

COMPARISON OF MEAN BLOOD LOSS USING HARMONIC SCALPEL AND MONOPOLAR ELECTROCAUTRY IN MODIFIED RADICAL MASTECTOMY

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ABSTRACT

Objective: The objective of this study was to compare the mean per operative and post operative blood loss using harmonic scalpel and monopolar electrocautry in modified radical mastectomy.

Study Design: Randomized controlled trial.

Place and Duration of Study: Department of surgery PNS Shifa Karachi, from 25th Oct 2011 to 24th Apr 2012.

Material and Methods: A total of 64 patients, undergoing Modified Radical Mastectomy (MRM) were randomly divided into two groups of 32 patients each, using random numbers table. Dissection in group A was done using Harmonic Scalpel (HS). Group B underwent Monopolar Electrocautry (ME) for dissection and hemostasis. Mean per and post operative blood loss was calculated in milliliters.

Results: Mean per operative and post operative blood loss using harmonic scalpel (group-A) was 121.19 ± 5.63 ml while 603.35 ± 8.04 ml loss was recorded in monopolar electrocautry group (group B). A *p*-value was calculated as <0.001 which shows a significant difference between both the groups.

Conclusion: The mean per and post operative blood loss using harmonic scalpel is significantly less than using monopolar electrocautry in modified radical mastectomy.

Keywords: Modified radical mastectomy, Monopolar electrocautry, Per operative, Post operative blood loss, Harmonic scalpel.

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INTRODUCTION

In the developed world, Breast cancer is one of the commonest causes of death in middle-aged women while it is responsible for 1-3% of deaths in third world countries¹. Surgery is the mainstay of treatment. Modified Radical Mastectomy (MRM) is the most widely used operation for this deadly cancer³⁻⁵. In MRM, the whole breast with large portion of overlying skin (the centre of which overlies the tumor but always includes the nipple), whole fat, fascia and lymph nodes of the axilla are excised en block¹. The axillary vein and nerves to the serratus anterior and latissimus dorsi should be preserved¹. Surgeons adopt different modalities of dissection in MRM. Some use a sharp scalpel and/or scissors, others prefer

blunt dissection using their finger to separate soft tissues or a gauze over an artery forceps^{2,3}. However, in today's surgical practice Monopolar Electrocautry (ME) is commonly used². It offers a cheap and rapid way for coagulating blood vessels <1 mm, but with production of large degree of smoke^{2,3}. Monopolar Electrocautry (ME) dissection in MRM is associated with significant morbidity in 35-50% of patients^{2,3}. It is attributed to lateral thermal injury causing incomplete occlusion of vascular and lymphatic channels². Harmonic Scalpel (HS) has recently emerged as a safe instrument that generates ultrasonic waves at frequency of 55,000/sec for cutting and hemostasis simultaneously^{2,3,5}. HS was extensively used in laparoscopic surgery but nowadays it is also employed in open surgeries (Abdomen, Thyroid & Breast) with a significant decrease in estimated mean blood loss and thus morbidity^{2,3}.

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Blood is a valuable commodity⁶ and operative bleeding is an important factor as it is believed that need for blood transfusions during MRM decreases the survival of the patient and worsens the prognosis². A better surgical technique is likely to be a part of clinical practice as a result of increased awareness of blood loss⁶.

The rationale of this study was to compare the two dissecting techniques in Modified Radical Mastectomy in terms of mean blood loss, there of, highlighting a better surgical alternative in local setup. The exact awareness of blood loss minimizes the risk of over or under transfusions. It thus, lessens the risk associated with transfusion related complications.

PATIENTS AND METHODS

The randomized controlled trial was carried out at department of Surgery, PNS Shifa Hospital Karachi from 25th October 2011 to 24th April 2012. Permission from 'Hospital Ethical Committee' was obtained. Non-probability consecutive sampling technique was used to collect the data. The sample size was calculated by WHO sample size calculator where level of significance (α) = 5%, Power of test ($1 - \beta$) = 80%, Population Standard Deviation = 95, Test value of Population Mean = 60, Anticipated Population Mean = 294, Sample size (n) = 32 patients in each group. Female patients, aged 25 to 90 years, having biopsy proven carcinoma of breast, undergoing MRM were included in the study. After obtaining an informed, written consent from every patient for MRM & their participation in the trial, they were randomly divided into two equal groups (n=32) by lottery method. In group A, Harmonic Scalpel (HS) was used, while in group B Monopolar Electrocautry (ME) was used for dissection and hemostasis. All the operations were performed by same team of consultant surgeons under general anesthesia. Per operative blood loss was measured by weighing the dry sponges preoperatively (preserving sterilization) and soaked sponges postoperatively with a highly sensitive weight measuring apparatus in grams (gms). The difference between the two was

equal to per operative blood loss. (1 gram = 1 millilitre). Every effort was made not to use mechanical suction during operation. If used; arrangements were made to calculate drainage volume in suction drain as well. Wound was closed after placing two suction drains (one at chest wall and second in axilla) in each group. Postoperative drainage volume (blood, serum and lymph) in drains was recorded in millilitres, every 24 hours. The drains were removed after the drain output <30 ml/ 24 hours. Post operative treatment including, mobilization of arms after 24 hours, change of dressing and discharge once drains removed, were same in both the groups. Data, thus collected for each patient was recorded on a patient's performa.

Patients with previous breast surgery, hypertension, any bleeding disorder i.e. thrombocytopenia, hemophilia, liver disease and patients on anticoagulants or anti platelets were excluded from study to control bias and confounding factors. Ethical issues like consent, privacy of the patient and financial problems were properly addressed. Data was analyzed using SPSS v16.0. Mean and standard deviation was calculated for quantitative variables like per and post operative blood loss in both the groups. For categorical variables like gender and age, in both the groups, frequencies were presented. Independent sample t-test was used for comparison of quantitative variables per and post operative blood loss. A *p*-value of <0.05 was considered as significant.

RESULTS

In our study all the patients were females 100% (n=32) in each group and majority of subjects were between 41-60 years of age in both the groups i.e. 65.63% (n=21) in group-A and 59.38% (n=19) in group-B, 9.37% (n=3) in group-A and 12.5% (n=4) in group-B were between 20-40 years, while 25% (n=8) in group-A and 28.12% (n=9) in group-B were between 61-80 years. No patient was between 81-100 years of age, in both the groups. Mean and S.D was calculated as 48.76 ± 6.21 in group-A and 44.45 ± 7.82 in group-B.

The mean per operative blood loss using Harmonic Scalpel (group-A) and Monopolar Electrocautry (group-B), was calculated as 48.22 ± 5.64 ml and 279.59 ± 8.04 ml respectively (table-I). A *p*-value was calculated as <0.001 which shows a significant difference between both the groups. The mean post operative draining volume was recorded as 72.97 ± 5.62 ml in group-A and 323.76 ± 6.11 ml in group-B. A *p*-value was <0.001 which shows a significant difference between both the groups (table-II).

The total blood loss (per operative and post operative) between group A and B was 121.19 ± 5.63 ml and 603.35 ± 8.04 ml respectively. A *p*-value was calculated as <0.001 which shows

operative blood transfusion in MRM decreases the survival of the patient and worsens the prognosis^{2,10}. Recently, Harmonic Scalpel has been recognized as a safe surgical instrument for dissection and hemostasis^{2,10,11}. As it uses the ultrasonic waves there is no danger of electric shock or burn to the patient and/or to the surgeon^{2,10}.

The exact awareness of blood loss leads to saving of blood for our community's blood banks and minimizes the risk of over or under transfusions, enabling our patients, return to routine activity quickly with little post operative discomfort. However, we planned to compare the two surgical techniques in MRM in terms of

Table-I: Comparison of mean blood loss using HS (G-A) and ME (G-B) in modified radical mastectomy (n=64).

Blood Loss (in ml)	Group-A (n=32)	Group-B (n=32)	<i>p</i> -value
Per Op	48.22 ± 5.64	279.59 ± 8.04	<0.001
Post Op	72.97 ± 5.62	323.76 ± 6.11	<0.001

Table-II: Comparison of mean blood loss (per and post OP) within the group (n=64).

Blood Loss (in ml)	Per Op	Post Op	<i>p</i> -value
Group-A (n=32)	48.22 ± 5.64	72.97 ± 5.62	<0.001
Group-B (n=32)	279.59 ± 8.04	323.76 ± 6.11	<0.001

a significant difference between both the groups.

DISCUSSION

Conventional MRM with axillary dissection using scalpel, clamp and tie techniques, and electrocautry is frequently associated with complications such as seroma and lymphedema^{7,8}. Other less common complications include hematoma, prolonged axillary drainage and per operative and postoperative bleeding^{7,8}. Hemostasis is usually performed using clips, suture ligation, or electrocautry. However, suture ligation is time-consuming and carries the risk of knot slipping, while clips may become dislodged. Moreover, electrocautry produces thermal spread to adjacent tissues⁹ and is considered a risk factor for seroma¹⁰ and other wound complications after mastectomy.

Per and post operative blood loss in MRM is an important factor. It is believed that intra-

mean blood loss to highlight a better dissecting and haemostatic technique in local setup.

The findings of our study are in agreement with the study conducted by Deo et al³. who recorded the mean per operative blood loss in HS group as 60 ± 35 ml and 294 ± 155 ml in ME group: Similarly the post operative blood loss was 590 ± 430 ml and 1085 ± 690 ml respectively³. Kozomara et al¹¹ recorded intraoperative blood loss in the group of patients mastectomized by harmonic scalpel 78 ± 31 ml compared to 256 ± 112 ml in the group mastectomized by monopolar electrocautry ($p<0.001$). The post operative drain in patients mastectomized by harmonic scalpel was 540 ± 390 mL compared to 960 ± 710 mL in patients mastectomized by electrocautry ($p<0.001$)¹¹. However, they concluded that using the ultrasound harmonic scalpel in comparison to monopolar electrocautry brings certain advantages but do not contribute significantly to

the total success rate of the operation. But in terms of mean blood loss in MRM, the results of our study are comparable to this study.

Nagah et al² compared Harmonic Scalpel with the Monopolar Electrocautry in Modified Radical Mastectomy and concluded that the use of harmonic scalpel in MRM shortened the axillary dissection time and caused significant decrease in blood loss and drainage volume and thus lessened overall hospital stay. This is in line with the conclusion of our study.

Majority of the patients in our study were between 41-60 years of age in both groups i.e. 65.63% (n=21) in group-A and 59.38% (n=19) in group-B. Kozomara et al¹¹ in his study showed the average age of the patients as 62 ± 17 years.

CONCLUSION

It is concluded that mean per operative and post operative blood loss using Harmonic Scalpel is significantly less than using Monopolar Electrocautry for dissection and hemostasis in Modified Radical Mastectomy indicating a better surgical technique in terms of blood loss.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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