ORIGINAL ARTICLE

MICRO-TEXTURED SILICONE IMPLANTS IN SECONDARY BREAST RECONSTRUCTION AFTER RADIOTHERAPY WITH LATISSIMUS DORSI FLAP - RECONSIDERATION OF ADVANTAGES**A. L. Poroşnicu^{1,3}, M. Coţofană^{1,4}, A. I. Mitcan², Ina Petrescu²**¹"Carol Davila" University of Medicine and Pharmacy, Faculty of Medicine, Bucharest, Romania²Clinical University Emergency Hospital, Plastic Surgery Department, Bucharest, Romania³Elias University Emergency Hospital, Plastic Surgery Department, Bucharest, Romania⁴3rd General Surgery Clinic, The University Emergency Hospital Bucharest, Romania

Corresponding author: Marius Coţofană

Phone no.: +40734434561

E-mail: mariuscotofana2004@gmail.com

Abstract

Delayed breast reconstruction after irradiated mastectomy cases includes a large series of reconstructive procedures like silicone implant/expander, numerous flaps or combined methods. Bad status of irradiated tissues needs to find a way to ensure a stable breast feature. Latissimus dorsi myocutaneous flap with implant represents one of classical methods of breast reconstruction providing a new breast with superior appearance. The aim of this paper is to present the advantages of breast reconstruction with latissimus dorsi flap and silicone-filled implant. New breast is created by combining the silicone implant placed under pectoralis major muscle and latissimus dorsi myocutaneous flap. Markings of flap is performed with the patients in standing position; first the new inframammary fold and midline and on back the skin paddle is design after a pinch test to check the amount available and the future donor site closure. It is recommended to place the incisions in transverse position so that the scar to be hidden in bra line. The study includes 84 patients who underwent breast reconstruction from April 2014 to April 2016. 57 were latissimus dorsi flap with implant and 5 from which were for salvage another breast reconstruction. The patient's age was average between 32 and 69 years. The implants used were round shape implants, silicone filled with micro-textured shell. Combination between autologous tissue and implant offer superior appearance of new breast with shape, volume, natural ptosis and consistency similar with normal breast. Also, fast recovering and socio-professional reintegration are the benefits of this method. Analyzing different surgical option, breast reconstruction with latissimus dorsi flap and silicone implant seems to offer very good results with minimum complications in such difficult cases. This method can be suitable for almost all irradiated postmastectomy cases.

Keywords: silicone implants, secondary breast reconstruction, radiotherapy

Introduction

Silicon is a metal-like element that in nature combines with oxygen to form silica (silicon dioxide). Silicon is produced by heating silica

with carbon and additional processing convert silicon into a polymer, a long chemical chain that is silicone [1].

There are two forms of silica: noncrystalline (amorphous silica) and crystalline form.

Amorphous silica is less toxic and it is used in most silicone shells (elastomers). Amorphous silica cannot convert to crystalline silica within the body [1].

According with American Society of plastic Surgeons from United States, the trend of breast reconstruction is growing from 78832 in 2000 year to 102215 in 2014 year, representing 30%.

The quality of women life affected by breast cancer is categorically improved by the breast reconstruction. Different methods are available: expander-implant based reconstruction, reconstruction with autologous tissues (pedicled or free flaps from the back, abdomen, thigh and buttock), and of course, combination methods. In addition to these methods, ADM (acellular dermal matrices) also can be used, but meta-analysis demonstrates increased complication rates in ADM-assisted implant-expander reconstruction, and protective effects of ADMs in irradiated tissues are inconsistent [2].

In difficult cases with radiotherapy after mastectomy, there are available only a few breast reconstruction methods. Irreversible tissue changes are occurred due to the radiotherapy with loss of skin and soft tissue elasticity, and the use of expander or implant after radiotherapy is risky – we cannot obtain good expansion and there is a high possibility of alloplastic material extrusion. Breast reconstruction with own tissue from back, abdomen or buttock in different musculocutaneous flaps is best option when there is no sufficient skin tissue to cover the implant. For each patient we must choose an appropriate method for these conditions to obtain a new breast with characteristics similar with opposite breast and with low risk of complication.

Latissimus dorsi (LD) flap was described first time by Tansini [3] and developed by Bostwick et al in 1978 [4]. This myocutaneous pedicled flap doesn't offer sufficient volume and, in most cases, it is necessary silicone implant. A latissimus dorsi flap provides implant cover so that the reconstructed breast has a more natural appearance [5]. This flap is very robust due to good vascularization of thoracodorsal pedicle.

TRAM flap (transverse rectus abdominis muscle), also a myocutaneous flap based on rectus abdominis, provide abdominal tissue for

the new breast and was first described by and developed in 1977 by Drever and modified by Hartrampf and Gandolfo in 1982 [6], [7].

Pedicled TRAM flap represent still a very good choice for breast reconstruction in cases with inferior abdominal skin and adipose tissue excess. This flap ensures good results without the lengthy time, special risks, and needs for microsurgical skills of a free flap. The main advantages for selected patients are predictability, low serious complication rate, technical ease, reliability of results, decreased operative time, and patient satisfaction [8].

Microsurgical breast reconstructive methods, like free TRAM flap, DIEP flap (deep inferior epigastric perforators) are suitable for patients with transverse abdominal scars that have compromise superior vascular epigastric pedicle or obese patients [8].

In conjunction with the autologous tissues transfer, silicone implants provide more breast volume and thus a better cosmetic outcome. It is known that the breast implant texture provides an increased protection against capsular contracture which promoted the development of silicone implants with fixed manufacturing standards [9].

When the patient is skinny or there is no abdominal flap, in our opinion, the appropriate choice is a LD flap combined with a silicone implant.

Materials and method

The study is retrospective, descriptive, unicentric and includes 84 patients who underwent breast reconstruction from April 2014 to April 2016. 57 were LD flap with implant out of which 7 were for salvage another breast reconstruction.

Results

The table below (Table 1) presents our experience in delayed breast reconstruction.

The patients' age was average between 32 and 69 years, therefore age was not a contraindication for breast reconstruction. On the other hand, the psychological effects of the breast loss are experienced even in older

patients. Most of the reconstructions were with LD flap and silicone implant, in 7 cases we performed this technique to save or to improve another previous breast reconstruction. Overall, the complications rate is low, flap losses and seroma being the most frequent of them.

Patients age (years)	31 – 69
Total number of breast reconstruction	87
Delayed reconstruction	85
Immediate reconstruction	2
Breast reconstructions	
Latissimus dorsi (LD) flap with implant	55
***LD flap with implant for improving/salvage other	7
Only LD flap	2
Breast reconstruction with direct implant	25
TRAM flap	5
Significant data about patients	
Radiotherapy	81
Obesity	4
Smokers	2
Previous smokers	78
Collagen-vascular disease	1
Surgical technique facts	
Entire muscle detachment	54
Preservation of humeral insertion	3
Nerve cutting	2
Nerve preserving	55
Drain on donor site	57
Duration of surgery	2h 15min – 3h 45min
Removal of last drain	4 - 10 days
Complications	
Flap loss	0
Partial flap necrosis	2
Hematoma	1
Seroma	2
Fistula	1
Infection	0
Reoperation	2
Breast simetrization	49
Immediate	3
Second stage	46
Discharged day	5 - 11 days
Socio-professional reintegration	20 - 30 days
Improvement in quality of life	Yes – 87 No – 1

Table 1 – overview on the experimental part of the study

The implants used are round shaped implants, with moderate to high projection and textured surface. Surface texture includes roughness (nano- and micro-roughness), waviness (macro-roughness), lay and flaws. The implant's shell is composed of a nodular textured surface: nodules with height of between 40-100 µm, diameter of 50-150 µm and a maximum total shell thickness of 1000 µm. In SEM (spectral electron microscopy) view, the surface appears almost geographical with height, flat-topped peaks and deep plunging crevasses; areas of this surface are characterized with ridges with periodicities between 1-5 µm.

The technique used with musculocutaneous LD flap consist in a skin paddle and large portion of muscle with complete detachment, it's safe and provide complete coverage of implant. Markings of flap is performed with the patients in standing position; first the new inframammary fold and the midline. On back, the skin paddle is design after a pinch test to check the amount available and the future donor site closure. It is recommended to place the incisions in transverse position so that the scar to be hidden in bra line.

The patient is placed in lateral decubitus position with the ipsilateral arm in abduction and resting on a padded brace so that decubitus lesions and brachial plexus injury are avoided. After skin incision is made, the flap is raised from the inferior and medial border. We detached the insertion of latissimus dorsi on humerus for a better mobility of the flap proximal to the entrance of the thoraco-dorsal vessels. The flap is rotated very easily and can be transferred to the anterior through an axillary tunnel.

Figure 1 – Results of breast reconstruction

With this method we can achieve good results (Figure 1), in terms of shape, volume, natural ptosis of new breast, and a very well-defined inframammary fold (Figure 2).

Figure 2 – Shape, volume, natural ptosis of the new breast

Also using round implants of 350 cc and generous flaps the total volume obtained can be higher, about 650 cc. It is a very useful salvage alternative in patients with radiotherapy which develop mastectomy flap necrosis and implant exposure (Figure 3).

Figure 3 – Patient with radiotherapy which develop mastectomy flap necrosis and implant exposure

Discussion

LD flap plus implant in delayed breast reconstruction is a classical method which demonstrated during the time its usefulness and liability in breast reconstruction. In combination with implant the new breast has superior

aesthetic qualities consist in volume, shape and projection similar with opposite breast [10,11].

Latissimus dorsi pedicled musculocutaneous flap consist of skin, fat tissue and muscle from the upper back. The vascularization is provided by the thoraco-dorsal pedicle which is the final branch of subscapular vessels and the innervation is assured by the thoraco-dorsal nerve. This method can be applied after almost all mastectomy cases and that is one of major advantages. The principal indication is when there is no sufficient abdominal tissue for TRAM or DIEP flap.

LD flap and silicone implant represent an important alternative also for delayed breast reconstruction in irradiated post mastectomy cases. Irradiate tissue lose their elasticity so that the pocket can offer enough space, to receive an implant, but in many cases without possibility to cover the implant. LD flap is a highly effective tool in dealing with the many difficult situations seen in the radiated breast [8] because the latissimus muscle provides healthy, vascularized coverage over the implant that lowers the risk of implant complications [8].

The cosmetic results are similar with others flap reconstruction [8]. Despite the preference for the TRAM flap, there was no statistically significant difference in aesthetic outcome between the TRAM and latissimus dorsi groups.

Another important advantage is rapid recovery with socio-professional reintegration, after 3-week comparative with abdominal flap breast reconstruction, which necessities 6-8 weeks. In delayed breast reconstruction cases with radiotherapy, women are after long therapeutic experience so they choose a method which not involves complex operation with slower recovery.

LD flap have consistent vascular anatomy due to thoraco-dorsal vessels which offer high survival rate – 97% after Bostwick [4] and do not require microsurgery for transfer [12]. They provide good coverage of implant with decreasing the infection and capsular contracture rates of implants breast reconstruction [12], especially for women who underwent radiotherapy.

This method is an excellent choice for women who don't have abdominal excess or have scars after previous surgery that can

compromise flap vascularization and for patients who don't want abdominal flap [12].

Also, LD flap with implant could be the plan B for salvage a previous complicated breast reconstruction method as wound dehiscence with implant exposure or abdominal flap necrosis.

Cosmetic qualities with good shape, volume and projection of new breast are superior comparative with abdominal flap. It is very suitable for thin patients whom implant based reconstructions tend to have fewer esthetic results [12], but also for overweight patients. At those patients, the flap consists in a supplementary fat paddle which provides an appropriate volume to the new breast.

Complications that can develop in breast reconstruction with LD flap are: complete flap loss, partial flap necrosis, hematoma, seroma, fistula, infections. Seroma is the most frequent complication after breast reconstruction with LD flap at donor site. Until now it was accepted that the drains can be removed when the fluids are less than 30 ml/day. Recent study shows that the risk of seroma is no higher if the drains are removed in the 3rd postoperative day [13]. To prevent seroma are used drains and quilting sutures [12].

When seroma developed despite these measures some authors recommend diluted fibrin sealant injections, sclerotherapy or steroid injections [12]. Evacuation by needle aspiration is an easy method and sometimes a second procedure is necessary. Seroma prevention can be done with suture chess table technique or with external compressive garment, but very carefully, to not compromise the vascular pedicle.

Textured implants attempt to disrupt the planar arrangement that fibroblast adopt on smooth-surface implant [14]. Large studies concluded that capsular contracture occurs less frequently in implants with the surface textures currently on the market [11]. In our series no case with capsular contracture occurred until the article's publication.

The primary goal of breast reconstruction is to recreate form and symmetry by correcting the anatomic defect while preserving patient safety and health. Now, however, it is known that reconstruction also can improve the psycho-

social well-being and quality of life of patients who have breast cancer [15].

Conclusions

Breast reconstruction using LD flap and silicone implant is a very affordable method which doesn't require any special surgical skills and equipment. It is suitable for almost all mastectomized irradiated patients. Textured implants have a good biological integration, even in irradiated tissues, with a low rate of immediate or later complications.

This reconstructive method ensures a new breast with superior aesthetic results like shape, volume, natural ptosis and improving the feature in time. For aesthetic aspect improvement, lipofilling is recommended. Donor site morbidity is less than all other reconstructive method with autologous tissue which contributes to fast recovery and socio-professional reintegration.

To minimize the chance of flap necrosis, we recommend Doppler ultrasonography before surgery, especially in cases where axillary lymph node dissection was performed. Even if lymphedema of upper extremity doesn't worsen, the patient should follow a lymphatic drainage exercises program.

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