



Evaluation of Early vs Late Latissimus Dorsi Flap Reconstruction for Breast Cancer Patients in Egypt

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Abstract: Background: Breast cancer remains the leading type of cancer affecting females in Egypt. More and more patients and surgeons are opting for breast reconstruction after radical surgery for breast cancer, partly due to more heightened awareness of the matter and partly due to more innovation in the techniques used. Aim of the Study: To compare the outcomes between early and late latissimus dorsi myocutaneous flap reconstruction as regards cosmetic outcome, complication rate and recurrence rate for female breast cancer patients in Egypt. Methodology: This is a retrospective analysis study. This study included 60 patients who underwent Latissimus-Dorsi Flap reconstructions for breast cancer in Nasser Institute Hospital and Ain Shams University Hospitals between January 2013 and December 2016. Results: This study found that, overall patients' age ranged from 23 to 48 years with a mean of 35.38 years. The majority of patients (93.3%) had invasive ductal carcinoma while (6.7%) had invasive lobular carcinoma, with a cancer stage of I (36.7%) or II (48.3%). None of patients had silicone or other co-morbid conditions. About 73% of patients underwent Modified Radical Mastectomy (MRM), while 27% underwent Conservative Breast Surgery (CBS) for their breast cancer. All patients have received adjuvant CTH while 68.3% have received the adjuvant RTH. No statistically significant difference between the two groups regarding the age of the patients or the receipt of adjuvant RTH. Conclusion: Plastic surgery plays an important role in the treatment of patients with breast cancer. Breast reconstruction with LDMF is widely applicable and can correct almost all post-mastectomy defects.

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1. Introduction

Preserving a breast shape after surgery for breast cancer is becoming more and more a target for both patients and surgeons, due to the psychological and social impacts that this has on the patient⁽¹⁾.

This outcome can be achieved through what is called oncoplastic techniques, which are techniques that are built on principles of plastic surgery to achieve cosmetic outcomes without compromising any of the oncologic measures. Oncoplastic techniques are either volume displacement techniques aimed at achieving safe margins of resection of the tumour while managing to preserve the shape and appearance of the breast, or through volume replacement reconstructive techniques where the volume and shape of the breast is replaced by either autologous tissue, or by prosthetic methods⁽²⁾.

The type and timing of breast reconstruction after breast cancer depend on several factors including the need for adjuvant therapy, desire for cosmesis and the surgeon's experience and preference. Additionally, oncoplastic approach may begin at the time of surgery (immediate), weeks (delayed-

immediate) or months to years afterwards (delayed)⁽²⁾.

Latissimus Dorsi myocutaneous flap is a volume replacement technique aimed at replacing the excised tissue with the volume of the Latissimus Dorsi muscle rotated around its pedicle⁽³⁾. It was first described in late nineteenth century by the Italian surgeon Tanzini, but has taken its modern form in late 1970s by Schneider et al. and remains one of the most widely used reconstruction techniques to this day⁽⁴⁾.

The purpose was to provide skin coverage and form restoration after modified radical mastectomies, by using the Latissimus Dorsi muscle and the overlying skin island⁽⁴⁾.

Over the subsequent years, many variations have been described for this technique. There are several specific indications for latissimus dorsi flap reconstruction in breast as it can provide autogenous reconstruction for breast cancer surgeries, including mastectomies, lumpectomies quadrantectomies as well as providing additional tissue with silicone implants. It can also provide a well vascularized tissue to an ischemic chest wall post-irradiation. Among its

complications are donor site seroma, flap necrosis, shoulder weakness or loss of mobility and winged scapula.

This technique can be done either immediately or delayed⁽⁴⁾. The advantage of having an immediate reconstruction is the having a surgical process that is smooth since oncological and reconstructive surgery can be associated in one operative setting. Additionally, because there is no scar and fibrosis tissue, breast reshaping is easier, and the aesthetic is improved⁽²⁾.

There are however two potential problems with performing an immediate breast reconstruction in a patient who will require postmastectomy radiation therapy. One problem is that postmastectomy radiation therapy can adversely affect the aesthetic outcome of an immediate breast reconstruction. The other potential problem is that an immediate breast reconstruction can interfere with the delivery of postmastectomy radiation therapy⁽⁵⁾. Another disadvantage is that surgical time can be lengthened, which can be time consuming, and require specialist training⁽²⁾.

On another hand in delayed reconstruction the surgeon waits until the postoperative changes occur and hence proper planning of the procedure can be done. Another important point is related to the postoperative recovery. In theory some complications of the immediate reconstructions can unfavorably defer the adjuvant therapy. With delayed oncoplastic reconstruction, operative time is shortened and the surgical process is less extensive than an immediate one. The outcomes of these reconstructions are good to excellent but the cosmetic outcome is always somewhat inferior to the results obtainable by immediate reconstruction because of the loss of the breast skin envelope after mastectomy and the need to replace so much of the chest wall skin⁽⁶⁾.

Aim of the Study

The aim of this study is to compare the outcomes between early and late latissimus dorsi myocutaneous flap reconstruction as regards cosmetic outcome, complication rate and recurrence rate for female breast cancer patients in Egypt.

Methodology

Type of study: Retrospective analysis.

Study Setting: This study was conducted through the clinical records of Nasser Institute Hospital and Ain Shams University Hospitals both tertiary care centers in Cairo, Egypt.

Study period: clinical records of all patients who underwent latissimus dorsi flap reconstructions for breast cancer in both cited hospitals between January 2013 and December 2016 was reviewed.

Patients:

This study included 60 patients who underwent Latissimus Dorsi Myocutaneous flap reconstruction in Nasser Institute and Ain Shams University Hospital. 30 whom underwent the procedure immediately after mastectomy and 30 of whom underwent the procedure at a later stage.

A- Inclusion Criteria:

Female patients who underwent latissimus dorsi flap reconstruction after modified radical mastectomy or conservative breast surgery for breast cancer with or without silicone prosthesis.

B- Exclusion Criteria:

1. Patients who underwent other types of reconstruction.
2. Patient who underwent breast reconstruction after operation for locally malignant tumours (Phylloid).
3. Patients who underwent subcutaneous mastectomy.
4. Patients who underwent palliative mastectomy.
5. Patients who underwent Latissimus Dorsi myocutaneous flap reconstruction after failure of another technique of reconstruction.
6. Patients who underwent reconstruction for non malignant diseases.
7. Patients who underwent reconstruction after prophylactic mastectomy.
8. Patients with concomitant chronic cardiovascular, endocrine or autoimmune illnesses.
9. Patients who are below 20 years or above 60 years of age.

Sampling method: Two groups were studied the first was the immediate reconstruction group and the second was the late reconstruction group.

Sample size: Sixty patients who underwent latissimus dorsi flap breast reconstruction for breast cancer, thirty of whom underwent the procedure early and thirty who underwent the procedure late.

Ethical considerations:

- Patient anonymity was guaranteed.
- Confidentiality about data was ensured.
- The patient was told about any abnormal findings about the results.
- The study is not harmful to the patients.

Study Procedures:

Operative procedure:

After undergoing modified radical mastectomy the latissimus is separated from the serratus anterior at the lateral border; from the paraspinous muscle fascia, lumbosacral fascia, and vertebral column; from the trapezius fibers superomedially; and from the teres major fibers in the axilla. After identification of the thoracodorsal vessels, the latissimus is divided near its attachment to the humerus. The myocutaneous or myofascial flap is then transferred to the mastectomy

defect through a subcutaneous tunnel in the axilla. A silicone prosthesis may or may not be added beneath the flap.

Data collection:

Patient's medical records were collected from Both Nasser Institute for Research and Treatment and Ain Shams University Hospitals, according to the inclusion and exclusion criteria cited above.

All patients data were analyzed retrospectively thoroughly as regards:

1- History: Patients records were analyzed as regards age, special habits and any noted known chronic medical illnesses known at the time of admission which would exclude the patients from the study notably chronic cardiovascular, endocrine or autoimmune diseases.

2- Breast Pathology: Breast pathology was reviewed to ensure whether they were either Invasive Ductal Carcinoma or Invasive Lobular Carcinoma. Any other types of breast pathology were excluded from the study.

3- Type and timing of procedure underwent: Patients either underwent conservative breast surgery and latissimus dorsi reconstruction or modified radical mastectomy and latissimus dorsi reconstruction. The ones who underwent the procedure immediately (in one setting) are the immediate group and the ones who underwent the procedure at a later stage are the late group.

4- Cosmetic outcome: Patients were interviewed as regards the outcome of their operation and were given the option of saying if the outcome was satisfying or unsatisfying.

5- Complications rate: Several complications are known to follow Latissimus dorsi reconstruction, most notably, flap necrosis, donor site seroma, hematoma, infection and shoulder mobility issues.

6- Recurrence rate as detected by regular follow up by sonomammography and clinical examination.

7- A follow up period is of at least 1 year post operatively, hence the patients included were only those between 2013 and 2016 to allow for a follow up period to have passed.

Statistical Analysis:

Data collected, is to be tabulated and all the results were subjected to adequate statistical analysis including mean \pm standard deviations, tabulated and will be discussed. Statistical distribution of the two groups over the different variables will be analyzed and discussed.

3. Results

As presented in **Table 1**, the mean age of patients ranged from 23 to 48 years with a mean of 35.38 years. The majority of patients (93.3%) had IDC, with a cancer stage of I (36.7%) or II (48.3%). None of patients had silicone or other co-morbid conditions.

Table (1): Distribution of patients according their age and medical history

		Frequency (%)
Age (years)	Mean \pm SD (Range)	35.38 \pm 7.22 (23 – 48)
Breast Pathology	IDC	56 (93.3%)
	ILC	4 (6.7%)
Stage	I	22 (36.7%)
	II	29 (48.3%)
	IIIa	8 (13.3%)
	IIIb	1 (1.7%)
Silicone	No	60 (100.0%)
	Yes	0
Comorbid conditions	No	60 (100.0%)
	Yes	0

Abbreviations: IDC= invasive ductal carcinoma, ILC= invasive lobular carcinoma

Table (2): Distribution of patients according the treatment of their cancer

		Frequency (%)
Type of operation	Modified Radical Mastectomy	44 (73.3%)
	Conservative Breast Surgery	16 (26.7)
Timing of Reconstruction	Immediate	30 (50.0%)
	Delayed	30 (50.0%)
Receiving Adjuvant CTH	No	0
	Yes	60 (100.0%)
Receiving Adjuvant RTH	No	19 (31.7%)
	Yes	41 (68.3%)

Abbreviations: CTH= chemotherapy, RTH= radiotherapy

Table (3): Distribution of patient's clinical characteristics according to the timing of reconstruction

		Timing of Reconstruction		p-value
		Immediate	Delayed	
Age (years)		35.93 ± 6.75	34.83 ± 7.74	0.560
Breast Pathology	IDC	29 (96.7%)	27 (90.0%)	0.306
	ILC	1 (3.3%)	3 (10.0%)	
Stage	I	11 (36.7%)	11 (36.7%)	0.003 ^a
	II	19 (63.3%)	10 (33.3%)	
	IIIa	0	8 (26.7%)	
	IIIb	0	1 (3.3%)	
Type of operation	MRM	14 (46.7%)	30 (100.0%)	<0.001*
	CBS	16 (53.3%)	0	
Receiving Adj. RTH	No	10 (33.3%)	9 (30.0%)	0.781
	Yes	20 (66.7%)	21 (70.0%)	

*. Statistically significant p-value (<0.05)

^a. Fisher's exact test

Abbreviations: MRM= Modified Radical Mastectomy, CBS= Conservative Breast Surgery

Table (4): Distribution of patient's post-operative outcomes according to the timing of reconstruction

		Timing of Reconstruction		p-value
		Immediate	Delayed	
Cosmetic outcome	Dissatisfied	5 (16.7%)	9 (30.0%)	0.222
	Satisfied	25 (83.3%)	21 (70.0%)	
Complications	Donor site seroma	3 (10.0%)	1 (3.3%)	0.668
	Flap necrosis	0	1 (3.3%)	
	Hematoma	1 (3.3%)	0	
	Infection	1 (3.3%)	1 (3.3%)	
	Recurrence	1 (3.3%)	0	
	None	24 (80.0%)	27 (90.0%)	

In **Table 2**, about 73% of patients underwent Modified Radical Mastectomy (MRM), while 27% underwent Conservative Breast Surgery (CBS) for their breast cancer. Reconstructions with LD flap were performed immediately in 30 patients and delayed in 30 patients. All patients have received adjuvant CTH while 68.3% have received the adjuvant RTH.

In **Table 5**, patients underwent immediate reconstruction surgery were compared with those who underwent the delayed reconstruction. No statistically significant difference between the two groups regarding the age of the patients or the receipt of adjuvant RTH.

However, there was a statistically significant association between the timing of reconstruction and stage of the cancer (p-value = 0.003) and the type of operation (p-value < 0.001). All patients with low-stage breast cancer (I or II) underwent the immediate reconstruction, while advanced cancer stages (IIIa or IIIb) tended to have delayed reconstruction. Also, all patients who underwent delayed reconstruction surgery had modified radical mastectomy, while those who underwent immediate reconstruction had either MRM (46.7%) or CBS (53.3%).

In **Table 4**, patients underwent immediate reconstruction surgery were compared with those who underwent the delayed reconstruction regarding to

post-operative outcomes. Although the immediate reconstruction showed better cosmetic satisfaction than the delayed reconstruction (83.3% versus 70.0%), it has been associated with more post-operative complications. However, these differences were not statistically significant.

4. Discussion

Breast reconstruction after mastectomy has evolved over the last century to be an integral component in the therapy for patients with breast cancer. Breast reconstruction originally was designed to reduce post-mastectomy complications and to correct chest wall deformity, but its value has been recognized to extend past this limited view of use. The goals for patients undergoing reconstruction are to correct the anatomic defect and to restore form and breast symmetry. The surgical options for breast reconstruction involve the use of endoprotheses (implants), autogenous tissue transfers, or a combination of both⁽⁷⁾.

The larger picture for both mastectomy and reconstruction is postoperative quality of life, a key component of which is function. To date, a number of studies have begun to look at the impact of reconstruction on form and function, yet few have

looked at potential strategies for improving this key outcome including time of reconstruction ⁽⁸⁾.

The benefits of immediate breast reconstruction after tumor removal are unquestionable nowadays. Breast reconstruction does not alter the biological behavior of the cancer and it does not affect the treatment. So, the purpose of this study was to critically compare the outcomes between early and late latissimus dorsi myocutaneous flap reconstruction as regards cosmetic outcome, complication rate and recurrence rate for female breast cancer patients in Egypt.

This retrospective study included 60 patients who underwent Latissimus-Dorsi Flap reconstructions for breast cancer in Nasser Institute Hospital and Ain Shams University Hospitals between January 2013 and December 2016. Two groups were studied the first was the immediate reconstruction group included thirty patients and the second was the late reconstruction group included thirty patients.

As regard the demographic data, our overall patients' age ranged from 23 to 48 years with a mean of 35.38 years. The majority of patients (93.3%) had invasive ductal carcinoma while (6.7%) had invasive lobular carcinoma, with a cancer stage of I (36.7%) or II (48.3%). None of patients had silicone or other comorbid conditions. About 73% of patients underwent Modified Radical Mastectomy (MRM), while 27% underwent Conservative Breast Surgery (CBS) for their breast cancer.

Regarding the differences between our groups, no statistically significant difference between the two groups regarding the age of the patients or the receipt of adjuvant RTH. However, there was a statistically significant association between the timing of reconstruction and stage of the cancer (p-value = 0.003) and the type of operation (p-value < 0.001).

All patients with low-stage breast cancer (I or II) in this study underwent the immediate reconstruction, while advanced cancer stages (IIIa or IIIb) tended to have delayed reconstruction.

Also another study found that all patients in immediate group had low-stage breast cancer as the follow: stage I (57%), stage II (43%) ⁽⁹⁾.

Also, all our patients who underwent delayed reconstruction surgery had modified radical mastectomy, while those who underwent immediate reconstruction had either MRM (46.7%) or CBS (53.3%) with statistically significant difference.

This is similar to a systematic review which reported that delayed reconstruction approach is also used in radical breast mastectomy, when the margins of resection are not known at the time of the operation and further excision may be required ⁽¹⁰⁾.

There are two potential problems with performing an immediate breast reconstruction in a

patient who was require post-mastectomy radiation therapy. One problem is that post-mastectomy radiation therapy can adversely affect the aesthetic outcome of an immediate breast reconstruction. The other potential problem is that an immediate breast reconstruction can interfere with the delivery of post-mastectomy radiation therapy ⁽⁶⁾.

In this study all patients have received adjuvant CTH while 68.3% have received the adjuvant RTH. 66.7% of immediate group received radiotherapy, while 70% of delayed group received radiotherapy with statistical insignificant difference between both groups.

This is in accordance with another study about timing of reconstruction which found that, 62% (26 of 42 patients) of patients did not require radiotherapy and, because of the preserved breast envelope, could go ahead with essentially an immediate reconstruction. The remaining 38% (16 of 42 patients) did require radiotherapy ⁽⁹⁾.

In the current study more satisfied patients were in immediate group (83.3%) versus (70%) in delayed group with statistical insignificant difference.

This is in agreement with another study which reported that the disadvantages of a delayed approach were largely psychological, due to the burden of patients living with breast deformity until reconstruction is completed ⁽¹¹⁾.

Some studies have reported this as leading to lower self-esteem and body image, causing depression and anxiety. Patients were often counseled to have realistic expectations for the aesthetic outcome of delayed reconstruction, especially if the field was previously irradiated. Patient evaluation of aesthetic outcomes can vary depending on the time reconstruction takes place ⁽¹⁰⁾.

In a prospective cohort study reported psychosocial benefits and body image gains which persisted at two years following immediate reconstruction ⁽¹²⁾.

Studies such as those of **de la Torre et al.** ⁽¹³⁾ and **Shestak and Nguyen** ⁽¹⁴⁾ describe the integration of plastic surgery into the management of breast cancer as a crucial event. The work of the plastic surgeon is essential for the recovery of a patient's self-esteem as it increases volume and improves the shape and natural appearance of the thorax, which would otherwise be a permanent cause of stigma and marked by a mastectomy scar.

Donor site seroma was the most common postoperative complications among our patients and was more frequent among patients with immediate reconstruction followed by hematoma, infection and recurrence in immediate group. While flap necrosis occurred only in delayed group.

This is similar to different studies which reported that the most common complication in breast reconstruction with the LDF was donor site seroma at the harvest site. Ischemic complications are uncommon, due to the reliable vascular supply of the thoracodorsal artery to the LDF⁽¹⁵⁾.

Also, **Al Hetmi et al.**⁽¹⁶⁾ found no significant difference in complications between patients who had immediate versus late reconstruction with latissimus dorsi.

Although the immediate reconstruction group in the present study showed better cosmetic satisfaction than the delayed reconstruction, it has been associated with more post-operative complications (20% versus 10%). However, these differences were not statistically significant.

This is in agreement with **Yoon et al.**⁽¹⁷⁾ in study about "Outcomes of immediate versus delayed breast reconstruction" 1957 patients (1806 immediate, 151 delayed), major complications, infections, and reconstructive failure rates were evaluated and found that the delayed group had lower odds of any (OR 0.38, $p < 0.001$) and major (OR 0.52, $p = 0.016$) complications, compared with immediate patients. Furthermore, delayed reconstruction was associated with lower failure rates (6% vs. 1.3%).

Also another study about "Immediate versus delayed breast reconstruction" found that cosmetic results were very promising and compare favorably with immediate reconstruction in the short-term follow-up⁽⁹⁾.

In other studies, early reconstruction showed higher Early complications include thrombosis, flap necrosis or loss, and local wound - healing problems, while late complications included hyperpigmentation, fat necrosis, volume loss, and flap contracture⁽⁶⁾. Tissue expansion is often poorly tolerated by many patients and can lead to complications such as a concave deformity of the chest wall. Several studies have reported contradictory results which suggest that careful choice of immediate reconstruction technique or adjuvant therapy can minimise some of the adverse events that can occur after adjuvant therapy⁽¹⁸⁾.

A number of studies have shown that reconstruction is oncologically safe directly after mastectomy even in advanced disease, thereby making this procedure even more acceptable for patients⁽¹¹⁾. It is claimed that early reconstruction tends to lead to better aesthetic outcomes since the breast envelope is preserved together with the inframammary fold and offers a better prospect of recreating a natural shape, with more symmetry to the breast. Adding a myocutaneous flap (well - vascularised and non - radiated) at the time of mastectomy can also be advantageous as it can promote tissue healing⁽¹⁹⁾.

For many years in the past there was the misconception that breast reconstruction must be delayed for several years after mastectomy because reconstruction might prevent or delay detection of local recurrence. Hence, a large population of women has sought and presently still seeks to undergo delayed post-mastectomy reconstruction months to years later. The outcomes of these reconstructions were good to excellent but the cosmetic outcome is always somewhat inferior to the results obtainable by immediate reconstruction because of the loss of the breast skin envelope after mastectomy and the need to replace so much of the chest wall skin⁽⁹⁾.

In regard to the all-important question of local recurrence, our study found that recurrence occurred in one patient (3.3%) who underwent immediate reconstruction while no recurrence occurred in delayed group.

This is similar to several longer term follow-up studies at the MD Anderson Cancer Center which indicated a lower incidence of local recurrence after immediate reconstruction while delayed showed no recurrence⁽⁹⁾.

This study has several limitations as the retrospective design. The sample size needs to be larger and includes multicenter.

Conclusion

Plastic surgery plays an important role in the treatment of patients with breast cancer. Breast reconstruction with LDMF is widely applicable and can correct almost all post-mastectomy defects.

A high degree of satisfaction among both groups of patients was achieved and the results were acceptable, with few complications.

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