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Comparative Study between Scalpel and Electrocautery, In Causation of Seroma after Modified Radical Mastectomy

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Abstract

Background: Breast cancer is one of the most common malignancies in women and a leading cause of cancer death among women. More than a million cases of breast cancer are diagnosed worldwide each year.

Methods: The study was performed on 100 patients admitted in Department of General Surgery, J.L.N. Medical College and Associated Group of Hospitals, Ajmer from December 2017 to November 2019. They were diagnosed clinically as to have breast carcinoma after satisfying inclusion and exclusion criteria in this study.

Results: 1 (2.00%) patient in scalpel group and 8 (16.00%) patients in electrocautery group seroma formation was present. 1 (2.00%) patient in scalpel group and 4 (8.00%) patients in electrocautery group wound infection was present. 1 (2.00%) patient in scalpel group and 4 (8.00%) patients in electrocautery group necrosis was present.

Conclusion: Scalpel or scissor in comparison to eletrocautery is advantageous and miraculous. It cause effective lymphostasis or less lateral thermal injury but its use in MRM is still cost effective and its recommended also to be used in countries where cost is a major concern.

Keywords: Scalpel, MRM, Electrocautery.

Introduction

Breast cancer is one of the most common malignancies in women and a leading cause of cancer death among women. More than a million cases of breast cancer are diagnosed worldwide each year. The overall incidence of breast cancer has been rising because of increase in the average life span, lifestyle changes that increase risk for breast cancer, and improved survival from other diseases[1]. It accounts for 33% of all female cancers and

is responsible for 20% of the cancer related deaths in women[2]. Modern therapy has evolved to include both surgical resection for local disease and medical therapy for systemic disease.

Seroma is defined as accumulation of serous fluid that develops in the dead space post operatively after fashioning of the skin flaps and axillary dissection following mastectomy. This fluid could be blood stained or clear and contains protein and different cells in various proportions[3].

Seroma is the most common complication of surgery of the breast and axilla. Further seroma can cause complications such as wound dehiscence, infection, flap necrosis, delay in adjuvant therapy and may affect reconstruction. It is also associated with patient discomfort, prolongation of hospital stay and may require increase visit for needle aspirations[3]

Several factors have been researched including surgical instruments used to create the skin flaps. The standard technique is use of electrocautery in our set up and although several studies have been carried out to compare scalpel, electrocautery and ultrasonic knife dissection in other part of the world, no study has been done in our setup. Since it has been shown that electrocautery indeed increases seroma formation, this study therefore seeks to compare seroma formation between scalpel and electrocautery dissection[3].

To prevent seroma formation, it is important to estimate individual risk of seroma formation i.e., the identification of predictive variables will be helpful in designing future trials aimed at reducing the incidence of this common complication of mastectomy[3].

Materials and Methods

The study was performed on 100 patients admitted in Department of General Surgery, J.L.N. Medical College and Associated Group of Hospitals, Ajmer from December 2017 to November 2019. They were diagnosed clinically as to have breast carcinoma after satisfying inclusion and exclusion criteria in this study.

They were included after explaining them about the study and taking proper written consent.

For all operations, same electrocautery instrument and with same setting of blend mode with cutting and coagulation of 35 each was used. To reduce the selection bias further and to increase comparability between two groups by avoiding confounding factors, patients were randomized in to two groups, A and B using table of random numbers.

In group A (sample size 50), during MRM, coagulating mode electrocautery were used to raise the skin flap and axillary dissection. In group B (sample size 50), during MRM, scalpel blade no. 15 was used to raise the skin flap, along with aid of scissors and suture ligation for axillary dissection wherever necessary. Further in group B, there was an extremely minimal use of electrocautery wherever found necessary to achieve hemostasis (with coagulating mode) but use of electrocautery in group B was absolutely avoided for routine rising of the skin flap and for axillary dissection. Both the groups undergoing standard modified radical mastectomy with lymph node dissection of level I, II and III. Closed suction drain with negative pressure (no. 16) will be kept in both the groups, with one tube along the lower skin flap and another tube in the axilla. Arm compression was avoided in both the groups. On histopathology report adequate lymph node dissection (minimum 10 number axillary nodes) was ensured in both the groups. In the post-operative period drain quantity was monitored and noted every 24 hours for both the groups. Post operatively our criteria for drain removal was when drain quantity in the last 24 hours has fallen to less than

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30 ml. Development of seroma as a complication defined when drain quantity continued to be more than 40 ml after post-operative day 7 or if there was clinically evident fluid collection beneath the skin flap during follow up of patient after discharge from hospital. After removal of drain, follow up for the next 12 weeks, skin flaps was examined regularly to see any fluid collection noticing fluctuation, and seroma was confirmed with aspiration of fluid.

Inclusion Criteria

The inclusion criteria are following

1. All the patients who was admitted to J.L.N. Medical College and Associated Group of Hospitals, Ajmer, during the study period with diagnosis of early breast cancer (stage I and II defined by AJCC 6th staging system) and eligible for MRM, posted for surgery was included in the study.
2. Patient age group within 35 to 70 years.
3. All patients who consent to participate in the study.

Exclusion Criteria

The exclusion criteria are following

1. Patients with locally advanced breast cancer (stage III and IV)
2. Patients having Body mass index (BMI) greater than 30 kg/m^2 and less than 18.5 kg/m^2.
3. Patients with Diabetes mellitus.
4. Patients with Uncontrolled hypertension (systolic BP >150 or diastolic BP >100)
5. Patients have received neoadjuvant treatment.
6. Patients anticipated of low compliance for follow up.

Statistical Analysis

Data was analyzed using statistical package for social sciences version 21. Data is presented in forms of tables, pie charts and histograms.

Observation

Table 1: Age wise distribution

Age (Years)	Group-A (n=50)	Group-B (n=50)
Mean	54.16	51.00
SD	13.39	12.93
P-value	0.233	

In the present study, the mean age of the patients in scalpel group was 51.00 ± 12.93 years and electrocautery group was 54.16 ± 13.39 years. The age wise difference in both group found statistically Insignificant.

Table 2: Duration of surgery wise distribution

Duration of surgery (Minutes)	Group-A (n=50)	Group-B (n=50)
Mean	101.50	125.60
SD	8.67	10.30
P-value	0.001	

In the present study, the mean duration of surgery of the patients in scalpel group was 125.60 ± 10.30 Minutes and electrocautery group was 101.50 ± 8.67 Minutes. The duration of surgery wise difference in both groups found statistically significant.

Table 3: Intra-operative blood loss wise distribution

Intra-operative blood loss (ml)	Group-A (n=50)	Group-B (n=50)
Mean	360.50	393.00
SD	22.72	20.51
P-value	0.001	

In the present study, the mean intra-operative blood loss of the patients in scalpel group was 393.00 ± 20.51 ml and electrocautery group was 360.50 ± 22.72 ml. The intra-operative blood loss wise difference in both group found statistically significant.

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Table 4 : Drain volume wise distribution

Drain volume (ml)	Group-A (n=50)	Group-B (n=50)
Mean	586.00	489.00
SD	22.67	10.54
P-value	0.001	

In the present study, the mean drain volume of the patients in scalpel group was 489.00 ± 10.54 ml and electrocautery group was 586.00 ± 22.67 ml. The drain volume wise difference in both group found statistically significant.

Table 5: Drain duration wise distribution

Drain duration (Days)	Group-A (n=50)	Group-B (n=50)
Mean	6.80	5.60
SD	0.62	0.61
P-value	0.001	

In the present study, the mean drain duration in situ of the patients in scalpel group was 5.6 ± 0.61 days and electrocautery group was 6.8 ± 0.62 days. The drain volume wise difference in both group found statistically significant.

Table 6: Complication wise distribution

Complications	Group-A (n=50)	Group-B (n=50)	p-value
Necrosis	4 (8.00%)	1 (2.00%)	0.21
Hematoma	1 (2.00%)	1 (2.00%)	0.99
Lymphoedema	1 (2.00%)	1 (2.00%)	0.99
Wound infection	4 (08.00%)	1 (2.00%)	0.52
Seroma	8 (16.00%)	1 (2.00%)	0.08

In the present study, 1 (2.00%) patients in scalpel group and 8 (16.00%) patients in electrocautery group seroma formation was present. 1 (2.00%) patients in scalpel group and 4 (08.00%) patients in electrocautery group wound infection was present. 1 (2.00%) patients in scalpel group and 4 (8.00%) patients in electrocautery group necrosis was present. The seroma formation wise difference in both group found statistically Insignificant.

Discussion

Safety, efficiency, complications, recurrences, cost, and acceptance from the patients are the factors determining the success of a surgical procedure. Acceptance from the patients is determined by postoperative pain, length of hospital stay, and recovery rate as well as complications.[4] Hence, our experience regarding the use of scalpel versus the traditional use of electrocautery (diathermy) in modified radical mastectomy for intraoperative and postoperative outcomes has been discussed taking into account of various parameters.

In the present study, the mean age of the patients in scalpel group was 51.00 ± 12.93 years and electrocautery group was 54.16 ± 13.39 years. The age wise difference in both groups found statistically Insignificant, which was in concordance with some of the earlier studies.[5,6] Our study showed the higher incidence of breast carcinoma in middle-aged group. Siddiqui et al.[7] and Baloch and Iqbal[8] also found the disease to be most common in middle-aged patients (40–59 years). This can be explained by the fact that the breast cancer is a heterogeneous malignancy, its age-specific incidence profile rises exponentially until menopause and increases more slowly thereafter.[9]

In the present study, the mean BMI of the patients in scalpel group was 23.99 ± 2.30 Kg/mt^2 and

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electrocautery group was 23.88 ± 2.39 Kg/mt^2. The BMI wise difference in both group found statistically Insignificant which was in concordance with some of the earlier studies.[6,7]

The mean operative time in our study was significantly longer using scalpel (125.60 vs. 101.50 min, P< 0.001). Our results were in contrast to the study conducted by Kiyingi et al.[10] and Huang et al.,[11] which showed no statistically significant difference. Our results were also similar to the study conducted by Rohaizak et al.[12] and Khan et al.[13]

Rohaizak et al.[12] said that this could be explained by the lack of experience in using the ultracision.

Böhm et al.[44] conducted similar study that exposed the surgeon to the technique for 5 months before the study and managed to show no significant difference in operating time between ultrasonic surgery and conventional device. Our study showed longer operative time using scalpel inspite of prior training.

We infer that the scalpel takes slightly longer than electrocautery to divide the tissue as it cuts and coagulates at the same time. This calls for patience and avoidance of undue traction on the surgical specimen, which is almost instinctive reaction to the slower rate of cutting.[15]

Our study revealed that the use of the electrocautery significantly reduces intraoperative blood loss (393.00 ± 20.51 vs. 360.50 ± 22.72, P = 0.001). This is in agreement with most of the studies, for example, Miller E et al [53], Sheen -Chen SM et al , Kozomara et al.,[16] Khan et al., and Huang et al. The electrocautery provides a better hemostasis, resulting in lesser intraoperative blood loss.[17]

Our study showed that the scalpel decreases the rate of occurrence of seroma than electrocautery (2.00% in scalpel group vs. 16.00% in electrocautery group); however, the difference was statistically insignificant. Porter et al.[18] found that the use of electrocautery was significantly associated with increased seroma formation in a randomized controlled trial. As the difference in drain volume was significant among the two groups, the study showed comparable results in relation to seroma formation, which might have been prevented due to the placement of drains in every single case. Thus, it can be concluded that scalpel can effectively occlude lymphatic channels.

In our study, 2.00% of patients were reported with hematoma in both scalpel and electrocautery groups. The difference between the two groups was statistically insignificant (P=0.99). However, intraoperative blood loss was significantly less in case of scalpel group, proving its less lateral thermal injury and tissue damage.

This study showed statistically insignificant value in terms of incidence of wound infection between the groups. Similar results have been shown in studies by Kozomara et al., Ribeiro et al.,[19] and Rohaizak et al. Infection was more common in patients who developed seroma, hematoma, or flap necrosis.

Flap necrosis either develops as sequelae to continued abnormal vascularity or develops primarily.[19] The seroma may become infected and cause flap necrosis.[21] Very thin flaps tend to develop necrosis; therefore, one should try to raise the flap with an approximately 0.5 cm thick layer of subcutaneous tissue.

In our study, flap necrosis was found in 2.00% patients in scalpel group and 8.00% patients in electrocautery group; however, the P value 0.99, which was not statistically significant. Hence, from this, we can infer that the scalpel causes lesser thermal tissue injury, leading to lesser chances of flap necrosis. However, in a study by Huang et al., a significant difference was

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observed in terms of wound complications between the two groups.

The hospital stay was counted from the 1st admission day. In this study, the length of hospital stay was not reduced as most of our patients were discharged, probably the 10th or 11th postoperative day as per our surgery department protocol. Hence, the length of hospital stay could not be compared effectively in our study.

The difference in the incidence of lymphedema between the two groups was not statistically significant (P = 0.99). However, these results should be carefully evaluated as lymphedema takes longer time to develop after surgery. One limitation of our study is its shorter period of follow-up, so we cannot comment on the frequency of lymphedema in both the groups.

Drains are placed to help check complications such as hematoma, seroma, and flap necrosis as a result of sequelae to seroma. Electro-coagulation causes temporary sealing of lymphatic channels, which open up latter on allowing egress of fluids without cells and extensive fat nacrosis and lymphatic vessel damage due to tissue burn leads to further seroma formation, and electrocautery also causes sloppy lymphostasis and hemostasis and increases morbidity by severing and thermically injuring lymph pathways as well as by forming hematoma.[18] The scalpel, on the other hand, inflammatory reaction in the operative field is reduced, less lymphatic tissues are injured, and less oozing surface is produced in the operative field.[19] All these factors contributed in reducing the postoperative drainage volume in our study.

Conclusion

The scalpel dissection for raising the skin flap during MRM surgery advocated in decreasing seroma formation, flap necrosis and wound infection so decrease all over co-morbidity, hospital stay and less follow up visit for needle aspiration. Early start of adjuvant chemotherapy and early return to work.

Scalpel or scissor in comparison to eletrocautery is advantageous and miraculous. It cause effective lymphostasis or less lateral thermal injury but its use in MRM is still cost effective and its recommended also to be used in countries where cost is a major concern.

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