

A COMPARATIVE STUDY OF USING LIGASURE VERSUS MONOPOLAR ELECTROCAUTERY IN BREAST CANCER PATIENTS

¹Ali Sabry Ali Helal*, ²Shahenda Abdelrahman Megahed Elrashidi, ³Taha Abdelwahab Biomy, ⁴Mohammed Mahmoud Elkilany, ⁵Joseph Rizk Israel

General Surgery Department, Zagazig University Faculty of Medicine, Egypt.

Corresponding Author: Ali Sabry Helal, Email Addresses: dr_ali_helal@yahoo.com

ABSTRACT:

Background: Breast cancer management has seen an evolution from the radical extirpation of the previous century to current practice which aims at breast preservation. Despite the emergence of breast conservation surgery, modified radical mastectomy (MRM) remains the most commonly performed operative procedure for breast cancer today. Electrocautery is the most commonly used surgical device for dissection and hemostasis in standard mastectomy; however, its wide thermal spread may lead to flap necrosis, wound infection, and prolonged drainage. This study aimed to compare the use of monopolarelectrocautery and LigaSure™ Small Jaw to highlight which is more effective in reducing the operative time and intraoperative blood loss in breast cancer patients undergoing modified radical mastectomy. **Patients and methods:** Forty females with breast cancer attending for modified radical mastectomy at Zagazig university hospital, were included in this study. They were divided into two groups: the monopolarelectrocautery group and the LigaSure™ Small Jaw group. **Results:** Forty female patients were included in this study. The mean operative time in the monopolarelectrocautery group and the LigaSure™ Small Jaw group was 124.1 ± 14.6 and 109.4 ± 21.5 min, respectively ($P < 0.05$). The mean amount of blood loss in the monopolarelectrocautery group and the LigaSure™ Small Jaw group was 190 ± 21.3 and 117.5 ± 59.87 ml, respectively ($P < 0.001$). **Conclusion:** Using LigaSure™ Small Jaw technique showed less operative time, and less blood loss than using monopolarelectrocautery.

Keywords: Ligasure , Monopolar Electrocautery , Modified Radical Mastectomy.

INTRODUCTION:

Breast cancer occupies the second rank in cancer incidence rates at national level, based upon results of National Cancer Registry Program (NCRP). In 2014, Breast cancer incidence rate was (32.0%) and by 2050, a 3-fold increase was estimated (1). Breast cancer management has seen an evolution from the radical extirpation of the previous century to current practice which aims at breast preservation (2).

Despite the emergence of breast conservation surgery, modified radical mastectomy (MRM) remains the most commonly performed operative procedure for breast cancer today (3).

Electrocautery is the most commonly used surgical device for dissection and hemostasis in standard mastectomy; however, its wide thermal spread may lead to flap necrosis, wound infection, and prolonged drainage (4).

Much of the morbidity associated with using electrocautery has been attributed to the large post mastectomy raw area, cut lymphatics and use of electrocautery (5).

Some studies showed that an electrothermal bipolar vessel-sealing system could shorten the operative time and decrease blood loss and drainage volume as compare to the results with Monopolar Electrocautery (6).

LigaSure™ is an electrothermal bipolar vessel-sealing system that provides hemostasis by creating a seal using pressure and electrothermal energy to change the structure of the vessel walls and surrounding tissues. The LigaSure™ Small Jaw is a new instrument with a cutting blade and is often used for thyroid surgery. This new energy instrument can be used for cutting as well as sealing blood vessels up to 7 mm in diameter (7).

The current study aimed to compare the use of monopolarelectrocautery and LigaSure™ Small Jaw to highlight which is more effective in reducing the operative time and intraoperative blood loss in breast cancer patients undergoing modified radical mastectomy.

Patients and Methods:

Our study was approved by the local institutional review board of the Faculty of Medicine, Zagazig University after having written consent from included patients in the study.

A total of 40 patients attending the Oncosurgery Unit, General Surgery Department, Zagazig University Hospitals from January 2018 to January 2019 were included in this prospective randomized clinical study. They were randomized into two groups (20 patients in each group): the monopolar Electrocautery group and the LigaSure™ Small Jaw group.

Inclusion criteria: Female Patients who had unilateral breast disease, with all indications for modified radical mastectomy with American Society of Anesthesiology Scores 1 and 2 were included.

Exclusion Criteria: Patients with early breast cancer (T1). Patients with history of previous breast surgeries. Patients on neo-adjuvant therapy. Presence of comorbidities as diabetes mellitus and other comorbid disease.

Operative technique:

The procedure was done under general anesthesia. Prophylactic antibiotic (ciprofloxacin 200mg IV drip) was given half an hour before anesthesia. In the supine position the patient was disinfected with 10% povidone-iodine solution. The operation was done through Halsted incision for modified radical mastectomy. An oblique elliptical incision from the infero-medial breast toward the axilla is employed. The upper and lower flaps are elevated. Once the anterior surface of the breast is free from the skin, the surgeon begins a medial to lateral dissection of the pectoralis fascia. Dissection of the infero-medial aspect of the breast ends with the axillary tail, which wraps around the pectoralis minor in most women. Axillary clearance is done by using monopolar diathermy probe or LigaSure™ Small Jaw according to the study groups. Once the specimen is free from the chest, the wound is irrigated with plain water and hemostasis verified. A closed system drain should be placed for the mastectomy site. The drain is placed to bulb suction after closure in layers (**Figure 1,2,3**).



Figure (1): Designing of skin incision



Figure (2): Monopolar Electrocautery: (A): elevation of flaps, (B): dissection of the breast from the pectoralis major



Figure (3): LigaSure™ Small Jaw probe used for flap elevation

Statistical analysis

The collected data were analyzed by computer using Statistical Package of Social Services version 24 (SPSS), Data were represented in tables and graphs, Continuous Quantitative variables e.g. age were expressed as the mean ± SD & median, and categorical qualitative variables were expressed as absolute frequencies & relative frequencies (percentage). Suitable statistical tests of significance were used after checked for normality. Categorical data were cross tabulated and analyzed by the Chi-square test, Continuous data were evaluated by Mann Whitney test. The results were considered statistically significant when the significant probability was less than 0.05 (P < 0.05). P-value < 0.001 was considered highly statistically significant (HS), and P-value ≥ 0.05 was considered statistically insignificant (NS).

RESULTS:

This study was conducted on 40 female patients their age ranged from 22-59 years divided into 2 groups to compare the use of monopolar diathermy probe and LigaSure™ Small Jaw, there is no significant difference between both groups regarding age (Table 1). All the studied females were obese grade II where BMI > 35 kg/m², with no significant difference between both groups regarding BMI (Table 2).

As regard pathology of breast cancer, mostly it was Infiltrative ductal carcinoma also Infiltrative lobular carcinoma was found affecting upper lateral in about 2/3 of cases, with no statistically significant difference between both groups regarding pathology of breast cancer and tumor quadrant (Table 3).

As regard intraoperative assessment, duration of surgery was statistically longer among Electrocautery group and LigaSure™ Small Jaw group, also amount of blood loss was statistically larger among Electrocautery group than LigaSure™ Small Jaw group (Table 4).

Table (1): Demographic characteristics of the studied groups

Item	Electrocautery group (N=20)	LigaSure™ Small Jaw group (N=20)	MWT	P-value
Age (years)				
Mean ± SD	41.53 ± 11.92	38.73 ± 12.73	71.000	0.515
Median (Range)	41 (23 – 59)	36 (22 – 59)		

Table (2): Body mass index of the studied groups

Item	Electrocautery group (N=20)	LigaSure™ Small Jaw group (N=20)	t-test	P-value
BMI (kg/m²)				
Mean ± SD	47.3 ± 6.12	47.8 ± 5.23	-0.277	0.782
(Range)	(35 – 50)	(36 – 49)		

Table (3): Clinicopathological characteristics of breast cancer among the studied groups.

item	Electrocautery group (N=20)		LigaSure™ Small Jaw group (N=20)		χ ²	P-value
	No.	%	No.	%		
Pathology of breast cancer						
• Infiltrative ductal carcinoma	18	90.0	17	85.0	0.361	0.834
• Infiltrative lobular carcinoma	2	10.0	3	15.0		
Tumor quadrant						
• Upper lateral	13	65.0	14	70.0	0.737	0.691
• Upper medial	5	25.0	3	15.0		
• Lower lateral	2	10.0	3	15.0		

Table (4): Intra-operative assessment among the studied groups

Items	Electrocautery group (N=20)	LigaSure™ Small Jaw group (N=20)	P- value
Duration of surgery (min)			
Mean ± SD	124.1 ± 14.6	109.4 ± 21.5	0.004*
Median (Range)	125(115-250)	105.5(97-210)	
Intraoperative blood loss(ml)			
Mean ± SD	190.0 ± 21.3	117.5± 59.87	0.001*
Median (Range)	195(150-220)	104.5(70-250)	

DISCUSSION:

Breast cancer management has seen an evolution from the radical extirpation of the previous century involving removal of the breast, skin and underlying muscle, to current practice which aims at breast preservation (2).

Breast cancer is generally diagnosed through either screening or a symptom (e.g., pain or a palpable mass) that prompts a diagnostic exam. Screening of healthy women is associated with the detection of tumors that are smaller, have lower odds of metastasis, are more amenable to breast-conserving and limited axillary surgery, and are less likely to require chemotherapy. This scenario translates to reduced treatment-related morbidity and improved survival (8).

This study was conducted to compare the use of monopolar diathermy probe and LigaSure™ Small Jaw to highlight which is more effective methods reducing the intraoperative complications in breast cancer patients undergoing modified radical mastectomy.

The present study included 40 female patients divided into 2 groups age of Electrocautery group was ranging from 23-59 years old with mean 41.53 ± 11.92 years old while age in LigaSure™ Small Jaw group was 38.73 ± 12.73 years old, ranged from 22-59 years old. This incidence is near to the report of Elattar et al., (9) published by

the National Cancer Institute of Egypt, which estimated that the mean age was 49 years, as well as the study done by **Thompson et al., (10)** who mentioned that the mean age of patients was 49.7 years old (range 26-69 years).

In the current study, BMI of Electrocautery group was ranging from 35-50 kg/m² with mean 47.3 ± 6.12 kg/m² while BMI in LigaSure™ Small Jaw group was 47.8 ± 5.23 kg/m², it ranged from 36-49 kg/m², with no significant difference, this matches with **Angin (11)** who stated that Several studies show that a significantly stronger association is obvious between increased body mass index (BMI) and higher breast cancer incidence. Furthermore, obese women are at higher risk of all-cause and breast cancer specific mortality when compared to non-obese women with breast cancer.

The upper outer quadrant was the most affected one (13 patients with 65 % incidence and 14 patients with 70 % incidence among Electrocautery group and LigaSure™ Small Jaw group respectively with no significant difference between both groups). This matches with **Skandalakis et al. (12)** and **Hunt et al.(13)** who reported that the upper outer quadrant contains the main bulk of breast tissue and thus it is the most usual site for both breast cancer and most benign breast pathologies.

The postoperative histopathological examination of the resected specimens showed that invasive duct carcinoma was the main pathological type in about (90% and 85% among Electrocautery group and LigaSure™ Small Jaw group respectively with no significant difference between both groups) with lobular carcinoma is 5% of the studied groups. This agreed by **Weigelt and Reis-Filho (14)** who stated that invasive duct carcinoma represents the most frequently encountered histologic type of breast carcinoma.

In the current study there was significant difference between Electrocautery group and LigaSure™ Small Jaw group regarding duration of surgery as it was 124.1 ± 14.6 min vs 109.4 ± 21.5 respectively, also there was significant difference between both groups regarding amount of blood loss as it was 190 ± 21.3 ml versus 117.5 ± 59.87 ml respectively.

The utility of the vessel sealing system (LigaSure Small Jaw™) to reduce operation time and control hemorrhage in surgery of breast cancer as reported by **Chang et al.(15)**, also similar advantages it the thyroid area has been reported by **Vidal et al. (16)**.

CONCLUSION:

The current study revealed that LigaSure™ Small Jaw was more effective than Monopolar Electrocautery in reducing the intraoperative complications in breast cancer patients undergoing modified radical mastectomy at Zagazig University Hospitals as regarding duration of surgery, and amount of blood loss. With using LigaSure™ Small Jaw, the duration of operation was significantly shorter, and there was less blood loss.

No Conflict of interest:

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