Hydrodissection technique versus electrocautery technique in nipple-sparing mastectomy: a comparative study

Mohamed F. Asal, Khaled E. Barakat, Islam M. Korayem, Haytham Fayed, Ahmed A. Abdelkader

Surgical Oncology Unit, Faculty of Medicine, Alexandria University, Alexandria, Egypt

Correspondence to Khaled E. Barakat, MBBCh, Surgical Oncology Unit, Faculty of Medicine, Alexandria University, Alexandria 21525, Egypt. Tel: +201099033194; e-mail: khaled.emad.barakat@gmail.com

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Background

Approximately 26% of all cancers in women are breast cancers, making it the most prevalent cancer among women. Breast cancer is the second leading cause of cancer-related mortality, behind lung cancer, with 40 000 women dying from it each year.

Tumescent dissection or hydrodissection (HD) is a technique that uses a crystalloid solution together with a local anesthetic and epinephrine to produce a subcutaneous and prepectoral plane throughout mastectomy. This research compared this approach with electrocautery mastectomy to assess postoperative complications and surgical results.

Patients and methods

The study involved 60 female breast cancer patients, who were hospitalized to the Surgical Oncology Unit at Alexandria Main University Hospital and who were advised to have a nipple-sparing mastectomy (NSM) between June 2020 and June 2022. Randomization was used to assign patients to group A or group B.
Group A patients underwent NSM using the tumescent technique and group B patients had standard electrocautery-assisted mastectomies.

Results

Sixty NSM procedures were performed (30 patients in the HD group and 30 in the electrocautery group). The demographics of the patients in both groups were fairly the same. HD required less time during surgery than a normal mastectomy. We also discovered that the tumescent group experienced significantly less intraoperative bleeding than the electrocautery group. In terms of the average amount of fluid that exits the drain each day, we discovered that there was a much lower amount of fluid in the tumescent group compared with the electrocautery group. The overall rate of complications was 25%; in the tumescent group, there were seven (23.3%) complications and in the electrocautery group, there were eight (26.67%) complications.

Conclusions

The tumescent technique may give a safe alternative to the electrocautery technique, allowing for simpler tissue dissection without direct heat harm. It considerably reduces the operating time and the time required for skin flap lifting, as well as the quantity of intraoperative hemorrhage and seroma in the drain postoperatively, resulting in early drain removal.

Keywords:
breast cancer, electrocautery, hydrodissection, nipple-sparing mastectomy, tumescent

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Introduction

Approximately 26% of all cancers in women are breast cancers, making it the most prevalent cancer among women. Breast cancer is the second leading cause of cancer-related mortality, behind lung cancer, with 40 000 women dying from it each year [1].

Breast cancer is primarily treated surgically, either by breast-conserving surgery or modified radical mastectomy (MRM) and conservative mastectomy. There are several conditions where mastectomy is the preferred course of therapy, which are contraindications to breast conservation. Contraindications to breast conservation surgery, according to the National Comprehensive Cancer Network (NCCN) recommendations, include [2,3]: prior radiation therapy to the breast or chest wall, radiation therapy being contraindicated when pregnant (with the exception of women in the third trimester who can get radiation postpartum), diffuse suspicious or malignant appearing microcalcifications,

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and widespread disease that is multicentric, distributed in more than one quadrant, and cannot be resected.

Seroma is the most frequent post nipple-sparing mastectomy (NSM) complication, occurring in 30% of cases [4], followed by wound infection and hemorrhage, which can be divided into primary and reactionary. Primary bleeding is defined as bleeding that occurs during the operation; reactionary bleeding is defined as bleeding that occurs within the first 24 h after the operation; and secondary bleeding is defined as bleeding that occurs 7–10 days postoperatively. Flap necrosis, lymphedema, injury to the thoracodorsal nerve, which innervates the latissimus dorsi (LD) muscle, and injury to the long thoracic nerve of Bell, which supplies the serratus anterior muscle, are additional complications [5]. This condition results in instability and an unsightly prominence of the scapula (scapular winging) [6]. Electrocautery dissection is a common method used in modern mastectomies. High-frequency alternating current is sent into the body during electrocautery to provide a targeted heating effect. Direct heat energy used in electrocautery can reach deeper tissues [6].

To help create a bloodless plane for dissection, hydrodissection (HD), also termed as tumescent dissection, involves injecting a combination of a crystalloid solution and local anesthetic with epinephrine into the subcutaneous and the prepectoral tissue. This method was originally utilized by Worland [7] to conduct a mastectomy in 1996, and since then it has been increasingly used in breast oncologic and cosmetic surgery settings [8–12].

The tumescent solution is injected during a mastectomy with the intention of facilitating the surgical operation by widening and displacing the space in between ligaments of Cooper. As a result, the subcutaneous vascular plexus may be preserved, the oncoplastic plane of dissection followed, and the subcutaneous tissue may be easier for surgeons to identify from the glandular tissue. By epinephrine-induced vasoconstriction and the hydrostatic impact of the large volume infusion tamponing tiny blood arteries and as a result, perioperative blood loss may be decreased. Numerous studies have supported these theoretical benefits, along with shorter operating times and improved postoperative analgesia [8,13–17]. Despite the potential advantages, using this approach, particularly when immediate implant-based breast reconstruction is being done, may raise the risk of problems [9,10,18].

HD has gained popularity in current healthcare systems even after the conflicting findings as it could offer a faster, lower-risk alternative to the electrocautery method. The more defined resection plane established by HD may be linked to higher quality flaps with little traction-related flap damage, which leads to a lesser need for reoperation. Consequently, employing this strategy might aid in reducing the growing pressure placed on already overburdened healthcare services. The purpose of this study was to assess the effect of HD on surgical complications, operating times, and the necessity for reoperation in the context of a risk-reducing, NSM with implant-based breast reconstruction to the usual electrocautery operational approach.

Our study's objective was to assess and compare between the tumescent technique and conventional electrocautery technique in patients undergoing NSM.

Patients and methods

The study involved 60 female breast cancer patients who were hospitalized to the Surgical Oncology Unit at Alexandria Main University Hospital and who were advised to have a NSM between June 2020 and June 2022. Following permission, all patients were randomly assigned to undergo MRM using either the standard electrocautery technique or the tumescent approach. This research was performed at the Department of General Surgery, Alexandria University. Ethical Committee approval and written, informed consent were obtained from all participants.

All patients underwent medical history taking, clinical examination, and a variety of investigations, including bilateral mammosonography, MRI if needed, a metastatic workup that included a ultrasound (US) abdomen, computed tomography chest, and bone scan, if necessary, as well as a US-guided core needle biopsy and immunohistopathological profiling for ER, PR, HER2, and Ki67.

Randomization was used to assign patients to group A or group B.

Group A (patients underwent mastectomy using the tumescent technique).

The amount injected was adjusted according to the size of the breast when using our tumescent method. The solution was produced by mixing 15–30 ml of 1% lidocaine with 1–2 ml of 1 mg/ml epinephrine, mixed with 500 cm of normal saline or lactated Ringer's solution.

A 20-G long spinal needle was used to inject this solution into the subcutaneous tissue of the anticipated mastectomy flaps. Sharp dissection using scissors and/or a scalpel was used during NSM.

B group patients had standard electrocautery-assisted mastectomies.

The mastectomy skin incisions are designed according to the tumor location and according to the patient and the surgeon's preferences. We categorize our incision into three types: (a) radial incision (b) inframammary incision, and (3) periareolar incision.

The total mammary gland removal is performed by sharp dissection using a surgical blade or a diathermy knife. The glandular tissue is dissected underneath the dermis, leaving a thin layer of 7–8 mm of fat tissue to preserve the subdermal vessels. The retroareolar histological features are checked by a frozen section, and when the specimen is free of tumor, the nipple–areola complex (NAC) can be preserved.

The specimen is sent to the pathologist with stitches to mark the retroareolar area and on the axillary tail of the gland.

All patients with N0 cancer undergo sentinel lymph node biopsy, and if the findings are positive, axillary dissection is conducted. Node-positive patients undergo complete axillary node dissection.

The immediate reconstructive options are one-stage direct implant or autologous tissue.

Autologous reconstructions involve pedicle flaps such as the LD myocutaneous flap, LD myocutaneous flap accompanied by prosthesis, and transverse rectus abdominis myocutaneous (TRAM) flap.

Postoperative assessment

All patients will be observed in the immediate postoperative period for detection of any postoperative complications that will be recorded, the NAC status, and standardized postoperative digital photographs will be taken in different views for comparison and follow-up.

Esthetic assessment

Assessment of esthetic results will be based on clinical examination of breasts, according to selection of some items of Tzafetta *et al.* [19]. This will be evaluated by a surgical team and by a separate team to compare the results, the following aspects will be recorded.

Breast shape and contour

(1) Excellent.
(2) Good.
(3) Fair.
(4) Poor.

Contralateral match

(1) Excellent match.
(2) Good match.
(3) Fair match.
(4) Poor match.

Inframammary fold

(1) Well-defined and symmetrical.
(2) Well-defined and asymmetrical.
(3) Ill-defined.

Overall result

(1) Excellent.
(2) Good.
(3) Fair.
(4) Poor.

Assessment of patient satisfaction

(1) Extremely satisfied.
(2) Satisfied.
(3) Less satisfied.
(4) Dissatisfied.

All patients received prophylactic antibiotics. The patients had a minimum of 6 months of scheduled follow-up at which the esthetic outcome was evaluated and the necessity for revision surgery was determined. Exclusion criteria for the patients were inflammatory breast cancer, smokers, DM, nipple retraction, and comorbidities.

We compared the two groups in terms of the total operation time and time consumed during skin flap raising, amount of intraoperative bleeding (weight of postoperative soaked towels to preoperative dry towels), total amount of fluid that emerged through the drain, duration until the drain was removed, and postoperative complications such as wound dehiscence and infection, seroma formation, hematoma, flap necrosis, and bleeding.

Results

The patients in the study had an average age of 51.6 years, with the majority of them (66.7%) falling between the ages of 40 and 60 years. Patients ranged in age from 24 to 85 years.

The mean BMI was 31.21 kg/m^2, with the range being 24–38.5 kg/m^2. The majority of cases (48.1%) had BMIs between 28 and 33 kg/m^2. Regarding age, bra cup size, breast size, and comorbidities, there were no differences found between the two groups.

In terms of breast size, bra cup size was utilized to determine the size of the breast. The majority of the patients in the study had breast cup sizes B and C.

In the tumescent group, the volume of solution injected varied from 200 to 500 ml depending on the size of the breast.

When compared with the electrocautery group, the operative time was significantly shorter in the group that received the tumescent technique (Table 1).

To compare the two study groups within the same size of the breast, we considered the cup size of the breast. We discovered that for patients with breast cup sizes B and C, which make up the majority of the study cases, there was a significant reduction in the operating time in the tumescent group compared with the electrocautery group (Table 2). The tumescent group's skin flap raising time was likewise significantly shorter than it was for the electrocautery group.

In terms of the amount of intraoperative bleeding, we discovered that the tumescent group experienced significantly less intraoperative bleeding than the electrocautery group. As another important factor that would affect the amount of intraoperative bleeding, we also included the cup size of the breast in our comparison (Table 3). We discovered that there was a significantly lower amount of intraoperative bleeding in the tumescent group compared with the electrocautery group for patients with cup sizes B and C, which represent the majority of the studied cases (Table 4). In terms of the average amount of fluid that exits the drain each day, we discovered that there was a much lower amount of fluid in the tumescent group compared with the electrocautery group (Table 5). This had a considerable impact on the time needed till drain removal, which was significantly shorter in the tumescent group (Table 6).

Table 1 Comparison between the two studied groups according to operative time

Operative time	Tumescent (*N*=30) [*n* (%)]	Electrocautery (*N*=30) [*n* (%)]	χ^2	*P*
<60	16 (53.3)	2 (6.7)		
60–90	12 (40)	16 (53.3)	18.978*	<0.001*
>90	2 (6.7)	12 (40)		

χ^2, χ^2 test. *Statistically significant at *P* value less than or equal to 0.05.

Table 2 Comparison between the two studied groups according to the operative time for each cup size

Breast size	Operative time	Tumescent (*N*=30) [*n* (%)]	Electrocautery (*N*=30) [*n* (%)]	χ^2	*P*
Cup A (*N*=14)	<60	4 (13.33)	1 (3.33)		
	60–90	3 (10)	4 (13.33)	3.440	^{MC}P=0.147*
	>90	0	2 (6.66)		
Cup B (*N*=18)	<60	7 (23.33)	1 (3.33)		
	60–90	3 (10)	5 (16.66)	6.323*	^{MC}P=0.046*
	>90	0	2 (6.66)		
Cup C (*N*=28)	<60	6 (20)	1 (3.33)		
	60–90	6 (20)	7 (23.33)	7.779	^{MC}P=0.022*
	>90	1 (3.33)	7 (23.33)		

MC, Monte Carlo; χ^2, χ^2 test. *Statistically significant at *P* value less than or equal to 0.05.

Table 3 Comparison between the two studied groups according to intraoperative bleeding

Intraoperative bleeding	Tumescent (*N*=30) [*n* (%)]	Electrocautery (*N*=30) [*n* (%)]	χ^2	*P*
<200	23 (76.7)	6 (20.0)		
200–300	4 (13.3)	16 (53.3)	19.438*	<0.001*
>300	3 (10.0)	8 (26.7)		

χ^2, χ^2 test. *Statistically significant at *P* value less than or equal to 0.05.

Table 4 Comparison between the two studied groups according to the amount of intraoperative bleeding for each cup size

Breast size	Intraoperative bleeding	Tumescent (*N*=30) [*n* (%)]	Electrocautery (*N*=30) [*n* (%)]	χ^2	*P*
Cup A (*N*=14)	<200	4 (13.33)	1 (3.33)		
	200–300	2 (6.66)	3 (10.0)	2.816	^{MC}P=0.420
	>300	1 (3.33)	3 (10.0)		
Cup B (*N*=18)	<200	6 (20.0)	1 (3.33)		
	200–300	4 (13.33)	4 (13.33)	5.872*	^{MC}P=0.035*
	>300	0	3 (10.0)		
Cup C (*N*=28)	<200	9 (30.0)	1 (3.3)		
	200–300	3 (10.0)	9 (30.0)	1.029	1.000
	>300	1 (3.3)	5 (16.66)		

MC, Monte Carlo; χ^2, χ^2 test. * Statistically significant at *P* value less than or equal to 0.05.

Table 5 Comparison between the two studied groups according to the average amount of fluid that emerges through the drain per day

Average amount per day	Tumescent (*N*=30) [*n* (%)]	Electrocautery (*N*=30) [*n* (%)]	χ^2	*P*
<100	6 (20.0)	2 (6.7)		
100–200	13 (43.3)	7 (23.3)	6.742*	0.033*
>200	11 (36.7)	21 (70.0)		

χ^2, χ^2 test. *Statistically significant at *P* value less than or equal to 0.05.

Table 6 Comparison between the two studied groups according to duration till removal of drain

Duration	Tumescent (*N*=30) [*n* (%)]	Electrocautery (*N*=30) [*n* (%)]	χ^2	*P*
<7	5 (16.7)	0		
7–10	16 (53.3)	3 (10.0)	23.204*	<0.001*
>10	9 (30.0)	27 (90.0)		

χ^2, χ^2 test. *Statistically significant at *P* value less than or equal to 0.05.

Table 7 Distribution of the studied cases according to the type of reconstruction

Type of reconstruction	Tumescent (*N*=30) [*n* (%)]	Electrocautery (*N*=30) [*n* (%)]
Primary implant (subpectoral)	7 (23.33)	6 (20.0)
Primary implant (prepectoral)	5 (16.66)	6 (20.0)
LD	11 (36.66)	10 (33.33)
LD+implant	3 (10.0)	5 (16.66)
TRAM	4 (13.33)	3 (10.0)

LD, latissimus dorsi; TRAM, transverse rectus abdominis myocutaneous.

Distribution of the studied cases according to the type of reconstruction

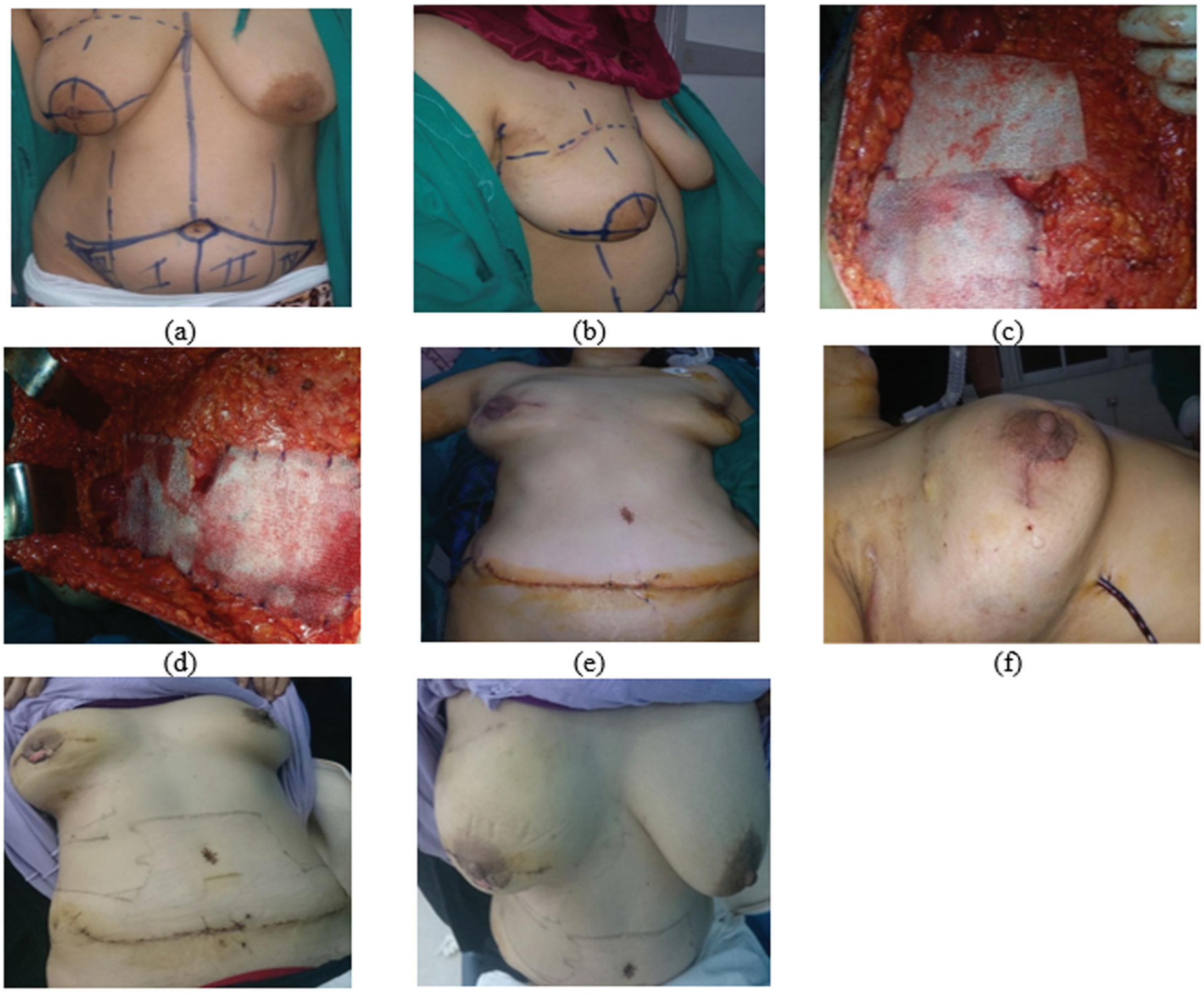
In the HD group, seven (23.33%) patients underwent subpectoral implant reconstruction, while in five (16.66%) patients the implant is placed in the prepectoral site using an ultrapromesh (Table 7 and Fig. 1).

Furthermore, autologous reconstruction was used in 14 (46.66%) patients in the form of LD flap alone (Fig. 2) and LD with implant. Eleven (36.66%) patients were reconstructed using the LD flap only & three (10.0%) patients were reconstructed using the LD flap in conjunction with implant. In addition, the TRAM flap was the suitable option in four (13.33%) patients, particularly cup C patients (Fig. 3).

While in electrocautery, implant-based reconstruction was conducted in 12 (40%) patients equally distributed between the subpectoral and the prepectoral implant site (Fig. 4). Autologous LD reconstruction was applied in 15 (50%) patients; 10 (33.3%) of them were reconstructed by the LD flap alone (Fig. 5) and five (16.66%) patients were reconstructed by the LD flap and supported by silicone implants. Finally, TRAM flap was the best available choice in only three (10%) cup C patients.

The overall rate of complications was 25%; in the tumescent group, there were seven (23.3%) complications and in the electrocautery group, there were eight (26.67%) complications (Table 8). Seroma was the most frequent complication and much more common in the electrocautery group in seven (23.3%) patients compared with only three (10%) patients in the HD group. Seroma was managed by frequent

Figure 1



(a) (b) (c) (d) (e) (f) (g) (h)

(a) Left nipple-sparing mastectomy, radial incision, and immediate reconstruction with implant using the HD technique. (b) Right nipple-sparing mastectomy, radial incision, and immediate reconstruction with implant using the HD technique. HD, hydrodissection.

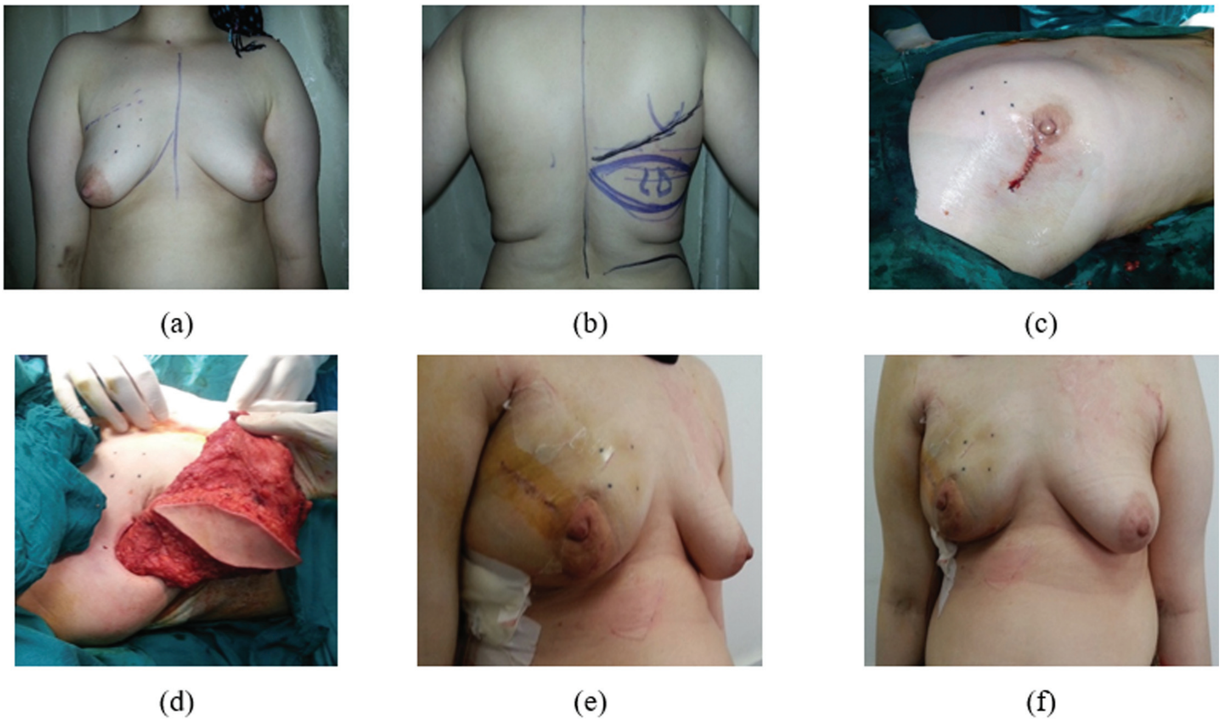
aspiration in the outpatient clinic and aspiration was US guided in intervention radiology if seroma was on top of implant. The incidence of flap necrosis and NAC necrosis (Figs 6 and 7) was higher in the electrocautery than in the HD group, but there is no significant statistical difference. Most of the cases were managed by conservative treatment and frequent dressing with topical nitroglycerine, particularly in those who underwent autologous reconstruction while in implant-based reconstruction, flap necrosis, and NAC necrosis were nightmares necessitating implant removal in two (6.66%) patients of each group and converted to MRM to avoid much more delay in adjuvant treatment. Capsular contracture developed only in one (3.33%) patient of each group and both were subpectorally placed and only one patient agreed to do capsulotomy and implant exchange (Fig. 8).

Four cases in the HD group out of 30 developed rebound bleeding (13.3% of the tumescent group); two of them had intraoperative bleeding, one of them was continued postoperatively after controlling of the intraoperative bleeding, and two cases had only postoperative rebound bleeding manifested by a large amount of blood in the drain (>500 ml blood) on the same day of operation. All episodes of rebound bleeding were handled conservatively, and none needed surgical intervention or blood transfusion. There were two cases complicated by hematoma in the tumescent group while only one case in the electrocautery group (Fig. 9).

Discussion

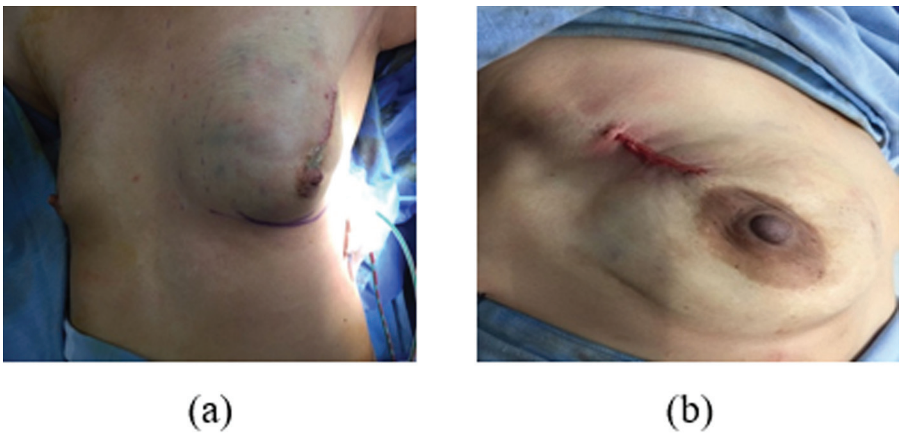
We compared the mean operating time, the time it took to raise the skin flaps, and the quantity of

Figure 2



A 42-year-old with infiltrating ductal carcinoma of the right breast, upper inner quadrant. The patient underwent right nipple-sparing mastectomy, radial incision, and immediate breast reconstruction with latissimus dorsi (LD) myocutaneous flap using the HD technique. (a, b) Preoperative views. (c) Radial incision. (d) Latissimus dorsi flap. (e, f) Postoperative lateral and anterior views. HD, hydrodissection.

Figure 3

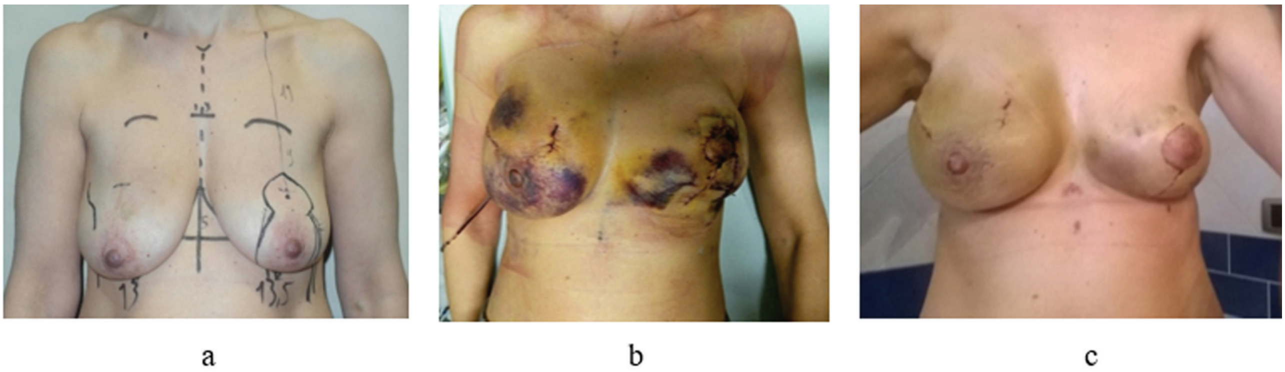


A 37-year-old with infiltrating ductal carcinoma of the right breast, upper outer quadrant. The patient undergo right nipple-sparing mastectomy, periareolar incision with medial and lateral extension and immediate breast reconstruction with ipsilateral transverse rectus abdominis myocutaneous (TRAM) flap using the HD technique. (a, b) Preoperative views. (c, d) Donor site repair with proline mesh. (e, f, g, h) Postoperative anterior and oblique views. HD, hydrodissection.

intraoperative bleeding between the two study groups based on the size of the breasts because this is a significant component that may affect these outcomes.

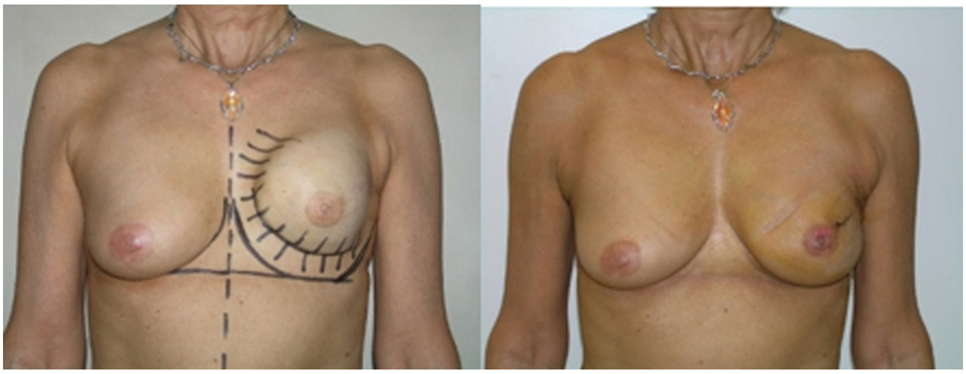
In comparison to the electrocautery group, we discovered that the tumescent group's operating time was significantly decreased, and the skin flap lifting procedure took noticeably less time. In a study by Kurtz and Frost [20], they discovered that there was a statistically significant difference in the amount of time reduced during operations between the 86 patients who got tumescent method mastectomy and the 110 patients who underwent electrocautery dissection. In a trial involving 53 patients, Shoher

Figure 4



Example of excellent case of immediate prepectoral implant reconstruction in the electrocautery group.

Figure 5



Example of excellent case of autologous LD reconstruction in the electrocautery group. LD, latissimus dorsi.

Table 8 Comparison between the two studied groups according to complications

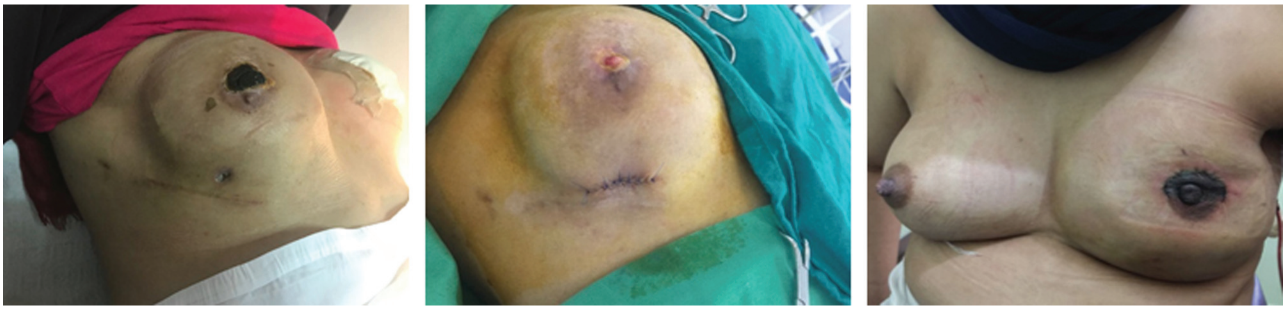
Complications	Tumescent (*N*=30) [*n* (%)]	Electrocautery (*N*=30) [*n* (%)]	χ^2	*P*
Seroma	3 (10.0)	7 (23.33)	1.920	^{FE}P=0.166
Wound dehiscence and infection	3 (10.0)	5 (16.66)	0.577	^{FE}P=0.706
Hematoma	2 (6.66)	1 (3.33)	0.351	^{FE}P=1.000
Flap necrosis	3 (10.0)	5 (16.66)	0.577	^{FE}P=0.706
Superficial NAC necrosis	4 (13.33)	5 (16.66)	0.131	^{FE}P=1.000
Full thickness NAC necrosis	1 (3.33)	1 (3.33)	0.000	^{FE}P=1.000
Implant removal	2 (6.66)	2 (6.66)	0.000	^{FE}P=1.000
Revision surgery	1 (3.33)	2 (6.66)	0.351	^{FE}P=1.000
Intraoperative bleeding	2 (6.66)	0	2.069	^{FE}P=0.492
Postoperative (reactionary) bleeding	2 (6.66)	0	2.069	^{FE}P=0.492
Capsular contracture	1 (3.33)	1 (3.33)	0.000	^{FE}P=1.000

FE, Fisher's exact; NAC, nipple–areola complex; χ^2, χ^2 test. *Statistically significant at *P* value less than or equal to 0.05.

et al. [13] established that the tumescent approach was quicker. However, Rousseau *et al.* [21] observed that electrocautery dissection is still superior in terms of how quickly big areas may be dissected in surgery.

A considerable decrease in intraoperative bleeding was observed in the tumescent group compared with the electrocautery group, according to our assessment of the amount of intraoperative bleeding. Out of 30 patients, four cases in the tumescent group experienced rebound bleeding. According to Maxwell and Gabriel [22], infiltration significantly narrows the internal mammary artery and the vein's perforating branches, particularly the second to fifth

Figure 6



Examples of partial nipple necrosis.

Figure 7

Example of full thickness nipple necrosis.

perforators. Higher epinephrine concentrations have been shown to have a favorable impact on the prevention of bleeding, according to a research by Folwaczny *et al.* [23]. Because tumescent vasoconstriction is only momentary, Black *et al.* [24] found that after a tumescent mastectomy, there may be an increase in postoperative hemorrhage.

There was a significant reduction in the average amount of fluid that emerged through the drain per 24 h in the tumescent group in comparison to the electrocautery group. As for the average amount of fluid emerging through the drain, we found that the average was about 200 ml because the amount was more on the first three or four postoperative day and then they decrease gradually, till reaching tiny amounts before removal.

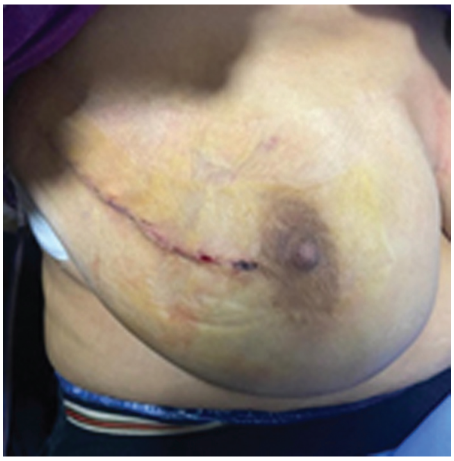
Due to enhanced thermal injury, Kuroi *et al.* [25] found that using electrocautery increases the likelihood of postoperative seroma. The use of electrocautery for dissecting flaps is significantly associated with increased seroma formation when compared with that of scalpel dissection, according to Abbott *et al.* [9] and Porter *et al.* [26], while Seth *et al.* [18] reported that the use of tumescent solution had no effect on the rate of postoperative hematoma and seroma when compared with electrocautery.

The total complication rate in our study was 25%, with seroma, wound dehiscence, infections, hematoma, flap necrosis, and bleeding being the most frequent problems. Generally, there were no significant differences in the two groups' rates of problems. In comparison to scalpel dissection, Miller *et al.* [27] observed that electrocautery increased seroma and other wound consequences such as cellulitis, infection, and necrosis. In a research conducted by Abbott and colleagues, 134 patients had mastectomy procedures, with a documented total complication rate of 21.6%. In general, there was no discernible difference in the two groups' rates of problems. He stated that electrocautery has been shown to cause significant tissue damage and high temperatures in the tissues around the wound, both of which increase the risk of skin burns, infection, flap necrosis, and wound dehiscence [24]. In a retrospective examination of 897 patients who underwent tumescent or electrocautery mastectomy, Seth and colleagues found that the tumescent method patients had a greater rate of overall complications, including significant flap necrosis. Between the tumescent and nontumescent groups, there was no significant difference in the frequencies of hematoma, infection, or seroma [22]. In a retrospective examination of 380 patients who underwent mastectomy using either the tumescent technique or electrocautery, Chun *et al.* [10] found a higher incidence of flap necrosis in those who received the tumescent approach. This most likely occurs as a result of the epinephrine component's vasoconstrictive effects, which may potentially impair the vessels.

Figure 8

Example of capsular contracture on follow-up managed by capsulotomy and implant replacement.

Figure 9



Example of postoperative hematoma: (a) preoperative, (b) 1 day postoperative view, (c) 3 weeks postoperatively.

Conclusion

Tumescent technique may give a safe alternative to the electrocautery technique, allowing for simpler tissue dissection without direct heat harm. It considerably reduces the operating time and the time required for skin flap lifting, as well as the quantity of intraoperative hemorrhage and seroma in the drain postoperatively, resulting in early drain removal.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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