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Comparison of Electrocautery and Ligasure in Terms of Per-Operative Blood Loss in Modified Radical Mastectomy

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ABSTRACT

Background: Carcinoma breast is the second most commonly diagnosed cancer worldwide. Mastectomy is the most practiced surgical treatment for breast cancer patients; The LigaSure Small Jaw is the modren bipolar vessel sealing system utilized for coagulation as well as cutting. **Objective:** The objective of the study was to compare mean intra operative blood loss using electrocautery versus ligasure in modified radical mastectomy in breast carcinoma patients. **Study Design:** Randomized controlled trial. **Settings:** Department of Surgery, Allied Hospital, Faisalabad. **Duration:** One year from June 01, 2019 to May 31, 2020. **Methods:** After taking approval from hospital ethical committee, patients fulfilling the inclusion criteria were admitted through OPD, and enrolled for the study. Informed consent was taken. All the patients were randomly divided into two groups. Group A patients underwent modified radical mastectomy using ligasure and Group B patients underwent modified radical mastectomy using electrocautery. Both the procedures were performed by senior surgeon. Intra operative blood loss was estimated. All the information was collected on proforma. **Results:** Comparison of mean intra operative blood loss in modified radical mastectomy using LigaSure with electrocautery in patients of breast cancer shows that 70.52 ± 1.22 ml is lost in Group-A and 87.04 ± 1.41 ml in Group-B, p value was 0.001. **Conclusion:** We concluded that mean intra operative blood loss using LigaSure is significantly lower when compared with using electrocautery for performing modified radical mastectomy in breast carcinoma.

Keywords: *Breast cancer, Electrocautery, Intraoperative blood loss, LigaSure, Modified radical mastectomy.*

INTRODUCTION

Carcinoma breast is the top most common disease in women dying of cancers worldwide[1] Surgical procedures for treatment of breast cancer have been evolving through years, starting from supra-radical mastectomy to radical and then modified radical mastectomy.[2,3] Today, though it has become the era of breast conservation surgery with oncoplastic techniques, modified radical mastectomy still has a major place in the treatment of breast malignancies.[4]

The mastectomy procedure includes raising the upper and lower flaps and dissecting the breast tissue off the pectoral fascia and muscles. This has been done traditionally utilizing sharp scalpel and scissor dissection. Later on, high frequency electrocautery got introduced and is being used extensively. The use of diathermy is associated with increased seroma formation, because it causes more tissue damage due to heat inducing local inflammatory reaction.[5]

Ligasure (bipolar vessel sealing system) has recently been introduced to carry out hemostasis. LigaSure TM is a bipolar hemostatic device. LigaSure TM implies a particular amount of energy and pressure to permanently change the collagen and elastin pattern within the vessel wall, thus sealing the blood vessel. It causes minimal spread of heat in surrounding tissues leading to very little tissue charring while ensuring complete coagulation.[6]

There is no local data available on comparison of these two devices. We conducted this study to find improvement in the surgical procedure.

METHODS

This randomized control trial study was conducted at Department of Surgery, Allied Hospital, Faisalabad. The duration of the study was one year from June 01, 2019 to May 31, 2020

The sample size was calculated by using WHO sample size calculator. (Sample size = 60) (30 in each group). Non probability consecutive sampling technique was used.

Female patients between the ages of 20-70 years having stage (IIB / III) breast cancer as per operational definition undergoing modified radical mastectomy were included in the study.

The patients with locally advanced tumors, Neoadjuvant therapy, Infra-mammary fold tumors, Bleeding diathesis and medical contraindication to major surgery were excluded from the study.

After taking approval from hospital ethical committee, patients presenting in the outpatient department who fulfilled the inclusion criteria were enrolled. All the patients were randomly divided into two groups. Group A patients underwent modified radical mastectomy using ligasure. Group B patients underwent modified radical mastectomy using electrocautery. Both the procedures were performed by senior surgeon. Hemorrhage was estimated by counting the sponges soaked during surgery. The dry sponges were weighed preoperatively using a digital weigh scale. The weight of dry sponges subtracted from the weight of wet sponges. Each gram of resulting weight is taken as equal to one milliliter. In this way amount of blood loss is estimated in milliliters. All the information was entered on predesigned proforma.

Figure 1: Use of ligasure in breast surgery

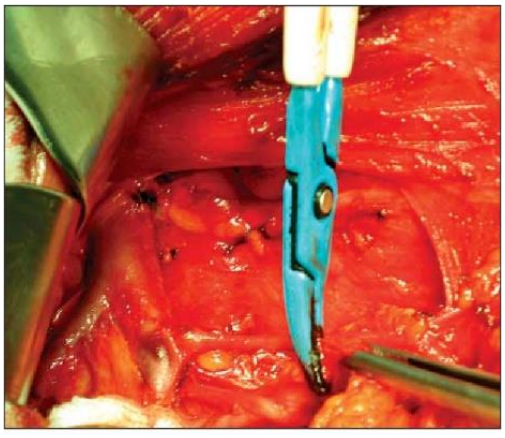

Figure 1. Use of the electrothermal bipolar vessel sealing system device in

Figure 2: Ligasure energy device

The data collected was entered on SPSS Version 21 and analyzed. Mean ± Independent sample t-test was applied to compare intra operative blood loss between two groups. A p-value ≤ 0.05 was considered significant.

RESULTS

A total of 60 cases (30 in each group) fulfilling the selection criteria were enrolled to estimate mean intra operative blood loss using LigaSure with electrocautery in modified radical mastectomy in patients of breast cancer. Comparison of mean intra operative blood loss using LigaSure (apart from raising flaps used in mastectomy and axillary dissection) with electrocautery in modified radical mastectomy in patients of breast cancer shows that 70.52 ± 1.22 ml blood was lost in Group-A and 87.04 ± 1.41 ml in Group-B, p value was 0.001. (Table 1)

Table 1: Comparison of mean intra operative blood loss using ligasure with electrocautery during modified radical mastectomy in patients of carcinoma breast (n=60)

Intra operative blood loss	Group-A (n=30)		Group-B (n=30)	
	Mean	SD	Mean	SD
	70.52	1.22	87.04	1.41

P value=0.001

Table 2: Age distribution (n=60)

Age (In years)	Group-A (n=30)		Group-B (n=30)	
	No. of patients	%	No. of patients	%
20-50	19	63.33	20	66.67
51-70	11	36.67	10	33.33
Total	**30**	**100**	**30**	**100**
Mean ± SD	**47.57 ± 7.96**		**46.3 ± 8.84**	

Table 3: Stage of breast cancer (n=60)

Stage	Group-A (n=30)		Group-B (n=30)	
	No. of patients	%	No. of patients	%
IIB	14	46.67	17	56.67
III	16	53.33	13	43.33
Total	**30**	**100**	**30**	**100**

Table 4: Stratification for age (n=60)

Age: 20-50 years

Intra operative blood loss	Group-A (n=30)		Group-B (n=30)		P value
	Mean	SD	Mean	SD	
	70.04	1.18	86.08	1.36	0.001

Age: 51-70 years

Intra operative blood loss	Group-A (n=30)		Group-B (n=30)		P value
	Mean	SD	Mean	SD	
	70.16	1.20	85.88	1.30	0.001

Table 5: Stratification for stage of breast cancer (n=60)

Stage II b

Intra operative blood loss	Group-A (n=30)		Group-B (n=30)		P value
	Mean	SD	Mean	SD	
	70	1.45	86.84	1.31	0.0001

Stage III

Intra operative blood loss	Group-A (n=30)		Group-B (n=30)		P value
	Mean	SD	Mean	SD	
	71	1.00	87.4	1.57	0.001

DISCUSSION

In modified radical mastectomy, commonly the hemostasis and dissection is performed using electrocautery but it is found to have hazardous effects like flap necrosis, wound infection and prolonged drainage due to its thermal effects. Recently studies have shown Ligasure to be an effective alternative to achieve hemostasis avoiding the side effects of electrocautery, and its use is recommended in literature.[7]

Ligasure is an electrothermal bipolar vessel sealing system (BVSS). It causes changes in structure of vessel wall and surrounding tissues and thus seals using electrothermal energy and pressure. Ligasure small jaw is a recent introduction as a good for dissection and hemostasis.[8] It has a cutting blade and may be employed to ligate or cut blood vessels as large as 7 mm in diameter. A precise amount of energy is delivered that ensures complete coagulation with minimal surrounding thermal spread. Its use is with advantage of less blood loss, less pain and early recovery.[9]

In our study, comparison of mean intra operative blood loss in modified radical mastectomy using Ligasure as against electrocautery was done in patients of breast cancer. It shows intraoperative blood loss to be 70.52 ± 1.22 ml in Group-A and 87.04 ± 1.41 ml in Group-B, p value was 0.001. Axillary dissection was particularly quick and efficient with ligasure. In one study El erian *et al* concluded that the use of ligasure had advantage of less blood loss with additional advantage of less operative time and avoiding blood transfusion.[10] In another study Mean intra operative blood loss was less by using ligasure (100±62 ml) as compared with electrocautery (182 ± 92 ml).[11] These results are in favor of our study. Seki T *et al* described no significant difference between ligasure and electrocautery in terms of intra-operative blood loss (18.2 ± 31.1 vs. 20.6 ± 26.3 m) but they declared ligasure more effective device when compared to electrocautery specially in axillary dissection.[12] Young Woo Chang and others made the same comparison as done in our study. They reported markedly decreased blood loss during surgery, lesser operative time ,decreased postoperative drain output.[13] In another study Archana A *et al* described intraoperative blood loss for electrocautery and ligasure 276.25 mL and 200.13 mL respectively, again this study favor the results of our study.[14] Huang, J *et al* Compared standard electrocautery with harmonic scalpel dissection (BVSS) and found significant advantages in decreasing postoperative drainage, seroma development, intraoperative blood loss in modified radical mastectomy.[15] These results are in accordance with our study. In another study comparing electrocautery with harmonic scalpel dissection (BVSS) Analar B *et al* found advantage of less intra-operative bleed in BVSS (560 and 500 Ml respectively).[16] In another meta-analysis Cheng H *et al* found 38% reduction in blood loss with the use of energy device BVSS in comparison with conventional method in breast surgery.[17]

Literature review showed that use of ligasure is beneficial with many other surgeries like haemorridectomy, hysterectomy and thyroidectomy in minimizing the blood loss. In one meta-analysis Macario A *et al* declared 43ml of less blood loss on an average for above procedures with the use of ligasure verse electorycautary.[18] In another meta-analysis by Cannizzaro MA *et al* for thyroid surgery use of ligasure was associated with less blood loss as compared to the conventional electorcauratery.[19] Again these meta-analysis related to different surgeries advocate use of ligasure to reduce blood loss. Anandaravi BN *et al* also reported less intra-operative blood loss comparing BVSS with electrocautery.[20] Faisal *et al* also described significantly smaller amount of intraoperative blood loss (69.4 ± 25.1 vs. 255.5 ± 41.6 ml) with use of ligasure in comparison with electrocaurity.[21]

Less intra-operative blood loss will save patients from complications of blood loss[22] and obviates the need for blood transfusion which is key to prevent transfusion complications[23] and additional cost to the patients, so with results of our study and literature review we conclude that the use of ligasure is justified to reduce the intraoperative blood loss.

CONCLUSION

We concluded that mean intra operative blood loss in modified radical mastectomy using LigaSure is significantly lower when compared with electrocautery in patients of breast cancer.

LIMITATIONS

No limitation in this study.

SUGGESTIONS / RECOMMENDATIONS

Since there is decrease in intraoperative blood loss using ligasure, it's use may be encouraged as compared to electrocautery in modified radical mastectomy

CONFLICT OF INTEREST / DISCLOSURE

No conflict of interest.

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