EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 7
Issue: 3
381-390
Year: 2020

ROLE OF AGNI- KARMA (ELECTRO SURGICAL CAUTERIZATION) IN BREAST CANCER–STAGE-I ($T_1N_0M_0$) AS A APUNARBHAVA CHIKITSA (NO RECURRENCE): A CLINICAL REVIEW STUDY

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Article Received on 22/01/2020 **Article Revised on 11/02/2020** **Article Accepted on 02/03/2020**

ABSTRACT
Purpose: The aim of this study is - to evaluate the effect of Agni-karma (Electro surgical cauterization) in Breast cancer surgery –Stage – I ($T_1N_0M_0$) as a Apunarbhava chikitsa (No recurrence). Carcinoma of the breast is the leading cause of cancer deaths in females in the India. 60 consecutive Stage -I breast cancer ($T_1N_0M_0$) patients taken for modified radical mastectomy were evaluated prospectively. Electro surgical cautery (i.e. Group-A) was used in 30 MRM operations and no electro surgical cautery was used in another 30 MRM operations (i.e. Group-B) in random order. In the first 30 patients (Group-A)- electro surgical cautery dissection was used to develop the thin skin flaps, MRM & axilla clearance. In the second group of 30 patients (Group-B), sharp dissection by scalpel was used for thin flap elevation, MRM & axilla clearance. In the post operative period vaccum drainage amount, duration & surgery time as well as the start time of arm exercise & long term followup for non –recurrence & metastasis were recorded. Complications like seroma, surgical site infection, haematoma & flap necrosis were determined without following of chemo & radiation therapy the recurrence rate & development of metastasis were also determined for next 5 years. Age, body mass index, breast volume & other parameters were similar in each group. Blood loss during this procedure is frequently high, often necessitating transfusion. Unfortunately, complications of this surgery have been significant. In this study, blood loss and wound healing with and without the use of electrocautery, in radical mastectomy were evaluated from both clinical and laboratory studies. The average blood replacement for Group-A was 160 ml per patient when cautery was used vs. 560 ml per patient when cautery was not used (Group-B). The postoperative hemoglobin and hematocrit values were statistically similar for both groups. Age - mean – 55 yr. & 53 yr. in Group-A & Group-B respectively. Vaccum drainage mean- 557ml & 840 ml in Group-A & Group-B respectively. Duration of surgical time decreased in Group –A by more than 30% to Group-B. Formation of seroma in Group-A is more than Group-B. Recurrence of disease / metastasis is nil & found 4 patients in follow-up of post operative 5 years in Group-A & Group-B resp. Average blood loss 160 ml & 560 ml in Group-A & Group-B resp. There was no statistical significance between the groups regarding time to start arm exercise, surgical site infection and flap necrosis were considered. Electro-Surgical Cautery is a new surgical instrument which provide atraumatic, scalpel like cutting incision, haemostasis, minimal tissue injury, so electro surgical cautery shortens the drainage amount, blood loss & duration of time compared to classical MRM operation of by scalpel method. As there is Agni- karma so there is less chances of recurrence or metastasis of disease too.

KEYWORDS: Breast neoplasm, electrosurgical cautery & Agni-karma, classical scalpel method, complication, recurrence or metastasis.

INTRODUCTION
क्षारादग्निर्गरीयान् क्रियासु व्याख्यातः,
तद्ग्धानां रोगाणाम् पुनर्भावाद्भेषज शस्त्रक्षारैरसाध्यानां तत्साध्यत्वाच्च||
सु.सू.12/3

There will be no recurrence of diseases, which is treated by Agni-karma & those diseases which are not cured by medicine, surgery & kshar-karma, those diseases will be definately cured completely by Agni–karma only. So Agni-karma is greater than kshar-karma.

अपुनर्भावादिती अपुनर्भावस्तु साध्यानां सम्यग्दग्धानाम्

एतव्दिपर्यये त्वग्निदग्धस्थापि पुनरुद्भव:||
डल्हण

No recurrence by Agni–karma only is possible, when the disease is curable. This is not applicable with non curable diseases means disease will recurrant even after Agni –karma if the disease is non curable - says Dalhan (A great criticizer of Sushruta).

First time, When surgical branch was not developed in the world. At that time, a person who had some knowledge about the diseases, he was gave direct heat by shalaka on diseased part. Most of the curable diseases was recovered but some non curable diseases was not recovered, so this method was popular in that era also, which has scientifically we called, **'Agni-karma'**. Due to the various types of agni-karma recurrence rate of disease is tremendously decreased, this was also the another cause of popularity of this technique, 'Agni-karma'.

According to the innovation in technology, this technique is replaced by electro surgical cautery. Due to this innovation, total surgical field is changed with reduced in duration of surgical time, less blood loss are the main benefits of electro–surgical cauterization. But there are more benefits of this techniques that, curable diseases treated / managed with this 'Agni-karma' / electro –surgical cauterization method, that is for reduction in recurrence rate. For this, I cited above version & to prove it, this study was done. Before the electro cautery, surgeon's did MRM by the traditional scalpel method, in that operation, there was severe blood loss, prolonged surgical & anesthesia time, so, more complications, were faced by doctor as well as patients & finally resulting in poor prognosis. It means the disease in which the patient should easily survive but due to various complications in absence of Agni-Karm, patient was paying it's cost for her life too.

But since the electric cautery is being used in surgery the morbidity rate, minimal blood loss, fast recovery & reduced recurrence rate in curable disease is raised / increased.

So for this study, we selected only those patients who were $T_1N_0M_0$ in this classified group. So we did this study to evaluate the efficacy of recurrence & non recurrence rate in breast cancer by both with electro-cautery done MRM (Group-A) & without electro–cautery done MRM (Group-B).

In this study, both groups were balanced for age group, tumour size is < 2.5 cm, ($T_1N_0M_0$) with informed conset was taken from patients & her relatives duly signed and after 382ounseling, we grouped them into 2 groups & data collected.

With this we also informed the patient that surgical equipment used in breast surgery that affects wound healing & minimizes the complications. This is also the another topic of investigation. New device such as plasma-kinetic cautery is beginning to play role in breast surgery. Plasma kinetic cautery derived from high grade radio frequency and which ionizes the water vapour both in the air & in the tissue is the main working principal of plasma kinetic cautery.

The aim of this study is to evaluate the non recurrence effect of electro surgical cautery in stage-I breast cancer. (i.e. T_1 M_0 N_0).

The use of the cautery in cauterizing malignant tumors was begun in 1906. In 1908, the first excisions with the cautery were done by Dr. Scott, senior. Between 1908 and 1910, he conceived the idea of cauterization alone, as advocated principally by Percy and practiced by many other surgeons.

Electrosurgery refers to the cutting and coagulation of tissue using high-frequency electrical current.[2] Surgeons using this technique must be knowledgeable about prevention and management of potential complications of electrosurgical procedures. In addition, they should understand the mechanism of action and how to troubleshoot equipment. Education on the principles of electrosurgery is important[3] as electrosurgical complications are relatively common.[4]

BASIC PRINCIPLES

Electrical current is created by the movement of electrons; voltage is the force that causes this movement. There are two types of electrical current: direct current (DC), where the electrons always flow in the same direction (eg, simple battery), and alternating current (AC), where the current changes direction periodically (eg, electrical wall outlet). A cycle is the time required to pass through one complete positive and one complete negative alternation of current or voltage. Frequency refers to the number of cycles in one second and is measured in hertz (Hz).

Electrosurgical units (ESUs) used in operating rooms convert standard electrical frequencies from the wall outlet, which are 50 to 60 Hz, to much higher frequencies, 500,000 to 3,000,000 Hz.[2] This is important to minimize nerve and muscle stimulation, which occurs at electrical currents below 10,000 Hz.[5] The possible effects of applying electrical current to tissue are fulguration, desiccation/coagulation, or vaporization/ablation.

When comparing the creation of a surgical incision in the skin using a scalpel versus electrosurgerical cautery, significant differences have been identified regarding infection rates, partial flap necrosis or scar appearance; however, postoperative wound pain is less with electrosurgery.[6]

MATERIAL AND METHODOLOGY

Methods

60 consecutive breast cancer Stage-I ($T_1N_0M_0$) patients taken & were evaluate for modified radical mastectomy prospectively.

The study was approved by local ethical committee.

Electro surgical cautery (SHALYA TURUSEAL-xcellance medical technologes pvt.ltd. 6 sense technology was used in 30 operations (Group-A) in order to manage skin flaps & excise breast tissue alongwith the underlying pectoralis fascia. Patient with only stage -1, TNM classified group- $T_1N_0M_0$, which is curable disease by surgery without need of further treatment like chemo + radiation excluded. Age, body mass index (BMT, Kg/m2) tumour stage, operation duration (the time from starting skin incision to the time of suturing the skin) and blood loss amount (measured by the number of sponges used & sponge weight) of the patient were recorded.

In the postoperative period, vacuum drainage amount and duration as well as the time of starting arm exercises were also recorded. Complications such as seroma, surgical site infection, hematoma and flap necrosis were determined. Fluid that collected under the skin flaps and axilla that presented as clinical findings and which required multiple aspirations were accepted as seroma. The collections observed in operation fields with skin colour changes and mass effect were accepted as hematoma for both groups.

Surgical techniques used

After a elliptical skin incision was made with a scalpel, the skin flaps were lifted up with the help of hooks. In the electrosurgical cautery group-A, Flaps were prepared by electrocautery. Only large vessels such as perforating branches of the arteria mammaria interna were tied with 2/0 silk, while other bleeding vessels were sealed with plasmacautery and electrocautery. Plasmacautery and electrocautery were also used for pectoralis fascia and breast tissue removal in their own groups. Axillary dissection of all patients was performed with scalpel. Electrocautery was used in both the coagulation and cutting modes in the 30 to 40 V range, and plasmacautery was used in the 6 to 8 neuric set point range in both the coagulation and cutting modes. The thoracodorsal pedicle and thoracicus longus nerve were preserved. Standard level 1 & 2 dissection was carried out in all patients, after completing of dissection, thoughrally search made for axillary nodes then NS wash given to the operated area, after that, strictly every surgeon & assistant were changed the gloves. Closed suction drains were used in all patients after hemostasis. Subcutaneous tissue was approximated with absorbable sutures and the skin was closed with ethilon 2-0 by interrupted sutures. Daily drainage volume was recorded and the drains were not removed until the daily drainage decreased to less than 10 ml/ day. Prophylactic antibiotics were used in both group.

Follow up were recorded for next 5 years on regular basis for both groups whether the disease is recurr/metastasize or not.

Inclusion Criteria

- Age – Between 30-65 years,
- Single tumour - size < 2.5 cm, unilaterally,
- TNM Classification stage – I ($T_1N_0M_0$),
- Haemodynamically stable patient.

Exclusion Criteria

Patient suffering from – Diabetes Mallitus,
- Hypertension,
- Any other major medical problem.

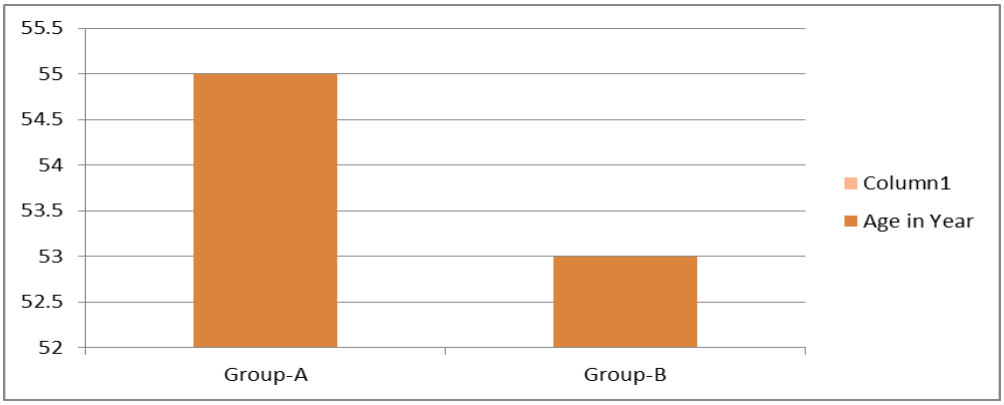
Statistical analyses

The differences between the groups were analyzed with the Mann-Whitney U test, and the chi-square test was carried out for the comparison of the complications.

Data Analysis

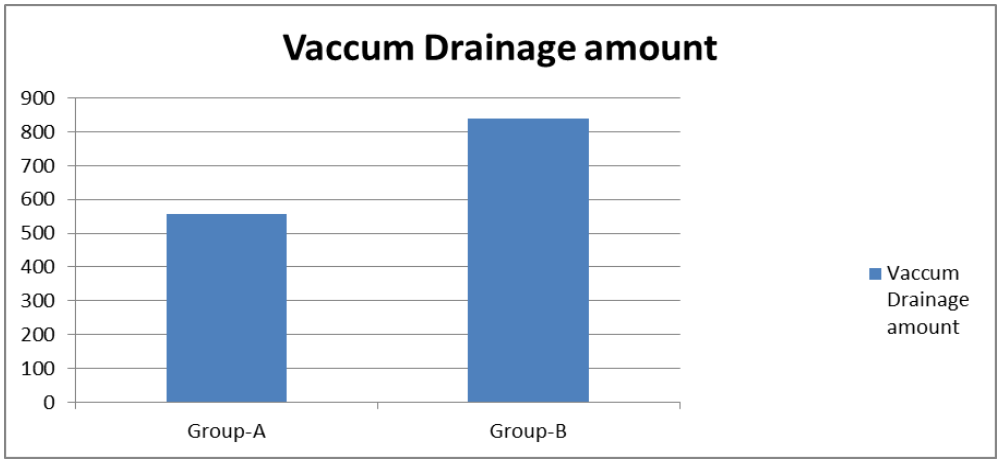
1) Age

	Group-A	Group-B
Age – Mean value in year	55	53



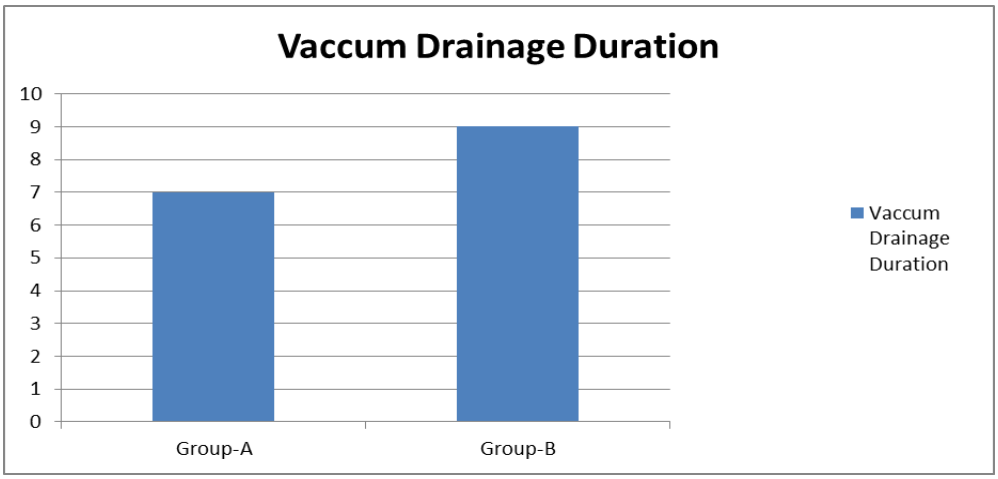
2) Vaccum Drainage amount- (Total)

	Group-A	Group-B
Vaccum Drainage amount	557 ml	840 ml



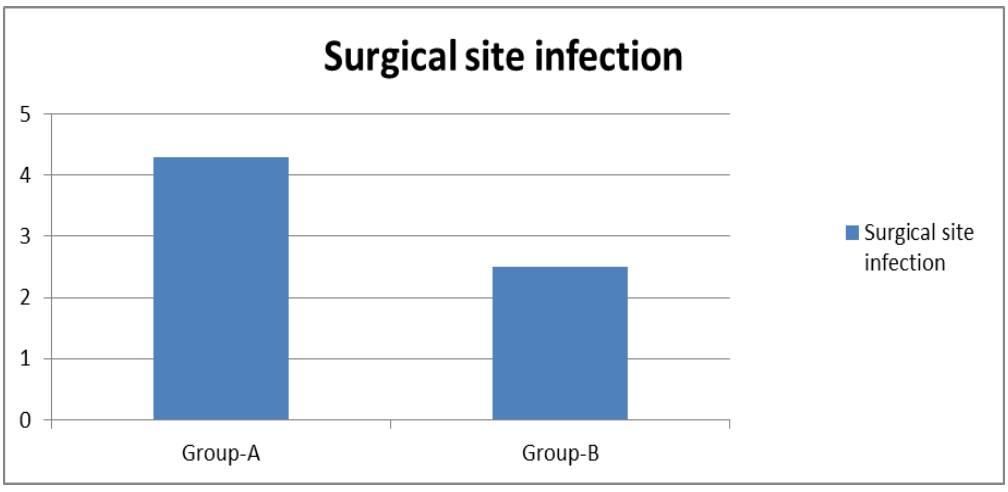
3) Vaccum Drainage Duration (Days)

	Group-A	Group-B
Vaccum Drainage Duration	7	9



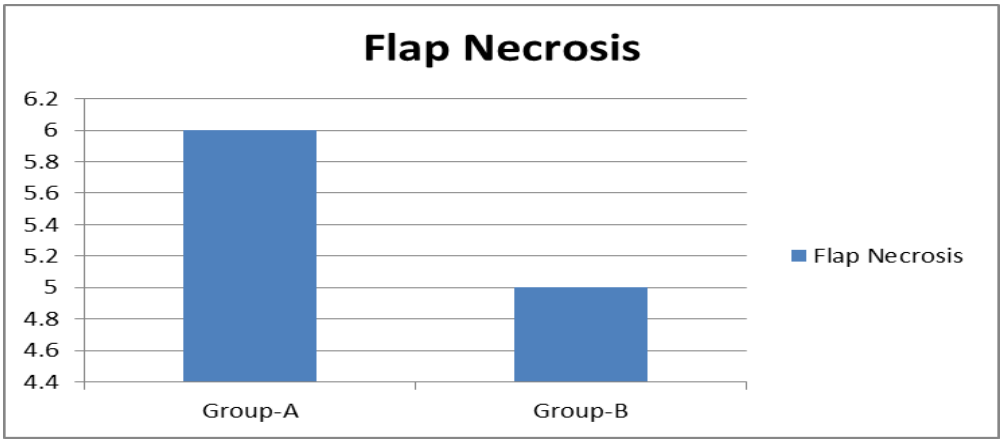
4) Surgical site infection- (No. of Patients)

	Group-A	Group-B
Surgical site infection	6	5



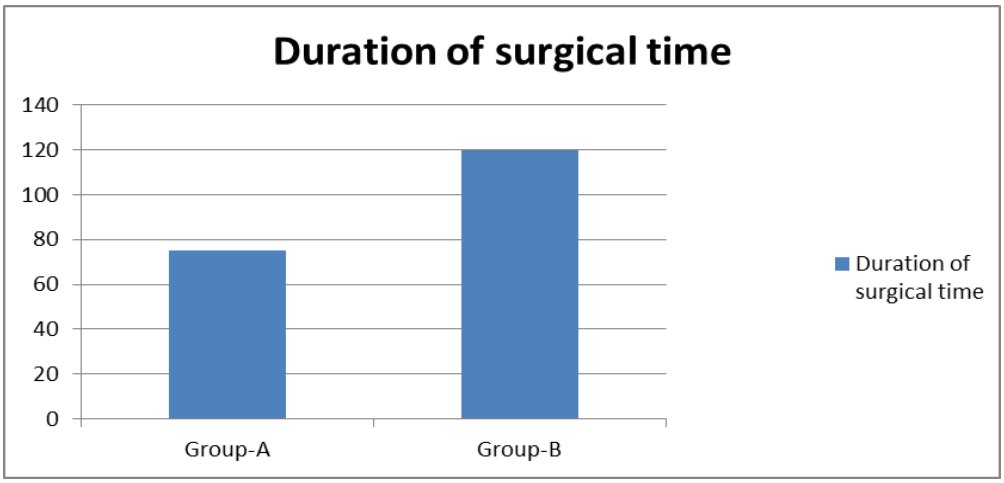
5) Flap Necrosis

	Group-A	Group-B
Flap Necrosis	6	5



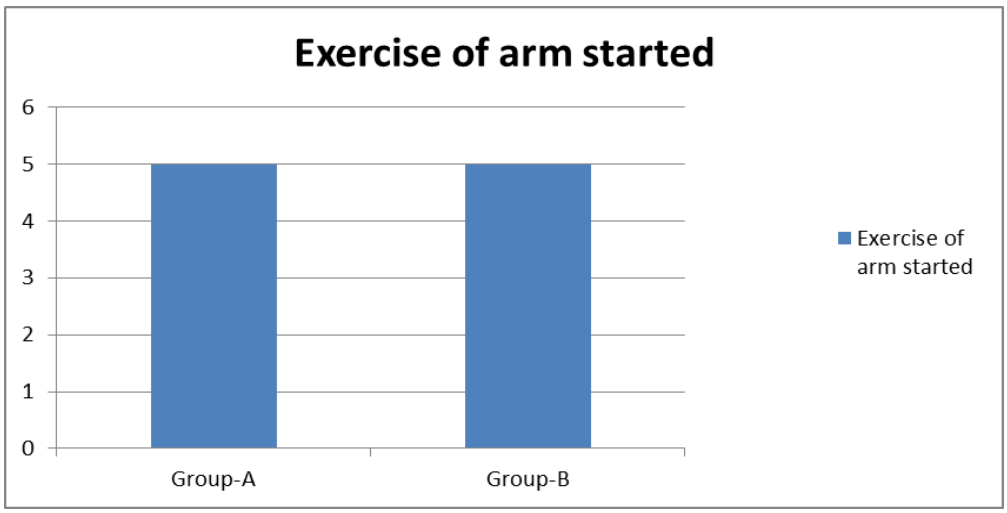
6) Duration of surgical time in minute.

	Group-A	Group-B
Duration of surgical time (min.)	75 min.	120 min.



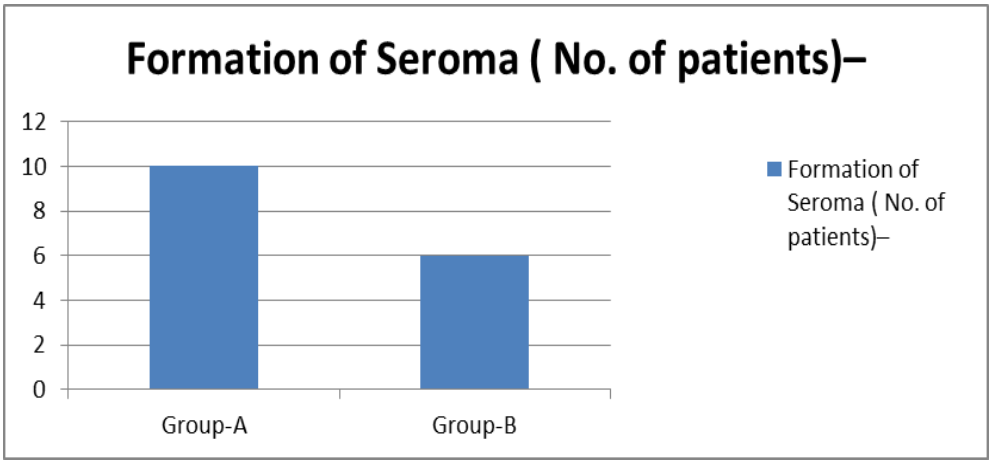
7) Exercise of arm started (Day)

	Group-A	Group-B
Exercise of arm started (Day)	5	5



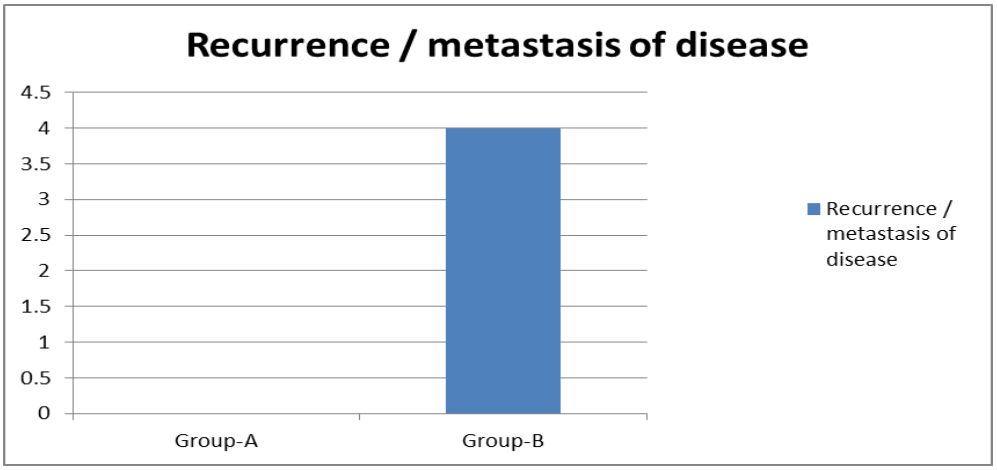
8) Formation of Seroma (No. of patients)

	Group-A	Group-B
Formation of Seroma (No. of patients)–	10	6



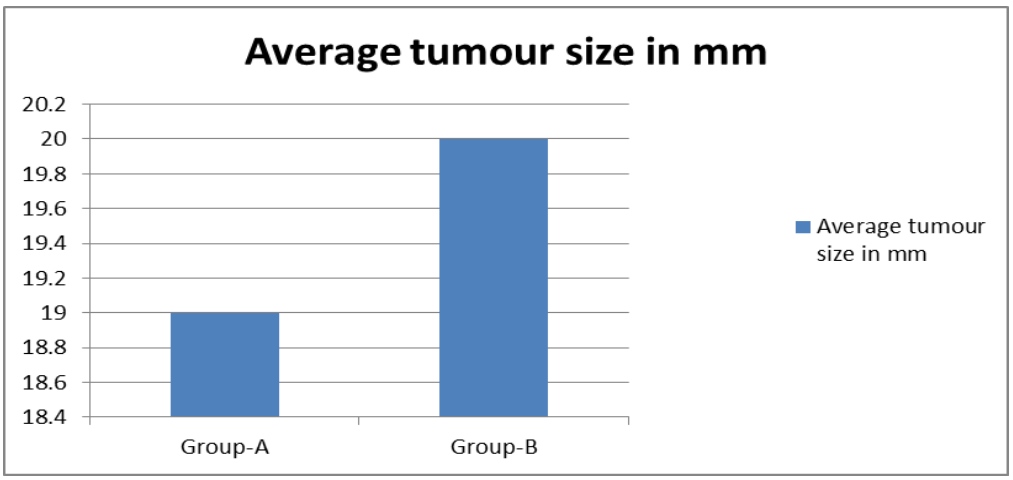
9) Recurrence / metastasis of disease – (Follow-up of next 5 years)

	Group-A	Group-B
Recurrence / metastasis of disease	00	4



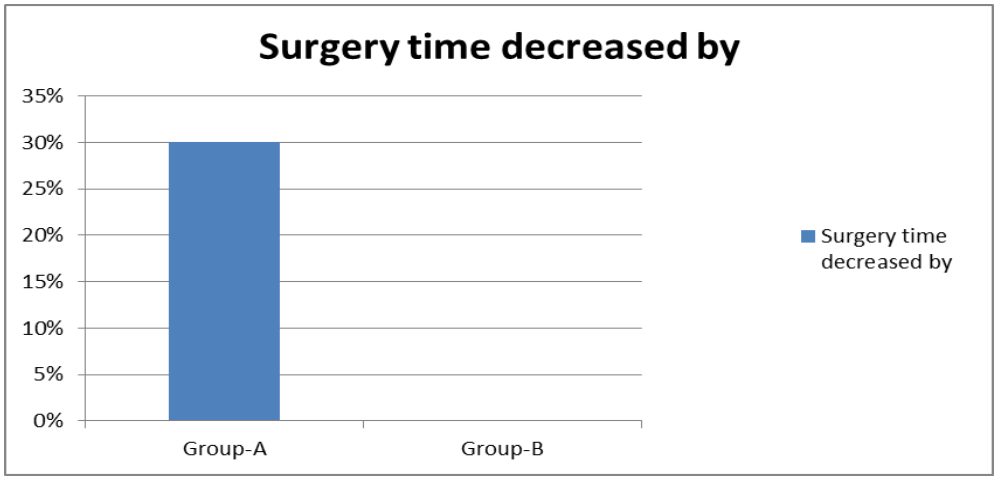
10) Average tumour size in mm –

	Group-A	Group-B
Average tumour size in mm	19	20



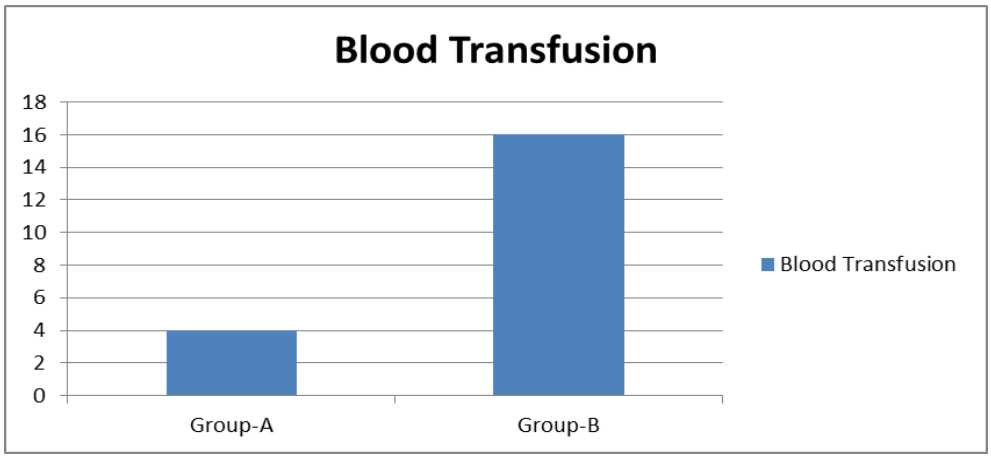
11) Surgery time decreased by

	Group-A	Group-B
Surgery time decreased by	30%	00



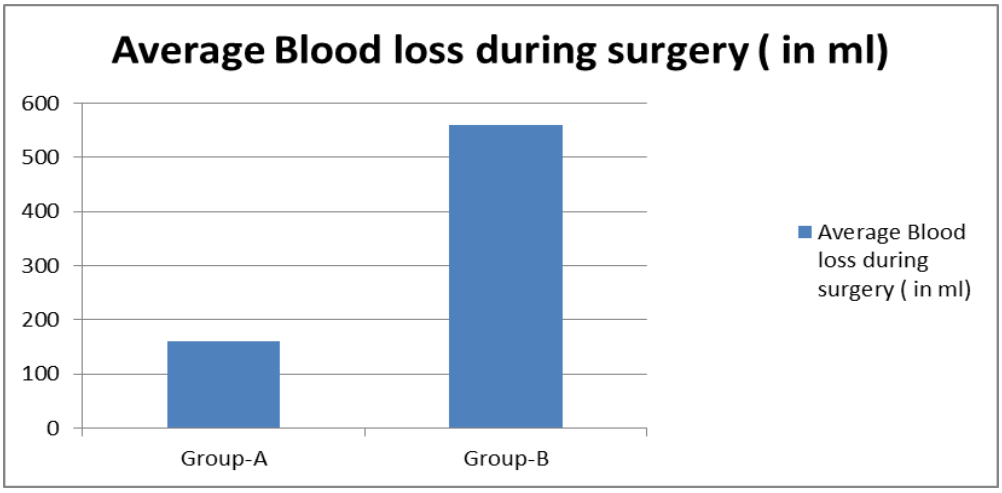
12) Blood Transfusion

	Group-A	Group-B
Blood Transfusion	4	16



13) Average Blood loss during surgery

	Group-A	Group-B
Average Blood loss during surgery (in ml)	160 ml	560 ml



RESULTS

1) Age - mean – 55 yr. & 53 yr. in Group-A & Group-B respectively.
2) Vaccum drainage (Total) mean- 557ml & 840 ml in Group-A & Group-B respectively.
3) Vaccum drainage duration (days) are 7 & 9 in Group-A & Group-B respectively.
4) The incidence of wound morbidity (infection or skin necrosis) was not similar for both groups.
5) Six patient in Group-A developed a clinical infection with positive wound culture. Group-B had total 5 patients got wound infections. Clinically, wound healing was not adversely influenced by the use of electrocautery.
6) Six patients in Group-A had marginal flap necrosis as opposed to 5 in Group B.
7) Duration of total surgical time is 75 & 120 min. in Group-A & Group-B respectively.
8) Exercise of arm started on 5 day in both group, both group does'nt influenced on this parameter.
9) Formation of seroma found in 10 patients of Group-A & 6 in Group-B. Recurrence of disease / metastasis is nil in Group-A & found 4 patients in follow-up of post operative 5 years in Group-B & Group-B resp.
10) Average size of tumour is 19 in Group-A & 20 in Group-B.
11) Duration of surgical time decreased in Group –A by more than 30% to Group-B.
12) 4 patients in Group-A (Electro surgical cautery group) received transfusions during surgery or in the SICU. In Group-B (scalpel dissection), 16 patients were given transfusions intra operative or immediate postoperative period. Significant statistical difference in the postoperative hemoglobin and hemato-crit values between the 2 groups, was found despite the much higher incidence of transfusion and greater average amount of blood transfused in the patients with sharp dissection (Group-B).
13) Average blood loss 160 ml & 560 ml in Group-A & Group-B resp.

For easy digest the comparison between both groups as follow

	Group-A	**Group-B**
1)Age – Mean value in year	55	53
2)Vaccum Drainage amount (ml) (Total)	557	840
3)Vaccum Drainage Duration (Days)	7	9
4)Surgical site infection	6	5
5)Flap Necrosis	6	5
6)Duration of surgical time (min.)	75	120
7)Exercise of arm started (Day)	5	5
8)Formation of Seroma (No. of patients)	10	6
9)Recurrence / metastasis of disease	00	4
10)Average tumour size (mm)	19	20
11)Surgery time decreased (%)	30	00
12)Blood Transfusion (No. of patients)	4	16
13)Average Blood loss during surgery (ml)	160	560

DISCUSSION

In our study, the use of electrocautery for skin flap elevation rather than sharp dissection was associated with a much lower inci- dence of blood transfusion. Despite this markedly decreased incidence, both in the number of patients receiving transfusion.

A surgical knife cuts tissue while the electric surgical cautery dissects by burning tissue.

Despite the critical act of dissecting and removing cancer from the breast, these common modalities simultaneously damage the patient's healthy tissue. This unfortunate complication puts a strain on both the surgeon/team and operative patient. These methods in surgery require more tools and additional processes to counter their inefficiency. More specifically, the tissue damage created during dissection dramatically increases pain level during the surgery. This necessitates the application of heavy narcotics, general anesthesia (requiring a breathing tube down the throat) and nerve blocking to numb the patient. The damage created continues to be present after surgery and increases the patient's risk of complications. In addition, the patient is vulnerable to the effects and complications that can arise from the pain blocking methods mentioned. This is superimposed on patients who have preconditions. This presents many layers of potential problematic avenues that can be experienced originating from an inefficient method of surgery.

During surgery and post-operatively, blood loss created by knife dissection increases the risk of blood transfusions and complications in recovery. This also presents the opportunity of seeding cancer cells escaping into the blood stream. A common fear and strong reason why many try to avoid surgery altogether. The repercussions from the surgical damage also include pain, slower tissue repair, heavy drainage, hematomas, increased levels of infection, and structural damage that may not repair. Cauterization features of the electric cautery dissection may reduce blood loss compared to knife surgery, but the damage to the tissues remain equally detrimental to the patient. This requires further Rx medications for both pain and infection. This affects the patient in all phases of the surgical experience.

Seroma is an accumulation of serous fluid that develops following the formation of skin flaps during mastectomy or in the axillary dead space in the acute postoperative period.[4] There has been no consistent definition of seroma in the literature, although it has been documented most frequently when it is symptomatic, bothersome to the patient and requires at least one needle aspiration.[5] The incidence of such occurences varies widely according to the type of surgical treatment and the operative techniques used, ranging from less than 10% to more than 50%.[6] Electrocautery is one named cause of seroma formation in the literature.[7] The seroma formation is the next step, coming after prolonged drainage, duration and increased drainage amount. The present study clearly showed that the drainage duration and the amount drained were low in the electro surgical cautery group (Agni-karm) i.e. Group-A. However, it has been suggested in the literature that wound complications such as infection, and necrosis increase with electrocautery.[8,9]

Prolonged drainage period diminishes patient comfort, causes a delay in the starting of arm exercises as well as discharge from hospital. However, patient can be discharged with the drain in situ & taught her, how to empty the drain ?.[9] Although the drainage period was statistically significant in the electro cautery group, this did not affect hospital stay and the starting of arm exercises.

There are very few studies in the literature investigating electro cautery & scalpel method and most of the ones that exist are experimental studies. As far as we know, this is the first study comparing electrocautery and scalpel method for evaluating the recurrence rate in modified radical mastectomy. Therefore, we were not able to compare our study with other studies.

As the outset, we wish to make clear that this study has not as yet been completed. For that reason and because we are necessarily limited as to space, it will be impossible to recite many of the most interesting details. Therefore, only certain outstanding facts are given and the others, we are explained in a subsequent report & needs further more study regarding non-recurrence (Apurbhav) effect due to Agni-karm (Electro-surgical cautery) in breast cancer stage–I without chemo-therapy & radio-therapy.

This additional benefit reduces the incidence of tumour recurrence & enables the patient to have a painless recovery, reduces scarring, greatly minimizing post-operative drainage, dramatically reducing chance of infection all with a faster recovery time.

This lack of tissue damage utilizing the laser is also very relevant in removing axillary nodes. In knife surgery the tissue and nerves are damaged; putting a patient at greater risk for long-term nerve damage and lymphedema in the axillary region.

Another topic that is rarely explored is the electro-surgical cautery's effect on tht electrical system of the body. The body naturally sends signals throughout the body by electricity and by introducing another electrical pattern into the body this creats a reaction to the bodies natural functioning.

These data strongly suggest that the use of electrocautery to develop thin skin flaps during radical mastectomy is a valuable adjunct in preventing blood loss, thereby decreasing the need for blood transfusion with its potential morbidity and mortality.

Use of electro surgical cautery for no recurrence (Agni-karma) in Grade –I, TNM classification is the topic of investigation of interest.

CONCLUSION

Use of Electro-surgical cautery (Agni-Karma) in breast cancer, stage–I, **($T_1N_0M_0$)** in MRM have great significance for reducing recurrence rate (Apunarbhav) rather than scalpel surgery without cautery.

Also save the surgical + anaesthesia time and loss of blood.

- **Financial support and sponsorship** – Nil.

- **Conflicts of interest** – There is no conflicts of interest.

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