

Original Research Article

Comparative Study of Harmonic Scalpel versus Electrocautery in MRM

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Abstract: Breast cancer is one of the most common carcinoma in the female population. Several combinations of surgery, radiotherapy, chemotherapy and hormonal immunotherapy are being used for treatment of carcinoma breast. Conventional MRM using electro-cautery is associated with a certain loss of blood and a moderate degree of operative morbidity. Ultrasonic dissection using the harmonic scalpel has recently emerged as a safe alternative to electro-cautery. The aim of the study is to compare the efficacy, safety and differences in blood loss, operative time, intra and postoperative complications of ultrasonic harmonic scalpel and electro-cautery in performing Modified Radical Mastectomy. This study has been conducted during year 2016-2017 in 30 patients of carcinoma breast of any age group in the department of General Surgery SMS Medical College and hospital Jaipur, Rajasthan. An analytic study to compare the outcome in MRM in group one using ultrasonic harmonic scalpel and group two electro-cautery was done. The result of our study showed median blood loss was 140 ml in harmonic scalpel group while 320 ml in electro-cautery group. Blood loss in harmonic scalpel group was significantly less compared to electro cautery group (p-value <0.001 on applying Mann-whitney U test). Number of drain days was significantly less in harmonic scalpel group compared to electro-cautery group (p-value <0.001 on applying Mann-whitney U test). Drain output was also significantly less in harmonic scalpel group compared to electro cautery group (p-value <0.001 on applying Mann-whitney U test). There was no significant difference in weight of excised specimen, operative time, post operative pain, seroma formation and flap necrosis in both groups. So we concluded that Harmonic scalpel is a newer innovative device being used for dissection and haemostasis in MRM. Use of harmonic scalpel for MRM significantly reduces blood loss, post operative drain output in comparison to electro cautery. Time taken for performing surgery using Harmonic Scalpel is comparable to Electro Cautery and even shorter in experienced hands. Though the cost of the equipment may be a constraint in its wide use yet it is wise to recommend use of harmonic scalpel in performing modified radical mastectomy.

Keywords: Electro cautery, Harmonic scalpel, Modified Radical Mastectomy (MRM)

INTRODUCTION

Breast cancer is the most common carcinoma in the female population. Several combinations of surgical therapy, radiotherapy, chemotherapy and hormonal immunotherapy are being used as ways of treatment in carcinoma breast. Conventional MRM using electro-cautery is associated with a certain loss of blood and a moderate degree of operative morbidity in

35% to 50% patients [1-3]. Ultrasonic dissection using the harmonic scalpel has recently emerged as a safe alternative to electro-cautery. Experiences in "open" surgery suggest that it could significantly diminish the blood loss, post-operative morbidity and operation time [4].

MATERIAL & METHOD

This study has been conducted during year 2016-2017 in 30 patients of carcinoma breast of any age group in the department of surgery, SMS Medical College And Hospital Jaipur, Rajasthan to compare outcome in MRM using ultrasonic harmonic scalpel and electro-cautery. All patients were divided in 2 groups. Group 1 patient were operated using harmonic scalpel while group 2 patients were operated by electric cautery.

INCLUSION CRITERIA

- Stage I, II, & III A
- Patients who were willing for surgery
- All patient with breast lump and FNAC or LCNB positive report for carcinoma

EXCLUSION CRITERIA

- Advanced Carcinoma Breast
- Coagulation disorder
- Pregnant women
- Patient with benign breast diseases
- Patient with inflammatory breast carcinoma
- Recurrent breast lump in a previously operated case of carcinoma Breast.

OBSERVATION &RESULTS

	Median Total Drain volume (ml)	Median weight of excised tissue (gms)	Median blood loss (ml)	Day's Req. for Drain (Mean)	Median VAS	Operative time Mean (min)
Harmonic Scalpel Group	210	380	140	4.07	3	72.87
Electro Cautery Group	340	350	320	5.53	3	70.20

DISCUSSION

This study was undertaken to compare the efficacy and safety of Harmonic Scalpel and Electro Cautery in modified radical mastectomy for carcinoma breast. Study was done in reference to patient profile, clinical presentation, intra-operative and post-operative complications. Almost half of the patients in the study group presented in their 5th decade of life. The mean age was 46.53 years in Harmonic Scalpel group and 48.60 in Electro Cautery group with standard deviation of 7.53 years in Harmonic Scalpel and 8.76 in Electro Cautery group (p=0.494). The youngest patient was of 32 years of age and the oldest was 70 years. Out of total, 14 patients had disease on left side while 16 patients had right-sided malignancy. There is no

The mean age was 46.53 years in Harmonic Scalpel group and 48.60 in Electro Cautery group with standard deviation of 7.53 years in Harmonic Scalpel and 8.76 in Electro Cautery group (p=0.494). Out of total patients in study, 14 patients had disease on left side while 16 patients had right-sided malignancy. 2 patients had stage I disease, 21 patients had stage II while remaining 07 patients were having stage III disease. Mean time of surgery in harmonic scalpel group was 72.87 min with standard deviation of ± 10.44 min and in electric cautery group was 70.20 min with standard deviation of ±09.57 min. Median blood loss was 140 ml in harmonic scalpel group while 320 ml in electro-cautery group. Blood loss in harmonic scalpel group was significantly less compared to Electro Cautery group (p-value <0.001 on applying Mann-whitney U test). Number of drain days was significantly less in harmonic scalpel group compared to electro-cautery group (p-value <0.001 on applying Mann-whitney U test). Drain output was significantly less in Harmonic Scalpel group compared to Electro Cautery group (p-value <0.001 on applying Mann-whitney U test). There was no significant difference in weight of excised specimen, operative time, post operative pain, seroma formation and flap necrosis in both groups.

predilection of carcinoma breast for either of side i.e. left or right. The clinical stage of breast cancer is determined primarily through physical examination of the skin, breast tissue, and lymph nodes (axillary, supraclavicular, and cervical). However, clinical determination of axillary lymph node metastases has an accuracy of only 33 percent. Mammography, chest radiograph, and intra-operative findings (primary cancer size, chest wall invasion) also provide necessary staging information. Presentation with advance disease is not uncommon in carcinoma breast. It may be attributed to lack of awareness and poor screening programme. Out of total 02 patients had stage I disease, 21 patients had stage II disease, while remaining 07 patients had stage III disease. Recently harmonic scalpel is emerging as an

alternative surgical tool for dissection and haemostasis especially in the field of minimally invasive surgery. Initially the harmonic scalpel procedure took a longer time than conventional mastectomy; however the operating time decreased with experience and the mean operating time was comparable with electrocautery [5]. We noted the time taken for surgery of each patient. Mean time of surgery in harmonic scalpel group was 72.87 ± 7.68 min. Mean time of surgery in electric cautery group was 70.33 ± 5.16 min. There was no significant difference in time taken using harmonic scalpel compared to electro-cautery patients. This was comparable to other studies by Shireen Ramzan ali Damani *et al* ($p=0.264$) and S V S Deo *et al* ($p=0.0837$).

We measured the weight of excised breast specimen for all patients. The mean weight of excised breast specimen in harmonic scalpel group was 380 grams while it was 350 grams in electric cautery group. There was no significant difference in weight of excised tissue in both groups.

Ultrasonic energy generated by the harmonic scalpel causes a breakage of hydrogen bonds and the formation of denatured protein coagulum. This coagulum seals off the vessels and lymphatics and result in decreased blood loss and lymphatic drainage [5]. Using the ultrasound harmonic scalpel, electric energy does not reach the tissue, and it possesses safety mechanisms that prevent ultrasound vibration occurrence in unaimed tissue. This achieves better homeostasis than using the electro cautery, which is confirmed by measuring the level of intraoperative blood loss [6].

In our study Intra-operative blood loss was measured for all patients. Amount of blood was estimated by subtracting weight of dry gauge piece from soaked one. Median blood loss was 140 ml in harmonic scalpel group while 320 ml in electro-cautery group. Blood loss in harmonic scalpel group was significantly less compared to Electro Cautery group. These results are comparable with other studies by S Deo *et al* ($p=0.0001$) and Shireen Ramzan ali Damani *et al* ($p=0.0001$).

Postoperative pain is one of the basic elements of patients accepting a new operational method; therefore measuring its intensity is one of the inevitable parameters in grading the success rate of a new method. Postoperative pain intensity is measured directly, using

one of the constructed scales, or indirectly, measuring the amount of analgesics administered for pain treatment. For direct measuring of postoperative pain intensity we used the visual analog pain scale (VAS) because of its adequate sensitivity [6].

We measured postoperative pain in every patient using visual analogue score (VAS). Median VAS for both the groups was 3. There was no significant difference in postoperative pain on comparing both the groups. These results are comparable to other studies by Shireen Ramzan ali Damani *et al.* ($p=0.197$), Davorin Kozomara *et al* ($p=0.122$).

Lumachi *et al.* correlated axillary drainage with the patient's body mass index, lymph node status, number of lymph nodes removed, type of operation (greater in modified radical mastectomy than in breast-conserving surgery), and technique of axillary dissection (greater with the conventional scalpel than with the harmonic scalpel) [7].

Post-operatively suction drain was placed in every patient with 2 tubes. One tube was placed over breast bed while another was placed in axilla. Number of drain days was significantly less in harmonic scalpel group compared to electro-cautery group. Mean number of drain days were 4.07 days with standard deviation of ± 0.88 days for harmonic scalpel group and 5.53 days ± 0.64 days for electro-cautery group. Mean drain days were significantly less in harmonic scalpel group compared to electro-cautery group

We measured daily and total drain volume for every patient. Median drain volume in Harmonic Scalpel group was 210 ml, while 340 ml in Electro Cautery group. We compared drain volume in both the groups. Drain output was significantly less in Harmonic Scalpel group compared to Electro Cautery group. These results are consistent with other studies done by ShireenRamzanaliDamani *et al.* ($p=0.0001$), DavorinKozomara *et al.* ($p= 0.0001$), S Deo *et al.* ($p=0.0001$) and Rohaizak Muhammad *et al.* ($p<0.0002$).

Lateral thermal injury has been shown to be halved with the harmonic scalpel, as compared to electro cautery in animal models, which can potentially decrease the flap necrosis rate [6]. Several experimental studies showed that this extent of lateral thermal injury spread was limited to 2-3 mm. Seroma formation can be

associated with other more serious complications such as infection, lymphedema, skin flap necrosis and delayed wound healing and may result in a prolonged hospital stay [7].

In our study there was no significant difference in seroma formation (p-value 0.999) and flap necrosis (p-value 0.999) in both the groups. This may be attributed to small sample size in our study. These results are comparable with other studies done by S Deo *et al.* (p=0.7389) and Shireen RD *et al.* in 2013 (p=0.247)

While this study has albeit a small sample population and some conclusions could be arrived at, further data needs to accrue.

CONCLUSION

- Conventionally Monopolar Electro Cautery is widely used for dissection and haemostasis.
- Harmonic scalpel is a newer innovative device being used for dissection and haemostasis in MRM.
- The device is handy, easy to use, safe and reliable.
- We experienced no technical difficulty with its use.
- Use of harmonic scalpel for MRM significantly reduces blood loss in comparison to electro cautery.
- Time taken for performing surgery using Harmonic Scalpel is comparable to Electro Cautery and even shorter in experienced hands.
- Harmonic Scalpel significantly reduces postoperative drain output and seroma formation compared to Electro Cautery.
- Lateral thermal injury to tissue is less in Harmonic Scalpel group, which causes lesser incidence of flap necrosis.
- There is no significant difference in postoperative pain in either of groups.
- While this study has albeit a small sample population and some conclusions could be arrived at, further data needs to be accrued.
- Though the cost of the equipment may be a constraint in its wide use yet it is wise to recommend use of harmonic scalpel in performing modified radical mastectomy.

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