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Skin Sparing Mastectomy Made Easy with the Use of LigaSure ImpactTm and Tumescent Local Anaesthesia: Towards Technical Standardization

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Abstract

Aim: To describe and evaluate skin sparing mastectomy (SSM) with the use of Ligasure ImpactTm instrument under tumescent local anaesthesia.

Methods: 15 patients with a mean age of 43.8 years having early breast cancer operated from Jan. 2011 through August. 2012 by SSM under tumescent technique of local anaesthesia with the use of the LigaSure ImpactTm variety instrument of the electrothermal bibolar vessel sealing system applied to grasp, seal and cut the subcutaneous fat by its long curved jaws along the plane of superficial layer (SL) of superficial fascia (SF) to uniformly dissect the flap in a centripetal manner through the small confine of the periareolar hole. Data of operative time, blood loss, flap thickness, exposed white dermis, number of dissected axillary nodes, biopsies for presence of duct epithelium in flap inner surface, inframammary fold (IMF) and periareolar skin as well as imprint cytology from the flap in close proximity with the tumor were recorded. Hematoma/seroma formation, flap necrosis, fat necrosis and local recurrence (LR) were also recorded.

Results: Mean operative time was 70.6 minutes, mean number of dissected nodes was 16.5, mean flap thickness was 5.6mm with no exposure of white dermis. Duct epithelium was'nt detected in biopsies from flap inner surface but was identified in IMFand periareolar skin. Imprint cytology in proximity of the tumor was negative. One case of hematoma, one with partial flap necrosis and one with fat necrosis were reported. None developed local recurrence within 6-12 months follow-up period.

Conclusion: SSM can be made easy under tumescent local anaesthesia with the novel use of LigaSure impactTm instrument with the advantage of an oncologically orthodox breast skin flap fashioning in a short time with minimal blood loss, avoiding complications of prolonged general anaesthesia and hazard of blood transfusion in malignancy operations.

Key Words: *Skin sparing mastectomy — LigaSure — Tumescent anaethesia.*

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Introduction

THE term skin sparing mastectomy was firstly introduced by Toth & Lappert in 1991 [ii. Later on, the oncological safety of SSM has been largely demonstrated [2-71.

The use of SSM has been one of the greatest advancements in immediate breast reconstruction It is technically more challenging than traditional mastectomy, a meticulous technique is necessary to avoid wound complications **[8].**

SSM is an approach whereby mastectomy is performed entirely through a circumareolar incision no larger than the original areolar diameter preserving breast skin envelope and IMF **[9,10].** Thus greatly enhancing aesthetic results of breast reconstruction. However, there are disadvantages to SSM; it is more technically demanding and time consuming than the modified radical approach, also an increasing debate regarding flap thickness that allows complete removal of mammary tissue and simultanously does not compromise flap viability, exists. It is known that malignancy potential is considered to be directly proportionate to the amount of mammary tissue removed. An inherent risk in SSM is failure to remove all breast parenchyma through a small incision because of surgeon's inexperience with the technique or superficial location of the cancer. Some authors stated that it is very difficult to completely extirpate whole breast tissue from the flap during mastectomy on the claim of narrow distance between the dermis and mammary tissue and that some mammary tissue exists within the subcutaneous fat space **[11,12],** however Nickll and Skelton in 2005 have studied breast reduction specimens and demonstrated that fat and glandular tissue are inseparable except in

the subcutaneous plane where only fat is present [13]. Therefore, the efficacy of SSM depends on the zeal of the surgeon in attempting to eradicate all breast tissue elements. Despite that, some authors propose leaving skin flaps no thicker than 4-5mms and accept a correspondingly high rate of skin necrosis [14]. Others in contrast recommend leaving a layer of about 5-10mms of subcutaneous fat [15]. Hidalgo Rol advocated the idea of creating flaps thin enough to remove all mammary tissue but thick enough to preserve flap circulation, but this is rather confusing. In addition, some surgeons [11,16] in executing SSM agreed with Haagansen's [17] recommendation to dissect in the plane just superficial to SL of SF of the breast. This allows for flap dissection in a relatively avascular plane without including any mammary tissue [17]. However, the use of conventional scalpel, scissor or electrocautery in fashioning skin flaps through the narrow confine of periareolar hole in SSM has an inherent risk of injuring the dermis (and thence the subdermal vascular plexus) or violating the SL of SF with the risk of injuring the axial mammary vessels with the resultant troublesome bleeding and nonuniform flap fashioning with much inclusion of mammary tissue within the flap.

Tumescent technique was initially developed for liposuction and is used to reduce blood loss in a variety of surgical flap procedures [18]. It means the infusion of a Ringer's or saline 0.9% solution containing local anaesthetic and adrenalin in the subcutaneous fat space to inflate (tumesce) it allowing for hemostatic flap dissection or easy passage of liposuction canulas to be done under local anaesthesia with minimal blood loss [18].

Electrocautary flap dissection during mastectomy adds to the hazard of compromising flap vascularity, because of the wide thermal spread that may injure the subdermal vascular plexus during flap fashioning [19,20]. Electro-thermal bibolar vessel sealing system (LigaSureTm) fuses vessel walls via denaturation of proteins in collagen and elastic fibres in the vessel wall obliterating vascular and lymph vessel lumen, and this seems to seal blood and lymph vessels permanently and completely offering an excellent method for bloodless dissection of tissues [21]. It delivers a precise and optimal amount of electro-thermal energy that ensures complete coagulation and sealing with very minimal surrounding thermal spread [21]. Several experimental studies [22-24] have proven that the extent of lateral thermal spread is minimal and limited to 2-3mm. LigaSure has been demonstrated to be effective and safe in modified radical mastectomy in regard to hemostasis, reduction of operative time, prevention of postoperative seroma formation, and complications including skin burn or necrosis [25]. The Ligasure ImpactTm variety of the electrothermal bibolar vessel sealing instruments that is designed to be used in abdominal and pelvic surgeries provides additional features [26] (Fig. 1): It has long jaws providing long seal and cut lengths minimizing the need for multiple applications, and the curved nature of such long jaws besides allowing for improved access it suits the curved contour of the breast if it is to be applied to dissect in the plane of SL of SF. Our hypothesis depended upon that; by the virtue of tumescent technique the subcutaneous fat space became inflated increasing the distance between the dermis and mammary tissue allowing for passing blunt tipped long curved jaws of the Ligasure ImpactTm, while opened, easily and atraumatically into the subcutaneous fat space guided by the plane of SL of SF in the same way like passing a liposuction canula creating swiss-cheese like juxtatunnels, then to close the open jaws to grasp tissue bridges in between, enabling for quick, sharp, precise, controlled hemostatic flap dissection without missing any mammary tissue in the flap or injuring the dermis. The purpose of this study was to describe and objectively evaluate SSM by the tumescent technique with the use of the Ligasure ImpactTm instead of the conventional ways of using electrocautary, scissor or scalpel, aiming at standardization of such a simplified technique that seems to meet optimum oncological and therapeutic safety conditions.

Patients and Methods

15 selected patients with a mean age of 43.8 years having early stage breast cancer (I&II) were operated upon by this technique from Jan. 2011 through August 2012 in the endocrine and breast surgery unit in the national institute of endocrine diseases, Cairo, Egypt. The clinco-pathological criteria of the patients are shown in Table (1). Inclusion and exclusion criteria were:

Inclusion criteria:

- Patients with early stage breast cancer preferring SSM and immediate breast reconstruction
- Tl&T2 tumors not eligible for breast conservation therapy:
  - Small breast: tumor ratio.
  - Central (retro-areolar) tumors.
  - Multicentricity.
  - Radiotherapy intolerance.
- Patients scheduled for prophylactic mastectomy
- Paget's disease.

Exclusion criteria:

- Locally advanced tumors i.e stage III.
- Neoadjuvant therapy.
- Inframammary fold tumors.
- Bleeding diathesis.
- Medical contraindication to major surgery.

Surgical technique & Methodology of its assessment:

• *Preoperative marking (Fig. 2a): Marking the followings:*

- Circular periareolar line for Circum-areolar incission.

  Imaginary marking of the native breast skin envelope for technical and study puposes by lines drawn from the areola to; the sternal angle,the upper end of the anterior axillary fold, the lower end of the anterior axillary fold, and to the xiphisternum. Thus defining the whole breast skin flap into; upper, lower, medial and lateral flaps.
- IMF.
- Skin area in close proximity with the tumor.

• *Patient positioning and preparation:*

Patient is positioned supine at the edge of the table to provide simple access to the operative field, the ipsilateral arm is placed at 90 angle on an arm board to avoid shoulder subluxation with its subsequent brachial plexus strech. Skin sterilization is done with the standard povidone-iodine solution. Both breasts are prepared in the operative field with exposure from the sternal notch to below thecostal margin, the arms are exosed to the mid-humerus. The abdomen is prepared for the plarmed transverse rectus abdominis myocutaneous (TRAM) flap for breast reconstruction if this was the chosen procedure for reconstruction.

The first assistant is positioned craniad to the shoulder of the ipsilateral breast to provide adequate retraction and arm mobilization without undue traction on the brachial plexus.

• *Technique:*

- *Tumescent anaesthesia:*

The following recipe for tumescent solution is both safe and effective **[18].**

Lidocain 2%	20m1
Epinephrin 1:1000	1ml
Lactated ringer's solution	1000m1
Lidocain 0.04%	1026ml
Epinephrin 1: 1.000.000	

- *Incission design and infiltration of tumescent solution (Figs. 2b,c):*

A circumferential areolar incision is planned just at the areolar edge that may extend to include a pre-existing nearby biopsy scar. If biopsy scar is distant enough from the areolar incision to allow a good area of intervening skin without fear of compromising its viability, it is to be planned to excise the scar separately. The marked area of planned periareolar incision is infiltrated with 2% lidocain and while the patient is under intravenous sedation and analgesia with the use of midazolam and pethedine, skin incision is made perpendicular to the subcutaneous plane along the previously sketched line using number 15 blade Fig. (2b). Retraction hooks or towel clips are placed on the skin margins to provide its appropriate elevation and retraction, then infiltration of the tumescent solution by the use of spinal needle No. 20 into the subcutaneous tissue plane above the level of the SL of the SF all around over the entire breast and into the axilla Fig. (2c). Solutions should be infused until the breast is firm to touch, which depending on the size of the breast may require from 500 to 2000m1 of solution. This leads to distension of the subcutaneous tissue space allowing us to distinguish between the subcutaneous and glandular tissues. 10 minutes after infiltration of the tumescent solution we procede with the operation.

- *Skin fiap fashioning: (Figs. 3 4a,b,c)*

The subcutaneous tissue space between the SL of the SF and the dermis became now inflated after infiltration of the tumescent solution.

With the periareolar skin margin elevated with the use of multiple towel clips, we look sharply for the SL of the SF, then, in a similar way of introduction of a liposuction canula, the blunt tipped long curved jaws of the LigaSure ImpactTm instrument while open are introduced just above the level of the superficial layer of the superficial fascia to gently penetrate the subcutaneous fat with some to and fro movement if resistance is met, sliding along the flap towards the designated landmark. The curved instrument gently curves with the soft contours of the breast without dermal friction which may injure the subdermal vascular plexus with the subsequent hazard of compromising flap viability. The passage of the instrument through the subcutaneous tissue plane is guided all of the time by assuring the thickness of the flap by palpating the skin flap over the instrument by the other hand as it passes towards the designated landmark. The instrument is then locked to grasp

the tissue bridge in between the created tow adjacent swiss-cheese like tutmels to seal and cut tissue bundles and vertical blood vessels from the axial parenchymal vessels to the subdermal vascular plexus. The same process (Creation of swiss-cheese like juxtatunnels and grasping tissue bridges in between) is repeated again precisely in a centripetal direction until the whole skin flap is fashioned till the designated landmarks; upper flap till the clavicle, medial flap till the sternum, lateral flap till the latissimus dorsi muscle and lower flap till the inframammary fold. The instrument is to be applied to give a skin flap with a rough thickness of approximately 5mms. In no step in flap fashioning in any case electrocautary was used.

- *Glandular mastectomy and axillary lymph nodal dissection: (Fig. 5a,b,c)*

Once the flaps have been completed, the pectoralis major fascia is devided and then elevated off using knife firstly then continuing with the Impact instrument, beginning at the superior aspect of the breast and continuing inferiorly. Internal mammary perforators along the sternal border are frequently encountered sealed and devided. The dissection continues over the pectoralis major muscle till its lateral edge, then interpectoral between both pectoral muscles to remove Rotter's lymph nodes, then to the lateral edge of the pectoralis minor muscle which is retracted upwards after opening the clavipectoral fascia to enter the axilla. the breast is then mobilized from over the serratus anterior and became hanged by its weight while attached by its tail to the axillary contents Fig. (5a). Because of the large skin envelope, axillary exposure could be obtained via a periareolar incision and up to level III axillary clearance was performed in continuity with the breast tail preserving the thoraco-dorsal neurovascular bundle,the nerve to serratus and intercostobrachial nerves. In no case a separate axillary incision was required and the whole of the procedure was performed via a periareolar incision.

The resulting empty space left after removal of the surgical specimen adapts well when a prosthetic implant is put subpectoral or TRAM flap is placed in the preserved skin envelope with its preserved IMF (Fig. 5b,c).

Once SSM has been completed, either we use prosthetic implant for reconstruction and the whole procedure is to be totally completed under tumescent local anaesthesia, or general anaesthesia is started to construct TRAM flap and complete reconstruction of the breast if this is the chosen procedure for reconstruction.

• *Assessment of SSM by this technique:*

The following data about SSM by this novel technique were recorded;

- Operative time.
- Amount of tumescent solution injected.
- Amount of operative blood loss by weighing the sponges before and after operation.
- Native breast skin flap thickness by the use of skin fold calliper, measured at two levels; at the edge of the flap all around and skin fold at the middle part of the flap where the calliper pinches the skin to raise a double layer of skin and underlying adipose tissue that represents the double of flap thiclmess.
- Areas of exposed white dermis on the inner surface of the flap.
- Skin flap biopsies in the form of a 5mm circular strip of skin from the circum-areolar skin edge and multiple random biopsies in the form of 9 biopsies from each part of the flap as 3 biopsies from the edge, 3 from the mid-portion and 3 from the base of each part of the flap and from the IMF which represents the base of the inferior flap.
- Imprint cytology from the inner surface of the flap in close proximity with the tumour (preoperatively marked from outside on the skin) to asses tumor margin safety.

No attempt at biopsing the chest wall or the axilla was made because we were more concerned here with assessing the thoroughness of flap fashioning by this novel technique.

- Follow-up data in the form of hematoma/seroma formation, skin flap necrosis, fat necrosis and ocurance of local recurrences.
- The reported number of axillary lymph nodes dissected in the pathology report.

Results

Table (2) shows operative data recorded to assess SSM by the described technique in the 15 patients included in the study. The mean operative time was 70.6min, the mean amount of tumescent solution injected was 835.6m1, the mean amount of operative blood loss was 74.6m1 and the mean number of axillary lymph nodes dissected through the small periareolar incision was 16.5. No exposure of the white dermis has been found on checking the inner surface of the skin flap and a uniform flap thickness allover with a mean of 5 6mm has been achieved. On biopsy assessment of the thor-

oughness of this technique in adequate extripation of the mammary tissue, duct epithelium was not detected in the random biopsies taken from different parts of the flap (32 biopsies), however, duct epithelium was detected in the 5mm periareolar circular skin strip (i.e close to the ill defined areolar edge) in 5 cases (33.3%) and in the inframammary fold in one case (6.6%) Table (3). Imprint cytology from the inner surface of skin flap in close proximity with the tumour was negative in all of the cases Table (3). Follow-up data in the short term revealed that only one case has developed hematoma but none has developed seroma, and only one case (6.6%) has developed partial flap necrosis. As regards the longterm follow-up data, only one case has developed fat necrosis (6.6%) and none has developed LR within this short follow-up period of the study (6 months to 1 year) Table (4).

Table (1): Clinco pathological criteria of the patients.

	Age
Mean	43.8 Y
Range	36-52 Y
Clinical stage:	
Stage 0	1
Stage I	4
Stage II	10
Stage III	0
Histopath. TYpe:	
IDC	12
DCIS	1
Medullary	1
Paget	1
Grade:	
	3
	11
Ill	1
Preop. Biopsy:	
FNAB	12
Open	3

Table (2): Operative data assessing the new technique in the 15 patients included in the study.

Pt	Operaive time (min)	Tumescent solution (cc)	Operative blood loss(cc)	Flap thickness (nun)	Dissected lymph nodes	Exposed white dermis
1	70	700	100	5.3	16	Nil
2	80	500	70	5.5	20	Nil
3	60	800	80	6	12	Nil
4	80	1000	50	7.3	15	Nil
5	75	1050	70	7.1	17	Nil
6	75	800	60	5.3	18	Nil
7	60	900	80	5.1	20	Nil
8	70	700	90	4.2	13	Nil
9	75	500	50	4.1	18	Nil
10	60	700	70	5.5	16	Nil
11	85	1100	70	6.1	17	Nil
12	70	1100	80	7	16	Nil
13	65	800	100	4.5	15	Nil
14	70	1000	80	5.3	16	Nil
15	65	900	70	5.7	19	Nil
Mean	70.6 (60-85)	836.6 (500-1100)	74.6 (50-100)	5.6 (4.1-7.1)	16.5 (12-20)	

Table (3): Biopsy assessment of the new operative technique in the 15 pts. of the study.

Pt No.	Biopsies (duct epithelium)			Imprint cytology
	Peri areolar skin	Flap inner surface	IMF	
1	—ve	Nil	—ve	—ve
2	—ve	Nil	—ve	—ve
3	+ve	Nil	—ve	—ve
4	—ve	Nil	+ ve	—ve
5	—ve	Nil	—ve	—ve
6	—ve	Nil	—ve	—ve
7	+ve	Nil	—ve	—ve
8	—ve	Nil	—ve	—ve
9	+ve	Nil	—ve	—ve
10	—ve	Nil	—ve	—ve
11	—ve	Nil	—ve	—ve
12	+ ve	Nil	—ve	—ve
13	—ve	Nil	—ve	—ve
14	+ve	Nil	—ve	—ve
15	—ve	Nil	—ve	—ve

Table (4): Early and late follow up data assessing the new operative technique in 15 pts. (6-12 month).

Pt No.	Hematoma/ seroma	Flap necrosis	Fat necrosis	Local recurrence
1	Nil	Nil	Nil	No
2	Nil	Nil	Nil	No
3	Hematoma	Nil	Nil	No
4	Nil	Nil	Nil	No
5	Nil	Nil	+ve	No
6	Nil	Nil	Nil	No
7	Nil	Nil	Nil	No
8	Nil	+ve	Nil	No
9	Nil	Nil	Nil	No
10	Nil	Nil	Nil	No
11	Nil	Nil	Nil	No
12	Nil	Nil	Nil	No
13	Nil	Nil	Nil	No
14	Nil	Nil	Nil	No
15	Nil	Nil	Nil	No

Fig. (1): The LigaSure impact with its blunt tipped long curved jaws.

Fig. (2A): Preoperative marking in a patient with Paget's disease of the nipple.

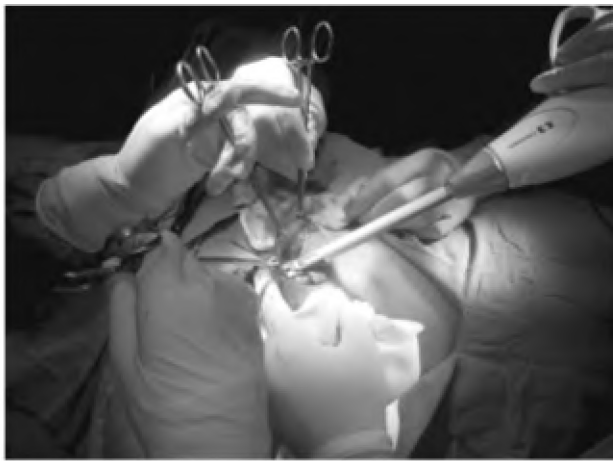

Fig. (3): Breast skin flap fashioning with the use of LigaSure ImpactTm along the plane of SL of SF.

Fig. (2B): Incision design.

Fig. (2C): Infiltration of tumescent solution in the subcutaneous fat above the level of SL of SF.

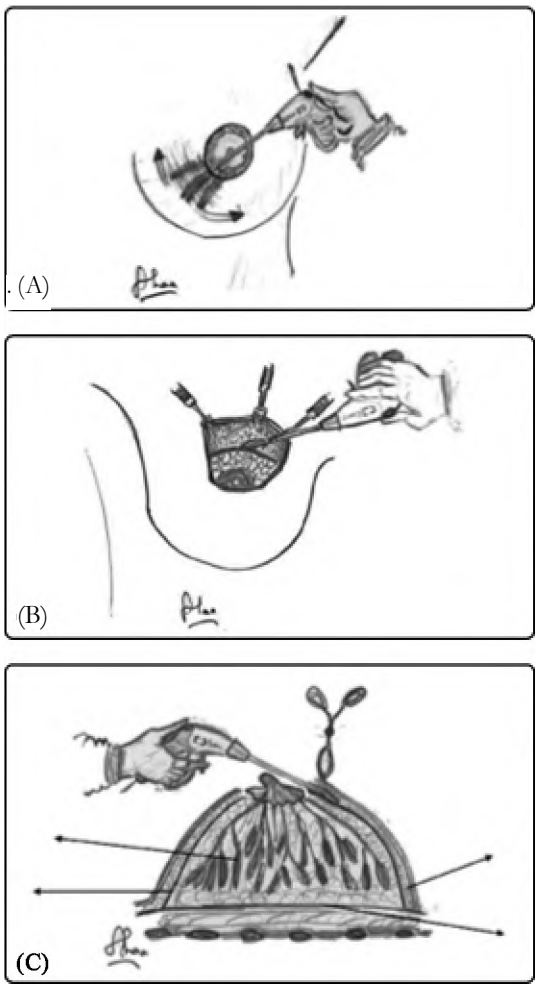

Fig. (4A,B,C): Graphic representation of the novel use of LigaSure ImpactTm along the plane of SL of SF in SMM.

Fig. (5A): Breast hanged on its tail and starting axillary dissection through the periareolar hole.

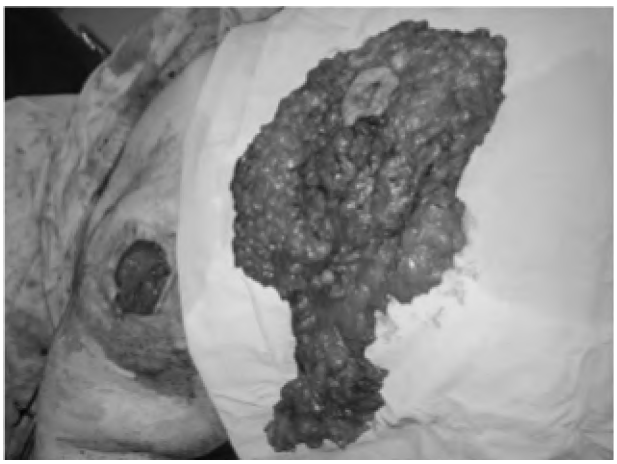

Fig. (5B): Completed SSM with the whole breast and axillary contents in continuity removed en bloc through the periareolar hole.

Fig. (5C): Another patient with SSM performed with the LigaSure ImpactTm.

Discussion

SSM is technically demanding, somewhat operator dependant and requires skill for meticulous gentle handling of tissues to prevent skin flap ischemia while adequately removing breast tissue from skin flap and accomplishing an adequate axillary dissection through a relatively small periareolar incision. Copeland has indicated that it is technically more difficult and requires that the oncologic surgeon be able to remove the entire breast through a small incision **[27]. It** takes more time than classical radical mastectomy, with about 45 minutes longer to perform **[28,29]**.

Although de novo cancer from islands of remaining breast tissue postmastectomy has been rarely demonstrated **[30]**, and From oncologic point of view, such uninvolved residual breast tissue seems to have no dominant risk on breast cancer recurrence because of that even extensive skin resection with subsequent grafting can not prevent LR entirely **[31-33]** and histopathological examination of LR rarely shows identifiable breast tissue [2,341, also LR rate after varying mastectomy techniques remained constant over the years and all patients with LR eventually died of metastatic disease, suggesting that LR is rarely an isolated event that can be ascribed to inadequate surgical excision,but rather,a component of widespread relapse **[31-35,37]**. However, still some investigators argue that benign mammary tissue left behind in the flaps after mastectomy may also give rise to a metachronous second breast carcinoma, as patients with one breast carcinoma are at increased risk of developing another carcinoma **[38,39]**.

Haagensan who is known with his extensive experience in cancer breast has pointed out **[17]** and many surgeons agree with him **[11,16]** that SL is a very delicate but definite structure that can be seen by the surgeon who looks sharply for it and keeps the operative field dry enough to permit its identification. Large axial blood vessels lie deep to this plane and send vertical branches to the subdermal plexus. Haagansan stated that this fascial layer provides the surgeon with a good guide to dissect skin flaps in relatively avascular plane without including any mammary tissue **[17]**. If dissecting too superficial to this layer or exposing the white dermis, the subdermal plexus will be injured and flap viability may be harmed **[12,40,41]**.

Beer et al. [12] in their study on breast reduction speciemens for the presence of SL of SF have demonstrated that SF is not always present, it is missing in 44% of cases in the lower poles and if it is present it is irregular, very thin to be detected macroscopically and even if it is visible the distance between it and the dermis is too thin to permit dissection superficial to it without compromising flap vascularity, in the same time they have dem-

onstrated that mammary tissue never present beyond the SF. Although such findings seem to be in opposition with Haagensen **[17]** who stated that SL is best developed in the caudal part of the breast and thins out towards the clavicle and such layer is a reliable landmark to dissect in its plane during flap fashioning, our agreement with Haagensen depended upon our actual practice where we were able to identify SL in nearly all of the cases and we found it to be in a proper distance from the dermis that allowed us to properly apply our unique Impact instrument. Furthermore, despite the objective nature of Beer et al., findings, they can be falsified by the very well known scientific fact that tissues shrank after formalin fixation or tissue processing that reaches up to 30% of the actual dimentions **[42,43],** also tissue specimens shrank in length and width after excision because of the intrinsic contractile properties of tissues **[44],** so such measurements in resected specimens are inaccurate and could never be correlated with invivo measurements.

The LigaSure ImpactTm instrument has unique characteristics of having blunt tipped long curved jaws with a long seal and cut lengths (jaw angle=14 degrees, seal length=36mm, cut length=34mm) plus having suitably long shaft (18cm) with the capability of blunt dissection, grasping, sealing and cutting have allowed for improved access and potentially minimized the need for multiple applications and exchange of instruments **[26]** thus enabled us to perform rapid, precisely controlled, consistently uniform, hemostatic flap fashioning blindly guided by the applied blunt tipped long curved jaws of the ImpactTm instrument, overcoming the problem of arbitrary flap dissection with the use of conventional instruments through a narrow limited field inherent to the periareolar skin sparing approach with its inadvertent hazard of exposing the dermis and injuring the subdermal vascular plexus and the subsequent post-operative periareolar skin sloughing or violating the superficial layer of the superficial fascia with the resultant miss of much of the duct tissue within the skin

In this study,besides the advantage of hemostatic dissection that the tumescent technique allows for, it has also the following benefits:

- Tumescing (Ballooning) of the subcutaneous fat space allows to distinguish between subcutaneous and glandular tissues and easy identification of SL of SF, giving good space for application of the long curved jaws of the ImpactTm instrument guided by the SL.
- Easy frictionless penetration of blunt tipped jaws of the instrument through the subcutaneous fat space with less trauma and bleeding.
- Decreased need for systemic anaesthetics, including postoperative narcotics, allowing for the operation of SSM/IBR (immediate breast reconstruction) to be done under local anaesthesia of the tumescent technique and restricting general anaesthesia to the part of TRAM flap construction if TRAM flap was the chosen procedure for breast reconstruction, however if prosthetic implant was to be used for reconstruction the whole procedure of SSM/IBR is done under tumescent local anaesthesia. In addition to the short operative time of this technique, this helps to avoid prolonged anaesthesia and operation with their lmown postoperative cardiovascular and pulmonary complications **[45-47].**

In view of our results, it seems that the artful use of such new technology instrument in performing SSM depending on proper knowledge of fascial,parynchemal and vascular anatomy of the breast has allowed for rapid precise flap fashioning,shortening operative time (mean=70 6min) and diminishing operative blood loss (mean=74.6m1) owing to LigaSure sealing of vertical braches from axial vessels to the subdermal plexus or the axial vessels themselves if the SF was accidentally violated, this is aided by the hemostatic effect of tumescent solution, thus diminishing the need for blood transfusion in SSM/IBR operation eliminating the known hazard of perioperative blood transfusion in malignancy operations **[48,49].** Also grasping subcutaneous fat by a series of multiple applications of the LigaSure Impact at the plane of SL of SF guided by digital palpation on the overlying skin to roughly control flap thickness then sealing and cutting explains the consistently uniform flap thickness produced (mean=5 6mm) without inadvertent exposure of the white dermis or violation of SL with maximal eradication of glandular tissues evidenced by the absence of duct epithelium on random biopsies from flap inner surface. This goes with Slavin et al. **[6]** where histopathological examination of all skin flap biopsies failed to reveal breast ducts in the dermis of any of the 32 patients studied. In the contrary, these results are in contrast to those reported by Torresan et al. **[39]** who first performed an SSM, and then removed the skin flap that would have remained in the patient, essentially converting the procedure to a conventional mastectomy. They found benign breast tissue in 59.5% of their skin flaps, and the presence of residual benign breast tissue was significantly associated with a skin flap

thickness of >5mm. However, duct epithelium was identified in the circular periareolar skin strip and this is consistent with the finding of Schnitt et al. **[50]** and holds the recommendation of Slavin et al., to perform the periareolar incision at least 5mm from the areolar edge because of eccentric distribution of ductal epithelium throughout the areola **[6].**

Also mammary tissue was identified in IMFof one of the 15 cases of the study, this goes with Carlson et al., who used computer image analysis to examine IMF tissue retained in SSM, where breast tissue was identified in specimens from IMF but comprised only 0.02% of the total area examined and concluded that IMF preservation does'nt appreciably affect completeness of mastectomy **[511.** However, breast cancer is extremely rare in this location, Haagensen in his large experience, cited only 26 cases of breast cancer occurring in IMF **[52].** Imprint cytology from flap area in close proximity of the tumour was negative in all cases. This is consistent with Ho etal who demonstrated the oncological safety of performing SSM in T 1 &T2 tumours because the chance of skin involvement is small and it is safe to preserve skin overlying the tumour so long there is no skin tethering **[53].** Postoperatively only one case developed hematoma, none developed seroma and Partial skin flap necrosis was noted in only one case (6.6%), such results can be interpreted in view of using the advanced technology of the electrothermal bibolar vessel sealing system instead of electrocautary in flap fashioning, this goes with recent studies that has demonstrated that the use of electrocautary in mastectomy is associated with moderate degree of morbidity in the form of blood loss, hematoma, seroma and flap necrosis because electrocautary is associated with lateral thermal injury effect causing damage to the subdermal vascular plexus and incomplete occlusion of vascular and lymphatic channels **[19,20]** and this is especially of concern here in SSM where the skin flap is more liable for ischemia due to more extensive undemining. Singlitary has reported 7% incidence of partial flap loss with SSM **[54]** and Carlson has reported 10.7% of native skin necrosis in SSM versus 11% in NSSM **[2].**

Because of large size and pliability of preserved skin envelope, axillary exposure was comfortably obtained via the small periareolar incision with a mean number of dissected axillary nodes of 16.5.

Only one case of fat necrosis was noted (6.6%), the most likely complication of SSM is fat necrosis (18%-20%) **[40,41].** None of the cases developed LR within the follow-up period (6 months to 1 year), Kroll et al. **[55]** reported only one LR in his study on SSM after an average of 23. 1 months and Hidalgo et al. **[56]** demonstrated no LR in 28 patients followed for an average of 25, 1 months. On conclusion; this novel technique of SSM with the use of LigaSure impactTm instrument under tumescent local anaesthesia could make possible the removal of maximum amount of breast tissue with minimal resultant complication of skin necrosis within the shortest operative time with minimal blood loss and an expected short learning curve without affecting radicality of mastectomy procedure, thus fulfilling the recent oncoplastic goals of breast cancer surgery,nevertheless,further similar objective assessment of such a technique is needed to confirm its benefits in the way of its possible technical standardization and this also opens the door for possible modification of such instrument to more appropriately suit the technically difficult technique of skin sparing mastectomy.

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