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Original Research Article

Evaluation of surgical dead space obliteration in modified radical mastectomy for incidence of seroma formation, drain volume and duration of drain

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ABSTRACT

Background: Modified radical mastectomy (MRM) is commonly performed surgery in Breast Cancer. Seroma formation is commonly seen after MRM. This study was conducted to evaluate three potential dead spaces obliteration (DSO) technique i.e., interpectoral space, space between skin flaps and pectoralis major and axillary spaces for prevention of seroma and other post operative outcome comparison.
Methods: A randomized prospective study of sample size 100 patients who were randomized into two groups. Group A undergoes MRM with DSO and group B undergoes only MRM. Post operative outcome were compared.
Results: The mean drain output per day, seroma formation, and drain removal duration was statistically less in patients underwent DSO.
Conclusions: Surgical dead space obliteration is a safe and feasible procedure which gives lower incidences of Seroma formation lesser postoperative complication and early removal of drain.

Keywords: Dead space obliteration, Modified radical mastectomy, Seroma

INTRODUCTION

Breast cancer is the most common cancer among women in India. Data from Globocan 2020 shows us that the incidence of breast cancer is 11.7% and mortality data shows that 6.9% of all cancer deaths are due to breast cancer.[1] The management of Breast cancer requires a complex multidisciplinary approach involving surgeons, radiotherapists, medical oncologists, and pathologists. Surgical treatment remains the mainstay in the treatment of breast cancer with curative intent. Modified radical mastectomy (MRM) and breast conserving surgery (BCS) are the two of the most commonly performed procedure in the management of breast cancer. MRM includes complete removal of Breast including skin and nipple-areola complex and axillary lymph nodes. Seroma develop as serous fluid collection under the skin flaps or in the axillary dead space following mastectomy and axillary dissection. Seroma formation delays wound healing and increases susceptibility to infection and skin flap necrosis and subsequent adjuvant treatments.[2] Different methods have been used to obliterate the dead space formed during MRM. Chemical methods of dead space obliteration such as fibrin glue, tissue adhesive and sclerotherapy agents have failed to show any significant considerable impact on seroma formation.[3] Recent evidence suggests that quilting sutures reduce the incidence of post mastectomy seroma. Quilting sutures consist of suturing the skin flaps to the underlying musculature to reduce ‘dead space'. Kuroi et al, Wolde et al, Ouldamer et al in separate studies found that Quilting decreases seroma formation after mastectomy.[4-6] In search of a new technique which shows comparable results to the standard MRM closure in reduction of post

mastectomy seroma and to provide a cheap and effective alternate way that is useful in limited resource setting. We came across the technique used by Jabir et al in Egypt.[7] The technique identifies three potential dead spaces i.e., interpectoral space, space between skin flaps and pectoralis major and axillary spaces and surgically obliterates them using sutures subsequently it reduces incidence of seroma, fewer aspirations of seroma, facilitates early drain removal and cost is comparable to the conventional technique. The aim of this prospective study is to evaluate the clinical outcomes following the unique technique of triple dead space obliteration in MRM in Indian setting at M.P. Shah Government Medical College Jamnagar.

METHODS

A randomized prospective study was conducted from October 2019 to October 2021 in Department of Surgery M.P. Shah Medical College, Jamnagar, Gujrat, India total with sample size of 100 patients (50 patients in each group). Institutional ethics committee approval was taken prior to the study commencement as it involved human participants. All patients were enrolled in the study after taking written informed consent. It was a single center study with balanced randomization using parallel group design.

Inclusion criteria

Female patients of age >30 who are diagnosed cases of carcinoma breast and planned to undergo Auchincloss Modified Radical Mastectomy were invited to participate in the study. Those who consented were enrolled in the study until the required sample size was reached (consecutive sampling).

Exclusion criteria

Pregnant patients were excluded from study. Recurrent breast carcinoma, previous radiation exposure to chest wall, patients with coagulation disorders, patients who have received treatment from outside before presenting to our hospital were excluded from study. patients had any previous surgery on the axillary lymphatic system patients having breast conserving surgery, patients planned for palliative mastectomy.

Management

All patients presenting to our outpatient department underwent preoperative comprehensive triple assessment according to protocol which include history and physical examination, imaging and pathological assessment. Patient were divided into 2 groups by parallel group design. Group A (50 patients) underwent auchincloss MRM along with Dead Space Obliteration under general anesthesia. Group B (50 patients) underwent MRM only. Skin incision was made with a scalpel and, superior and inferior flaps were raised by monopolar electrocautery (Figure 1). The breast tissue along with the underlying pectoralis fascia was dissected off from the medial to lateral side and by incising the clavipectoral fascia, axilla was entered, and axillary dissection performed. All fat and level I and II axillary lymph nodes were removed in all cases with preservation of the long thoracic nerve and thoracodorsal pedicle. Thereafter, homeostasis was achieved. Surgical dead space obliteration (DSO) was started which included Obliteration of post-mastectomy dead space by three steps (Figure 2).[1] Buttress/Interrupted suture with 2-0 Vicryl to obliterate the axillary dead space. 2. Interrupted sutures with 2-0 Vicryl taken between pectoralis major and minor muscles.[3] Simple interrupted 2-0 Vicryl sutures anchoring the mastectomy skin flaps to pectoralis major and the lateral chest wall muscles. Two drains were placed, one in the axilla and the other beneath the flaps and were connected to one suction drain and skin was closed by nonabsorbable monofilament suture. (Figure 3) Patients were followed up in the postoperative period for daily drain output, complications (seroma formation, hematoma, flap necrosis, surgical site infection) and duration for which the drains were left in place (drains were removed when 24 hours output was <20 ml). After discharge the patients were followed up in the outpatient clinic every 3 days for dressing and detection of complications**.**

Statistical analysis

Performed by the SPSS program for Windows, freely available version (SPSS, Chicago, Illinois). Continuous variables were presented as mean±SD, and categorical variables were presented as absolute numbers and percentage. Data was checked for normality before statistical analysis. Normally distributed continuous variables were compared using the unpaired t test, whereas the Mann-Whitney U test was used for those variables that were not normally distributed. Categorical variables were analyzed using either the chi square test or Fisher's exact test. For all statistical test, $p<0.05$ was considered statistically significant.

Figure 1: Lifting off of breast tissue from pectoralis by monopolar electrocautery.

Figure: 2 closures of superior flap with interrupted quilting suture to the pectoralis major.

Figure: 3 Negative suction drain placements.

RESULTS

We had enrolled 100 participants in our study. The average age of the participants was 53.8±9.47 years (range is 35-75 years). The Mean BMI of the participants was 23.23±0.76 and 17 (34.6%) of the patients had Diabetes mellitus type 2. In our study 36(36%) patients had IDC grade 1 tumor, 58 (58%) had IDC grade 2 tumor and only 4 (4%) had malignant phyllodes and 2(2%) lobular Carcinoma. 28 (56%) patients had ER positive, 25 (54%) had PR marker positive and 9(18%) HER2NEU marker positive. Table 1 daily drain output was measured till post operative day 12.

Drain output was statistically lesser in patients underwent DSO compare to non-DSO group. The mean drain output measured per day (in ml) are shown in the table 2. Out of 50 Patients of DSO group 3 (6%) patients had Flap Necrosis and 6 (12%) had Surgical Site Infections. None of the patients developed hematoma in our study. 41(82%) patients developed no any complications. While in group B, 5 patients develop hematoma, 9 patients develop SSI, 7 patients develop flap necrosis and 15 patients develop seroma. Table 3 The mean number of days for which drain kept was 8.47 days in patients undergoing DSO procedure as compared to those patients in whom DSO was not done and mean number of days drain kept were 9.55 days with p value of 0.02, this result was statistically significant (Table 4).

Table 1: Demographic data of patients.

Age of patient in both group (mean±SD)	53.8±9.49
Mean BMI (kg/m^2)	23.23±0.76
Diabetes mellitus	34.6%
Tumor type	
IDC grade-1	36%
IDC grade-2	58%
Malignant phyllodes	4%
Lobular Carcinoma	2%
Tumor marker	
ER	56%
PR	27%
HER2NEU	18%

Table 2: Mean drain output.

Days	Group A (mean output in ml)	Group B (mean output in ml)
Day 1	79.4	154.6
Day 2	68	130.8
Day 3	56	115.4
Day 4	45.4	98.6
Day 5	37.6	83.9
Day 6	29	74.2
Day 7	22	67.4
Day 8	14	60.4
Day 9	8.6	45.2
Day 10	3	15.7
Day 11	1.4	10.5
Day 12	0.2	5.4

Table 3: Frequency of complications.

Complication	Group A	Group B
Hematoma	0	5
SSI	6	9
Flap necrosis	3	7
Seroma	8	15
No complication	33	14
Total	50	50

Table 4: Association between DSO procedure done in patients and mean drain duration.

Group	Mean duration of drain(days)	Total patients
Group A	8.47	50
Group B	9.55	50

DISCUSSION

In our study, Daily mean drain output was also lesser in group A patients who underwent MRM with DSO compare to non-DSO group B patients. ($p<0.05$). Group A, 8 (16%) patients out of 50 developed seromas while

15 patients out of 50 in group B develop seroma. Variable incidence of post mastectomy seroma has been reported as 2.5- 51% in different series.[5] The efficacy of dead space reduction as a preventive technique has been confirmed previously by meta-analysis of van Bemmel et al.[3] Similar findings that surgical DSO decreases seroma formation have been found in study conducted in past.[8-15] Study by Sakkary et al, also reported that, mastectomy flap fixation technique is a valuable procedure that significantly decreases the incidence of seroma formation.[14] Study by Madhu et al in a similar trial found that the closure of dead space by mastectomy quilting sutures will reduce the total volume of drained fluid, seroma formation and the number of aspirations.[15] Out of the 50 patients in group A, 3 (6%) patients had flap necrosis and 6 (12%) had surgical site infections. Which was less in our study group. Study by Ten Wolde et al, also found that quilting decreased the incidence of Surgical Site Infections.[5] The mean number of days in which drains were kept in patients operated with DSO was 8.47 days compared to other patients in which DSO was not done was 9.55 days and this difference was statistically significant. Study by Sakkary et al also reported that quilting reduces the duration and amount of fluid drained.[14]

The main limitation of the study was its small sample size, which limits the wider application of the results of this study. As multiple surgical teams operated the patients so there is scope for bias due to surgical technique in this study. As the study was performed in a single tertiary care center, there may be centripetal bias. Studies on larger patient groups are required to validate the results of this study on larger populations.

CONCLUSION

After analyzing the data of this prospective study, we found that the incidence of seroma formation after surgical dead space obliteration in the study group was less. Daily drain output, mean duration of drain and post operative complication (hematoma formation, surgical site infection and flap necrosis) was lesser with dead space obliteration.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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