



Immediate nipple areolar complex reconstruction over latissimus dorsi skin paddle flap in bilateral periareolar mastectomy & reconstruction

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Background: Today, conservative mastectomies allow preservation of skin and nipple-areolar complex with oncologic safety. In those cases where nipple-areola complex (NAC) must be sacrificed, the latissimus dorsi (LD) musculocutaneous flap can be considered as an effective method for immediate breast reconstruction with simultaneous NAC reconstruction over the LD skin paddle. The skin color of the dorsal flap, dermal thickness, and preservation of the fat under the thoracic fascia and its perforator vessels allows a safe and acceptable reconstruction with two surgical steps and satisfactory outcomes.

Methods: A retrospective analysis of 12 patients who underwent bilateral skin sparing mastectomy (SSM) by periareolar approach and immediate NAC reconstruction over the LD skin island flap was performed between January 2013 and June 2019. The use of an expander/implant is included in the overall surgical strategy for breast reconstruction. Mean follow-up was 32.2 months.

Results: In this limited series of 12 patients (24 procedures), the mean age was 57 years and patients selected with no comorbidities. As complications, seroma at the dorso was the most common. We also experienced one back wound dehiscence. No reinterventions were needed. Success in NAC reconstruction was 100%. A thin donor-site scar remains in the back, designed with a 'banana' pattern. The flap rotates completely to the breast because of the muscle insertion partial release, and the volume provided by the flap is increased by keeping the deep layer of fat attached to the muscle. This maneuver effectively softens the contours of the reconstructed breast. NAC reconstruction over the LD skin paddle maintains the projection over time thanks to the latissimus dorsi flap (LDF) dermis thickness. Breast animation is minimized by sectioning the thoracodorsal nerve, and the consistency and quality of the result are improved by using a staged tissue expander/implant strategy. Minimal complications were observed.

Conclusions: With advancements in surgical technique by conservative mastectomies and improvements by immediate NAC reconstruction over the LD skin island flap, outstanding results obtained can be outstanding using the LDF in bilateral breast reconstruction when NAC must be sacrificed.

Keywords: Latissimus dorsi flap (LDF); autologous; expander

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Introduction

Oncoplastic surgery has been widely developed during the last decades. Oncological security has been assured in these procedures. Skin sparing mastectomy (SSM) is widely accepted when the nipple-areola complex (NAC) cannot be preserved (1). Different types of reconstruction can be addressed in these cases as distant or local autologous tissue, or expanders-implant devices. When the skin envelop is not completely reliable, an additional improvement is recommended. In our Institution we have increasingly used the latissimus dorsi (LD) flap with the modification of NAC reconstruction over the skin paddle. The breast envelop is returned to its original dimensions, the NAC is reconstructed and the envelop quality regarding thickness is now properly adjusted for safely covering the expander or implant with the muscle (2).

Based on technical modifications the latissimus dorsi flap (LDF) has intrinsic features that provides a wide range of surgical options to achieve satisfactory aesthetic result (3).

The oncoplastic surgical process has a final step, the creation of the NAC. It used to be considered as a secondary complement to breast reconstruction. Nowadays, it is a key element, not only for the psychological impact in women, but also because marks the end of the medical process. NAC is usually reconstructed after an interval of several months and it could be done by different techniques such as local flaps or composite graft of the opposite NAC. The authors performed an immediate NAC reconstruction with a local flap over the LD paddle, acquiring satisfactory outcomes in relation to symmetry, position, size, shape, texture, color, and long-term projection (*Figure 1*).

The purpose of this study is to present a combination of techniques that allows for treating breast cancers in bilateral skin sparing mastectomies with an immediate reconstruction using LDFs. This offers versatility as it contributes volume to the breast and adds the possibility of reconstructing the entire breast envelope with the NAC on its skin paddle in a single surgery. We present the following article in accordance with the STROBE reporting checklist (<https://abs.amegroups.com/article/view/10.21037/abs-21-144/rc>).

Methods

A retrospective review was carried out of 12 patients who had undergone immediate breast and nipple reconstruction

with bilateral LDF after SSM, in a single surgical time. The period in which these surgeries were performed was between January 2013 and June 2019. Mean follow-up time was 32.2 months.

Statistical analysis

Patient characteristics and statistical analyses are reported in *Table 1*.

Inclusion criteria: women, no ptosis, BRCA (+) or breast cancer, no viability of NAC after mastectomy.

Exclusion criteria: breast ptosis, under 18 years old, comorbidities.

The study was approved by the Institutional Review Board of Instituto Oncológico Henry Moore University of Buenos Aires (IRB No. HM-12008) and performed in accordance with the principles of the Declaration of Helsinki (as revised in 2013). Written informed consent was obtained from all individual participants.

Results

In this limited series of 12 patients (24 procedures), the mean age was 57 years (range, 38–71 years); patients were selected with no comorbidities and no overweight. As complications, seroma at the dorso was the most common 5/12 (40%); and bilateral minimal back wound dehiscence in the same patient with spontaneous good evolution. No reinterventions were needed. Success in NAC reconstruction was 100%.

Operative technique

Surgical position

Ventral position with arms abducted at 90 degrees to perform the SSM and transfer and closure of the LDF.

Dorsal position with arms abducted at 90 degrees to perform LDF.

Marking

Breast markings

SSM marking must be designed depending on the absence or presence of scars biopsies and breast contouring (ptosis and excess volume). Usually done as a periareolar mark with extension to scars, biopsies, axillar dissections (*Figure 2A*) or an inverted T pattern, when volume excess is present and mastopexy is associated (4).



Figure 1 Pre-operative front picture of a 60-year-old patient with previous periareolar scars for mastopexy with implants.

Back markings

The limits of the entire LD muscle are marked according to the anatomical concerns such as scapula tip superiorly, vertebral origins medially (from T7 down). Over the upper portion of the muscle, we designed the skin paddle in an oblique, “banana” design, that could vary in position (medial to lateral) and dimensions (up to 10 × 30 cm) depending on breast requirements (*Figure 2B*).

Markings over the breast are performed around the NAC with a lateral curved incision up to the external breast footprint. Thickness of the flaps must be individually evaluated previously with MRI and mammography seeing fat coverage. In addition, surgical dissection must be meticulous and uniform across the Cooper ligaments to provide oncological security and preservation of flap

Table 1 Demographics for patients

Patient	Age (years)	Disease	Type of SSM	Implant/expander	Implant characteristics	Hospitalization (days)	Complications	Follow up (months)
1	53	Bilateral breast cancer w/nipple secretion	Periareolar SSM	Anatomical expander 345 cc	Round 300 cc	2	No	12
2	62	BRACA w/periareolar scars	Periareolar SSM	Anatomical expander 300 cc	Anat. 295 cc	1	No	72
3	49	Bilateral Br Ca nipple involvement	Periareolar SSM	Anatomical expander 300 cc	Round 400 cc	1	Seroma	6
4	64	BRACA w/previous mastopexy	Periareolar SSM	Anatomical expander 400 cc	Anat. 345 cc	1	Seroma	48
5	55	Br Ca with previous mastopexy	Periareolar SSM	Anatomical expander 345 cc	Round 400 cc	1	Seroma/dehiscence	24
6	47	BRACA w/previous mastopexy	Periareolar SSM	Anatomical expander 400 cc	Anat. 255 cc	2	Seroma	6
7	38	Bilateral breast cancer w/nipple retraction	Periareolar SSM	Anatomical expander 255 cc	Anat. 2955 cc	1	No	36
8	60	BRACA w/previous mastopexy	Periareolar SSM	Anatomical expander 345 cc	Anat. 295 cc	2	Seroma	52
9	58	BRACA w/previous mastopexy	Periareolar SSM	Anatomical expander 295 cc	Anat. 345 cc	1	No	48
10	46	Bilateral breast cancer with periareolar scars	Periareolar SSM	Anatomical expander 345 cc	Anat. 345 cc	1	No	23
11	71	BRACA w/periareolar scars	Periareolar SSM	Anatomical expander 350 cc	Round 350 cc	2	Seroma	36
12	42	BRACA w/previous mastopexy	Periareolar SSM	Anatomical expander 345 cc	Anat. 345 cc	2	No	24

SSM, skin sparing mastectomy; w, with; Br Ca, breast cancer; Anat., anatomical.

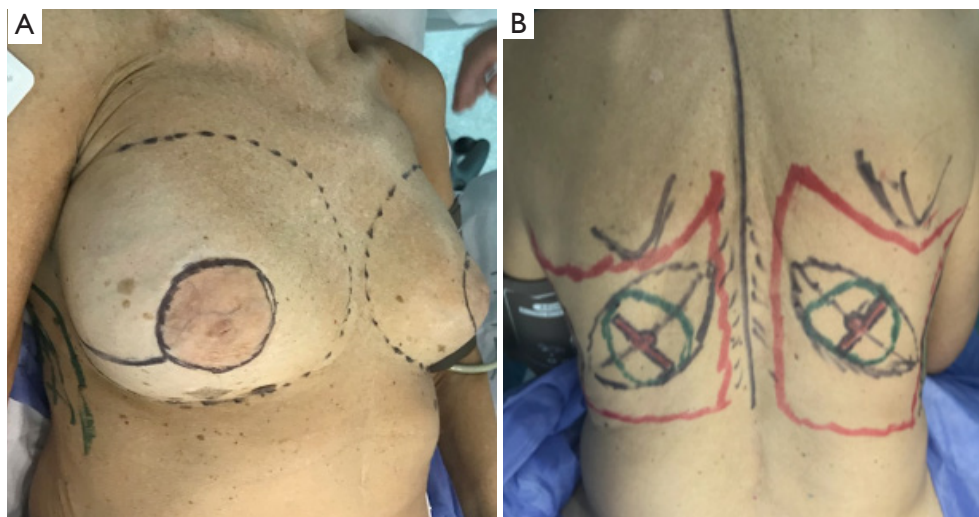


Figure 2 Pre-operative markings (A) on the breast for bilateral SSM with NAC resection and immediate reconstruction, and (B) of the back. By gently pinching the skin of the back, the orientation of the relaxed skin tension lines can be easily identified. For optimal scar appearance, it is best to orient the skin ellipse along an axis that parallels these lines. SSM, skin sparing mastectomy; NAC, nipple-areola complex.



Figure 3 Intra operative bilateral NAC tailoring over LD skin paddle. NAC, nipple-areola complex; LD, latissimus dorsi.

vitality (5).

NAC designed on skin paddle

The preferred NAC reconstruction technique for the authors is the C-V flap. Designed over the skin paddle island on the LDF. Performed before the LDF are dissected (Figure 3). It consists in two lateral V flaps and one central C flap; the V flap are elevated subcutaneously, and donor site closed primarily. The C flap is elevated as dermal flap

where both V flaps wrapped around, and the C flap are placed on top of them as a cap. The rest of skin that is not used for C-V flap is de-epithelized and preserved to increase periareolar breast volume. NAC reconstruction over the LD skin paddle maintains the projection over the time thanks to the LD dermis thickness, losing less than 25% after two years. Success rate for NAC reconstruction was 100%.

LDF dissection technique

The incision proceeds around the skin island to the subcutaneous tissue, increasing subcutaneous volume to incorporate perforator vessels. A layer of fat is preserved over the LD by tailoring flap dissection at the thoracic fascia. This allows preservation of perforator vessels to maintain NAC vitality. The fatty layer incorporation into the overall volume provided by the flap is an important element to make maximal profit of the LD musculocutaneous flap (6-8).

Dissection extends onto the limits of the LD muscle (Figure 4).

The thoracodorsal pedicle enters the deep plane of the LD 8 to 10 cm below the axillary vessels and 2.5 to 3 cm from lateral margins. Dissection proceeds along 2–3 cm above the entrance of the pedicle. Distal musculotendinous insertion (in the proximal humerus) is released to increase the arch of rotation and for better recreation of the axillary



Figure 4 NAC tailored over LD muscle previous to flap transfer. NAC, nipple-areola complex; LD, latissimus dorsi.



Figure 6 Immediate post-op breast view.



Figure 5 Immediate front post operative with NAC transfer to the breast. NAC, nipple-areola complex.

fold. Care is taken to avoid tension on the vascular pedicle which is now completely liberated. Before muscle transfer, the thoracodorsal nerve is cut to avoid animation under loop magnification (9).

Flap viability is essential and must be checked before transfer. A subcutaneous tunnel is developed high in the axilla, the flap is transferred first to the axilla and then to the breast. At this point the flap length is checked to see if

it will reach the areas to be restore specially the periareolar defect, and any necessary revision are made at this time. Drains are placed for the back and for expander pockets (10).

For final results, depending on reconstructive requirement, different surgical options might be applied to the procedure such as breast expanders, implants or fat grafting (Figures 5,6).

Discussion

Conservative mastectomies incorporate the benefit of tumor and total gland excision as traditionally done by radical mastectomies, preserving breast envelope and NAC, if possible. For those cases where NAC must be sacrificed, the SSM allows the preservation of original NAC position, determine by the rest of the breast envelope conserved (11).

Significant advances in surgical techniques had been incorporated over the last 30 years in reconstructive breast surgery. Each of the major techniques includes the use of implants with or without tissue expanders, the LDF, the transverse rectus abdominis musculocutaneous (TRAM) flap, various free flaps. All the reconstructive options had a gold period; we have used the LDF, as a consistent option for cases where bilateral mastectomy was unavoidable, and NAC was not possible to preserve. The LDF incorporates volume not only because on the muscle but also on the fat layer superficial to the LD fascia; that increments around 300 cc in a patch of 20 cm × 30 cm flap. Moreover, it is possible to increase volume using tissue expander or

implants, achieving high specific volumes, making better matches between both breasts. Also, fat transfer is other way to increase volume and mitigate discrepancies between both breasts without the need to use implants (12). Comparably to other autologous flaps like TRAM, or free flaps from abdomen, where muscle harvest implicate functional morbidity as muscle wall weakness, usually high scarring mal positions with unpleasant aesthetic results. The LDF has a donor site scar placed on the back over the relax skin tension lines, resulting in a fine, smooth, and less visible scar (13). Finally, LDF skin island has a thick dermis, more

than any other flap technique for NAC reconstruction; this allows a more consistent and long-lasting result as compared with skin quality of TRAM flap or the post expanded breast skin. Moreover, skin dorsum has a different color compared to breast skin and tattooing might not be necessary. The technique used is a C-V flap deigned over an oblique back pattern in order to place the remaining scar over the skin tension lines of the back (14,15). This C-V flap is tailored in the ventral decubitus position before the transfer of the LDF to the breast, as the tissue is more stable, and the thick dermis of the dorsum makes the flap confection technically easier and lowers operative time with minimal changes in outcomes, complications, or patient satisfaction (16,17) (*Figure 7*).



Figure 7 Two years post-op front view.

Complications

The major complication resulting from elevation of the LD musculocutaneous flap is the formation of a persistent back seroma. Sometimes, the back drain may remain for as long as 6 weeks postoperatively. Any recurrent fluid accumulation will be treated with outpatient percutaneous aspiration. Rarely, a scar capsule may develop in the back and may necessitate surgical removal and drainage. Two small superficial incision dehiscence are reported (*Figure 8*). Loosing of the muscle functionality is usually well tolerated, with only the most athletic patients noting any function loss.

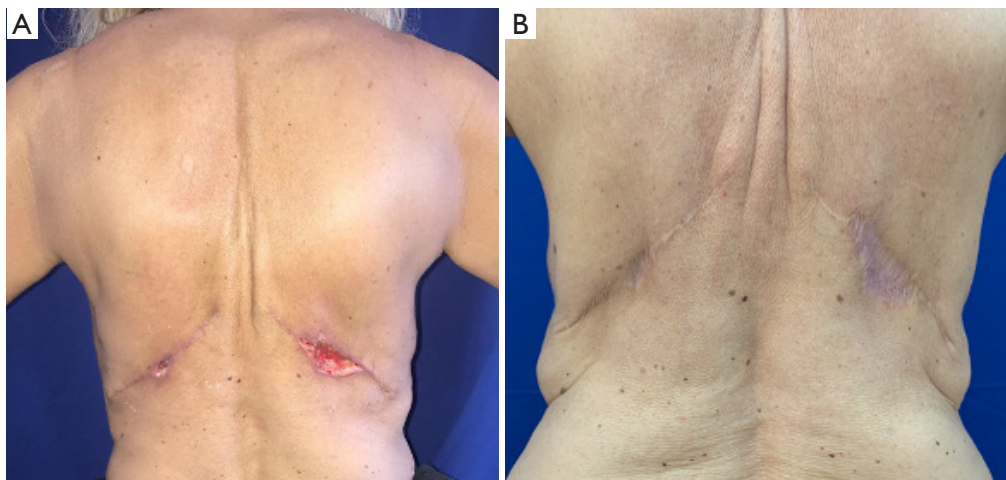


Figure 8 Back wound evolution and result (A) dehiscence complication on the back 1 month postoperative (B) final result 2 years post-op back view.

Limitations to this study

Results with this approach with this small series with careful patient selection is a limitation to our conclusions, and a larger number of patients is needed to confirm our results.

Conclusions

For those cases where bilateral SSM must be associated with NAC resection, Bilateral LDF reconstruction with NAC tailoring over the LD skin paddle is a remarkable reconstructive option.

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Footnote

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Oncológico Henry Moore University of Buenos Aires (IRB No. HM-12008) and performed in accordance with the principles of the Declaration of Helsinki (as revised in 2013). Written informed consent was obtained from all individual participants.

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