



COMPARING THE HARMONIC SCALPEL WITH ELECTROCAUTERY IN REDUCING INTRAOPERATIVE BLOOD LOSS, POSTOPERATIVE DRAIN FLUID VOLUME, DAYS TILL DRAIN REMOVAL AFTER MODIFIED RADICAL MASTECTOMY IN CARCINOMA BREAST PATIENTS

General Surgery

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ABSTRACT

Background- Only a few studies compare the efficacy of the harmonic scalpel and electrocautery in performing mastectomies and these have mainly compared their intraoperative parameters. This study was undertaken with the intention to evaluate the benefits of harmonic scalpel dissection over electrocautery in MRM.

Methods- This comparative study was conducted in Department of Surgery, IGMC Shimla over a period of one year from 1 July 2015 to 30 June 2016. Histologically proven cases of carcinoma breast presenting in the surgery OPD or admitted in the surgery wards were included in the present study.

Results- In HARMONIC MRM group mean blood loss was 119.12 ± 34.9 ml and in ELECTROCAUTERY MRM group mean blood loss was 160.35 ± 28 ml. The difference was found to be statistically significant with a p value of < 0.0001 . In Group A Mean axillary flap drain output till removal was 157.35 ± 27.83 ml. In Group B Mean axillary flap drain output till removal was 269.70 ± 41.74 ml. which was found to be statistically significant with a p value of < 0.0001 . In Group A Mean breast flap output till removal was 93.67 ± 26.43 . In Group B Mean breast flap output till removal was 144.70 ± 22.86 . which is statistically significant. Mean amount of drain fluid till removal in HARMONIC MRM group was 249.7 ± 40.88 ML whereas in ELECTROCAUTERY MRM group was 411.17 ± 47 ML. The difference was found to be statistically significant with a p value of < 0.0001 .

Conclusion- We concluded that the harmonic scalpel reduces the total drainage volume of seromas, the number of drain days, intraoperative blood loss

KEYWORDS

Drainage, Blood loss, MRM

INTRODUCTION

Scalpels with disposable knives are traditionally used for mastectomy procedures. In the last two decades, electrocautery has been accepted as a safe alternative to the scalpel in terms of reduced blood loss and less operating time. However, the increased incidence of seroma formation and flap necrosis is still a concern for many surgeons who prefer to use cold knives.^{1,2}

The introduction of the ultrasonically activated harmonic scalpel a decade ago was a major breakthrough in the field of surgery; it is now considered an integral part of all advanced laparoscopic procedures.³ Though the harmonic scalpel is used in many other major open operations, its use in modified radical mastectomy (MRM) is still limited.

An electrocautery performs its action via an electrical current that produces heat. The harmonic scalpel uses ultrasound technology to create high-frequency mechanical vibrations in the range of 20,000Hz to 60,000Hz to cut and coagulate at the same time, sealing vessels at lower temperatures than electro-surgery. The vibrations cut through tissue and seal it using protein denaturation, rather than heat.⁴ The harmonic scalpel has the advantages of precise dissection, reliable hemostasis, less lateral thermal spread, and less charring, surgical smoke, desiccation, and tissue sticking when compared with electrocautery.⁵ The harmonic scalpel is not without constraints, which include cost and availability limitations.⁶

This study was undertaken with the intention to evaluate the benefits of harmonic scalpel dissection over electrocautery in MRM.

MATERIALS AND METHODS

This comparative study was conducted in Department of Surgery, IGMC Shimla over a period of one year from 1 July 2015 to 30 June 2016. Histologically proven cases of carcinoma breast presenting in the surgery OPD or admitted in the surgery wards were included in the present study.

INCLUSION CRITERION

Patients diagnosed with carcinoma breast disease, planned for modified radical mastectomy.

EXCLUSION CRITERION

Patients with fungating advanced ca breast and patient unfit for general anaesthesia were excluded.

All patients were thoroughly evaluated clinically followed by routine blood investigations and imaging in the form of x rays, ultrasound, bilateral mammography.

STATISTICAL METHODS

1. For descriptive statistics of quantitative variables the mean, range and standard deviation were used to describe central tendency.
2. For analysis of the differences in proportions and differences in means independent two samples "t" test was used for the continuous variables, Fisher's Exact and Chi-square tests were used where applicable.
3. P-value < 0.005 was considered to be significant.

OBSERVATIONS

A comparative study between harmonic assisted modified radical mastectomy (HA-MRM) and electrocautery assisted MRM (EA-MRM) was conducted in IGMC, Shimla over a period of one year from 1st July 2015 to 30 June 2016. A total of 68 patients diagnosed with Carcinoma breast underwent modified radical mastectomy in the Department of surgery and were included in the study.

Informed consent was taken from all patients. Patients were divided into two groups Group A and Group B. Group 'A' (34 patients) underwent harmonic assisted MRM while Group 'B' (34 patients) underwent electrocautery assisted MRM.

The age of the patients in study ranged from 31 to 78 years. Age in Harmonic MRM (Group A) ranged from 32 to 73 years and the mean age was 51.29 ± 10.15 years whereas in Electrocautery MRM (Group B) the age ranged from 31 to 78 years and mean age was 50.16 ± 11.62 years. The youngest patient in Harmonic Group was 32 years, whereas in Electrocautery Group was 31 years. Most of patients (44.12% versus 50%) in both groups were in the age group of 41-50 years. All the 68 (100%) patients in both the Groups in the study were females and none was male.

Table-1 Intraoperative Blood Loss In Both Groups Of MRM

Blood loss Approx. (in ml)	HARMONIC MRM n=34 No. of pts. (percent)	ELECTROCAUTERY MRM n=34 No. Of pts. (percent)
80-110	17(50%)	2(6%)
111-140	11 (32%)	3 (9%)
141-170	5(15%)	12(35%)
171-200	1(3%)	17(50%)
Total	34	34
P Value	<.0001	

Intraoperative blood loss ranged from 80-180 ml for HARMONIC MRM Group and ranged from 90-200 ml for Electrocautery MRM Group. In Harmonic MRM Group mean blood loss was 119.12±34.9 ml and in Electrocautery MRM Group mean blood loss was 160.35±28ml. This difference was found to be statistically significant in terms of intraoperative blood loss between the two groups with a p value of <.0001.

Table-2 Total Amount Of Drain Fluid Till Drain Removal

Mean drain fluid amount in ml	Harmonic MRM group n=34(percent)	Electrocautery MRM group n=34(percent)
Breast flap	93.67±26.43ml	144.70±22.86ml
Axillary flap	157.35±27.83ml	269.70±41.74ml.
p-value	<.0001	

In Group A, breast flap drain output ranged from 70-170ml till removal. Mean breast flap drain output till removal was 93.67±26.43ml.

In Group B, breast flap drain output ranged from 120-180ml till removal. Mean breast flap drain output till removal was 144.70±22.86ml. This difference was found to be statistically significant with a p value of <.0001.

In Group A, Axillary flap drain output ranged from 120-220ml till removal. Mean axillary flap drain output till removal was 157.35±27.83ml.

In Group B, Axillary flap drain output ranged from 170-350ml till removal. Mean axillary flap drain output till removal was 269.70±41.74ml. This difference was found to be statistically significant with a p value of <.0001.

Table-3 Total Amount Of Drain Fluid Till Drain Removal

Drain fluid amount in ml	Harmonic mrm group n=34(percent)	Electrocautery mrm group n=34(percent)
180-280	25(73%)	1(3%)
281-380	4(12%)	6(18%)
381-480	5(15%)	27(79%)
Total	34	34
p-value	<.0001	

Drain was removed when output was less than 30 ml for 24 hrs. Total amount of drain fluid till removal ranged from 180-390 ml for Harmonic MRM Group and ranged from 280-480 ml for Electrocautery MRM Group. Mean amount of drain fluid till removal in Harmonic MRM Group was 249.7 ±40.88 ML whereas in Electrocautery MRM Group was 411.17±47ML. This difference was found to be statistically significant with a p value of <.0001.

Drain was removed when output was less than 30 ml for 24 hrs.

Table-4 Total Duration Of Days Till Breast Drain Removal

BREAST DRAIN DURATION (IN DAYS)	Harmonic MRM Group n=34(percent)	Electrocautery MRM Group n=34(percent)
2	22(65%)	20(59%)
3	11(32%)	14(41%)
4	1(3%)	0
p-value	0.3483	

The duration that the drain was kept in situ postoperatively ranged from 2-4 days for Harmonic MRM Group and ranged from 3-4 days for Electrocautery MRM Group. Mean duration of breast drain removal in Harmonic MRM group was 2.52 ±.47 day and in Electrocautery MRM Group was 2.41 ±.49 day. This difference was

not found to be statistically significant with a p value of 0.3483.

Table-5 Total Duration Of Days Till Axillary Drain Removal

AXILLARY DRAIN DURATION (IN DAYS)	Harmonic MRM Group n=34(percent)	Electrocautery MRM Group n=34(percent)
3	20(59%)	1(3%)
4	9(26%)	3(9%)
5	5(15%)	18(53%)
6	0	12(35%)
p-value	<.0001	

Postoperatively axillary drain was removed between 3-5 days for HARMONIC MRM Group and between 3-6 days for ELECTROCAUTERY MRM Group. Mean duration of axillary drain kept in axilla in HARMONIC MRM Group was 3.56±.71 day and in ELECTROCAUTERY MRM Group was 5.15±.73 day.

This difference was found to be statistically significant with a P value <0.0001.

DISCUSSION

Modified Radical Mastectomy (MRM) is the most commonly performed surgical procedure for carcinoma breast. MRM either with knife or electrocautery, is associated with increased blood loss, seroma, wound infection, flap necrosis, hematoma, and prolonged axillary drainage. The higher percentage of morbidity is attributed to the large raw area after mastectomy. Electrocautery commonly used in MRM dissection also causes thermal tissue injury, leading to subdermal vascular plexus disruption and incomplete lymphatic and vascular occlusion, which in turn leads to a higher morbidity rate^{7,8,9}.

In Group A, Mean axillary flap drain output till removal was 157.35±27.83ml.

In Group B, Mean axillary flap drain output till removal was 269.70±41.74ml. which was found to be statistically significant with a p value of <.0001.

In Group A, mean breast flap output till removal was 93.67±26.43ml. In Group B, mean breast flap output till removal was 144.70±22.86ml. The difference was found to be statistically significant.

Shereen R D et al¹⁰ in a study of fifty carcinoma breast patients from December 2010 to June 2012 undergoing MRM reported that axillary drain volume [group A 113.7 ± 15.2 ml vs group B 179.2 ± 45.9 ml], flap drain volume [group A 94.8 ± 14.2 ml vs group B 145.6 ± 37.3 ml] were less in Harmonic Group in comparison to Electrocautery with results comparable to the present study.

Present study showed that the use of harmonic scalpel can significantly reduce the total postoperative drainage and seroma development. Mean amount of drain fluid till removal in HARMONIC MRM group was 249.7 ±40.88 mL whereas in ELECTROCAUTERY MRM group was 411.17±47mL. The difference in amount was found to be statistically significant with a p value of <.0001.

In a study by S. Kozomara D et al.¹¹ (in 2008) on ca breast smaller total drain secretion were noted which was statistically significant in the group of patients mastectomized with harmonic scalpel (540±390 mL) in comparison to the group mastectomized with the electrocauter (960±710 mL). The results of this study were comparable to present study.

In another Study by khater et al¹², the mean total amount of drainage fluid before drain removal was (446.00 milliliters ±70.64 (SD) versus 773.50 milliliters ± 159.82(SD) which was comparable to the results of present study.

In studies by Khan S et al¹³, drain volume and the rate of seroma when compared between harmonic to that of electrocautery (631 ±275 vs. 1035±413,p<0.001) was also comparable to present study depicting that patients operated upon with Harmonic had significantly less postoperative drainage & seroma formation.

Mean duration of days till breast drain removal in HARMONIC MRM group was 2.52±.47 days and in ELECTROCAUTERY MRM group was 2.41 ±.49 days. The difference was not found to be statistically significant.

Mean duration of days till axillary drain removal in HARMONIC MRM group was $3.56 \pm .71$ days and in ELECTROCAUTERY MRM group was $5.15 \pm .73$ days . The difference was found to be statistically significant.

Shereen et al¹⁰ in their study reported that mean duration of days till breast drain removal in HARMONIC MRM group $2.2 \pm .6$ days and in ELECTROCAUTERY MRM was $3.8 \pm .8$ days.

Mean duration of days till axillary drain removal in HARMONIC MRM group was $2.8 \pm .7$ days and in ELECTROCAUTERY MRM group was 6.7 ± 1.02 days with the results comparable to present study.

The difference though evident in the present study was not statistically significant in breast drain. This could be attributed to small sample size in the present study. A large randomized trial would probably demonstrate efficacy of Harmonic over Electrocautery in this regard.

CONCLUSION

We concluded that the harmonic scalpel reduces the total drainage volume of seromas, the number of drain days, intraoperative blood loss

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