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Original article ■

Breast Reconstruction With Extended Latissimus Dorsi Flap and Silicone Implant

Milan Višnjić[1], Predrag Kovačević[1], Ljiljana Paunković[1], Goran Đorđević[1], Aleksandar Višnjić[2]

[1]*Clinic of Plastic and Reconstructive Surgery, Clinical Centre Niš, Serbia*

[2]*Institute for Public Health, Niš, Serbia*

SUMMARY

Breast carcinoma is the most common female malignancy. Mastectomy and breast reconstruction are indicated to treat the disease and to improve quality of life. The aim of this study was to compare the esthetic results of breast reconstruction with extended latissimus dorsi flap and implant for breast cancer with and without denervation of latissimus dorsi muscle.

Our study was a retrospective review of prospectively collected data. Surgery was performed as primary reconstruction in 24 (75%) and secondary reconstruction in 8 patients (25%). All patients were consecutively divided in two equal groups (with 16 patients each) with latissimus dorsi muscle intact or denervated. Their average age was 46.2 years. Primary reconstruction was done for stages I and IIA, and secondary reconstruction one year after the completion of oncologic treatment. Postoperative follow-up was two years.

Early complications (hematoma, infection) were not observed and dorsal seroma was observed in four women (12.5%). Partial flap necrosis was found in one case, but complete flap necrosis was not found. In six patients (18.7%), unacceptable scarring at the donor site required correction.

Two years after reconstruction the patients assessed the procedure as very good or excellent. Excelent grade was often statisticaly significant in the group with innervated flap.

Primary or secondary breast reconstruction should become an integral part of breast cancer treatment. Extended latissimus dorsi flap with implant is a safe and relatively simple reconstruction technique and should be preferred to other similar techniques. We suggest the reconstruction with innervated musle flap for better esthetic results.

Key words: **breast cancer, surgery, breast reconstruction, latissimus dorsi flap, silicone implant**

Corresponding author:

Milan Višnjić •

e-mail: visnjic@medfak.ni.ac.rs •

INTRODUCTION

Breast cancer is a disease still posing a serious medical problem with high morbidity and mortality worldwide. Our national cancer registry presents breast cancer as the most common malignant tumor in women with increasing incidence in general female population and in younger age groups (1). Some authors stated that one woman in eight will develop breast cancer during her lifetime (2).

Until late in the 20th century, mastectomy was the standard treatment of breast cancer. Breast conserving procedures were then introduced and breast reconstruction techniques opened a new chapter in the breast surgery esthetics. These procedures reduce psychological problems, enabling the patients to successfully cope with the disease improving their quality of life. Conservative surgery and breast reconstruction do not have any negative oncologic consequences (3).

Breast reconstruction is nowadays an integral part of rehabilitation after mastectomy, and can be performed immediately after amputation (primary reconstruction) or later, usually after completed oncologic treatment (secondary reconstruction). Immediate breast reconstruction is gaining wide support due to its evident benefits-single stage procedure, better psychological adjustment and better esthetic outcome (4).

There is a number of options in breast reconstruction, using either autologous tisue as pedicled or free flaps or using silicone implants (SI), and there is also the combination of flaps and implants (3, 5).

The choice of reconstruction method depends on general health, size and shape of the contralateral breast, motivation and consent of the patient to various breast reconstruction options and the experience of surgical teams for particular reconstruction techniques (3, 5).

Latissimus dorsi flap (LDF) was introduced by Tansini in 1906 as a myocutaneous flap and was popularized in 1976 by Olivari (6,7). Bostwick, Muhlbauer and Olbrisch introduced this flap combined with silicone implants during the 1980s for secondary breast reconstruction (8, 9). Since it possessed an appropriate and safe vascular pedicle, this flap is well established for free tissue transfer in reconstructive surgery for distant areas (3, 6, 10, 11).

As a pedicled flap, LDF has been widely used in chest wall defect reconstructions and in breast reconstruction. The advantages of this flap are safe blood suply, relatively simple surgical technique and easy closure of the donor region (5, 7, 9).

LDF with silicone implant (LDF + SI) is an acceptable and reliable approach to breast reconstruction since it produces:

- Reconstructed breast which does not hamper detection of relapse of primary disease;
- Acceptable symmetry without the need for correction of contralateral breast in a high percentage;
- Excellent cosmetic outcome and
- A high level of satisfaction of the patients (5, 7, 12).

Appropriate evaluation of candidates for reconstruction is a prerequisite for successful and appropriate reconstruction. Healthy and lean patients are adequate candidates, while breast reconstruction with LDF cannot be recommended for persons with previous ipsilateral posterior thoracotomy (5).

PATIENTS AND METHODS

In our tertiary care clinic, we conducted a retrospective review of prospectively collected data of the patients with primary or secondary breast reconstruction in a four-year period (2002-2006). Breast reconstruction with LDF+SI was performed as primary or secondary procedure. We used low profile round silicon gel breast implants in all patients. The muscle was not transected from its humeral insertion in any of the cases. All patients were consecutively divided into two groups with latisimus dorsi muscle denervated or latisimus dorsi musle intact/innervated. The groups were identical (16 women in each of them). All patients were assessed to be in good general health and scored I-III according to the American Society of Anesthesiology.

Indications for primary reconstruction with LDF +SI in our series were stages I and IIA (T1/T2, N0/N1, M0) and patient motivation for primary reconstruction with LDF+SI.

Indications for secondary reconstruction were the absence of local relapse and distant metastases, preserved vascular pedicle of the latissimus dorsi muscle during breast amputation, and patient motivation for breast reconstruction with the suggested technique (LDF+SI).

During the operation in half of the patients the muscle was kept intact/innervated and in the other half we transected the thoracodorsal nerve.

Postoperative follow-up aimed to detect early and late complications. After the reconstruction of the mammilla-areola complex further follow-up was performed and after two years the patients were questioned about the satisfaction with cosmesis. In one case (3.1%) with primary reconstruction, disease progression (multiple hepatic metastases) was observed 8 months after the operation and the patient was excluded from our study.

Thirty one patients were questioned two years after the treatment to grade the success of the treatment with marks from 1 to 10 as follows:1,2=poor; 3,4=modest; 5,6=good; 7,8=very good; 9,10=excelent.

RESULTS

Age distribution of the patients with primary and secondary reconstruction is presented in Table 1.

Primary reconstruction was performed in 24 (75 %) and secondary in 8 patients (25%). All the patients with primary reconstruction were stage I and IIA (T1N0M0, T1N1M0 and T2N0M0). In those with secondary reconstruction, surgery was done after oncologic treatment and absence of relapse and disease progression. Surgery was done under general anesthesia, and postoperative antibiotic treatment (with cephalosporins) was applied for 5 days.

Primary reconstruction was done together with mastectomy as a primary surgery. After modified radical mastectomy by Madden, skin territory of the LDF was tailored in a size and shape of skin defect after mastectomy, and the whole latissimus dorsi muscle was elevated (extended flap) (Figures 1a, b).

Figure 1a.

Figure 1b.

During flap elevation, all the elements of neurovascular pedicle were preserved in 16 patients and in the other 16 we cut the thoracodorsal nerve. Careful planning and elevation of the flap produced an implant bed in front of pectoralis maior muscle and provided for proper reconstruction of the missing skin and preservation of the inframammary fold. For the symmetrization of reconstructed and opposite breast we used comercial moderate to high anatomic profile-shaped, 150-450ml silicone implants. Mammila-areola complex was reconstructed under local anesthesia as a delayed procedure after six months in 28 women. We used full thickness skin graft harvested from the inner side of the upper arm and local tissue of the reconstructed breast. Contralateral breast correction and reconstruction of mammilla-areola complex was performed in four women in the subgroup of primary reconstructions under general anesthesia. Augmentation mammoplasty in two cases and breast suspension with augmentation mammoplasty in another two cases was performed. Final results after primary reconstruction are presented in Figures 2 a, b.

Figure 2a.

Figure 2b.

In eight cases of secondary reconstruction, preoperative Doppler sonography of thoracodorsal artery and vein was evaluated. Flap planning and implant bed

formation was done as in primary reconstruction, and size and shape of the skin isle of the flap was planned based on the shape and size of the opposite breast. The same implants were used as in primary reconstruction. Contralateral breast correction and reconstruction of mammilla areola complex was done in the second stage under general anesthesia in all patients (augmentation mammaplasty in two, breast suspension in two, and breast reduction in four women). Definitive results after secondary reconstruction and correction of oposite breast are presented in Figures 3 a, b.

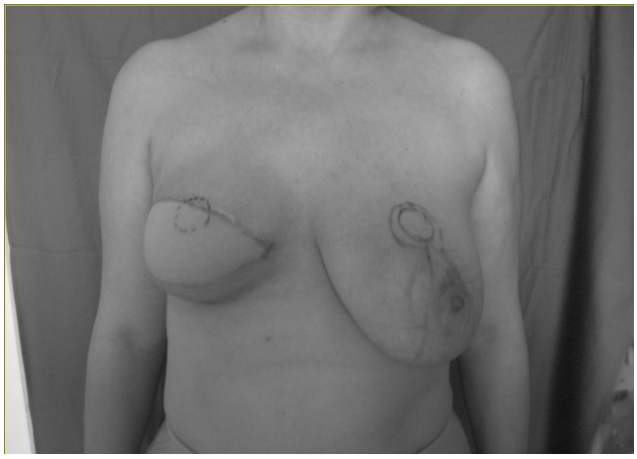

Figure 3a.

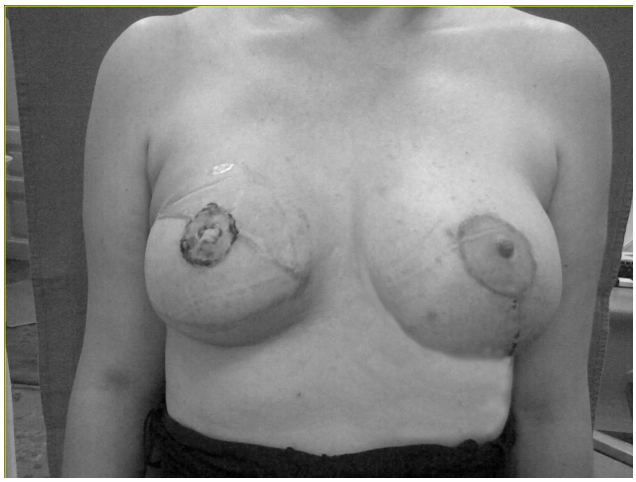

Figure 3b.

Regarding early complications, dorsal seroma formation was the only observed event - in four patients (12.5%) in the donor region. Partial flap necrosis in the medial corner of skin isle was found in one case, healing without surgery, though. Complications such as total flap necrosis, infection and implant extrusion were not observed. There were no implant extrusions nor degree III or IV capsular contractures. Hospitalization lasted from 9 to 15 days.

In six patients (18.7%), unesthetic scarring was observed in the donor region. Secondary correction was performed in these cases and satisfactory results were obtained.

All the patients were postoperatively monitored for 24 months. In that period, we did not detect local recurrence in any of the patients (our procedure was oncologically safe).

In the interview, 21 patients (67.7%) graded the surgery with 9 or 10 (excellent), while 10 patients (23.2%) graded their treatment with 7 or 8 (very good). Relating to the innervation of pectoralis maior musle, there is a statisticaly significant difference, with more excelent marks in non-denervatred musle group (Table 2).

Table 1. *Age distribution of the patients with primary and secondary reconstruction*

Age (years)	Primary reconstruction	Secondary reconstruction	Total number of patients
20-30	1 (3.1%)	0	1 (3.1%)
31-40	4 (12.5%)	2 (6.2%)	6 (18.7%)
41-50	12 (37.5%)	5 (15.6%)	17 (53.1%)
51-60	5 (15.6%)	1 (3.1%)	6 (18.7%)
> 60	2 (6.2%)	0	2 (6.2%)
Total	24 (75%)	8 (25%)	32 (99.8%)

Table 2. *Structure of patients according to muscle inervation and mark of satisfaction*

Grade	Inervated muscle	Denervated muscle	P value
	No/%	No/%	
10	7/22.58	2/6.45	
9	5/16.13	7/22.58	
8	4/12.90	5/16.13	0.035
7	0/0	1/3.13	
Total	16/51.6	15/48.39	

DISCUSSION

In all patients with breast carcinoma included in our study we performed modified radical mastectomy by Madden. Some authors report of the possible use of skin - sparing mastectomy. Skin - sparing mastectomies with immediate reconstruction have been described recently, and the method is gaining support since it preserves breast skin and inframammary fold (13-17). This correlates with patient selection for skin sparing mastectomy for stage 0 and I according to the American Joint Commitee of Cancer (AJCC) (14-16). Patients with diagnosed breast carcinoma insisted on radical treatment with primary or secondary reconstruction. Other authors had similar comments (14).

Our patients were aged 46.2 years on the average. The average age of patients in other studies was 48.1 years (4) and 49.5 years (18). The difference can be explained by the fact that our younger patients had accepted breast reconstruction as an integral part of breast cancer treatment.

LDFs were commonly used in the reconstruction of chest wall defects in oncologic surgery. The use of LDF in breast reconstruction and to treat postoperative chest wall defects was described by a number of authors (5-9,12).The first breast reconstruction with LDF in our centre was performed in 1984. The results of the technique were satisfactory, but only small breasts could have been treated with this procedure. In patients with larger breasts latissimus dorsi flap is not sufficient - the combination of latissimus dorsi muscle and prosthesis is thus recommended (19, 20). Extended latissimus dorsi flap is recommended by some authors as a flap producing excellent cosmesis (20-22). Combined use of silicone implants and extended latissimus dorsi flap cannot be recommended in the presence of recognizable damage of thoracodorsal vascular pedicle (23).

According to the current guidelines, primary and secondary reconstruction can be performed using LDF +SI. In recent years, we have preferred at our clinic breast reconstruction techniques with implants (for small breasts) and with LDF plus implant (for medium sized and large breasts). Both techniques are relatively simple, with rare complications, and with excellent results in appropriately chosen patients. In this paper we present only the reconstruction with LDF+SI. Different approaches are aimed to preserve the innervation of latisimus dorsi flap. Some authors suggest denervation and some of them do not (19, 20).

LDF is very useful in breast reconstruction because of its well - defined vascular pedicle, flap elevation procedure is safe, and this implant increases the volume of the reconstructed breast, producing excellent overall results. These elements make this technique the method of choice for breast reconstruction at our clinic. Other authors describe similar results with this technique (7, 24). In our series, we left humeral attachments intact, but in some studies complete or partial detachment is preferred (19, 25).

From our personal experience with other methods of primary and secondary reconstruction, including transversal rectus abdominis miocutaneous flap (TRAM), we can say that this is a metod acceptable for reconstruction of voluminous breasts. The results were excellent, but postoperative herniation frequently occurred at the donor site. In addition, the operation is relatively complex, with frequent partial or complete flap necrosis, which is similar to findings in other studies (2, 24). Some authors prefer TRAM to latissimus flaps (26).

Breast reconstruction with free microvascular flaps (i.e. deep inferior epigastric perforator flap) produces good results. However, for this reconstruction technique, a well-trained team of surgeons is required, as well as specially designed equipment, and the intervention itself is complex, time-consuming, and associated with complications such as thrombosis at the anastomosis site and flap necrosis (4). This reconstruction technique has not been performed in our centre.

Early complications during reconstruction with LDF+SI, such as hematoma, infection and total flap necrosis, were not observed in our series. Overall, early complications in our study were found in five patients (15%). Other authors report percentages ranging from 15.2% to 79% (7,12,24,27,28). There were no cases of total flap necrosis since the flap elevation technique was clearly defined; other results corroborate this

finding (with reports of flap survival of 100%) (7, 12, 24). No implant movements nor extrusion were observed in our patients since we precisely defined the implant bed, suturing the muscle portion of the flap with continous resorbable suture along the implant bed rim, but some authors describe secondary corrections of implant position because of its movement towards the armpit in 3-5% (5, 7). Most of the remarks and complaints of our patients with LDF+SI referred to unesthetic scarring in the donor region - in six of them (18.7%) corrections of the scars were required. A similar percentage was described by other authors (7). In our series, oncologic safety of the procedure was clearly proven, which agrees with the literature data (3, 28).

We asked 31 patients two years after surgery to assess the success of reconstruction and they graded the success as very good and excellent. We believe that such grades are primarily the consequence of the fact that there were no cases of implant extrusion and capsular contractures. Improved breast reconstruction with this technique is the result of short hospital stay and low rate of early complications (hematoma, infections). Other authors describe similar findings (3, 22, 26, 27). In one study including 1000 breast reconstructions in 706 patients, the author stated that autologous flaps combined with implants reduced implant-related complications and prefered them to expander/ implant technique (24). Other studies in a series of patients point to the advantages of breast reconstruction with LDF+SI; all the women stated that they were very satisfied with the reconstruction results (29, 30). Better esthetic results of statistical significance with innervated muscle could be explained by the absence of muscle atrophy, an appropriate muscle tone keeping the silicone implant in place and by the innervation of flap skin.

CONCLUSION

Breast reconstruction is nowadays an integral part of treatment after mastectomy in most grade I and IIA cases of breast carcinoma. It is actually a form of social and psychologic rehabilitation of women with breast cancer, being acceptable too from the point of view of oncologic safety. Immediate reconstruction produces better results, reduces treatment costs. Breast reconstruction with LDF+SI is a safe method with rare complications, produces excellent esthetic results in both primary and secondary reconstruction, and the correction of contralateral breast is almost mandatory in secondary reconstruction. It should be pointed out that all patients with breast reconstruction were highly satisfied with the procedure and graded the results as very good and excellent.

Primary or delayed breast reconstruction using extended latissimus dorsi muscle and silicone implant produces excellent results in view of breast size, shape, symmetry, well-formed inframammary fold and sensitiveness of the skin.

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REKONSTRUKCIJA DOJKE PROŠIRENIM LATISSIMUS DORSI REŽNJEM I SILIKONSKIM IMPLANTOM

Milan Višnjić[1], Predrag Kovačević[1], Ljiljana Paunković[1], Goran Đorđević[1], Aleksandar Višnjić[2]

[1]Klinika za plastičnu i rekonstruktivnu hirurgiju, Klinički centar Niš, Srbija
[2]Institut za javno zdravlje, Niš, Srbija

Sažetak

Karcinom dojke je najčešći malignitet kod žena. Mastektomija i rekonstrukcija dojke indikovani su kao vid tretmana i u cilju poboljšanja kvaliteta života. Cilj ove studije bio je da uporedi estetske rezultate rekonstrukcije dojke proširenim latissimus dorsi režnjem i implantatom kod karcinoma dojke, sa ili bez denervacije latissimus dorsi mišića.

Studija predstavlja retrospektivni pregled prospektivno sakupljenih podataka. Hirurški tretman izvodio se kao primarna rekonstrukcija kod 24 žene (75%) i kao sekundarna rekonstrukcija kod 8 bolesnica (25%). Sve su bolesnice konsekutivno podeljene u dve jednake grupe (svaka sa 16 bolesnica), sa latissimus dorsi mišićem intaktnim ili denervisanim. Prosečna starost bolesnica bila je 46,2 godine. Primarna

rekonstrukcija preduzimana je kod stadijuma I i IIA, a sekundarna godinu dana po završetku onkološkog tretmana. Bolesnice su postoperativno praćene dve godine.

Rane komplikacije (hematom, infekcija) nisu zabeležene, a dorzalni serom nađen je kod četiri žene (12,5%). Delimična nekroza režnja nađena je u jednom slučaju (1,7%), dok potpuna nekroza režnja nije zabeležena. Kod šest bolesnica (18,7%), neprihvatljivo ožiljavanje na donorskoj lokaciji zahtevalo je korekciju.

Dve godine po rekonstrukciji bolesnice su proceduru ocenile kao vrlo dobru ili odličnu. Odlične ocene su statistički značajno bile češće beležene u grupi sa inervisanim režnjem.

Primarna ili sekundarna rekonstrukcija dojke treba da postane integralni deo tretmana karcinoma dojke. Prošireni latissimus dorsi režanj sa implantatom predstavlja bezbednu i relativno jednostavnu tehniku rekonstrukcije i preferira se u odnosu na druge slične tehnike. U cilju postizanja boljih estetskih rezultata, naša je preporuka postupak rekonstrukcije inervisanim mišićnim režnjem.

Ključne reči: **rak dojke, hirurgija, rekonstrukcija dojke, latissimus dorsi flap, silikonski implanti**