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СОВРЕМЕННОЕ ПОЛОЖЕНИЕ ДЕЛ В РЕКОНСТРУКЦИИ МОЛОЧНОЙ ЖЕЛЕЗЫ ПОСЛЕ МАСТЭТОМИИ

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MODERN SITUATION IN BREAST RECONSTRUCTION AFTER MASTECTOMY

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Введение. В последние годы увеличивается число пациентов, выбирающих реконструкцию молочной железы после мастэктомии. Последние достижения в технике работы с аутогенными тканями, технологиях протезирования и разработка новых заменителей тканей привели к существенному прогрессу в реконструкции молочной железы.

Реконструкция молочной железы. Реконструкция молочной железы может быть разделена на две основные категории по времени операции (немедленная или отложенная) и по материалам, используемым для реконструкции (аллопластические или аутологичные).

Обсуждение. Таким образом, становится важной всесторонняя предоперационная оценка ожиданий пациентов и возможности определенного вида реконструкции. Пластические хирурги, занимающиеся реконструкцией молочной железы, должны обладать достаточными знаниями и опытом если не во всех, то хотя бы в большинстве методик реконструкции.

Выводы. Реконструкцию молочной железы следует рассматривать не как один из этапов после лечения рака груди, а как важную часть процесса лечения.

Ключевые слова: рак молочной железы, аутологичная реконструкция молочной железы, реконструкция молочной железы имплантом, качество жизни.

Introduction. In recent years there have been an increase number of patients choosing breast reconstruction after mastectomy. Recent refinements in autogenous tissue techniques, improvements in prosthetic technologies, and development of novel tissue substitutes have induced noticeable advances in breast reconstruction.

Breast reconstruction. Breast reconstruction can be classified into two major categories based on the timing of surgery (immediate or delayed) and on the material used to reconstruct the breast (alloplastic or autologous).

Discussion. A thorough preoperative evaluation of the patient's expectations and suitability for a particular reconstruction is therefore essential. Plastic surgeons involved in breast reconstruction should have considerable knowledge and experience, if not all, in most reconstructive techniques.

Conclusion. Breast reconstruction should not be considered a posterior step of breast cancer treatment. Breast reconstruction should be considered an essential part for an integral treatment.

Key words: breast cancer, autologous breast reconstruction, implant breast reconstruction, quality of life.

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INTRODUCTION

Breast cancer is the second most common cancer in the world and, by far, the most frequent cancer among women with an estimated 1.67 million new cancer cases diagnosed in 2012 (25% of all cancers). The lifetime risk of being diagnosed with breast cancer for women of all races is about 16%. This means one out of every 8 women will develop breast cancer at some point of their lives [1].

Breast reconstruction has become an appropriate option for women diagnosed with breast cancer, and in recent years there have been an increase number of patients choosing breast reconstruction after mastectomy. Several studies of women who undergo mastectomy find correlations between

aesthetic outcome and the level of depression and anxiety [2–7]. The myriad of reconstructive procedures available and the rapidly evolving nature of the field make it a particularly challenging area in plastic surgery. Maintaining competence in breast reconstruction requires not only expertise in technical innovations but also knowledge of the medical developments that influence patient care. The breast reconstructive surgeon is required to apply this breadth of expertise in a varying context of individual patient circumstances. It allows better aesthetic–functional outcomes and consequently an improvement of the psychological aspects of patients with breast cancer [8–9].

Recent refinements in autogenous tissue techniques, improvements in prosthetic technologies,

and development of novel tissue substitutes have induced noticeable advances in breast reconstruction. The approach to breast reconstruction will be adapted to attain an appropriate balance between minimizing the risk of recurrence and providing the best aesthetic outcomes.

Many authors have reported that women who undergo breast reconstruction have less mental distress about losing a breast and better cosmetic results, self body image, and overall quality of life [10–11].

The purpose of this article is to present our management of the different surgical techniques for breast reconstruction as well as the analysis of their involvement in the quality of life of our patients.

BREAST RECONSTRUCTION

Breast reconstruction can be classified into two major categories based on the *timing of surgery* (immediate or delayed) and on the *material used to reconstruct the breast*. Reconstruction can be performed through implants (alloplastic reconstruction), through body tissue (reconstruction with autologous tissue) or reconstruction using mixed techniques (implant placement + autologous tissue). All these techniques have a series of indications that will be analysed next.

The techniques that have gained more popularity in recent years are those that use the patient's own tissue to recreate the breast, since it offers results very similar to those of a natural breast. The flap used most frequently for autologous breast reconstruction is the deep inferior epigastric perforator flap. However, in some patient reconstruction using breast implants is more appropriate.

The surgical modality, choice of immediate versus delayed reconstruction, and approach for the contra lateral breast all must be established preoperatively. Patient concerns and expectations must be explored in depth. Patient incentives include the desire for wholeness and body image restoration and avoidance of external prosthesis use. Care must be taken to avoid expectations that are too high by clearly describing potential complications and expected results [9].

Autologous tissue reconstruction remains the technique associated with the highest patient satisfaction and represents the gold standard for recreation of the breast mound. The surgeon specializing in this field requires experience and knowledge of all available techniques to guide the patient to the technique best suited to their particular diagnosis, values, and long-term goals [12].

Timing for breast reconstruction

– Immediate reconstruction

Immediate reconstructions permit skin-sparing mastectomies and reduce the total number of pro-

cedures and associated costs needed for the final outcome. Skin-sparing mastectomies markedly improve appearance by limiting incisions to the periareolar region and avoiding a skin color mismatch. The avoidance of an interim period of mastectomy deformity can have psychological benefits. Paradoxically, women who have delayed reconstructions experience greater increases in quality-of-life measures and satisfaction with breast appearance than immediate reconstruction patients [13]. Differences in preoperative mental health states and expectations likely account for this phenomenon. Skin-sparing mastectomy and immediate reconstruction has been found to provide superior cosmetic results and comparable quality of life to breast conservation therapy [14]. Skin-sparing and modified radical mastectomies result in similar rates of mastectomy skin flap necrosis and local recurrence [9].

Most women with breast cancer are candidates for immediate breast reconstruction and should be considered in all prophylactic mastectomies.

Immediate breast reconstruction may not be appropriate for women with very advanced or rapidly growing tumors where surgical margins may be involved, those with multiple or serious medical problems, and those who are psychologically unprepared for reconstruction. Smokers are at increased risk of complications and should quit smoking as far in advance of surgery (6 weeks) if possible.

– Delayed reconstruction:

Delayed reconstruction is possible any time after cancer treatment is complete. There are neither age limits nor a finite length of time after mastectomy (or lumpectomy) when reconstruction would not be considered. Delayed breast reconstruction should be considered if tumor clearance is uncertain and in patients with extensive Stage III or Stage IV disease in whom immediate postoperative chemotherapy and radiation is expected.

In delayed reconstructions, as opposed to immediate surgery, missing breast skin usually must be expanded by an implant or replaced using a flap. Additional scars may be visible when compared to immediate reconstruction (where the breast skin and often the nipple is preserved), and a secondary procedure will be required to reconstruct a nipple and areola (as opposed to nipple-sparing procedures).

Surgical procedures

Implant breast reconstruction

– Two-staged implant breast reconstruction

Traditional implant breast reconstruction involves two stages in which shapeless skin remaining after a mastectomy is slowly expanded over many months using a tissue expander. A permanent implant is placed in a second operation, and the nipple and areola are reconstructed as a third procedure in delayed reconstruction cases.

In the first stage, an expander is placed deep to the pectoralis muscle and fascia. Care should be taken to ensure good muscle coverage directly under the incision to prevent implant exposure in the event of mastectomy skin flap necrosis. The expander is then inflated using biweekly injections until a threshold overexpansion of approximately 30 percent is reached. In the second stage, which is usually performed within 3–6 months after, the inflated expander is replaced with a permanent saline or silicone implant.

In general, ideal candidates for tissue expansion are women who have not undergone irradiation when delayed reconstruction is performed.

– Single-staged implant breast reconstruction

Single-staged implant breast reconstruction is indicated in immediate cases in those women who are not likely to receive radiation therapy and who, due to the type of tumour, undergo a nipple-sparing or skin-sparing mastectomy.

The procedure should be considered in women with a small-breast size who have not undergone irradiation and who have excess chest wall skin after mastectomy, and also in women with a big-breast size using a nipple-sparing mastectomy following mastopexy or reduction pattern [15]. This type of surgery must be performed very carefully, since the skin flap of the mastectomy has poor irrigation, and if the sub dermal plexus is not properly preserved, it could cause skin flap suffering, with the subsequent extrusion of the prosthesis [16]. Intraoperative fluorescence imaging also can help to determine whether adequate perfusion is retained to the breast skin envelope for immediate insertion of the permanent breast implant [17].

Adjunct techniques for implant-based reconstruction after mastectomy include the use of biological (a cellular dermal matrix) and synthetic meshes that can be placed in the inferior pole of the breast or completely covering the implant. These adjunct techniques have increased considerably the

indication of implant breast reconstruction, allowing the reconstruction with implants in a single time. However, mesh placement is not without complications and its indications in reconstructive surgery are limited [18–19].

One-stage implant reconstruction is less costly than a two stage option and tends to better maintain the ptotic shape of the breast, which results in a more natural-appearing reconstructed breast.

The advantages of implant breast reconstruction include reduced operating times and surgical morbidity. The lack of a donor site facilitates the procedure from both a technical and a clinical point of view. Disadvantages include implant-related problems such as capsular contracture, deflation, and migration. Implant reconstructions generally have a less natural feel and appearance compared with autologous tissue. The typical need for a two phases surgical approach might also be viewed as a drawback.

Reconstruction with implants may be a good option in patients who have not received radiotherapy, in thin patients with very little autologous tissue to recreate a new breast, or in patients who, due to their medical conditions or their own preferences, require a short and simpler intervention. On the other hand, although the surgery is shorter, the patient may require a longer period in the reconstruction process, especially if two-staged reconstruction is required. As the implants are foreign elements to the human body, they may need a replacement in the future, so it presents less stability and longevity compared to reconstruction with autologous tissue.

In addition, it may be difficult to achieve a natural form with respect to the contra lateral breast, so this type of intervention is usually recommended in patients with small breasts, who do not tend to fall over time. Also is a good indication in bilateral cases, so it is easier to achieve adequate symmetry (Figure 1).



Figure 1. 47-year-old female who underwent risk-reducing bilateral mastectomy and immediate reconstruction with breast implant (anatomical breast implant 285gr). The patient refused the preservation of the nipple areola complex: *a* – shows the preoperative pictures; *b* – shows the postoperative result after 6 months; *c* – shows the postoperative result after nipple areola reconstruction at one year postoperative

In summary, reconstruction with implants has been frequently supported in patients with minimal donor sites or in those who wish to minimize the deformity of donor sites. Although the result is generally less natural compared with autologous tissue reconstruction, it can provide reasonable results in suitable selected patients.

Autologous breast reconstruction

Autologous reconstruction, on average, achieves the best cosmetic match to the native, mature breast. The reconstructed breast has ptosis that is determined by the native skin envelope, and a soft feel provided by the transplanted fat. Autologous tissues are more resistant to infection and not subject to capsular contracture. Finally, after the initial reconstruction and necessary revisions, autologous reconstructions require less late interventions and will change in size with patient weight gain and loss. Overall, this is the preferred reconstructive procedure in women who are appropriate candidates. The tissue of the abdomen, by its characteristics, is considered as the ideal donor site. It gives us, in most cases, enough volume to recreate a new breast, and the inherent characteristics of the skin and fat from abdominal area (colour, thickness and consistency) make it the most breast-like tissue [20–21].

– Deep inferior epigastric perforator flap (DIEP flap)

The DIEP flap has become the “gold-standard” technique of breast reconstruction, since it uses only skin and fat the lower abdomen, without altering the muscular function of the area.

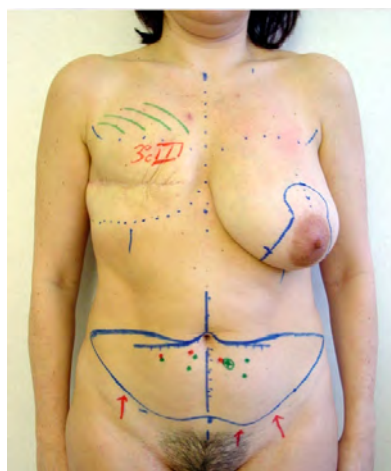
Dissection of the DIEP flap can be quite challenging technically, requiring surgical skills to perform successful flap dissection, but with experienced surgeon is a completely safe technique and offers good results.

Dissection of the perforating vessels of the deep inferior epigastric artery out of the rectus muscle yields significantly longer vessel lengths, thereby facilitating inset at the recipient site. Indeed, compared with free TRAM flaps, lower rates of abdominal wall herniation, pain, and bulge formation and shorter hospital stays have been shown. The DIEP flap has been shown to have less abdominal wall morbidity and lower fat necrosis rates, shorter hospital stays, and complete flap loss rates similar to those of pedicled TRAM flaps. As a consequence of shorter hospital stays, DIEP flap reconstructions have been found to be more cost effective than TRAM flaps [22].

Performing DIEP flaps in overweight and obese patients may not place the flap at greater risk because proportionately larger abdominal wall perforators are present in these patients. The use of

computed tomographic angiography can serve as a “road map” to optimally position the flap overlying the perforating blood vessels and to hasten the selection and dissection of the perforating blood vessels.

In many cases an aesthetic benefit can be offered to the abdomen. The excision of abdominal tissue is performed following the patterns of abdominal aesthetic dermolipectomy, trying to achieve the best result. The abdominal scar is designed to lie low on the torso and is usually completely hidden in undergarments or a swim suit. Closure of the abdominal donor site creates the effect of a “tummy tuck” (Figure 2).



a



b

Figure 2. 58 year-old female who underwent delayed right breast reconstruction with DIEP flap and breast contra lateral symmetrization: *a* – shows preoperative markings; *b* – postoperative result at 9 months

The double-DIEP flap is especially useful for thin patients who need additional volume to reconstruct the breast or for patients who have had radiation therapy who need a large amount of skin replacement.

All these characteristics lead us to define DIEP the technique of choice for breast reconstruction.

In our experience, applying this approach clearly and concisely, most patients opt for reconstruction with DIEP. We don't perform in those patients who have an alteration of the abdominal wall or lack of excess abdominal tissue. Relative contraindications are active smoking, obese patients (BMI > 30) and age over 70 years.

– Superficial inferior epigastric artery flap (SIEA)

The free SIEA flap carries the same abdominal tissue as the previously described flap. The vascular pedicle can be dissected superficially and inferiorly down to its origin off of the femoral vessels without damaging the abdominal wall. The flap has negligible abdominal wall morbidity beyond what would accompany a typical abdominoplasty.

It has the advantage of being the least invasive technique and that less morbidity causes the patient to not have to open the abdominal fascia to look for the vessels of the deep system.

However, the vessels tend to be small or absent and are only suitable for use in 30 percent of patients. In addition, the flap has a more limited vascular territory and is only appropriate for women with A to B cup breast sizes [23]. Routine dissection of the vessels is reasonable, as they may allow turbo charging (vascular augmentation) of compromised DIEP flaps.

– Other Free Perforator Flaps

If the abdomen does not provide an adequate source of tissue for breast reconstruction, the gluteal tissue (SGAP flap / IGAP flap), thigh tissue (TMG flap), lumbar flap (LAP flap), the posterior aspect of the thigh (PAP flap) or even flap from the contra lateral breast (breast-sharing flap) could be performed.

These flaps are not commonly used, and not all centres may offer these techniques. These flaps are usually used when the patient wishes to reconstruct with autologous tissue and it is not possible to perform abdominal tissue reconstruction or tissue from the dorsal region because they are very thin or they have had previous surgery that contraindicates their use.

The superior gluteal artery perforator flap carries fat and skin from the upper buttocks region. The donor site can result in buttock asymmetry, which occasionally requires a contra lateral balancing operation. The flap is nonetheless an improvement over the superior gluteal free flap because the pedicle is longer and muscle is not sacrificed.

The inferior gluteal artery perforator flap is similar to the superior gluteal artery perforator flap but uses tissue from the lower part of the buttock, resulting in better donor-site contour and a more concealed scar (Figure 3).



Figure 3. 1 year postoperative result after bilateral breast reconstruction with bilateral SGAP flap

– Pedicled Latissimus Dorsi Flap

The latissimus dorsi musculocutaneous flap is pedicled on the consistently reliable and robust thoracodorsal axis and is therefore a good option for patients with risk factors such as tobacco use, diabetes, or excessive body weight. The flap is generally used in combination with an implant reconstruction. Skin and muscle from the latissimus flap can be used to replace radiation-damaged skin. Unlike pure implant reconstructions, latissimus flaps allow the lower lateral pole of the implant to be covered with a thick layer of autologous tissue, resulting in a better aesthetic outcome. The flap can also be used without implants.

Overweight patients with small breasts are reasonable candidates for completely autologous latissimus reconstruction. However, donor-site asymmetry can be striking and may necessitate a balancing liposuction procedure.

Disinserting the muscle from its humeral insertion increases flap mobility, decreases breast movement with contraction, and makes the axilla more accessible for detecting nodal disease on physical examination. However, this maneuver does increase the risk of pedicle avulsion injury.

Shortcomings include the need for intraoperative repositioning/redraping and implant-related complications. Seroma rates of 47 to 96 percent are reported [24]. Donor-site asymmetry can be significant if large volumes of tissue are harvested in overweight patients. Although not common, some women may have weakness in the back, shoulder or

arm after this surgery by using the broad dorsal muscle for reconstruction [25].

– **Thoracodorsal Artery Perforator Flap (TDAP)**

The pedicled thoracodorsal artery perforator flap uses the same vascular supply and skin territory as the latissimus flap. Perforating vessels arising on or just medial to the superolateral border of the latissimus flap are dissected proximally through the latissimus muscle. Care must be taken when separating the vessels from the thoracodorsal nerve to preserve latissimus muscle function.

Wide variability in perforator anatomy is the main reason why this flap has not gained widespread popularity. The thoracodorsal artery perforator flap and the similarly conceived intercostal artery perforator flap is a potential solution for large quadrantectomy defects. Also, it has been described total breast reconstruction with TDAP flap [26].

– **Fat grafting**

Autologous fat grafting allows to achieve good results in the partial reconstructions of breast or to complement other reconstructive techniques (especially those that use patient's own tissue like the DIEP).

The increasing use of autologous fat grafting also has contributed to enhanced aesthetic outcomes using implant-based breast reconstruction. Surgeons have begun to perform fat grafting as a preliminary step after radiation therapy and before the exchange for the permanent implant. The objective is to decrease subsequent wound healing problems and implant dehiscence during the second stage (Exchange for the permanent implant). Future research will need to focus on the best timing at which to apply fat grafting to a reconstructed breast.

DISCUSSION

There is evidence showing that breast reconstruction is a safe option for the majority of women undergoing mastectomy for breast cancer and that it does not have an adverse effect on rates of recurrence [27]. Clinical guidelines around the world recommend that the option of breast reconstruction be offered to suitable women choosing or requiring mastectomy, with acknowledgement that this may need to be carefully sequenced with other cancer treatments and that in some situations delayed rather than immediate reconstruction may be preferable. Despite these recommendations, a highly variable proportion of women actually undergo breast reconstruction. Reported rates of breast reconstruction in population studies range from 5 to 30% [27]. A wide variety of factors including patient age, comorbidities, insurance status, planned adjuvant therapy, geographical and

local access issues as well as surgeon attitudes/expertise and patient choice have been proposed as explanations for generally low rates of reconstruction.

Breast reconstruction means a primordial step towards normality, not only restoring a lost organ, but also helps to regain lost femininity and helps to forget the terrible fight that has been carried out against the disease. It does not interfere either in the treatment or in the control of the patients, and more and more oncologists recommend breast reconstruction [28–29].

Ideally, all plastic surgeons involved in breast reconstruction should have considerable knowledge and experience, if not all, in most reconstructive techniques. From implant breast reconstruction and latissimus dorsi flap reconstruction to the more sophisticated techniques of perforator flaps (DIEP, SIEA, SGAP...).

Immediate reconstruction is currently considered the standard of care in this surgical intervention. However, the optimal timing for breast reconstruction after mastectomy remains a topic of controversy, especially in the setting of radiation therapy. Techniques also include a more focused use of flaps only in the setting of radiation therapy with increasing use of new perforator-based autologous tissue flap options [30–32].

Autologous tissue technique should, in fact, be used as a standard in breast reconstruction, except in cases where it is contraindicated, that may be medical conditions, women with few autologous tissues to recreate the new breast, or patient preferences.

Patient expectations play a major role in post-operative satisfaction, and realistic outcomes must be discussed from the outset. Patients deemed to have inadequate preparatory information before embarking on breast reconstruction have been shown to have a higher rate of decisional regret and dissatisfaction. A thorough preoperative evaluation of the patient's expectations and suitability for a particular reconstruction is therefore essential.

CONCLUSION

Breast reconstruction is an elective procedure that aims to improve the quality of life of patients affected by breast cancer. Breast reconstruction should be valued as more than rebuilding a breast in the context of a mastectomy. It is an essential step in the recovery of the physical and psychic sequels produced by the treatment of breast cancer in women, and should be analysed individually. Therefore, the only way to achieve good breast reconstruction begins with an adequate study of the disease and especially of the woman who suffers from it.

In this way the choice of the most appropriate technique should be done in a consensual way between the patient and the plastic surgeon. In order to achieve a truly adequate choice of technique, it is essential that the plastic surgeon have the sensitivity to understand the patient, the essential experience of all

surgical techniques and the ability to communicate in a clear and honest way to the patient.

Breast reconstruction should not be considered a posterior step of breast cancer treatment, it should be considered an essential part for an integral treatment.

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