ORIGINAL ARTICLE

Harmonic Scalpel Versus Electrocautery in Axillary Dissection in Carcinoma Breast

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Abstract

Objective: To compare the results between harmonics scalpel and electrocautery use in axillary dissection for carcinoma breast.

Study Design: Randomized controlled trial.

Place and Duration of Study: Department of Surgery, Services Hospital, Lahore, from December 2013 to June 2014.

Methodology: Eighty patients fulfilling the inclusion criteria were selected and equally divided in two groups. Axillary dissection for carcinoma breast was performed by using the harmonic scalpel in one group and by using electrocautery in the other group. Total mean axillary drain output and frequency of axillary numbness were noted in both groups and compared.

Results: All the patients were females with mean age of 53.52 ±9.8. Mean axillary drain output in harmonic scalpel group was 167.75 ±43.90 as compared to 310.00 ±60.09 in electrocautery group while only 12.5% of patients were positive for axillary numbness in harmonic scalpel group as compared to 100% of patients who were positive for electrocautery group.

Conclusion: Use of harmonic scalpel in axillary dissection resulted in decreased total mean axillary drain output and lowered frequency of axillary numbness when compared to utilizing electrocautery.

Key Words: *Axillary dissection. Modified radical mastectomy. Harmonic scalpel. Electrocautery.*

INTRODUCTION

Breast carcinoma is the commonest carcinoma in women. It accounts for 22% of all female cancers worldwide and approximately 42% cases occur in developing world.[1] One in every nine Pakistani women is likely to have breast cancer, highest incidence rate in Asia.[2] Genetics, use of oral contraceptives and parity are considered important in causation of carcinoma of breast.[3]

Conventional Method (CM) of breast cancer surgery, typically performed using electrocautery, considered risk factor for postoperative seroma formation and thermal injury to adjacent nerve.[4] Harmonic scalpel use reduces spread of heat into adjacent tissues as compared to electrocautery.[5]

Sanguinetti conducted comparative study between ultrasound scissors and electrocautery; and found axillary drainage volume (200 ±130 vs. 450 ±230 ml, $p < 0.001$) was significantly lower in ultrasound scissors group.[6] Hung noticed significantly fewer incidence of axillary numbness in the subgroup treated with harmonics scalpel ($p < 0.020$).[7]

To the authors' knowledge, the safety and efficacy of this harmonics scalpel in breast cancer surgery has not been thoroughly investigated in Pakistan.

The purpose of this study was to compare the mean axillary drain output along with frequency of axillary numbness in axillary dissection in Modified Radical Mastectomy (MRM) and breast conservative surgery between the use of harmonics scalpel and electrocautery.

METHODOLOGY

This study was a prospective randomized controlled trial conducted at the Department of Surgery, Services Hospital, Lahore, from December 2013 to June 2014. After approval from the hospital ethical and research committee, eighty patients aged 18 - 80 years having breast carcinoma assessed clinically (tumor size and palpable lymph nodes) and with a histological diagnosis using core biopsy were recruited from outdoor department. All patients having locally advanced breast carcinoma, metastatic carcinoma, recurrent carcinoma breast, radiotherapy of chest wall for breast carcinoma and ASA III and IV were excluded from the study. A detailed history was taken, including demographic data. Patients were requested to sign an informed consent. They were assured confidentiality and explained about expertise used for the particular procedure. Pre-operatively, tumors were staged according to TNM classification.

The patients were divided into two groups randomly using random number tables. Blinding was not done. Group A underwent axillary dissection by using harmonics scalpel whereas Group B underwent axillary dissection by using electrocautery.

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Received: September 22, 2014; Accepted: September 22, 2015.

Level II axillary clearance was done in all cases. Postoperatively compression bandages were applied for 2 days. A single closed suction drainage system was placed in the axilla. Drainage volume (daily) was recorded till axillary drain output was less than 20 ml/day. Numbness of upper arm and axilla was assessed with direct physical examination. If the patient had either complaint or positive physical examination, then these findings were recorded as positive. Patients were discharged after drain removal. Stitches were removed on 10th day. All the data was recorded on especially-designed proforma.

The data was entered into SPSS version 20 and analyzed through its statistical program, using mean and standard deviation for quantitative data like age and axillary drainage. Frequency and percentages were calculated for qualitative data like axillary numbness. T-test was used to compare the mean axillary drainage in both groups and chi-square test was used to compare the 'axillary numbness' in both groups. P-value ≤ 0.05 was considered as statistically significant.

RESULTS

A total of 80 patients were recruited with 40 in each group. Age distribution of the patients is presented in Table I. Most of the patients were between 40 - 54 years of age (43.7%, n= 35); 42.5% (n = 34) were between 55 - 69 years; 8.8% (n = 7) were between 25 - 39 years; and 5% (n =4) were between 69 - 84 years. Mean age was 53.52 ±9.8 years.

Mean axillary drain output in the electrocautery group was 310.00 ±60.09 ml; and 167.75 ±43.90 ml in the harmonic scalpel group (p < 0.001).

In the electrocautery group, 100% of patients (n=40) were positive for axillary numbness while in the harmonic scalpel group only 12.5% of patients were positive for axillary numbness (n=5). This showed very low frequency of axillary numbness in the harmonics scalpel group when compared with the electrocautery group (p < 0.001).

Table I: Distribution of patients by age (n = 40).

Age (years)	Frequency	Percentage
25 - 39	7	8.8
40 - 54	35	43.7
55 - 69	34	42.5
70 - 84	4	5.0
Total	80	100

Mean age: 53.52 ±9.8

DISCUSSION

The harmonic scalpel is an innovative device that vibrates at 55.5 kHz and causes three synergistic effects: cavitation, coagulation, and cutting to achieve effective hemostasis and tissue dissection at a precise point. It has the advantage of reduced thermal spread that lowers the incidence of adjacent tissue destruction.[5] This instrument has been approved by the U.S. Food and Drug Administration (FDA) for ligation of vessels upto 5 mm in diameter. The safety and advantages of the harmonic scalpel have been reported for surgeries in several anatomical regions.[8]

MRM, performed using electrocautery, is associated with a moderate degree of morbidity[9] in the form of blood loss, hematoma, flap necrosis, seroma and prolonged axillary drainage. Tejler *et al*. reported a post-mastectomy morbidity rate of 35% in a series of 385 breast cancer patients and found that 17% of the total hospital stay was due to postmastectomy morbidity. Recent studies have shown that cautery associated thermal tissue injury causes damage of sub-dermal vascular plexus and incomplete occlusion of vascular and lymphatic channels, leading to increased morbidity.[10]

Ostapoff, in a retrospective study regarding the electro-cautery and harmonics use in axillary lymph node dissection, did not find any difference between axillary drain output. Although there was a decrease in the total number of days that closed suction drainage was required, this was not statistically significant.[11] Complication rates were similar between the two groups.[11]

Perveen did a prospective study in modified radical mastectomy using harmonics and her results showed that MRM and axillary dissection using the harmonic scalpel was safe, feasible, and effective.[12] This device simplified the surgical procedure, reduced the operative time, peri-operative blood loss, drainage volume and duration of drainage. Furthermore, the incidence of seroma and lymphodema was also reduced.[12]

Galal did a comparative study between the use of harmonic and electrocautery in MRM and concluded that the use of harmonic scalpel in MRM had shortened the axillary dissection time and decreased the drainage volume and duration, as well as hospital stay.[13]

This study conducted on 80 patients aimed at further defining the role of harmonic scalpel and electrocautery use in axillary dissection in modified radical mastectomy in our setup. Mean axillary drain output in the electrocautery group was 310.00 ±60.09 ml and in harmonics scalpel group was 167.75 ±43.90 ml with a p-value < 0.001, which was significant. So these results showed that the use of harmonics scalpel in axillary dissection in modified radical mastectomy had significantly reduced mean axillary drain output.

The numbness and later on pain in the upper arm is seen in patients after axillary dissection in modified radical mastectomy or breast conservative surgery. Postaxillary dissection pain is probably more appropriate for this syndrome. During the dissection, - nerve is often damaged, which may give rise to neuropathic pain of that nerve.[14]

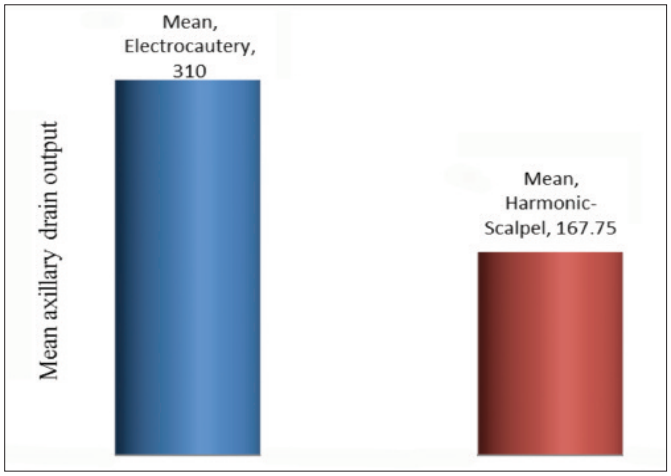

Figure 1: Total mean axillary drain output in electrocautery and harmonic scalpel groups.

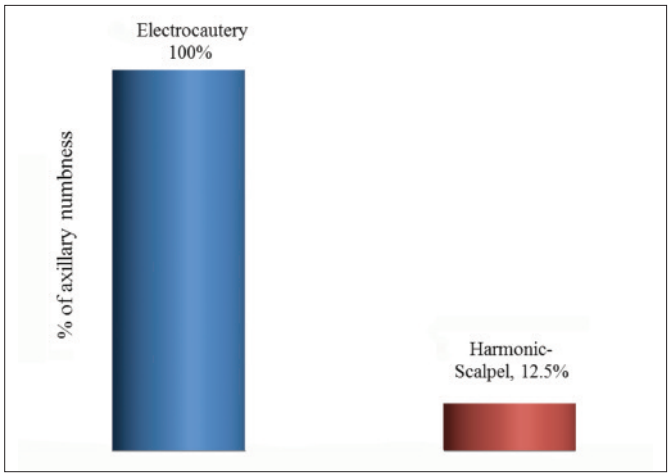

Figure 2: Percentage of axillary numbness in electrocautery and harmonic scalpel groups (N = 40 in each group).

Preservation of the intercostobrachial nerve does not affect patient survival. It improves patient sensory deficit significantly and modestly improves long-term symptoms.[15] Zu did a study on anatomical information on preservation of intercostobrachial nerve (ICBN) for axillary lymph node dissection in breast cancer. His results showed identification, dissection, and preservation of ICBN as simple and easy in a modified radical mastectomy for breast cancer and breast-conserving surgery. It took only 10 - 20 minutes, but effectively reduced the incidence of postmastectomy pain syndrome and significantly improved the quality of life for patients after surgery.[16]

Warrier conducted a meta-analysis of multiple randomized control trials on preservation or division of intercostobrachial nerve ICBN in axillary dissection for breast cancer. This meta-analysis demonstrates that division of the ICBN is associated with higher risk of sensory disturbance, and that the nature of this sensory disturbance is more likely to be hyposensitive, attributed to reduced nerve function.[17]

In this study, all the patients in electrocautery group had axillary numbness; while in the harmonic scalpel group, only 12.5% of patients were positive for axillary numbness. This showed a very low frequency of axillary numbness in harmonic scalpel group when compared with electrocautery group, which was highly significant.

CONCLUSION

Use of harmonic scalpel and electrocautery in axillary dissection resulted in trends suggesting decreased total mean axillary drain output and lowered frequency of axillary numbness by use of harmonics scalpel when compared to traditional technique utilizing electro-cautery. The main advantage of harmonics scalpel is its ability to achieve hemostasis and ease to use. It simplified the surgical procedure, while achieving efficient lymph vessels sealing and hemostasis and safe to use near nerves when compared with electrocautery.

Disclosure: It is a dissertation based article.

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