

## A NOVEL TECHNIQUE OF HARMONIC TISSUE DISSECTION REDUCES POSTOPERATIVE HEMATOMA, FLAP NECROSIS, WOUND SEPSIS AFTER MODIFIED RADICAL MASTECTOMY COMPARED TO CONVENTIONAL ELECTROCAUTERY

Dr. Ajay Kumar<sup>1</sup>, Dr. Bhavesh Devkaran<sup>2</sup>, Dr. Arun Chauhan<sup>3</sup>, Dr. Sunil Kumar Negi<sup>4</sup>

<sup>1</sup>Resident Doctor, Department of General Surgery, IGMC Shimla

<sup>2</sup>Professor, Department of General Surgery, IGMC Shimla

<sup>3</sup>Assistant Professor, Department of General Surgery, IGMC Shimla

<sup>4</sup>Resident Doctor, Department of General Surgery IGMC Shimla

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**Corresponding author:** Dr. Sunil Kumar Negi

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### Abstract

**Background:** Breast cancer is a serious public health problem with high incidence and prevalence coefficients. 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:** *Postoperative hematoma occurred in 1 patient of Electrocautery Group, which was drained. There were no cases of postoperative hematoma in Harmonic Group. This difference was not found to be statistically significant with P value=.313.*

*Postoperative flap necrosis occurs in 1 (3%) patient of harmonic MRM Group and 4(11.8%) patients of electrocautery MRM Group. This difference was not found to be statistically significant with P value 0.1633. Postoperative wound sepsis occurs in 2 (5%) patient of Harmonic MRM Group and 5(14%) patients of Electrocautery MRM Group. This difference was not found to be statistically significant with P value 0.2312.*

**Conclusion-** Harmonic scalpel significantly reduces postoperative overall complications (flap necrosis, and SSI) in the patient undergoing MRM

**Keywords:** Flap necrosis, SSI, MRM

### Introduction

Breast cancer is a serious public health problem with high incidence and prevalence coefficients. Breast cancer is no longer seen as a single disease but rather a multifaceted disease comprising of distinct biological subtypes with diverse natural history, presenting a varied spectrum of clinical, pathological and molecular features with different prognostic and therapeutic implications. Breast cancer is a common cancer in women, both in the developed and the developing world. The incidence of breast cancer is increasing in the developing world due to increased life expectancy, urbanization and adoption of western lifestyles.

Over the last few decades there have been outstanding advances in breast cancer management, leading to development of more effective treatments, thus resulting in significant decline in breast cancer related mortality and morbidity and improved outcomes.<sup>1,2</sup>

Modified Radical Mastectomy (MRM) still remains the most commonly performed surgical procedure for carcinoma breast despite increasing trends toward breast-

conserving surgery (BCS). MRM either with knife or electrocautery, is associated with increased blood loss, seroma, wound infection, flap necrosis, hematoma, and prolonged axillary drainage. Operative morbidity associated with MRM using knife or electrocautery is between 30 and 50 %<sup>3,4</sup>. This 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<sup>3,4,5</sup>.

Ultrasonic dissection with a harmonic scalpel is a safe alternative tool for surgical dissection and hemostasis to electrocautery. The harmonic scalpel is a high-power, high-frequency (55,000 cycles per second) ultrasonic system for dissecting tissue and sealing blood vessels. By combining vascular sealing and tissue dissection, surgical procedures are facilitated. The harmonic scalpel converts electrical energy into high frequency (55.000 Hz) mechanical vibrations that cuts and coagulate the tissue at the same time. The ultrasonic energy generated by the harmonic

scalpel causes break down of hydrogen bonds and the formation of denatured protein coagulum which seals off the vessels and lymphatics thus decreasing blood loss and lymphatic drainage. The harmonic scalpel offers greater precision in tight spaces near vital structures where fewer instrument changes are needed and less tissue charring and desiccation occur. Furthermore the visibility in the surgical field is improved.

The harmonic scalpel is a safe alternative surgical tool for both hemostasis and dissection, and its role has been well studied in open as well as in minimally invasive surgery.

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  $51.29 \pm 10.15$  years whereas in Electrocautery MRM (Group B) the age ranged from 31 to 78 years and mean age was  $50.16 \pm 11.62$  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: Postoperative hematoma in both Groups**

Postoperative hematoma	Harmonic Group (n=34)	MRM Electrocautery Group (n=34)
Yes	0	1 (3%)
No	34	33 (97%)

Postoperative hematoma occurred in 1 patient of Electrocautery Group, which was drained. There were no cases of postoperative hematoma in Harmonic Group. This difference was not found to be statistically significant with P value=.313.

**Table 2: Postoperative flap necrosis in both Groups**

Postoperative flap necrosis	Harmonic Group (n=34)(Percent)	MRM Electrocautery Group (n=34) (percent)
Yes	01(3%)	04(11.8%)
No	33(97%)	30(88.2%)
Total	34	34

Postoperative flap necrosis occur in 1 (3%) patient of harmonic MRM Group and 4(11.8%) patients of electrocautery MRM Group. This difference was not found to be statistically significant with P value 0.1633.

**Table 3: Postoperative wound sepsis in both Groups**

Postoperative wound sepsis	Harmonic MRM Group (n=34) Percent	MRM Electrocautery Group (n=34)(percent)
Yes	02(5%)	05(14%)
No	32(95%)	29(86%)
Total	34	34

Postoperative wound sepsis occurs in 2 (5%) patient of Harmonic MRM Group and 5(14%) patients of Electrocautery MRM Group. This difference was not found to be statistically significant with P value 0.2312.

#### 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<sup>3,4,5</sup>.

*Postoperative hematoma occur in 1 patient of electrocautery Group, which was drained. There were no cases of postoperative hematoma in harmonic Group. The difference was not found to be statistically significant between the two groups.*

*Postoperative wound sepsis occur in 2 (5.882%) patient of harmonic MRM group and 5(14.706%) patients of electrocautery mrm group. The difference was not found to be statistically significant between the two groups.*

**Gustavo et al<sup>6</sup>**, in (2008) studied a prospective non-randomised clinical trial among patients with ca breast. In total, 46 patients underwent an MRM with ES and 49 with HS. The rate of local complications was 29% in the HS group and 52% in the ES group ( $p=0.024$ ). Necrosis was the only complication of the four evaluated (seroma, flap necrosis, infection and haematoma) that showed a significant difference between the groups, occurring less frequently in the women in the HS group (4% vs. 22%;  $p=0.013$ ) suggesting that in experienced hands the rate of postop complication is less in both the Groups, even though Harmonic makes dissection easier.

**Jinbo et al in (2015)<sup>7</sup>** studied that the rate of wound complications is decreased by the use of harmonic scalpel in this meta analysis. The most common complications included flap necrosis, haematoma and wound infection. These were encountered more often in electrocautery dissection possibly due to its thermal tissue injury to subdermal vascular plexus and incomplete occlusion of lymphatic channels. Whereas, harmonic scalpel displays advantages in dissection with less thermal tissue injury which resulted in less flap necrosis. They reported that, the

low thermal condition is not conducive to bacterial growth which leads to the reduced infection rates. Although incidence of postoperative complications are reportedly higher in electrocautery Group. The same could not be statistically significant *due to small sample size in the present study. A large randomized trial would probably demonstrate superiority of Harmonic over Electrocautery dissection in MRM in regard to postop complications.*

### Conclusion

Harmonic scalpel significantly reduces postoperative overall complications (flap necrosis, and SSI) in the patient undergoing MRM

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