002-9610;1879-1883 (2012 Jun)

**Author(s):** Lovino F; Auriemma PP; Ferraraccio F; Antoniol G; Barbarisi A

**Language:** English

**Abstract:** BACKGROUND: Seroma formation after axillary dissection remains the most common early sequel to breast cancer surgery. Different surgical approaches have been performed to reduce seroma collection. Therefore, we aimed to assess the outcome of patients operated on using an ultrasound scalpel according to a standardized operative technique before accepting it as a routine procedure. METHODS: A randomized controlled trial was designed to compare the outcome of patients undergoing breast surgery and axillary dissection using either standard scalpel blades, scissors, ligations, and electrocautery or the ultrasound scalpel only. Each arm of the trial consisted of 30 patients. RESULTS: A statistically significant benefit in terms of axillary and chest wall drainage volume, the number of axilla seromas, intraoperative bleeding, and hospitalization stay was recorded in the harmonic scalpel group. No significant differences were found between the 2 groups in terms of operative time. Finally, no postoperative hematoma, wound infections, and chest wall seroma were observed. CONCLUSIONS: The use of the harmonic scalpel was shown to reduce the magnitude of seromas in axilla and hospitalization stay. The harmonic scalpel can be used alone in axillary dissection with a safe and effective hemostasis. Our results must be confirmed by larger series. **Publication Type:** Comparative Study; Journal Article; Randomized Controlled Trial

**Source:** MEDLINE

10. An efficient technique for drainage of seromas after breast cancer surgery.

**Citation:** Breast Journal, September 2011, vol./is. 17/5(514-5), 1075-122X;1524-4741 (2011 Sep-Oct)

**Author(s):** Khalid U; Chin KH; Taylor A

**Language:** English

**Abstract:** Seroma formation is a frequent sequelae following breast cancer surgery. Current methods for seroma drainage often involve repeated needle aspiration that requires multiple passes, and is time consuming. We describe a technique that uses a needle attached to a high vacuum wound drainage system. We believe that this technique is aseptic, relatively cheap, and efficient. It can easily and safely be adopted in the outpatient setting.

**Publication Type:** Journal Article

**Source:** MEDLINE

**Full Text:** Available from EBSCOhost in *Breast Journal*

11. Seroma formation in two cohorts after axillary lymph node dissection in breast cancer surgery: does timing of drain removal matter?.

**Citation:** Breast Journal, July 2011, vol./is. 17/4(359-64), 1075-122X;1524-4741 (2011 Jul-Aug)

**Author(s):** Andreweg CS; Schriek MJ; Heisterkamp J; Roukema JA

**Language:** English

**Abstract:** The purpose of this study was to compare short-term versus long-term axillary
drainage in women treated for lymph node positive breast cancer. A comparative cohort study on differences between short-term or long-term axillary drainage was performed. Primary outcome measures were seroma formation demanding aspiration and wound related complications. Secondary outcome measures were type of operation (modified radical mastectomy (MRM) or wide local excision with axillary lymph node dissection (ALND) or completing ALND after positive sentinel node), length of hospital stay, and visits to the emergency department and outpatient clinic. The short-term drainage group consisted of 37 patients, and the long-term drainage group of 40 patients. Short-term drainage was associated with a shorter hospital stay (1.7 versus 2.6 days, p = 0.01), but more visits to the emergency department (0.3 versus 0.1, p = 0.04) and outpatient clinic (3.6 versus 2.8, p = 0.03). Overall incidence of seroma formation was 40% and more frequently in the short-term drainage group (p = 0.01). The highest incidence of seroma and largest aspirated volumes were found in patients with short-term drainage and MRM.

No difference in incidence of wound infection was found between both groups, and overall incidence of wound infection was 32%. Seroma formation itself was associated with a higher risk of wound infection (OR 4.39 95% CI 1.6–12.1). Short-term axillary drainage does not lead to an increase in wound-related problems, but is associated with a higher incidence of seroma. This seems especially the case in patients who underwent MRM. Therefore, we propose a differentiated policy: patients treated with MRM should be offered long-term axillary drainage, whereas patients treated with breast conserving therapy and ALND or completing ALND after a positive sentinel node should be offered short-term axillary drainage. 2011 Wiley Periodicals, Inc.

**Publication Type:** Journal Article

**Source:** MEDLINE

**Full Text:** Available from EBSCOhost in Breast Journal

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12. No effect of steroids on seroma formation after mastectomy.

**Citation:** Danish Medical Bulletin, February 2011, vol./iss. 58/2(A4241), 0907-8916;1603-9629 (2011 Feb)

**Author(s):** Okholm M; Axelsson CK

**Language:** English

**Abstract:** INTRODUCTION: Seroma formation is a common problem after breast surgery. Studies indicate that seroma formation is a result of the postoperative inflammatory process. Glucocorticoid inhibits the inflammatory response.

**MATERIAL AND METHODS:** In a randomized pilot study, we measured the effect of glucocorticoid on drainage volume and seroma formation after breast surgery. A total of 42 patients with operable primary breast cancer scheduled for total mastectomy were randomized to either 125 mg methylprednisolone sodium succinate intravenously as a single bolus before the start of surgery or to a control group.

**RESULTS:** There was no difference between the groups as to the number of patients having drains from day to day. The drainage volume was lower in the methylprednisolone sodium succinate group than in the control group; however, the difference was not significant (7,979 ml versus 9,267 ml). There was a tendency towards a higher seroma formation in the methylprednisolone sodium succinate group, but the tendency was not significant (15,803 versus 13,987 ml), and there was no significant difference in the number of seroma aspirations after surgery (92 versus 99).

**CONCLUSION:** Injection of a bolus of 125 mg of methylprednisolone sodium succinate before mastectomy did not reduce drainage volume or seroma formation. If intravenous glucocorticoid did have an effect, the case material was too small to prove it.

**Publication Type:** Journal Article; Randomized Controlled Trial

**Source:** MEDLINE

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13. Use of multiple drains after mastectomy is associated with more patient discomfort and longer postoperative stay.

**Citation:** Clinical Breast Cancer, November 2009, vol./iss. 9/4(243-6), 1526-8209;1938-0666 (2009 Nov)

**Author(s):** Saratzis A; Soumian S; Willetts R; Rastall S; Stonelake PS

**Language:** English

**Abstract:** BACKGROUND: Seromas constitute a common complication following surgery for breast cancer, and closed drainage is used routinely to reduce its incidence. The aim of this study was to evaluate the influence of number of drains on patient discomfort, seroma formation, and hospital stay during the immediate postoperative period after mastectomy for breast cancer.

**PATIENTS AND METHODS:** Based on a retrospective review of our
clinical database, 110 consecutive patients from January 2004 through January 2006 who had undergone a mastectomy and axillary clearance for breast cancer were sent a simple postal questionnaire for collection of data. RESULTS: A total of 70 patients responded (all women; mean age, 69.4 +/- 11.4 years). Twenty-seven patients (38.57%) had 3 drains implanted unilaterally, 24 (34.28%) had 2, and 19 (27.14%) had 1 drain. They were divided into 2 groups: the first group with 1 drain (19 patients) and the other with 2 or 3 drains (51 patients). Median postoperative hospital stay was 2 days (range, 1-8 days); patients with 1 drain had a significantly shorter postoperative hospital stay (median, 2 days [range, 1-4 days] vs. 2 days [range, 1-8 days]; Mann-Whitney U test, P = .02). A total of 15 patients (21.43%) complained of a seroma. There was no difference in seroma rates between groups. Patients who had a single drain implanted had a significantly lower rate of discomfort (median, 2 [range, 1-5] vs. 3 [range, 1-7]; Mann-Whitney U test; P = .04). CONCLUSION: The number of drains used after a mastectomy for breast cancer did not significantly affect the rate or amount of seromas in this study, but the use of a single drain after mastectomy was significantly associated with less discomfort and shorter postoperative hospital stay.

Publication Type: Journal Article
Source: MEDLINE
Full Text: Available from EBSCOhost in Clinical Breast Cancer

14. Factors affecting seroma formation after mastectomy with full axillary dissection.
Citation: Acta Chirurgica Belgica, July 2009, vol./is. 109/4(481-3), 0001-5458;0001-5458 (2009 Jul-Aug)
Author(s): Akinci M; Cetin B; Aslan S; Kulacoglu H
Language: English
Abstract: BACKGROUND AND OBJECTIVES: Seroma formation is the most common complication after breast cancer surgery, especially when axillary dissection is performed. This clinical research was undertaken to identify factors that predict the development of seroma after modified radical mastectomy for breast cancer. METHODS: 40 patients with primary breast cancer were included. Modified radical mastectomy with full axillary dissection was performed without electrocautery dissection. The seroma was diagnosed clinically by detection of the collection beneath the skin flaps. Drains were retained until the 24 h total output was < or = 40 ml. RESULTS: A total of 40 patients with a mean age of 53 +/- 11 years were included in this study. Nine patients (27.5%) developed seroma after mastectomy. Patients with hypertension were more likely to develop seroma (50% versus 11% in patients without hypertension), but no such difference was found with age, tumour size, total number of lymph nodes or metastatic lymph nodes. When a drain was required for > 7 days, seroma formed more often (36.4%) as compared to when the drain stayed for a shorter time (6%). CONCLUSIONS: It is concluded that hypertension and a drainage flow rate greater than 40 ml/day for more than 7 days predict seroma formation following breast cancer surgery.

Publication Type: Journal Article
Source: MEDLINE

Citation: Breast, April 2009, vol./is. 18/2(109-14), 0960-9776;1532-3080 (2009 Apr)
Author(s): Droeser RA; Frey DM; Oertli D; Kopelman D; Baas-Vrancken Peeters MJ; Giuliano AE; Dalberg K; Kallam R; Nordmann A
Language: English
Abstract: It is unknown whether there are any clinically relevant differences between volume-controlled (<30-50 ml/24h across trials) vs no/short-term drainage after axillary lymph node dissection in breast cancer surgery on outcomes such as seroma formation, wound infection or length of hospital stay. Randomised controlled trials comparing volume-controlled drainage vs no or short-term drainage after axillary lymph node dissection in breast cancer surgery were identified systematically using PubMed, EMBASE and The Cochrane library. Trial data were reviewed and extracted independently by two reviewers in a standardised unblinded manner. Six randomised controlled trials which included a total of 561 patients fulfilled our inclusion criteria. Patients randomised to volume-controlled drainage were less likely to develop clinically relevant seromas compared to patients randomised to no/short-term drainage. There was, however, no difference in wound infections between patients treated with volume-controlled drainage and patients with no or short-term drainage. Patients randomised to volume-controlled drainage stayed significantly longer in hospital than
patients randomised to no/short-term drainage. Based on available evidence, clinically relevant seromas occur more frequently in patients treated with no/short-term drainage. However, no/short-term drainage after axillary lymph node dissection does not lead to an increase in wound infections and is associated with shorter hospital stay.

**Publication Type:** Journal Article; Meta-Analysis

**Source:** MEDLINE

16. **An analysis of factors that influence the duration of suction drainage in breast cancer surgery.**

**Citation:** Journal of Nippon Medical School = Nihon Ika Daigaku Zasshi, December 2008, vol./is. 75/6(332-6), 1345-4676;1345-4676 (2008 Dec)

**Author(s):** Iida S; Furukawa K; Yanagihara K; Iwasaki R; Kurita T; Tsuchiya S; Naito Z; Haga S; Tajiri T

**Language:** English

**Abstract:** BACKGROUND: The duration of suction drainage in patients undergoing breast cancer surgery is difficult to predict. The uncertainty this poses may complicate the development of a clinical pathway for patients with breast cancer. In this study we attempted to identify factors that may influence the duration of suction drainage in patients undergoing breast cancer surgery.

METHODS: We examined the relationships between the duration of suction drainage and several clinical factors including type of drainage tube in 60 patients with primary breast cancer who underwent surgical resection at the Nippon Medical School Hospital in 2004 and 2005. The drainage tubes were removed 1 day after the daily drainage volume had decreased to less than 50 mL or on the seventh postoperative day in patients in whom such a decrease did not occur. All patients were discharged from the hospital 1 or 2 days after the drains were removed.

RESULTS: Seroma was observed in all patients. No complications associated with the drainage were observed. The median duration of drainage was 4.5 days, and the range was 2 to 7 days. Univariate analyses revealed significant relationships between the duration of drainage and the following 5 factors: patient age at surgery, body mass index, intraoperative blood loss, operation time, and type of surgery (total breast resection or partial breast resection). Univariate and multivariate analyses showed no significant statistical associations between the duration of drainage and the other factors, including the type of drainage tube.

CONCLUSION: None of the factors examined was strongly associated with the duration of drainage. This study has shown that any type of drainage tube can be used in breast cancer surgery, in regards to the duration of drainage, and that patient discharge 1 or 2 days after drainage tube removal is appropriate.

**Publication Type:** Journal Article

**Source:** MEDLINE

17. **Analysis of risk factors affecting the development of seromas following breast cancer surgeries: seromas following breast cancer surgeries.**

**Citation:** Breast Journal, November 2007, vol./is. 13/6(588-92), 1075-122X;1075-122X (2007 Nov-Dec)

**Author(s):** Unalp HR; Onal MA

**Language:** English

**Abstract:** This study aimed to determine the effects of demographic, clinical, and therapeutic variables in development of seromas. The relation between development of seromas and age, preference for surgery, tumor size, existence of axillary lymph nodes and lymph nodal metastases, number of lymph nodes removed, type of surgical equipments used, drainage duration, drainage flow rate, and whether or not neoadjuvant chemotherapy was received; dead volume was reduced; or pressure garment was used in patients who received surgery due to breast cancer between 2000 and 2005 years. Mean age of 119 patients included in the study was 53.13±13.26 (range 26-79). Seromas were observed in 17 (14.28%) patients. In multivariate logistic regression analysis an association of postoperative seroma formation was noted with a drainage flow rate greater than 50 mL/day after 48th hours following breast surgery (p=0.007), while other variables investigated herein are not associated with development of seromas. We conclude that a drainage flow rate greater than 50 mL/day after 48th hours is a predicting factor for seroma formation in breast cancer patients. Thus, we do not recommend terminating the drainage before flow rate at 48 hours is seen and daily drainage is lower than acceptable limit.

**Publication Type:** Journal Article

**Citation:** ANZ Journal of Surgery, May 2007, vol./is. 77/5(385-9), 1445-1433;1445-1433 (2007 May)
**Author(s):** Nadkarni MS; Rangole AK; Sharma RK; Hawaldar RV; Parmar VV; Badwe RA
**Language:** English
**Abstract:** The aim of this study was to evaluate the influence of surgical technique in the form of electrocautery and suction drains on seroma formation following surgery for breast cancer. A prospective randomized study was carried out. One hundred and sixty patients with breast cancer who underwent surgery were allocated to four arms using a 2 x 2 factorial design. This method enabled us to evaluate the independent effect of two different causative factors on the incidence of postoperative seroma formation using a single dataset with limited numbers. The main outcome measure was postoperative seroma formation defined as a postoperative axillary collection requiring more than one aspiration after removal of the drain. The incidence of seroma in our institution is 90%. Incidence of postoperative seroma was 88.3% if electrocautery was used, which reduced to 82.2% if surgery was carried out using scissors for dissection and ligatures for haemostasis (P = 0.358). There was no influence on the incidence of seroma formation whether suction drain (84.6%) or corrugated drains (86.1%) were used (P = 0.822). The use of electrocautery in axillary dissection does not adversely affect postoperative seroma formation after surgery for breast cancer. The use of different drainage techniques has no bearing on the postoperative seroma formation. The surgical technique has no influence on the rate of seroma formation after surgery for breast cancer.

**Publication Type:** Journal Article; Randomized Controlled Trial
**Source:** MEDLINE

Full Text: Available from EBSCOhost in Breast Journal

19. Harmonic focus versus electrocautery in axillary lymph node dissection for breast cancer: a randomized clinical study.

**Citation:** Clinical Breast Cancer, 01 December 2012, vol./is. 12/6(454-458), 15268209
**Author(s):** He Q; Zhuang D; Zheng L; Fan Z; Zhou P; Zhu J; Lü Z; Chai J; Cao L
**Language:** English
**Abstract:** BACKGROUND: Electrocautery has been proven to be associated with prolonged serous drainage that might result in several complications in patients requiring axillary lymph node dissection for breast cancer. We proposed that the Harmonic Focus might outperform electrocautery in axillary lymph node dissection, resulting in shorter operative times and reduced postoperative complications. PATIENTS AND METHODS: One hundred twenty-eight women with confirmed T1-3 N1-2 breast cancer were randomly assigned to undergo mastectomy or breast-conserving surgery with axillary dissection by using Harmonic Focus or electrocautery. Sixty-four has surgery with Harmonic Focus (group A) and 64 with electrocautery (group B) by the same surgical team. Operative time, blood loss, total drainage volume and days, incidence of seroma, hematoma, pain score, and flap necrosis were recorded. RESULTS: Using Harmonic Focus significantly diminished operative time, blood loss, total drainage volume, days of stay, and visual analogue scale as compared with traditional electrocautery. There was no statistical difference between the 2 groups regarding seroma, hematoma, and flap necrosis. CONCLUSION: Axillary lymph node dissection using Harmonic Focus is feasible, safe, and a more comfortable design for the surgeon.

**Publication Type:** Journal Article
**Source:** CINAHL


**Citation:** Breast Care, 01 June 2012, vol./is. 7/3(231-235), 16613791
**Author(s):** Garbay, Jean-Rémi; Thoury, Anne; Moinon, Etienne; Cavalcanti, Andréa; Di Palma, Mario; Karsenti, Guillaume; Leymarie, Nicolas; Sarfati, Benjamin; Rimareix, Françoise; Mazouni, Chafika
**Language:** English
**Abstract:** Background: After lymphadenectomy for early breast cancer, seroma formation is a constant event requiring a suction drainage. This drainage is the strongest obstacle to reducing the hospital stay. Axillary padding without drainage appears to be a valuable option amid the various solutions for reducing the hospital stay. Methods: We conducted a
comparison between 114 patients with padding and 185 patients with drainage. Data were obtained from 2 successive prospective studies. Results: The mean hospital stay was 2.4 days (range 1-4) in the padding group and 4.2 days (range 2-9) in the drainage group (p < 0.05). There were fewer needle aspirations for seroma in the padding group (8.8 vs. 23%, p < 0.05). At 6 weeks, only 28% (32/114) of the patients in the padding group reported pain versus 51% (94/185) in the drainage group. The mean pain intensity at 6 weeks was 3 and 4.3 respectively (p < 0.0001). Conclusion: Axillary padding without drainage was associated with a better post-operative course than suction drainage in this historical comparison, and the hospital stay was significantly shortened. There are only few series published on this new technique but they all indicate good feasibility and good tolerance. A large randomised multicentric evaluation is now warranted.

Publication Type: journal article
Source: CINAHL

21. Flap anchoring following primary breast cancer surgery facilitates early hospital discharge and reduces costs.
Citation: Breast Care, 01 April 2010, vol./is. 5/2(97-101), 16613791
Author(s): Almond LM; Khodaverdi L; Kumar B; Coveney EC
Language: English
Abstract: Background: Routine drain placement after breast cancer surgery is standard practice. Anchoring the axillary and mastectomy flaps to the underlying chest wall with sutures has been advocated as a means of avoiding drainage following breast surgery. This study compares outcomes following flap fixation or routine drain placement and uniquely considers the economic implications of each technique. Patients and Methods: Data on seroma formation and wound infection following mastectomy and axillary clearance were recorded prospectively. Patients underwent either routine drain placement or flap anchoring using subcutaneous tacking sutures without drainage. Equipment and surgical bed costs were provided by our finance department. Results: Data was available for 135 patients. 76 underwent flap anchoring without drainage and 59 had routine drainage. There was no difference in seroma rates between the two groups: 49% vs. 59% (p = 0.22). However, the length of hospital stay was reduced in the flap fixation group: 1.88 vs. 2.67 days (p < 0.0001). Per patient, flap suturing equated to an estimated financial saving of £240. Conclusions: Flap anchoring resulted in a significantly shorter hospital stay than routine drainage, with a comparable rate of seroma formation. This technique presents a viable alternative to drain placement and could lead to a considerable economic savings.
Publication Type: journal article
Source: CINAHL

22. Ultrasonic dissection versus electrocautery in mastectomy for breast cancer - a meta-analysis.
Citation: European Journal of Surgical Oncology, October 2012, vol./is. 38/10(897-901), 0748-7983;1532-2157 (2012 Oct)
Author(s): Currie A; Chong K; Davies GL; Cummins RS
Language: English
Abstract: BACKGROUND: Electrocautery has advanced the practice of mastectomy but significant morbidity, such as seroma and blood loss, remains a concern. This has led to newer forms of dissection being introduced including the ultrasonic dissection devices, which are thought to reduce tissue damage. The aim of this systematic review was to compare the outcomes after mastectomy using novel ultrasonic dissection or standard electrocautery in published trials. METHODS: Medline, Embase, trial registries, conference proceedings and reference lists were searched for comparative trials of ultrasonic dissection versus electrocautery for mastectomy. The primary outcomes were total postoperative drainage, seroma development and intra-operative blood loss. Secondary outcomes were operative time and wound complications. Odds ratios were calculated for categorical outcomes and standardised mean differences for continuous outcomes. RESULTS: Six trials were included in the analysis of 287 mastectomies. There was no effect in total postoperative drainage (pooled analysis weight mean difference: -0.21 (95% CI: -0.70-0.29); p = 0.41) or seroma development (pooled analysis odds ratio: 0.77 (95% CIs 0.43-1.37); p = 0.37). Intra-operative blood was slightly less for ultrasonic dissection compared to standard electrocautery (pooled analysis weight mean difference: -1.04 (95% CI: -2.00 to -0.08); p = 0.03). Ultrasonic dissection and standard electrocautery had similar outcomes with regard to operative time and wound
complications. CONCLUSION: Ultrasonic dissection and standard electrocautery appear to deliver similar results in the mastectomy setting. Further cost-effectiveness analysis may guide surgeon selection in the use of new technologies for mastectomy.

**Publication Type:** Comparative Study; Journal Article; Meta-Analysis; Review

**Source:** MEDLINE

**Full Text:** Available from European Journal of Surgical Oncology

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23. **Modified radical mastectomy: a pilot clinical trial comparing the use of conventional electric scalpel and harmonic scalpel.**

**Citation:** International Journal Of Surgery, 2013, vol./is. 11/6(496-500), 1743-9159;1743-9159 (2013)

**Author(s):** Ribeiro GH; Kerr LM; Haikel RL; Peres SV; Matthes AG; Depieri Michelli RA; Bailao A Jr; Fregnani JH; Vieira RA

**Language:** English

**Abstract:** BACKGROUND: The aim of this study was to compare the rates of local postoperative complications among women undergoing modified radical mastectomy with an electric scalpel (ES) or a harmonic scalpel (HS). It is thought that HS use has less postoperative complications, mainly seroma formation. METHODS: This study was a prospective non-randomised clinical trial (NCT01391988) among consecutive patients, performed in parallel. Patients underwent modified radical mastectomy using an HS or ES. We analysed the following operative variables: time, blood loss and seroma volume drainage. Postoperative complications, including seroma, flap necrosis, haematoma and infection were evaluated on the 7th and 14th days. RESULTS: Forty-six patients underwent a MRM with ES and 49 with HS; no differences were observed between the groups. The rate of local complications was 29% in the HS group and 52% in the ES group (p=0.024). The rates of seroma (16.3% versus 28.3%; p=0.161), necrosis (4.1% vs. 21.7%; p=0.013; OR=0.15), haematoma (2.0% vs. 8.7%; p=0.195) and infection (2.0% vs. 6.5%; p=0.351) were lower in the HS group. Adding the findings of all comparative studies using HSs in MRM to the seroma rates in the current study, the seroma rate, expressed as a categorical variable, did not decrease with HS. Seroma was present in 60/219 cases using an HS and in 69/239 cases utilising an ES (p=0.72). Based on a multivariate analysis, HS decreased the risk of skin necrosis (p=0.015). CONCLUSIONS: HSs do not decrease the seroma rate. However, this method may be useful in skin sparing mastectomy because it decreases skin flap necrosis.

**Publication Type:** Journal Article

**Source:** MEDLINE

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24. **The effect of plasmakinetic cautery on wound healing and complications in mastectomy.**

**Citation:** Journal of Breast Cancer, June 2013, vol./is. 16/2(198-201), 1738-6756;1738-6756 (2013 Jun)

**Author(s):** Dogan L; Gulcelik MA; Yuksel M; Uyar O; Erdogan O; Reis E

**Language:** English

**Abstract:** PURPOSE: Surgical equipment used in breast cancer surgery that affects wound healing and minimizes complications seems to be a popular investigation topic. The aim of this study is to evaluate the effect of plasmakinetic cautery on wound healing in patients receiving mastectomy. METHODS: Forty-six consecutive breast cancer patients receiving modified radical mastectomy were evaluated prospectively. Plasmakinetic cautery was used in 24 operations and electrocautery was used in 22 operations in random order to manage skin flaps and excise breast tissue. In the postoperative period, vacuum drainage amount and duration time as well as the start time of arm exercises were recorded. Complications like seroma, surgical site infection, hematoma, and flap necrosis were determined. RESULTS: Age, body mass index, breast volume and flap area parameters were similar in each group. Mean drainage duration was found to be 5.5 days in the plasmacautery group and 7.9 days in the electrocautery group (p=0.020). In the plasmacautery and electrocautery groups, mean drainage volume was 707 and 1,093 mL, respectively (p=0.025). There was no statistical significance between the groups when operation duration, amount of blood loss, time to start arm exercises, seroma, hematoma, surgical site infection, and flap necrosis were considered. CONCLUSION: Plasmakinetic cautery is a promising new surgical instrument that provides atraumatic, scalpel-like cutting precision and electrosurgical-like hemostasis, resulting in minimal tissue injury. So, plasmacautery shortens the drainage amount and duration time compared to
electrocautery without elongating operation duration or increasing the amount of blood loss.

**Publication Type:** Journal Article  
**Source:** MEDLINE

25. **Ultracision versus electrocautery in performing modified radical mastectomy and axillary lymph node dissection for breast cancer: a prospective randomized control trial.**  
**Citation:** Medical Journal of Malaysia, June 2013, vol./is. 68/3(204-7), 0300-5283;0300-5283 (2013 Jun)  
**Author(s):** Rohaizak M; Khan FJ; Jasmin JS; Mohd Latar NH; Abdullah SS  
**Language:** English  
**Abstract:** BACKGROUND: Treatment for breast cancer has improved dramatically over the decades. Nevertheless, modified radical mastectomy with axillary dissection remains the standard treatment for most patients, especially those with big tumours. The conventional technology is to use diathermy to cut and coagulate blood vessels. The Ultracision dissector has been widely used in laparoscopic surgery and is documented to be safe and fast for cutting and coagulating tissue. The aim of this study is to compare ultracision to electrocautery, looking in terms of amount of post operative drainage, duration of drain days, seroma formation and other complications. METHODOLOGY: This study was a prospective randomized control trial of modified radical mastectomy performed for breast cancer in Pusat Perubatan Universiti Kebangsaan Malaysia (PPUKM) between 1st June 2007 to 31st December 2008. Patients were randomized in two groups: group A (n = 20) underwent modified radical mastectomy using ultracision (UC) and group B (n = 20) with the conventional electrocautery (EC) method. Main outcome measures were amount of drainage and duration of drain days. An unpaired 2-tailed Student's t test and the 2 test to compare the groups. RESULTS: A total of 40 patients were involved in this study. The majority of patients were Malay (55%) followed by Chinese (35%), Indian (5%) and others (5%). The mean volume of drainage from the axilla in the EC group was significantly higher than UC group [489.5 versus 188.1 mls (p < 0.001)]. The mean volume of drainage from the breast and the total drainage from both the breast and axilla was also significantly higher in the EC group compared to UC [169.3 versus 58.8 mls (p = 0.004) and 663.7 versus 247.0 mls (p < 0.002) respectively]. The drainage consequently showed significant reduction in terms of drain days in the axilla [6 days versus 3 days (p < 0.002)] and the breast [3 days versus 2 days (p < 0.002)] in the UC compared to the EC. There was no significant complication in both arms. In conclusion, the use of ultracision able to reduce the amount of drainage and the number of drain days after performing modified radical mastectomy. In doing so, the use of this technology enable us to discharge patients earlier without significant morbidities.  
**Publication Type:** Journal Article  
**Source:** MEDLINE

26. **Does fibrin sealant reduce seroma after immediate breast reconstruction utilizing a latissimus dorsi myocutaneous flap?.**  
**Citation:** Archives of Plastic Surgery, September 2012, vol./is. 39/5(504-8), 2234-6163;2234-6171 (2012 Sep)  
**Author(s):** Cha HG; Kang SG; Shin HS; Kang MS; Nam SM  
**Language:** English  
**Abstract:** BACKGROUND: The most common complication of latissimus dorsi myocutaneous flap in breast reconstruction is seroma formation in the back. Many clinical studies have shown that fibrin sealant reduces seroma formation. We investigated any statistically significant differences in postoperative drainage and seroma formation when utilizing the fibrin sealant on the site of the latissimus dorsi myocutaneous flap harvested for immediate breast reconstruction after skin-sparing partial mastectomy. METHODS: A total of 46 patients underwent immediate breast reconstruction utilizing a latissimus dorsi myocutaneous island flap. Of those, 23 patients underwent the procedure without fibrin sealant and the other 23 were administered the fibrin sealant. All flaps were elevated with manual dissection by the same surgeon and were analyzed to evaluate the potential benefits of the fibrin sealant. The correlation analysis and Mann-Whitney U test were used for analyzing the drainage volume according to age, weight of the breast specimen, and body mass index. RESULTS: Although not statistically significant, the cumulative drainage fluid volume was higher in the control group until postoperative day 2 (530.1 mL compared to 502.3 mL), but the fibrin sealant group showed more drainage beginning on postoperative day 3. The donor site comparisons showed the fibrin sealant group had
more drainage beginning on postoperative day 3 and the drain was removed 1 day earlier in the control group. CONCLUSIONS: The use of fibrin sealant resulted in no reduction of seroma formation. Because the benefits of the fibrin sealant are not clear, the use of fibrin sealant must be fully discussed with patients before its use as a part of informed consent.

Publication Type: Journal Article
Source: MEDLINE

27. Comparing scalpel, electrocautery and ultrasonic dissector effects: the impact on wound complications and pro-inflammatory cytokine levels in wound fluid from mastectomy patients.

Citation: Journal of Breast Cancer, March 2011, vol./is. 14/1(58-63), 1738-6756;2092-9900 (2011 Mar)
Author(s): Yilmaz KB; Dogan L; Nalbant H; Akinci M; Karaman N; Ozaslan C; Kulacoglu H
Language: English
Abstract: PURPOSE: Introducing the relationship between the surgical instruments used in modified radical mastectomy and wound complications is important for preventing and decreasing complications. This prospective randomized trial was designed to assess the impact of scalpel, electrocautery, and ultrasonic dissector usage on wound complications and tissue damage. METHODS: Eighty-two consecutive patients operated with mastectomy were studied. The postoperative time period needed for hemovac drainage, the amount and duration of seroma, infection, flap ecchymosis and necrosis rates were compared. Tumor necrosis factor alpha (TNF-) and interleukin-6 (IL-6) levels in drainage fluids were determined to confirm the inflammatory response and tissue damage. RESULTS: The numbers of patients included in the scalpel, electrocautery and ultrasonic dissector groups were 27, 26, and 29, respectively. The groups were homogenous with respect to age, body mass index, stage, comorbidities, breast volume and flap area. Operation time and the amount of bleeding were statistically higher in the scalpel group. The incidence of seroma was higher in the electrocautery group and arm mobilization had to be delayed in this group. There were no differences between groups with respect to hematoma, infection, ecchymosis, necrosis, hemovac drainage and the total and first 3 days of seroma volume. TNF- and IL-6 levels in drainage fluids were significantly higher in samples obtained from the drains of patients operated with electrocautery. CONCLUSION: Ultrasonic dissector decreases operation time by decreasing the amount of bleeding without increasing the seroma incidence. High cytokine levels in drainage fluids from patients operated with electrocautery indicates that electrocautery induces more tissue damage and acute inflammatory response. Therefore, seroma, due to acute inflammatory response, was seen more frequently in the electrocautery group. Ultrasonic dissector coagulates protein by breaking hydrogen bonds which may close vascular and lymphatic channels more precisely. But, its actual preventive effect on seroma formation might be related to diminished inflammatory response.

Publication Type: Journal Article
Source: MEDLINE


Citation: Handchirurgie, Mikrochirurgie, Plastische Chirurgie, December 2012, vol./is. 44/6(343-7), 0722-1819;1439-3980 (2012 Dec)
Author(s): Chang DW
Language: English
Abstract: Historically, the reported incidence of upper extremity lymphedema in breast cancer survivors who have undergone axillary lymph node dissection has ranged from 9% to 41%. In the past 2 decades, sentinel lymph node biopsy has become popular as a way to minimize the morbidity associated with axillary dissection without compromising the cure rate for breast cancer patients. However, even with sentinel node biopsy, the postoperative incidence of upper limb lymphedema in breast cancer patients remains at 4-10%. Lymphedema occasionally emerges immediately after surgery but most often appears after a latent period. Obesity, postoperative seroma, and radiation therapy have been reported as major risk factors for upper extremity lymphedema, but the etiology of lymphedema is still not fully understood. Common symptoms of upper limb lymphedema are increased volume and weight of the affected limb and increased skin tension. The increased volume of the affected limb not only causes physical impairments in wearing clothes and in dexterity but also affects patients' emotional and mental status. Surgical
management of lymphedema can be broadly categorized into physiologic methods and reductive techniques. Physiologic methods such as flap interposition, lymph node transfers, and lymphatic bypass procedures aim to decrease lymphedema by restoring lymphatic drainage. In contrast, reductive techniques such as direct excision or liposuction aim to remove fibrofatty tissue generated as a consequence of sustained lymphatic fluid stasis. Currently, microsurgical variations of lymphatic bypass, in which excess lymph trapped within the lymphedematous limb is redirected into other lymphatic basins or into the venous circulation, have gained popularity.

**Publication Type:** Journal Article

**Source:** MEDLINE

**29. The value of mastectomy flap fixation in reducing fluid drainage and seroma formation in breast cancer patients.**

**Citation:** World Journal of Surgical Oncology, 2012, vol./is. 10/(8), 1477-7819;1477-7819 (2012)

**Author(s):** Sakkary MA

**Language:** English

**Abstract:** BACKGROUND: Prolonged and excessive drainage of serous fluid and seroma formation constitute the most common complications after mastectomy for breast carcinoma. Seroma formation delays wound healing, increases susceptibility to infection, skin flap necrosis, persistent pain and prolongs convalescence. For this, several techniques have been investigated to improve primary healing and minimize seroma formation. MATERIALS AND METHODS: Between June 2009 and July 2010 forty patients with breast carcinoma, scheduled for modified radical mastectomy, were randomly divided into 2 groups, the study group (20) and the control group (20). In the study group; the mastectomy flaps were fixed to the underlying muscles in raws, at various parts of the flap and at the wound edge using fine absorbable sutures. In the control group; the wound was closed in the conventional method at the edges. Closed suction drains were used in both groups. Patients, tumor characteristics and operative related factors were recorded. The amount and color of drained fluid were recorded daily. The drains were removed when the amount become less than 50 cc. The total amount and duration of drained fluid and the formation of seroma were recorded and the results were compared between the two groups. RESULTS: In the flap fixation group, the drain was removed in significantly shorter time compared to the control group (p < 0.001). Also, the total amount of fluid drained was significantly lower in the flap fixation group (p < 0.001). The flap fixation group showed a significantly lower frequency of seroma formation compared to the control group, both clinically (p = 0.028) and ultrasonographically (p = 0.047). CONCLUSIONS: The mastectomy flap fixation technique is a valuable procedure that significantly decreases the incidence of seroma formation, and reduces the duration and amount of drained fluid. However, it should be tried on a much wider scale to prove its validity.

**Publication Type:** Journal Article; Randomized Controlled Trial

**Source:** MEDLINE

**Full Text:** Available from National Library of Medicine in World Journal of Surgical Oncology

**30. Prospective randomized comparison of conventional instruments and the Harmonic Focus() device in breast-conserving therapy for primary breast cancer.**

**Citation:** European Journal of Surgical Oncology, February 2012, vol./is. 38/2(118-24), 0748-7983;1532-2157 (2012 Feb)

**Author(s):** Bohm D; Kubitza A; Lebrecht A; Schmidt M; Gerhold-Ay A; Battista M; Stewen K; Solbach C; Kolbl H

**Language:** English

**Abstract:** BACKGROUND: In recent years, surgeons have utilized Harmonic instruments to perform breast cancer resection. Retrospective and prospective studies have demonstrated that the use of this surgical device for mastectomy and axillary dissection can reduce perioperative blood loss, seroma formation, and duration and total amount of drainage. No study has analyzed the feasibility of Harmonic instruments in breast-conserving surgery. We conducted a prospective, randomized clinical trial comparing Harmonic instrument and conventional surgery in the performance of breast-conserving surgery and axillary procedures to determine differences in surgical procedures, postoperative outcome, and complications. METHODS: One hundred and six patients with operable breast cancer who underwent breast-conserving surgery at a single institution
between December 2009 and January 2011 were included in the analysis. Surgery was performed in 52 patients with the Harmonic Focus() device and in 54 with scissors and electrocautery. This study focused on operative time, drainage volume, and postoperative outcome measures like blood loss, surgery related complications and patient-reported postoperative pain.

RESULTS: We found a multivariable independent influence in axillary seroma formation and volume of breast drainage with HS. Evident difference in volume and duration of axillary and breast drainage, subjective and objective postoperative pain, reduction in serum hemoglobin, size and weight of resected breast tissue and length of hospital stay in favor of the Harmonic instrument could also be shown.

DISCUSSION: The Harmonic instrument provides key benefits in surgical technique, postoperative outcome, and complication rates in breast cancer surgery.

Publication Type: Comparative Study; Journal Article; Randomized Controlled Trial
Source: MEDLINE
Full Text: Available from European Journal of Surgical Oncology

31. Effect of local gentamicin application on healing and wound infection in patients with modified radical mastectomy: a prospective randomized study.

Citation: Journal of International Medical Research, July 2010, vol./is. 38/4(1442-7), 0300-0605;0300-0605 (2010 Jul-Aug)
Author(s): Yetim I; Ozkan OV; Dervisoglu A; Erzurumlu K; Canbolant E
Language: English
Abstract: This study investigated the effects of Gentacoll implants on healing in patients (n = 44) undergoing modified radical mastectomy and axillary dissection. Group I, the Gentacoll group (n = 22), underwent surgery followed by insertion of 10 x 10 x 0.5 cm Gentacoll implants (280 mg collagen sponge plus 200 mg gentamicin sulphate) into the axillary area and under the flap area of the breast before wound closure. Group II, the control group (n = 22), underwent surgery without the application of Gentacoll. Neither group received oral or parenteral post-operative antibiotic therapy. Outcome measures included wound infection, seroma formation, total drainage volumes, drain removal time and duration of hospital stay. Post-operative infection rate, seroma formation, drainage volumes and duration of hospital stay were significantly reduced in the Gentacoll group compared with the control group. In conclusion, the application of Gentacoll significantly improved post-operative outcomes in patients undergoing modified radical mastectomy.

Publication Type: Journal Article; Randomized Controlled Trial
Source: MEDLINE
Full Text: Available from Highwire Press in Journal of International Medical Research
Available from Journal of International Medical Research in Lincoln County Hospital

32. Prevention of seroma formation after mastectomy and axillary dissection by lymph vessel ligation and dead space closure: a randomized trial.

Citation: American Journal of Surgery, September 2010, vol./is. 200/3(352-6), 0002-9610;1879-1883 (2010 Sep)
Author(s): Gong Y; Xu J; Shao J; Cheng H; Wu X; Zhao D; Xiong B
Language: English
Abstract: INTRODUCTION: We aimed to reduce the incidence of seroma formation by altering surgical technique.METHODS: Two hundred one breast cancer patients were randomly divided into 2 arms: arm 1 was operated on using an altered surgical technique, which is to ligate all of the tissue connecting axillary vein bundles to the specimen, to suture the anterior edge of the latissimus dorsi to the chest wall, and to fix the skin flap to the underlying muscle by subcutaneous sutures; arm 2 was operated on using the conventional technique.RESULTS: The drainage volume, in the initial 3 days, for patients in arm 1 was significantly less than that for patients in arm 2 (P < .01). The duration of drainage in arm 1 was shorter than that in arm 2 (P < .01). The incidence of seroma formation in arm 1 (2%) was significantly less than that in arm 2 (14%) (P < .01).CONCLUSION: The modified operating technique is an effective approach to reducing the incidence of seroma formation after mastectomy and axillary dissection. 2010.

Publication Type: Journal Article; Randomized Controlled Trial
Source: MEDLINE

33. Does the use of fibrin glue prevent seroma formation after axillary lymphadenectomy for breast cancer? A prospective randomized trial in 159 patients.

Citation: Journal of Surgical Oncology, June 2010, vol./is. 101/7(600-3), 0022-4790;1096-
BACKGROUND: Seroma formation frequently occurs in patients who have undergone axillary lymphadenectomy. The aim of the study was to evaluate the effect of fibrin glue in the prevention of seroma formation after axillary lymphadenectomy.

MATERIALS AND METHODS: Hundred fifty-nine breast cancer patients about to undergo quadrantectomy or mastectomy plus axillary lymphadenectomy were enrolled in the study and randomized into two groups. Fibrin glue spray applied to the axillary fossa plus placement of closed suction drainage were used in 80 patients (group A); placement of closed suction drainage was only used in 79 patients (group B).

RESULTS: Group A patients showed a slight advantage with regard to the mean duration of axillary drainage placement (4.5 +/- 1.3 days in group A vs. 5.1 +/- 1.6 days in group B) and number of seroma aspirations (6.3 +/- 1.1 in group A vs. 6.7 +/- 1.2 in group B). No statistically significant differences were observed between the two groups of patients regarding the mean volume of total axillary drainage and of total seroma volume.

CONCLUSIONS: The use of fibrin glue does not prevent seroma formation and does not reduce seroma magnitude and duration. The costs of the product involved do not justify its routine use in patients undergoing axillary dissection.

Publication Type: Journal Article; Randomized Controlled Trial
Source: MEDLINE
36. Fibrin glue reduces the duration of lymphatic drainage after lumpectomy and level II or III axillary lymph node dissection for breast cancer: a prospective randomized trial.

**Citation:** Journal of Korean Medical Science, February 2009, vol./iss. 24/1(92-6), 1011-8934;1598-6357 (2009 Feb)

**Author(s):** Ko E; Han W; Cho J; Lee JW; Kang SY; Jung SY; Kim EK; Hwang KT; Noh DY

**Language:** English

**Abstract:** This randomized prospective study investigated the effect of fibrin glue use on drainage duration and overall drain output after lumpectomy and axillary dissection in breast cancer patients. A total of 100 patients undergoing breast lumpectomy and axillary dissection were randomized to a fibrin glue group (N=50; glue sprayed onto the axillary dissection site) or a control group (N=50). Outcome measures were drainage duration, overall drain output, and incidence of seroma. Overall, the fibrin glue and control groups were similar in terms of drainage duration, overall drain output, and incidence of seroma. However, subgroup analysis showed that fibrin glue use resulted in a shorter drainage duration (3.5 vs. 4.7 days; p=0.0006) and overall drain output (196 vs. 278 mL; p=0.0255) in patients undergoing level II or III axillary dissection. Fibrin glue use reduced drainage duration and overall drain output in breast cancer patients undergoing a lumpectomy and level II or III axillary dissection.

37. Effectiveness of fibrin glue in conjunction with collagen patches to reduce seroma formation after axillary lymphadenectomy for breast cancer.

**Citation:** American Journal of Surgery, August 2008, vol./iss. 196/2(170-4), 0002-9610;1879-1883 (2008 Aug)

**Author(s):** Ruggiero R; Procaccini E; Piazza P; Docimo G; Iovino F; Antoniol G; Irlandese E; Gili S; Lo Schiavo F

**Language:** English

**Abstract:** BACKGROUND: Axillary lymphadenectomy remains an integral part of breast cancer treatment, yet seroma formation occurs in 15% to 85% of cases. Among methods employed to reduce seroma magnitude and duration, fibrin glue has been proposed in numerous studies, with controversial results.METHODS: Fifty patients underwent quadrantectomy or mastectomy with level I/II axillary lymphadenectomy; a suction drain was fitted in all patients. Fibrin glue spray and a collagen patch were applied to the axillary fossa in 25 patients; the other 25 patients were treated conventionally.RESULTS: Suction drainage was removed between postoperative days 3 and 4. Seroma magnitude and duration were significantly reduced (P = .004 and .02, respectively) and there were fewer evacuative punctures in patients receiving fibrin glue and collagen patches compared with the conventional treatment group.CONCLUSIONS: Use of fibrin glue with collagen patches does not always prevent seroma formation, but it does reduce seroma magnitude and duration, as well as necessary evacuative punctures.

38. Fibrin glue to reduce seroma after axillary lymphadenectomy for breast cancer.

**Citation:** Minerva Chirurgica, June 2008, vol./iss. 63/3(249-54), 0026-4733;0026-4733 (2008 Jun)

**Author(s):** Ruggiero R; Procaccini E; Gili S; Cremone C; Docimo G; Iovino F; Antoniol G; Irlandese E; Gili S; Lo Schiavo F

**Language:** English

**Abstract:** UNLABELLED: Axillary lymphadenectomy remains an integral part of breast cancer treatment, yet seroma formation occurs in 15-85% of cases. Among the methods employed to reduce seroma magnitude and duration, fibrin glue has been proposed in numerous studies with controversial results. RESULTS: Sixty patients underwent quadrantectomy or mastectomy with level I/II axillary lymphadenectomy; a suction drain was fitted in all patients. Fibrin glue spray was applied to the axillary fossa in 30 patients; the other 30
patients were treated conventionally. Suction drainage was removed between postoperative days III and IV. Seroma magnitude and duration were significantly reduced (P=0.004 and 0.02, respectively), and there were fewer evacuative punctures, in patients receiving fibrin glue compared with the conventional treatment group. The authors conclude that the use of fibrin glue does not always prevent seroma formation, but does reduce seroma magnitude, duration and necessary evacuative punctures.

**Publication Type:** Comparative Study; Journal Article; Randomized Controlled Trial

**Source:** MEDLINE

39. **Modified radical mastectomy with axillary dissection using the electrothermal bipolar vessel sealing system.**

**Citation:** Archives of Surgery, June 2008, vol./is. 143/6(575-80; discussion 581), 0004-0010;1538-3644 (2008 Jun)

**Author(s):** Manouras A; Markogiannakis H; Genetzakis M; Filippakis GM; Lagoudianakis EE; Kafiri G; Filis K; Zografos GC

**Language:** English

**Abstract:** HYPOTHESIS: The use of the electrothermal bipolar vessel sealing system is feasible, safe, and effective in modified radical mastectomy with axillary dissection in terms of lymph vessel sealing, hemostasis, and perioperative complications.DESIGN: Prospective study.SETTING: University surgical department.PATIENTS: Between January 1, 2003, and December 31, 2003, 60 patients with locally advanced breast cancer (T2 or T3) admitted for modified radical mastectomy with axillary dissection were included in this study. The entire procedure was performed by the same surgical team using the electrothermal bipolar vessel sealing system.MAIN OUTCOME MEASURES: Final outcome, operative time, hospitalization stay duration, intraoperative blood loss, postoperative mastectomy and axillary drainage volume and duration, and postoperative complications (seroma, bleeding, skin burn, hematoma, lymphedema, pneumothorax, and wound infection or necrosis).RESULTS: The mean (SD) intraoperative blood loss was 45 (12) mL, and the mean (SD) operative time was 105 (7) minutes. No postoperative bleeding, seroma, hematoma, lymphedema, or other complications occurred. The mean (SD) mastectomy and axillary drainage volumes were 20 (8) and 155 (35) mL, respectively, and the mean (SD) drainage durations were 1.3 (0.2) and 2.7 (0.5) days, respectively. The mean (SD) hospital stay was 3.7 (0.6) days.CONCLUSIONS: In this first report (to our knowledge) of modified radical mastectomy with axillary dissection using the electrothermal bipolar vessel sealing system, the technique was feasible, safe, and effective. The device simplified the surgical procedure, while achieving efficient lymph vessel sealing and hemostasis. Compared with historical data regarding the conventional or harmonic scalpel, this technique seems to result in reduced operative time, perioperative blood loss, drainage volume and duration, and incidence of seroma or lymphedema. Prospective randomized controlled studies are necessary to evaluate the effect of this technique on perioperative complications.

**Publication Type:** Comparative Study; Journal Article

**Source:** MEDLINE

**Full Text:** Available from Silverchair Information Systems in Archives of Surgery

40. **Effect of harmonic scalpel on seroma formation following surgery for breast cancer: a prospective randomized study.**

**Citation:** Journal of B.U.On., April 2008, vol./is. 13/2(223-30), 1107-0625;1107-0625 (2008 Apr-Jun)

**Author(s):** Kontos M; Kothari A; Hamed H

**Language:** English

**Abstract:** PURPOSE: With the escalating cost of healthcare provision, surgical techniques that could lead to shorter postoperative stay and reducing cost of health provision are welcomed. We report the results of a prospective randomized trial to investigate the role of harmonic scalpel (HS) in reducing postsurgical seroma formation, complications, pain and consequent cost in breast surgery.PATIENTS AND METHODS: Thirty-three procedures were carried out on 32 women. Patients were prospectively randomized to either HS or electrocautery (EC). The two cohorts were accordingly matched and postsurgical seroma volumes, complications and pain scores were documented.RESULTS: There were 16 procedures in the HS and 17 in the EC group. First 48 h drainage, total drained volume, aspirated volume, operative time, pain score, number of patients that developed seromas, number of clinic visits for aspiration, complications and required analgesia were comparable in the two groups. Multivariate
analysis showed no significant correlation between the total amount of seroma drainage and the known risk factors (body mass index/BMI, size of the invasive tumor and number of positive nodes). **CONCLUSION:** No significant reduction in seroma formation or wound complications and pain could be found with the use of HS. We were unable to demonstrate any significant clinical advantages with the use of HS or cost benefit.

**Publication Type:** Journal Article; Randomized Controlled Trial

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41. **Boostrom S Y, Throckmorton A D, Boughey**
Incidence of clinically significant seroma after breast and axillary surgery
Journal of the American…........2009 (Needs full citation)

42. **Fortunato L, Mascaro A, Amini M et al**
Sentinel lymph node biopsy in breast cancer

43. **Kell M R, Burke J P, Barry M**
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44. **Okada N, Narita Y, Takada M et al**
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45. **Pisesky A**
Does keeping the drains for a longer period after mastectomies lessen seroma formation/

46. **Tong R, Kohi N, Fidelman N**
Clinical outcome of IR drainage of breast seroma following mastectomy with reconstruction
This preports to be the first study to report clinical outcome of IR drainage breast seroma.

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