

Original Research Article

Breast conserving surgery with immediate partial breast reconstruction using a latissimus dorsi mini flap: oncological clearance and cosmetic outcomes

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ABSTRACT

Background: In our center, a breast conserving surgery (BCS) with immediate partial breast reconstruction using a latissimus dorsi mini flap (LDMF) is performed in women with a large tumor-to-breast-size ratio who declined mastectomy. We conducted a study to assess the oncological clearance and cosmetic outcomes following a BCS with immediate LDMF partial breast reconstruction in women with various breast pathologies.

Methods: A cross-sectional study was conducted involving patients who underwent a BCS with immediate LDMF reconstruction between January 2016 and January 2021 in the hospital Kuala Lumpur, Malaysia. The demographic data, tumor characteristics, operative details and post-operative complications were documented. The histopathological reports were reviewed to determine the oncological clearance. Patient's satisfaction on the cosmetic outcomes evaluated using a standard breast-Q questionnaire.

Results: Thirty patients with various breast pathologies were recruited; invasive carcinoma (n=26, 86.7%), ductal carcinoma in-situ (DCIS) (n=1, 3.3%), phyllodes tumor (n=2, 6.7%), and dermatofibrosarcoma protuberans (n=1, 3.3%). The mean tumor size was 4.92 cm, giving the mean specimen weight of 224 g. Adequate oncological clearance was obtained in 96.7% of all cases. Seventeen of the patients (n=17, 56.6 %) were deeply satisfied and the remaining patients were satisfied (n=13, 43.3 %).

Conclusions: In a stage II/III breast cancer, a BCS with immediate partial breast reconstruction using a LDMF can be safely performed with satisfactory cosmetic outcomes in women with a large tumor-to-breast-size ratio.

Keywords: LDMF, BCS, Cosmetic outcomes, Oncological clearance

INTRODUCTION

Breast cancer is the most common cancer among Malaysian women accounting for 24.1% of all cancers and 47.9% of these women were diagnosed at the late stages either stage III or IV.¹ These women can be either treated surgically by performing mastectomy or BCS. However, due to the large tumor-to-breast-size ratio, majority of these women will then be subjected to mastectomy with or without breast reconstruction. A BCS can only be performed in a minority of women without compromising the oncological clearance and cosmetic

outcomes. However, 10-40% of the BCS resulted in an unsatisfactory cosmetic outcome.^{2,3} One of the important factors leading to this unsatisfactory outcome is a significant loss of breast volume due to the resection of more than 20 % of breast tissue regardless of the size of the breast.^{4,7} In 7.3-34% of BCS are associated with inadequate oncological clearance requiring a second corrective surgery which can be either re-excision of margin or mastectomy.^{8,9} Studies have shown re-excision of margin resulted in significantly worse cosmetic outcomes, greater patient distress, and increased healthcare costs.¹⁰⁻¹²

Due to these reasons, patients with a large tumor-to-breast-size ratio requiring resection of more than 20% of the breast volume are often recommended for mastectomy. Nonetheless, the recent advancement in the oncoplastic breast surgery has permitted a BCS to be performed in women with large or multiple tumors by enabling a wider surgical resection while maintaining adequate oncological clearances and good cosmetic outcomes.¹³ In our center, selected cases with a large tumor that declined mastectomy, we performed an oncoplastic BCS with immediate LDMF partial breast reconstruction. There are only few papers reported on the practicability of this technique in treating women with a large tumor.^{14,15} Therefore, we conducted a study to assess the oncological clearance and cosmetic outcomes of partial breast reconstruction using a LDMF following a BCS for various breast pathologies.

METHODS

We performed a cross-sectional study involving thirty consecutive patients with various breast pathologies who underwent BCS with immediate partial breast reconstruction using a LDMF between January 2016 and January 2020 in the hospital Kuala Lumpur, Malaysia. This study was reviewed and approved by the ethics committees of hospital Kuala Lumpur, Malaysia (NMRR ID-21-02110-PQN). Patients with a large tumor-to-breast-size ratio requiring resection of more than 20% of the breast tissue were offered this surgery. However, patients who preferred mastectomy or refused to participate in this study were excluded.

The surgery was performed by a single oncoplastic breast surgeon. The key steps of the technique were as followed. The BCS and axillary clearance were performed in a standard manner. During the axillary clearance, the thoracodorsal neurovascular bundle identified and preserved. The lateral part of latissimus dorsi (LD) muscle was mobilized by dissecting from the serratus anterior muscle. To harvest the LD flap, the patient repositioned into the lateral decubitus position while the wounds covered with sterile dressings. The flap was designed at the ipsilateral back of chest in a horizontal elliptical form along the bra-line. The skin incisions made and deepened until the underlying LD muscle. Once the myocutaneous flap harvested, the flap transferred to the breast defect through a subcutaneous tunnel in the axilla and eventually into breast defect. Partial breast reconstruction was then performed using this flap. Two radevac drains size 10-Fr inserted before wound closure.

The sample size was calculated based on the Krejcie and Morgan table. Given thirty patients underwent this surgery from January 2016 to January 2021, the minimum sample size required for this study should be twenty-eight patients. After considering 10% drop-out rate, a total of thirty patients were required for this study. During the follow-up, patients were counselled about the study and an informed consent obtained to those agreed

to participate. We reviewed the medical records to obtain the demographic data, tumor characteristics, operative details, and post-operative complications. The histopathological reports were reviewed to determine the surgical margins and eventually, the oncological clearance. The negative margins are defined as no tumor at the inks based on the local clinical practice guideline, management of breast cancer.⁹ All surgical margins must be negative to be characterized as adequate oncological clearances.

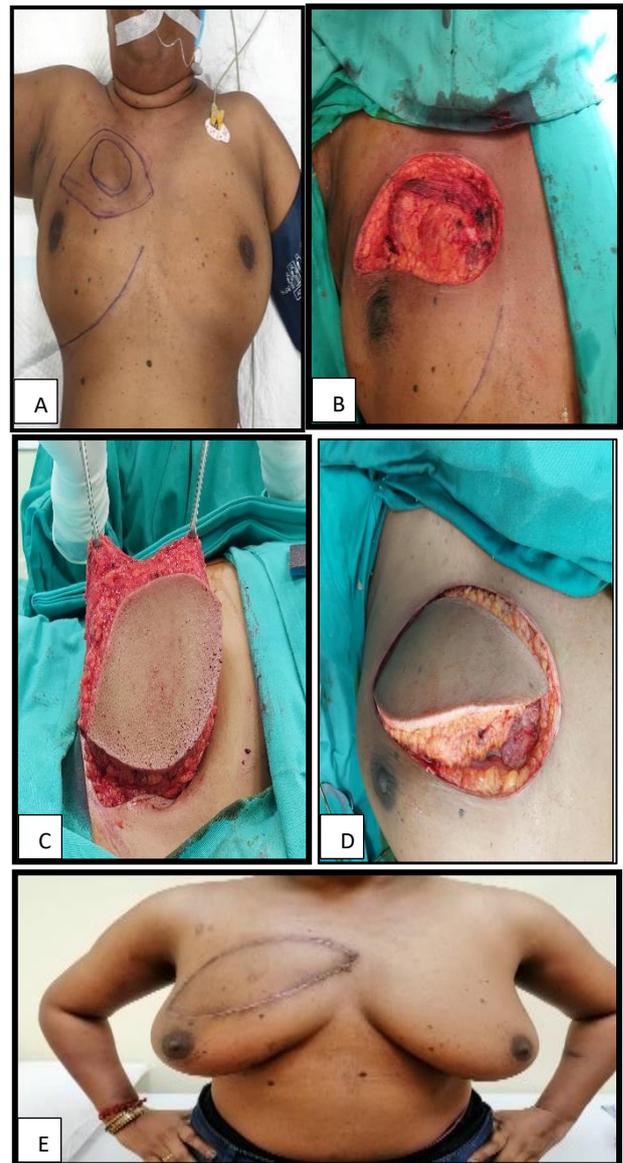


Figure 1 (A-E): A 38-year-old lady with a right triple-negative breast cancer (pT3, N2, M0) underwent neoadjuvant chemotherapy. Clinically, tumor measured 5x5 cm at the upper inner quadrant and breast defect measuring 15x10 cm following a wide local excision together with resection of underlying pectoralis major, a harvested LDMF, a LDMF has been rotated and delivered into the breast defect and the cosmetic outcome at the post-operative day-30 following a partial breast reconstruction using LDMF.

Subsequently, patient’s satisfaction on cosmetic outcome were analyzed using the Breast-Q questionnaire. The data analysis was performed using the SPSS version 26. Descriptive variables expressed as mean ± standard deviation (SD) and range. Categorical variables were summarized as counts and percentage.

RESULTS

Thirty patients with various breast pathologies who underwent BCS with an immediate partial breast reconstruction using a LDMF were included in this study. The various breast pathologies were invasive carcinoma (n=26, 86.7%), DCIS (n=1, 3.3%), phyllodes tumor (n=2, 6.7%), and dermatofibrosarcoma protuberans (n=1, 3.3%) (Table 1). Based on the American joint committee on cancer (AJCC) TNM system, pathologic stages among those patients with breast cancer were 0 (n=1, 3.7%), I (n=0), II (n=15, 55.6%), III (n=10, 37%), and IV (n=1, 3.7%). Majority of patients had breasts of B (n=10, 33.3%)/ C (n=18, 60%) cup size. The molecular subtypes among twenty-seven patients with breast cancer luminal A (n=8, 26.7%), luminal B (n=7, 23.3%), human epidermal growth factor receptor 2 (HER 2) (n=5, 16.7%) and triple-negative breast cancer (n=7, 23.3%). Majority of tumors were located either in upper inner quadrant

(n=9, 30%)/ upper outer quadrant (n=18, 60%) with mean tumor’s size-4.92 cm (range 1.5-8 cm). Two patients with benign phylloides tumor had tumor size of 8 cm.

The mean duration of surgery and weight of specimen was 179 minutes and 224 grams respectively. Adequate oncological clearance with negative margins were achieved in the twenty-nine patients (n=29, 96.7%) (Table 2). One patient had positive resected margins and eventually, underwent a second surgery, mastectomy with a pedicle transverse rectus myocutaneous (TRAM) flap breast reconstruction. All patients had adjuvant chemotherapy except two patients with phylloides tumour and one patient with DCIS. Of these 27 patients, 6 patients had it as neo-adjuvant treatment. All patients had adjuvant radiotherapy except for two patients with benign phylloides tumor.

Immediate post-operative complications were reported in eleven patients: wound dehiscence (n=3, 10%), hematoma (n=1, 3.3%) and seroma at the donor site (n=7, 23%) giving an overall rate of complication of 36.3%. There was no flap necrosis reported. In term of patient’s satisfaction on cosmetic outcome, seventeen of patients (n=17, 56.6%) were deeply satisfied and remaining patients were satisfied (n=13, 43.3%) (Table 3).

Table 1: Demographic data.

Parameters	Mean ± SD/ Number	Percentage (%)	Range
Age (years)	40±8.5		25-55
BMI	26.7±5.9		17.5-36
Breast cup			
A	1	3.3	
B	10	33.3	
C	18	60	
D	1	3.3	
Breast pathologies			
IDC*	26	86.7	
DCIS**	1	3.3	
Phylloides	2	6.7	
Dermatofibrosarcoma protuberans	1	3.3	
Tumor location			
Upper inner quadrant	9	30	
Upper outer quadrant	18	60	
Lower inner quadrant	1	3.3	
Lower outer quadrant	1	3.3	
Retro-areolar	1	3.3	
Molecular subtypes of breast cancer			
Luminal A	8	26.7	
Luminal B	7	23.3	
HER-2	5	16.7	
Basal-like (triple negative)	7	23.3	
AJCC stage			
0	1	3.70	
I	0	0	
II	15	55.6	
III	10	37.0	
IV	1	3.70	

*IDC=infiltrating ductal carcinoma, ** DCIS=ductal carcinoma in-situ

Table 2: Tumor characteristics.

Parameters	Mean ± SD/ no.	Percentage (%)	Range
Maximum tumor size (cm)			
<2	1	3.4	
2-5	16	53.3	
6-10	13	43.3	
Mean tumor size (cm)	4.92±1.7		1.5-8
Mean duration of surgery (min)	179±39.9		150-260
Mean weight of specimen (gm)	223±104		114-523
Margins			
Involved	1	3.3	
Clear	29	96.7	
Post-operative complications			
Wound dehiscence of donor site	3	10	
Seroma	7	2	
Hematoma	1	3.3	
Flap necrosis/loss	0	0	
Chemotherapy			
Adjuvant chemotherapy	21	77.7	
Neoadjuvant chemotherapy	6	22.2	
Radiotherapy			
Yes	28	93.3	
No	0	6.7	

Table 3: Patient' satisfaction on the cosmesis.

Satisfaction grade	Number	Percentage (%)
Very satisfied	17	56.6
Satisfied	13	43.3
Dissatisfied	0	0
Very dissatisfied	0	0

DISCUSSION

Women with a large breast cancer tumor can be either subjected to a mastectomy followed by the adjuvant systemic chemotherapy or undergone neo-adjuvant chemotherapy (NACT) before proceeding to any surgical intervention. For those women who prefer a BCS, they can be subjected to the NACT. The NACT can downstage tumors, with subsequent improvement in the ability to perform a BCS. In those women who are already candidates for BCS, it increases the potential obtaining a good cosmetic outcome by reducing the volume of tissue that needs to be excised. A meta-analysis showed that NACT can reduce tumor size

leading to a higher rate of BCS compared with those women who have adjuvant chemotherapy (64.8% vs 49.0%).¹⁶ Although, there is no difference in the mortality rate, the local recurrences are higher in those women who underwent NACT.¹⁶ Furthermore, tumor response rate to the NACT varies according to the molecular subtypes of breast cancer. Triple-negative or HER2-positive breast cancer are more likely to respond to chemotherapy with a higher rate of pathological complete response (pCR).¹⁷

Due to the higher local recurrent rate and variation of tumor response to the NACT, some women prefer to undergo surgery followed by adjuvant chemotherapy. In those women with a relatively large tumor-to-breast-size ratio, BCS can still be performed with immediate partial reconstruction using a LDMF as a volume replacement. This technique is to ensure adequate oncological clearance without compromising the cosmetic outcomes. In our series, only a fraction of patients with invasive carcinoma had NACT despite half of these patients were either a triple-negative or HER2-positive breast cancer (n=6/26, 23%). This was attributed to several factors: the patient's choice, surgeon's preference for a surgical intervention, and failure to identify sub-groups of patients with a triple-negative or HER2-positive breast cancer that will benefit the most with the NACT with or without combination of a Trastuzumab therapy since the pre-operative immunohistochemical analyses for the oestrogen (ER), progesterone (PR), and HER2 status were not routinely performed in our center. As a consequent, we resorted to this surgical technique for those women with large tumors requesting for a BCS. Interestingly, we managed to achieve adequate oncological clearance of 96.7% in a population of patients with either a stage II or III breast cancer with a mean tumor size and weight specimen of 4.92 cm and 223 grams respectively. This surgical technique was also extended in the extreme cases of large benign phylloides tumors with a mean size of 8 cm. Using this surgical technique, Nano et al reported 17 out of 18 cases had clear margins following a resection of median tumor diameter of 3 cm and weight specimen of 130 grams.¹⁸ Other studies also reported a high oncological clearance with a mean weight of resected specimen ranging from 94-212 grams.^{15,19}

In term of the cosmetic outcomes, satisfactory results were achieved between 65-80% of cases.^{19,20} In our study, a satisfactory cosmetic outcome was reported in all the patients: 17 (56.6 %) cases were deeply satisfied, and 13 (43.3%) cases were satisfied with the final cosmetic outcome respectively. We believed this satisfaction with the cosmetic outcome was due to the preservation of breast with this technique thus avoiding mastectomy. Furthermore, using a LDMF as a volume replacement, we managed to achieve symmetrical breasts in term of the size and shape despite extensive resection of the breast tissue. In fact, the satisfactory outcomes were also preserved in those women who had the adjuvant radiotherapy. The other crucial factor that there were no

reported wound infection or flap necrosis in any of the 30 patients. The reported complications were minor due to the mild wound dehiscence and seroma. Only one case required reoperation for hematoma at the donor site.

Only a few patients were not pleased with the visible incision scars and discrepancy of skin tones between the breast and LD flap. Figure 2 is a good example of a patient who was generally satisfied with the overall cosmetic outcomes except the visible skin island of a LD flap. This predicament was unavoidable in some cases with a T4b tumor whereby the overlying skin together with the tumor had to be excised to ensure adequate surgical clearances. Those women with a less obvious scar around the peri-areolar region or at the lateral mammary fold with preservation of the overlying skin had excellent cosmetic outcomes. Figure 3 illustrates an excellent cosmetic outcome in a lady with left breast cancer (pT2N1M0) who had symmetrical breasts and hidden scars at the peri-areolar and axillary regions.

Like the previous studies on this surgical technique, the small number of recruited patients contributed to the main limitation for this study. Within the span of four years, only thirty patients were managed to be recruited in this study. Stringent patient selection, patient's preference for mastectomy or other alternative surgical techniques of partial breast reconstruction using chest wall perforator flaps were the main hinderance factors for the patient recruitment. Nonetheless, the results from this study were very promising and comparable to the previous studies. Perhaps, a meta-analysis would provide a more definitive conclusion.



Figure 2: A 50-year-old lady with left breast cancer (pT2N1M0). The tumor was located at the 12 o'clock measuring 5x4 cm. The picture taken 2 years after the BCS with a LDMF followed by the adjuvant chemotherapy and radiotherapy.



Figure 3 (A and B): A 30-year-old lady with left breast cancer (pT2N1M0) at the upper inner quadrant underwent a BCS using a round-block mastopexy technique. The harvested LDMF rotated into the breast cavity through a small incision at the axilla and the horizontal scar at the back along the bra line following a LDMF.

CONCLUSION

In a stage II or III breast cancer, a BCS with immediate partial breast reconstruction using a latissimus dorsi mini flap can be safely performed with satisfactory cosmetic outcomes in women with a large tumor-to-breast-size ratio.

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