



Immediate direct-to-implant breast reconstruction in Egypt: Evaluation of Outcomes

Mohammed Gamal Ahmed Awad¹, Maher Hassan Ibraheem², Tamer Mostafa Manie³, Mohammed AbdelSaboor Shalan⁴

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Abstract

Objective: Immediate direct-to-implant (DTI) breast reconstruction is the method of choice utilized by many breast surgeons worldwide and preferred by most breast cancer patients, however the cost of acellular dermal matrix (ADM) and some synthetic meshes is high ,especially in a developing country. This study aimed to Establish the short-term and long-term safety of immediate implant-based breast reconstruction performed with and without a low-cost alternative mesh. In addition, Evaluate the indications, restrictions, aesthetic outcome and complication rate. **Methods:** This is a prospective cohort study that was conducted on sixty-six patients who underwent Nipple sparing mastectomy or Skin sparing mastectomy with immediate reconstruction by silicon implants in the National Cancer Institute, Cairo University, Egypt from December 2019 to December 2022.The Study outcomes were mainly directed to evaluate technique , Complications , aesthetic outcome. Techniques employed were either subpectoral, Prepectoral or dermal sling. The Complications were stratified into early (within) and late (after 6 months postoperatively) and further subcategorized into major or minor according to management. Aesthetic outcome was assessed using breast Q questionnaire. **Results:** This study included 66 patients (70 breasts) with Median age 39 years. The Median follow up was 15.6 months. The sub-pectoral technique was done for 30 patients, while 27 patients had pre-pectoral implants. Dermal sling technique was used in 9 patients. We mainly used the ultrapro mesh in 75.4 % of patients. The overall complication rate was 43%. Early complications included; full-thickness mastectomy skin necrosis (8.3%) ,infection (5.7%) ,superficial sloughing (7.1 %), hematoma (1.4 %) and red breast syndrome (1.4 %). Consequently,7 implants were lost. Late complications included; Capsular contracture (21.4 %) , implant extrusion (2.9 %) and radionecrotic ulcer (1.4 %) . 5 implants were lost in the late complication group. Radiotherapy and chemotherapy were significant risk factors for complications. **Conclusion:** This study demonstrates acceptable complication rate and aesthetic outcome of direct to implant breast reconstruction , even without ADM or expensive synthetic meshes , however proper patient selection is a key factor for both the success and the choice of operative technique.

Keywords: Breast reconstruction, Immediate direct-to-implant, Ultrapro mesh, Risk factors, Complications, implant removal.

1. M.B, B.Ch., M.Sc., Assistant lecturer of surgical oncology, National Cancer Institute, Cairo University, Egypt; (mohamed.gamal@nci.cu.edu.eg)
2. Professor of surgical oncology, National cancer Institute, Cairo University, Egypt; (dr.maherhasan@gmail.com)
3. Assistant Professor of surgical oncology, National cancer Institute Cairo University, Egypt; (tamermanie@gmail.com)
4. Assistant Professor of Surgical Oncology, National Cancer institute, Cairo University, Egypt; (Mshalan@bcfe.org)

Corresponding Author: Dr. Maher Hassan

Email: dr.maherhasan@gmail.com

1.INTRODUCTION

Up to 40 % of breast cancer patients will require mastectomy each year as part of their surgical treatment (**World Cancer Research Fund 2018**).

Since Nipple sparing mastectomy (NSM) and skin sparing mastectomy (SSM) have proven to be oncologically safe, preservation of skin envelope allowed for a more natural looking breast (**Tokin et al., 2012**). Currently, implant-based reconstruction is the most common reconstructive procedure performed worldwide (**Jones et al., 2019**).

Traditionally, a two-stage procedure is done, a tissue expander is placed with is later exchanged to fixed volume implant. A method that is inconvenient to the patient, need multiple expansion visits and a second operation

(**Negenborn VL et al., 2018**). The introduction of biological and synthetic meshes have revolutionized this technique, especially acellular dermal matrices (ADMs). However, despite the advantages of ADMs, its cost is significant. Consequently, non-biological materials have been introduced as low-cost alternatives, Such as: Vicryl mesh, TiLOOP mesh ,TiLOOP Bra , TIGR Matrix and Ultra pro mesh .

After mastectomy, the mesh is sutured between the lower edge of the released pectoralis major muscle and the inframammary fold to create a subpectoral pocket that is large enough to accommodate a fixed-volume implant (**D. Pukancsik et al., 2017**).

Alternatively, the mesh is completely wrapped around the implant and prepectoral pocket is

created where the implant is placed, with the advantage of leaving the pectoralis muscle intact, reducing Pain, bleeding, implant animation and recovery time after surgery (Negenborn VL et al., 2018).

Another technique for direct to implant breast reconstruction which can be used in patients with significant ptosis or large breasts. The implant pocket is created superiorly by the released lower border of pectoralis major muscle which is sutured inferiorly to a deepithelized lower pole mastectomy skin flap using a wise pattern mastectomy reduction mammoplasty incision technique. This can be done without using a mesh (Folli S et al., 2015).

Several Complications have been reported such as necrosis of the skin flaps, partial to total loss of the Nipple –areola complex (NAC), hematoma, seroma, infection, implant extrusion, capsular contracture and post radiation therapy adverse effects. These complications need to be discussed with the Patient in advance and dealt with appropriately if they occur. The consequence of such complication can range from conservative outpatient treatment and follow-up to additional surgery and removal of the implant. The risk of complications is kept to a minimum by correct patient selection and surgeon experience (Endara et al., 2013).

In our center, a tertiary university hospital funded by the government, several surgical oncology breast surgeons, including supervised trainees, are involved in the procedures. Different techniques are used to reconstruct the breast following mastectomy whether autologous-based or implant-based. This study presents an evaluation of implant-based reconstruction in our hospital. Despite facing many challenges as a low-income country, we regard our results interesting and useful for professionals involved in breast reconstructive surgery.

2. MATERIAL AND METHODS

This prospective cohort study was conducted on sixty-six patients, who underwent Nipple sparing mastectomy or Skin sparing mastectomy with immediate reconstruction by silicon implants in the National Cancer Institute, Cairo University from December 2019 to December 2022.

All patient's candidate for NSM or SSM whether to treat cancer or for a risk-reducing mastectomy were included in this study. All patients were informed about other alternative techniques, such as delayed-immediate Reconstruction with tissue expander, autologous Flaps (If the Patient is a candidate) or delayed reconstruction.

Breasts were excluded if the reconstruction was assisted by a flap or a tissue expander or a combined approach. A smoker was defined as a patient smoking within 6 weeks before surgery.

The follow-up period was calculated from date of DTI breast reconstruction until end of data collection (12/2022).

Surgical technique and perioperative evaluation

The type of surgery was decided individually according to the patient's characteristics, choice, oncological status, co-morbidities and expectations. Preoperative markings are done at the day of surgery while patient is standing. The inframammary fold is marked inferiorly. The upper border is determined by slightly pushing the breast towards the chest wall to obtain the footprint of the breast. Medially the midline is marked and anterior axillary line laterally (Figure 1).

In skin-sparing mastectomy with excision of the NAC, an ellipsoidal periareolar incision was generally used (Figure 2). For nipple-sparing mastectomy an inframammary incision is used (Figure 1), or an incision along the lower half of the areola extending laterally with superior or inferior periareolar extension, the latter was preferred in breasts with volumes >400 mL. In selected patients with large or very ptotic breasts a Wise-pattern incision was applied.

Following mastectomy, the specimen is oriented for margins (Figure 3). In NSM, biopsy is taken from the retroareolar tissue and sent for frozen section, if positive for malignant extension NAC is removed. When frozen section is not available and the retro areolar tissue is proved to be positive for malignant extension on paraffin examination, removal of NAC is done under local anesthesia on a separate setting.

The skin flap viability was assessed with confirmation of bleeding edge and no dermal exposure. If the viability is confirmed, we proceed to either pre pectoral or subpectoral according to breast volume. If the viability of the skin flaps is questionable, a tissue expander is placed and delayed reconstruction is to be considered.

The final implant weight was guided by preoperative breast measurements and the specimen weight intraoperatively, as no breast implant sizer is available in our hospital.

The implant, mesh and the preformed pocket is washed with 2 liters of normal 0.9 saline and 4 ampoules of 40 mg garamycin.

Implants were inserted pre pectoral with complete ULTRAPRO / Tailoop mesh pocket (Figure 4), or subpectoral position with partial pocket, which is created by elevation of pectoralis Major muscle (PM) from lateral to medial (Figure 5). The origin of the muscle is divided from 4—8 clock position to release it, then a 15*15 piece of Ultrapro mesh / tailoop mesh is sewn to edge of PM with 2/0 absorbable horizontal mattress sutures.

In patients candidate for small size implants, the implant was inserted under pectoralis major muscle and the lateral side of the pocket was closed by

suturing the serratus fascia to the lateral edge of pectoralis major without using the mesh.

In a large ptotic breast, A de-epithelialized inferior mastectomy flap sutured to the freed inferior border of the pectoralis major muscle to cover the lower pole of the implant (**Figure 6**) (**Figure 7**). In cases with NAC preservation is needed either a full thickness NAC Graft is used or a bipedicle dermal sling depending on the inferior and superomedial pedicle to preserve NAC blood supply (**Figure 8**). Pectoralis major muscle Can be Spared in dermal sling approach by attaching the Dermal sling to the ultrapro mesh and suture the upper edge of the mesh to the anterior surface of pectoralis major

creating a prepectoral pocket for the implant and adding the advantage of sparing the pectoralis major muscle (**Figure 9**).

Two drains were used routinely: one in the implant pocket and one in the subcutaneous cavity.

All Patients received 1.5 Gm of sulbacef (4th generation cephalosporin) at induction of anesthesia and another dose 6 hours post operatively , then we continue post operative antibiotics for 1 week, which can be extended for 1 more week until drains are removed.

All implants used in this study were silicone gel implants. The mesh used in our study is a synthetic mesh either ultrapro or tailoop.



Figure 1 : NSM done using inferolateral incision and immediate reconstruction with subpectoral implant insertion and ultrapro mesh.

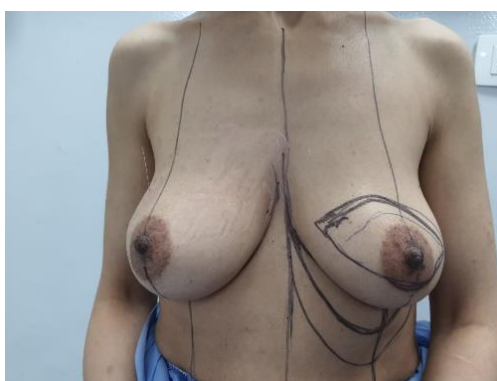


Figure 2 : SSM done using elliptical incision and immediate reconstruction with subpectoral implant insertion and ultrapro mesh.

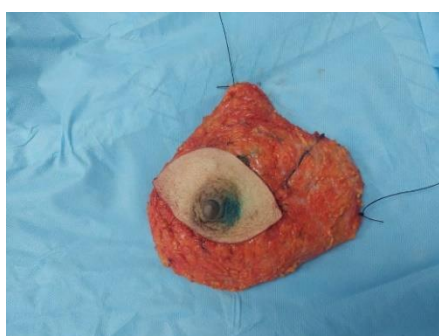


Figure 3 : SSM done using elliptical incision , the specimen is oriented for margins , Short thread (superior margin) and Long thread (lateral margin) .

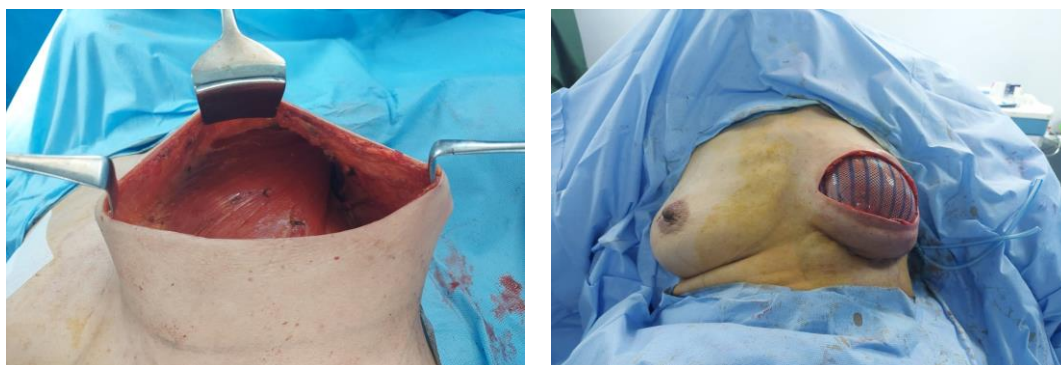


Figure 4: Skin sparing mastectomy using elliptical incision and immediate Prepectoral reconstruction with complete wrapping of the implant with ultrapro mesh.



Figure 5 : Subpectoral reconstruction mesh attached to lower border of pectoralis major.

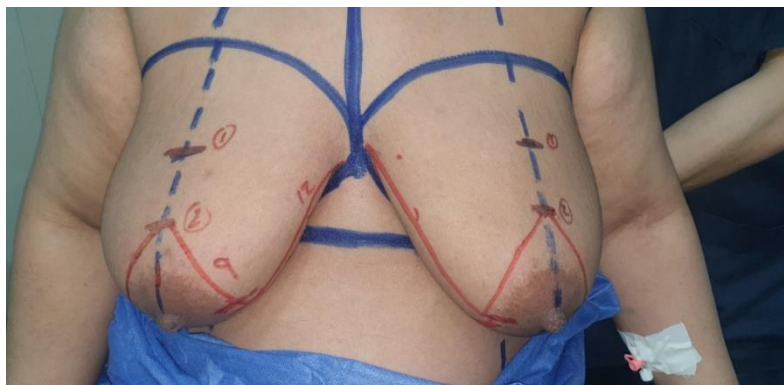


Figure 6 : Preoperative markings showing bilateral wise pattern drawings.



Figure 7: Left SRM with sub pectoral immediate implant reconstruction with dermal sling sutured to lower border of the muscle .



Figure 8 : Skin reducing – nipple sparing mastectomy using wise pattern incision and immediate reconstruction with silicon implant under the dermal sling – pectoralis major muscle . the NAC Blood supply here is dependent upon the Superiomedial pedicle .

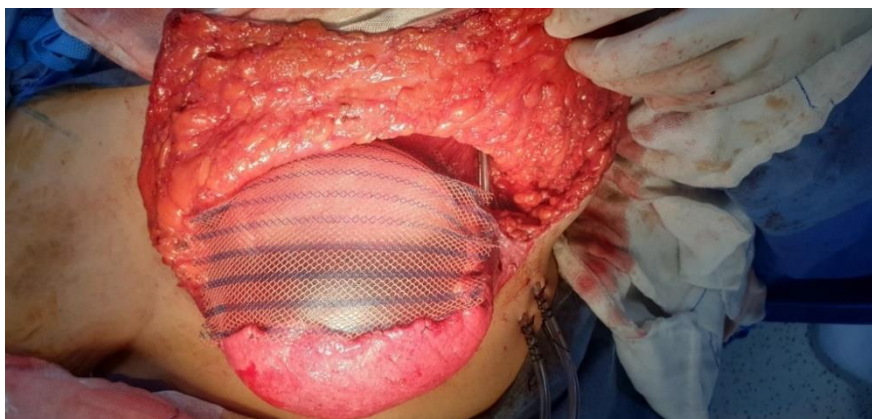


Figure 9 : Left SRM with pre pectoral immediate implant reconstruction with dermal sling attached to ultrapro mesh

The patient was instructed to wear compression surgical bra until the 6th postoperative week. The drains were removed if the output was less than 30 mL for 2 consecutive days.

All contralateral symmetrization +/- nipple reconstruction procedures were done on another setting usually after 6 month of completion of radiation therapy if indicated, except cases with bilateral cancers or bilateral risk reducing mastectomy.

Statistical analysis plan

IBM® SPSS® v28 was used for data analysis. Qualitative data is presented as frequency and relative frequency while the quantitative data is presented as mean \pm standard deviation and mean (IQR). Quantitative data was checked for distribution of normality; then using Mann-Whitney U test or independent samples t-test to examine the statistical-significance between subgroups. Chi-square and Fisher's exact tests were

run to determine the difference of qualitative data among subgroups.

3. RESULTS

This study included 66 patients (70 breasts) with Median age 39 range (16-56) years. The Median follow up 15.6 months, range (2.1-85.2) months. Almost one third of patients had positive family history for breast cancer. The most common pathological type was IDC (62.9 %), followed by ILC (17.1 %). Only 2 cases had benign pathology. Two patients (4 breasts) had prophylactic surgery after through counselling and BRACA 1 positive testing.

Forty-one reconstructions (58.6%) were performed after SSM, seventeen reconstructions (24.3%) were performed after NSM and 12 (17.1%) were performed after SRM. Most SSM were done through an elliptical (with or without radial extension) incision including NAC. A lateral radial incision (with or without a circumareolar extension) and inferolateral incision were mainly

utilized in NSM. For SRM a wise patten incision were utilized in 17 cases (24.3 %). All axillary surgeries whether SLNB (46.9 %) or AC (53 .1 %) were done using the same mastectomy incision. Six breasts had no axillary surgery (**Table 1**).

Twenty-nine breasts (27 patients) had pre-pectoral implant. The sub-pectoral technique was done for 30 patients (31 breasts). Dermal sling technique was used in 9 patients (10 breasts). Due to high cost, low economic resources and poor availability of ADM and other synthetic meshes in Egypt, we mainly used the ultrapro mesh (75.4 %). whether completely wrapping the implant in the prepectoral approach (2 meshes 15 * 15) or 1 mesh 15*15 to attach the Pectoralis major muscle to the

inframammary fold in the subpectoral approach .Nine cases (11 %) were done without mesh (1 prepectoral and 8 subpectoral), all were Cup A , small size breasts and the implant was a small and filled the pocket (**Table 1**).

Median implant size was 400 with range between 240 and 690 . all implants were high cohesive silicon gel of the smooth round type either moderate or high profile. no textured or saline filled implants were used in this study.

About thirty-seven percent of cases received adjuvant CTH while (32.9 %) received neoadjuvant CTH. About (52 %) of patients received adjuvant RTH (**Table 1**).

Table 1: illustrating the surgical details and adjuvant therapy of the study participants.

		Frequency (n=70)	Percent
Operation	SSM	41	58.6
	NSM	17	24.3
	SRM	12	17.1
Axillary surgery (n=64)	AC	34	53.1
	SLNB	30	46.9
Incision	elliptical ± Radial extension	36	51.4
	wise pattern	17	24.3
	lateral ± superior circumareolar extension	9	12.9
	inferolateral	7	10
Mesh (n=61)	superior lateral incision	1	1.4
	Ultrapro	46	75.4
	Dermal sling	10	14.3
	Tailloop	4	5.7
Without mesh (n=9)	Prolene	1	1.4
	Pre-pectoral	1	11.1
	Sub-pectoral	8	88.9
Site	Sub-pectoral	31	44.3
	Pre-pectoral	29	41.4
	Dermal sling	10	14.3
Implant size	Mean (sd)	Median (IQR)	Min-max
	416.5 (88.7)	400 (352.5-480)	240--690
Chemotherapy	no	21	30.0
	adjuvant	26	37.1
	neoadjuvant	23	32.9
Radiotherapy	no	33	47.1
	yes	37	52.9

The overall complication rate was 43% (30/70) . which were subdivided into 2 groups: early complication group - within 6 months of the operation and late complication group - after 6 month period .Such grouping were mainly done to evaluate post reconstruction RTH effect, aesthetic outcome and drawbacks of different reconstruction techniques used in this study .In addition to evaluate the feasibility and drawbacks of using the

ultrapro mesh as a low-cost alternative (to ADM and other more expensive synthetic meshes) in most of our DTI reconstructions.

The most common complication in the early complication group (n=14) was full-thickness mastectomy skin necrosis in 6 breasts (8.3%) and infection in 4 breasts (5.7%) all required implant removal (7 implants). Other minor complications (7 cases) such as; superficial sloughing in 5 patients

(7.1 %) and hematoma in 1 patient (1.4 %) were conservatively successfully managed. A single well-controlled diabetic case, she was diagnosed as having red breast syndrome and was successfully treated by antihistaminic and corticosteroids.

Regarding the late Complication group (n=21), capsular contracture (15 Cases) (21.4 %) was the

most common, Grade 3 followed by grade 2 capsular contraction with relative frequency 46.7 and 33.3 respectively .2 implants were extruded after radiation therapy, 1 case developed radionecrotic ulcer 3 years after radiation therapy (Table 2).

Table 2: showing the late complications and their management among study participants.

Late complications	Frequency	Percent	Management	Frequency
Capsular contracture	15	21.4	No treatment	6
			Capsulotomy	6
			Pain management	1
			Patient refused revision	1
			Implant removal	1
implant extrusion	2	2.9	Implant removal	2
Radionecrotic ulcer/implant exposure	1	1.4	Implant removal	1

We observed that in NSM, a lateral incision especially with a circumareolar extension was associated with a higher complication rate while inferolateral incision was the safest (P value 0.04).

Most SRM had minor complications especially at the T junction of the wise pattern incision (Table 3).

Table 3: shows the relation between type of operation, type of incision and complications.

Operation	Incision	N (%)	Complication n (%)	No complication n (%)	p-value*
NSM (n=17)	lateral +/- superior circumareolar extension	8 (47.1)	5 (62.5)	3 (37.5)	<u>0.04</u>
	inferolateral	6 (35.3)	0	6	
	wise pattern	2 (11.8)	0	2	
	superior lateral incision	1 (5.9)	1	0	
SRM (n=12)	wise pattern	11 (91.7)	6 (55.3)	5 (45.5)	>0.999
	lateral +/- superior circumareolar extension	1 (8.3)	1	0	
SSM (n=41)	elliptical +/- Radial extension	36 (87.8)	15 (41.7)	21 (58.3)	0.475
	wise pattern	4 (9.8)	1	0	
	inferolateral	1 (2.4)	1 (25)	3 (75)	

Aesthetic outcome:

We assessed the aesthetic outcome of different DTI techniques using breast q questionnaire and we obtained good aesthetic outcome as shown in (Table 5).

Table 5: summarize the score of different domains of Breast Q.

Breast Q	Psychosocial well benign	Satisfaction with breasts (post op)	Satisfaction with Implants	Physical wellbeing (chest)	Breast animation deformity
Mean (sd)	77.9(16.4)	69.2(17.9)	6.7(1.4)	73.1(16.1)	68.5(13.8)
Median (IQR)	83 (68-93)	72 (58-82)	7 (6-8)	76 (64-80)	70 (59-76)
Min-max	34-100	13- 100	2-8	28 -100	41- 100

There is statistically significant difference between complicated and uncomplicated cases as regards the Psychosocial well benign Satisfaction with
4. CASES:

breasts (post op) and Breast animation deformity domains. The 36 patients (40 breasts) who didn't suffer any complications reported statistically-significant higher scores.

A



B



C



D



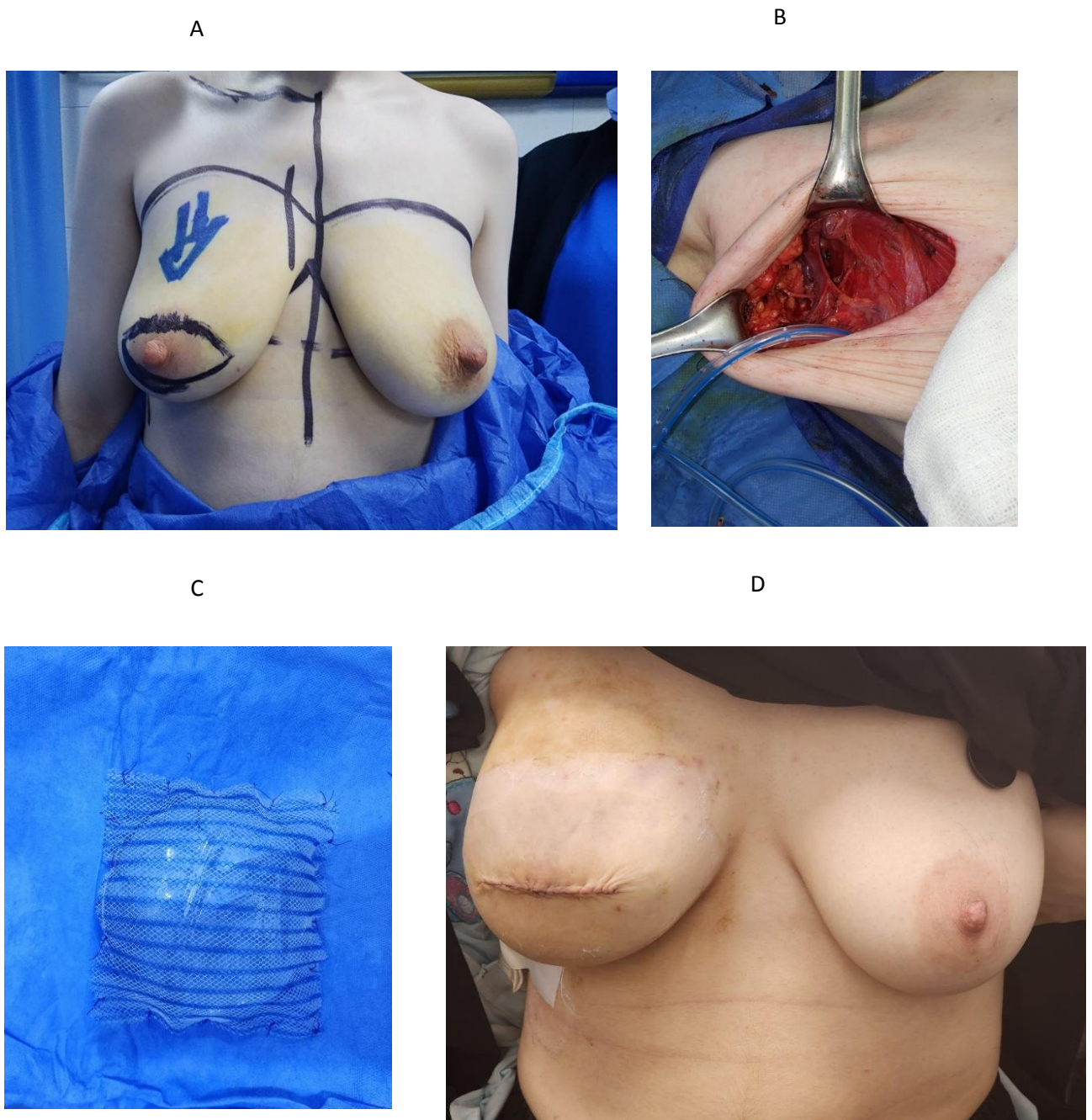
Case 1 :

A : 23 years old Patient presented with with left Upper inner quadrant mass ,invasive duct carcinoma , received neoadjuvant chemotherapy.

B : Pre operative markings in standing position (foot print of the breast , midline , inframmary fold , anterior axillary line .

C: 2 weeks post operative picture for a left NSM + left SLNB and subpectoral reconstruction with 325 silicon implant through inferolateral incision.

D : Picture 1 month after radiation therapy.



Case 2 :

A: Pre operative marking for a 31 years old patient with a Right lower outer quadrant mass reaching NAC . IDC luminal A.

B: Intraoperative Picture after SSM + Rt Axillary Clearance + immediate reconstruction with prepectoral silicon implant 375 and ultrapro mesh.

C: The ultrapro mesh completely wrap the implant

D : Picture 2 weeks after the operation



Case 3 :

Post left SSM + pre pectoral implant reconstruction with ultrapro mesh + left nipple reconstruction. Pictures after 15 month after she Received adjuvant Chemotherapy and Radiation therapy.



Case 4 :

28 years old pt, post RT NSM and immediate reconstruction with prepectoral implant wrapped in ultrapro mesh using lateral incision with superior circumareolar extension .Pictures 6 month after completion of radiation therapy.

5. DISCUSSION

Many options are available for reconstructing the breast following mastectomy, implant-based techniques are currently the most common (Kamali et al., 2016) (Jones et al., 2019). A single-stage mastectomy and reconstruction, eliminates the need for multiple tissue expansion visits and a second implant exchange operation. Moreover, it offers a shorter operative time, less post operative pain, and saves the autologous flap for future unexpected events.

For the last 50 years, sub-pectoral implant placement has been regarded as the pillar of implant-based reconstruction and the widely accepted and recommended method (Radovan, 1985) (Prpic, 1980). However, several functional impairments derived from pectoralis muscle elevation such as animation deformity and acute pain are yet unsolved (Reitsamer et al., 2015). Later on, the need for total sub-muscular coverage was substituted by the introduction of acellular dermal matrices or synthetic meshes to cover the lower pole which allowed a wide range of implant volume and improved aesthetic results (Casella et

al., 2019). Nevertheless, muscle recruitment and patient discomfort has not been changed (**Forsberg et al., 2014**). Consequently, pre-pectoral breast reconstruction started gaining attention in the literature and introduced in most centers since then we have witnessed a decrease in complications and better aesthetic results (**Berna et al., 2017**) (**Kobraei et al., 2016**).

We started our experience with DTI by employing subpectoral reconstruction with total submuscular coverage (**8 breasts**) followed by partially covering the lower pole of the Implant by an ultrapro mesh (**31 breasts**) or tailloop mesh (**4 breasts**) or by a dermal sling (**10 cases**). Then, We shifted to perform prepectoral reconstruction in most of our cases (**29 cases**), in which the implant were completely wrapped by an ultrapro mesh.

Sigalove et al. found less than 5% of aesthetic complications (capsular contracture, implant malposition, and rippling) after prepectoral reconstruction with ADM. Their complication rate was 9.1%: 4.5% infections, 2.0% seromas, and 2.5% necrosis (**Sigalove et al 2017**).

In a multicenter cohort study in the United Kingdom, where 2108 patients were recruited to establish the short-term safety of immediate IBBR performed with and without mesh, either biological or synthetic, in prepectoral or submuscular pockets. After 3 months of surgery, 9% of the patients suffered implant loss, 18% required readmission, 18% needed a second surgery because of the complications, and 25% had treatment for an infection, with no differences regarding mesh use or type (**Potter et al., 2019**).

Despite the advantages of ADMs, the related cost of the biological matrices is significant in health care systems. As a low socioeconomic country with limited resources, we didn't have the luxury to use the ADM and other biological materials, and we had to find a cost-effective alternative that can benefit our patient. In this study, we concluded that using ULTRAPRO mesh can provide good aesthetics satisfactory result, with improved quality of life, acceptable emotional, social and body image.

A study included 174 breasts reconstructed by the use of implant and ultrapro mesh in the National Institute of Oncology in Budapest, Concluded that: synthetic, partially absorbable ULTRAPRO mesh exhibited encouraging results in DTI BR over a long-term period of evaluation and offers a potentially safe, effective and less expensive alternative to biological matrices (**Pukancsik et al., 2017**).

We mainly used the ultrapro mesh (**75.4 %**) whether completely wrapping the implant in the prepectoral approach (**2 meshes 15 * 15**) or 1 mesh 15*15 to attach the Pectoralis major muscle

to the inframammary fold in the subpectoral approach .however , In large breast sizes the dermal sling substituted the mesh in the subpectoral approach . The mesh was used mainly for mechanical support of the implant and to optimize position and aesthetic results. Nine cases (**11 %**) were done without mesh (1 prepectoral and 8 subpectoral), all were Cup A, small size breasts and the implant was a small and filled the pocket. The mesh usage, type, technique and site were not associated with increased risk of complications.

Implant selection is of utmost importance to optimize aesthetic results. The placement of an implant with insufficient width can result in concave lateral chest wall contour deformity so it's useful to have a variety of sizers intraoperative for proper implant volume selection (**Salzberg 2012**). Unfortunately, we don't have sizers nor sufficient range of implant volumes. We depends mainly on precise preoperative measurements and actually sometimes, we tailor the surgical technique to match the readily available, single provided implant according to base width, patient preference and surgeon experience. As a result, we corrected the asymmetries in a later setting whether by fat injection or by symmetrization procedures, and this might explain part of the higher complication rate and decreased patient satisfaction compared to similar studies in literature. Despite using large volume implants, Implant size and site were not statistically-significant factors for complications.

In our study, NSM was done for 17 breasts (**24.3%**), in 8 breasts (**47%**) the incision was lateral \pm superior circumareolar extension. SRM was done for 12 breasts (**17.1%**); in 11 breasts (**92%**) the incision was wise pattern, SSM was done for 41 breasts (**58.6 %**), 36 breasts (**88%**) had elliptical \pm radial extension. Unlike previous publications (**Algaithy et al., 2012**), in our series, incision placement had no significant relationship with adverse surgical outcomes.

Many studies have reported on the efficacy of laser-assisted indocyanine green angiography in detecting mastectomy flap ischemia and preventing necrosis (**Wapnir et al., 2014**). However, a recent cost analysis showed, the use of laser-assisted indocyanine green angiography is not cost-effective when used indiscriminately but can be cost-effective when used for certain high-risk patients (**Kanuri et al., 2014**). We do not routinely use tissue perfusion technology given its unavailability at our center where most of our reconstructions are performed; however, the mastectomy skin flap is always carefully assessed clinically, assessing skin color, temperature, capillary refill, dermal edge bleeding, prior to selection of reconstructive technique. Additionally, after the implant is placed, the mastectomy flap is clinically assessed again to ensure that the skin flap remains well perfused

while the implant in place and stressing the overlying skin.

We apply topical nitroglycerin in some cases to the nipple-areolar complex (NAC) and surrounding skin and sometimes to the peri-incisional area of SSMs as well. Nevertheless, full thickness mastectomy skin necrosis occurred at about 8.6 (6) of reconstructions, making it the most common complication in our series. This is, however, very consistent with recent literature rates of skin flap necrosis (10%-14%) after subpectoral DTI and expander breast reconstructions (**Krishnan et al., 2016**).

A Dutch multicenter RCT randomized 142 women to DTI breast reconstruction with ADM or two-staged implant-based reconstruction without ADM (**Dikmans et al., 2017**). They found high complication rates in the ADM group with explanation in 11% vs. 4% in the non-ADM group. Wound infection was seen in 8% vs. 2% of the patients, skin necrosis in 12% vs. 1%, and wound dehiscence in 9% vs. 0%, respectively. The authors advocated for improved understanding of patient selection, risk factors, surgical and post-surgical procedures. Our rate of implant loss (**17%**) was slightly higher than the Dutch RCT (11%). Wound infection was seen in 5.7 %, skin necrosis in 8.6 % and superficial sloughing in 7.1 %. A total of 7 implants were lost in the early post operative period and they mainly occurred in cases done at the initial learning phase.

Despite facing many challenges during our experience with DTI such as : using a low cost-effective ULTRAPRO mesh, unavailability of indocyanine green for adequate assessment of vascularized skin flaps, lack of availability of a wide range of implant volumes and sizes and dealing with large sized breasts and high BMI in most of our patients, we managed to obtain satisfactory Breast Q scores namely in the following domains: Psychosocial well being : median 83 (68-93), Satisfaction with breasts (post op): median 72 (58-82), Satisfaction with Implants: median 7 (6-8), Physical wellbeing (chest) median 76 (64-80), Breast animation deformity 70 (59-76). However, we found a statistically significant difference between complicated and uncomplicated cases as regards the Psychosocial well-being, Satisfaction with breasts (post op) and Breast animation deformity domains. The 36 patients (40 breasts) who didn't suffer any complications reported statistically-significant higher scores.

We started this study just before the beginning of Covid 19 pandemic and we continued our research throughout this period, we had faced many challenges here in Egypt to provide the implants and the meshes necessary for the technique, as we believed it will benefit many breast cancer patients in our hospital and our country.

6. CONCLUSION

Breast reconstruction approaches are always evolving. With recent technological advances and improved mastectomy techniques, more patients are opting for a single-stage reconstruction. DTI in properly selected patients offers excellent outcomes and patient satisfaction. The complication rate is low and improves with experience of the surgeon. It can avoid multiple tissue expansions seen with tissue expanders and it can save the patient from prolonged operation time, post operative pain and functional deformity observed with autologous flaps. The Ultrapro mesh is a safe low cost reliable alternative especially in low socioeconomic countries. Prepectoral reconstruction offers excellent aesthetic outcomes and avoid pain and animation deformity seen with the subpectoral technique and should be considered first.

Abbreviations

Patient (Pt)

Immediate direct-to-implant (DTI)

Nipple-areola complex (NAC)

Nipple-Sparing mastectomy (NSM)

Skin-Sparing mastectomy (SSM)

Indocyanine green fluorescence (ICG)

Acellular dermal matrices (ADMs)

Sentinel Lymph node biopsy (SLNB)

Direct to implant (DTI)

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