8 Aesthetic Principles for Breast Reconstruction: Breast Aesthetic Units and Evaluation of Late Aesthetic Results

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8.1 Introduction

Aesthetics (*aisthésis*) is a branch of philosophy dealing with the study of nature and beauty. Several philosophers have encountered great difficulty when attempting to define beauty, or even ugliness, and even more when attempting to quantify this property. Kant, a respected philosopher whose aesthetic notions were quoted by his peers, asserted that it was impossible to establish theoretical rules to build beautiful things.

Upon attempting to establish aesthetic notions, physicians face difficulties in scientifically validating their results. Individual criteria are invariably attributed to judgment.

Because it is a subjective matter, aesthetic assessment imposes limitations on science's attempts to measure it. In breast reconstruction, a result is deemed good when it pleases most people, especially the patient. Questionnaires on quality of life can be applied as a scientific method to assess results, although quite often they were developed for other medical areas and later adapted for plastic surgery. Another possibility is to apply a statistically validated specific questionnaire to the assessment of results.

Recently, one such questionnaire, BREAST-Q, was validated. After application to 817 women, it proved to be an efficient instrument to assess aesthetic or reconstructive surgery of the breast. The development of standardized questionnaires is important because these instruments allow comparisons among publications by different institutions and thus represent a powerful scientific tool [1]. This questionnaire was used in several clinical studies. McCarthy et al. [2] applied it to 672 mastectomy patients and concluded that those who underwent reconstruction with silicone implants were more satisfied than those who underwent reconstruction with saline implants. Another group of researchers applied this questionnaire to 219 women who underwent reconstruction with implants and autologous tissue and found that the group with the transverse rectus abdominis myocutaneous (TRAM) flap was more satisfied with their new breasts [3].

In recent years, there has been increasing concern with judging the effectiveness of plastic surgery procedures by means of questionnaires. Despite its biases, this method supports the consolidation of surgical procedures based on the improvement of the quality of life. BREAST-Q might become an effective instrument for this purpose because it was developed specifically for plastic surgery and allows for the standardization of the assessment of results in future literature.

Are quality-of-life questionnaires able to assess aesthetic results? This question is the subject of long-standing debate because, even if it were proven that plastic surgery positively impacts quality of life, it is very difficult to quantify aesthetics. Despite these shortcomings, questionnaires represent an important tool for the validation of surgical techniques and may eventually compel health insurance companies to fund these procedures.

Owing to the difficulties in establishing a scientific method of assessing aesthetic results in plastic surgery, many of the notions discussed in this study are purely empirical and thus offer a low level of scientific evidence.

8.2 Breast Reconstruction

Breasts are viewed by many as a fundamental indicator of femininity or as an element of sexual attraction, and they represent a very important factor in the psychosocial balance of women.

Since 1980, postmastectomy breast reconstruction has become an integral part of the therapeutic plan in breast cancer. Evidence of the oncologic safety of this procedure and developments and advancements in several surgical techniques allow satisfactory reconstruction of the shape and size of breasts.

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The first decision to be made concerns the most appropriate time to perform the reconstruction, namely, whether during the same surgery as mastectomy or delayed by several months or years.

In ideal circumstances, immediate is preferred to delayed reconstruction. Patients are thus spared the trauma caused by breast amputation and have better odds of good aesthetic results because the anatomical elements are better preserved and less susceptible to the effects of late wound healing.

The choice of the reconstruction technique involves a complex assessment that must begin at the preoperative evaluation. The clinical history and physical examination allow not only the estimation of the anesthetic and surgical risks, but also prediction of the viability of certain reconstruction techniques. Ideally, reconstruction must be individualized, and no priority should be attributed a priori to any of the several available possibilities.

There are several techniques for breast reconstruction and they differ in the amount of tissue to be removed in the mastectomy, its localization, and the possibility of autologous tissue donor sites.

The anatomical elements that might require replacement include skin, glandular tissue, and the areolar–papillary complex. The extent and localization of the replaced tissue depend on the oncologic surgical treatment.

Breast reconstruction historically passed through several evolutionary phases as a function of its results. Initially, surgeons sought only to create a mammary volume. Next, the challenge was to give a proper shape to the reconstructed breast. Currently, it is possible to reconstruct symmetric breasts, aiming at attaining better balance. However, the search for perfection continues, and recently, an aesthetic concern arose regarding reconstruction. The challenge of applying aesthetic notions to reconstruction has become a trend, and the description of the anatomical units of the breasts and the chest wall motivates the discussions.

The assessment of the aesthetic results of reconstructions focuses on the attainment of symmetry in the volume, shape, and position of the breasts. This symmetry is a primordial, universally accepted notion, which is the goal of all patients. A new aesthetic criterion to consider was recently described, and concerns the anatomical units of the breast. According to this principle, instead of repairing only the damage caused by the oncologic-surgical treatment, the total reconstruction of these units might afford better aesthetic results [4, 5].

8.3 Breast Aesthetic Units

Burget and Menick [6] described the aesthetic subunits in nose reconstruction. The idea that the replacement of a full unit was better than partial reconstruction induced an extraordinary improvement in results. Similarly to nose reconstruction, the principle of aesthetic subunits in the planning of reconstructive breast surgery might result in better quality of the final results.

One of the aims is to restore the tissue in the most similar and natural manner possible with minimal scarring trauma.

In aesthetic breast surgery, surgeons choose to perform the incisions on the skin folds and anatomical sulci (axillary fold, inframammary fold, and areolar margin), thus reducing the stigma of a surgical intervention. In reconstructive surgery, this principle might not be followed owing to the oncologic priority of treatment. The localization and extent of the neoplasm determine the position of the scars. Nevertheless, the current approach still considers the aesthetic side without interfering in the local–regional treatment of disease [7].

On these grounds, in recent years, the concept of breast oncoplastic surgery emerged, which might be defined as the balance between the maximal local–regional control of breast cancer and the minimal possible trauma.

In the literature on breast cancer, the breasts were described as geometric circles divided into quadrants (“mammary mass”), without taking into account the natural and anatomical shape (of a drop) or the aesthetic demarcation lines. Surgical incisions on uncovered areas of the skin are aesthetically unpleasant. One of the main stigmas associated with the full process of breast reconstruction is the scar resulting from the catheter inserted to infuse chemotherapy agents, which remains visible on the upper chest area in the vast majority of patients [5].

In 1999, Restifo [8] applied the concept of breast aesthetic units in delayed reconstructions with a TRAM flap. In those cases where the lower flap was affected, the full lower pole was replaced by the skin island derived from the abdominal flap (TRAM flap).

A similar principle was applied by Coutinho et al. [9], who observed that it is often preferable to sacrifice a part of the preserved tissue and replace the full anatomical unit to attain more harmonious results. These same authors also reported their preference for single horizontal or oblique scars that do not encroach on the upper medial quadrant.

8.4 Langer’s Lines

Karl Langer, an Austrian anatomist, studied the skin of nonembalmed corpses and found that, although the bundles of dermal collagen fibers are placed in all directions, thus resulting in a resistant tissue, in any particular location, most fibers follow the same direction. He noticed that boring wounds produced by an ice pick on the skin of a corpse are slit-shaped rather than rounded because the ice pick divides the dermis according to the prevailing direction of the collagen fibers and thus allows the wound to open.

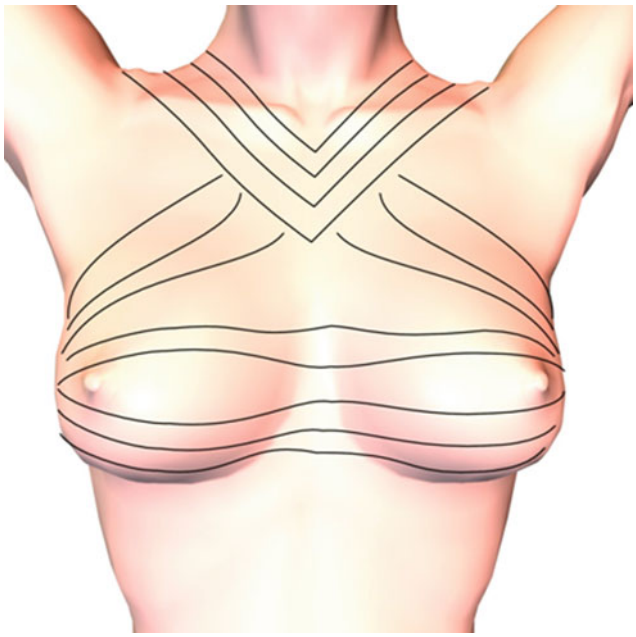

Fig. 8.1 Breast Langer's lines

The prevailing pattern of the collagen fibers determines the characteristic tension and wrinkles of the skin. The cleavage lines (also known as lines of minimum tension or Langer's lines) tend to be longitudinal spirals in the limbs and transverse in the neck and trunk [10].

Whenever possible, surgeons choose to follow the cleavage lines because they afford better-looking scars (Fig. 8.1).

8.5 The Subunit Principle

On the grounds of the breast subunit principle, two major approaches to reconstruction are described:

1. Reconstructions with flaps respecting the aesthetic subunits and thus producing good results.
2. Reconstructions not respecting the aesthetic subunits and thus giving a patch-like appearance to the anterior chest area.

The aesthetic subunits are characterized by the type of the skin, including its hue, texture, and thickness. These characteristics convey a uniform visual impression. The anatomical transitions between the breast and its boundaries, mainly the skin of the chest and the upper abdomen, demarcate clear transitional areas. Differences in the skin hue determine the characterization of the subunits and are crucial for the aesthetics of reconstruction.

Transitions are perceptible between the following locations:

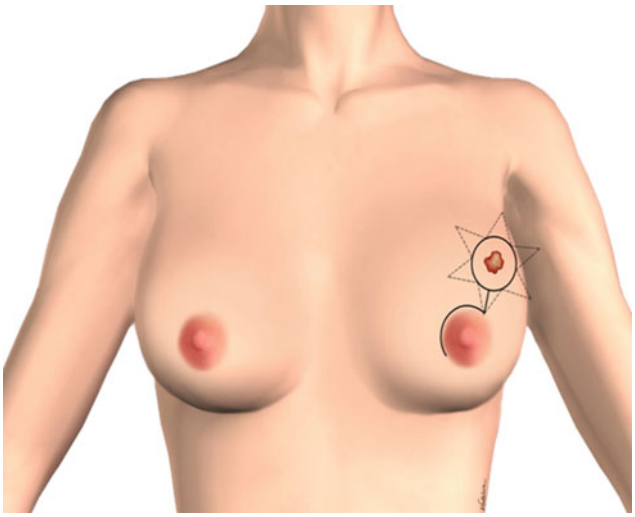

Fig. 8.2 The skin resection should be performed concentrically to the tumor, thus allowing the appropriate orientation of scars toward the better-camouflaged areas of the breasts

- Breast skin and areola
- Areola and nipple
- Breast skin and sternum skin
- Breast skin and upper abdomen skin
- Breast skin and lateral chest wall skin

Spear and Davison [11], in a 2003 review covering 10 years, assessed 264 patients who underwent reconstruction with autogenous tissue and concluded that the main breast subunits to be reconstructed and that afforded the best results in terms of appearance and scar camouflage were the areolar–papillary complex and the periareolar area. Once again, they emphasized the importance of taking these structures into account in surgical planning to achieve good results.

8.6 Reconstruction in Partial Mastectomies

The main goal of partial reconstruction is to preserve the cone shape of the breasts with the areolar–papillary complex centered on the breast projection apex. Scars must be linear or oblique and follow the lines of force (Langer's lines). Whenever possible, it is advisable to place the scars in the lower quadrants, inframammary fold, and periareolar area. The most difficult areas, which result in more visible scars, are the upper medial quadrants, which are not covered by the clothes.

The skin resection should be performed concentrically to the tumor, thus allowing the appropriate orientation of scars toward the better-camouflaged areas of the breasts (Fig. 8.2).

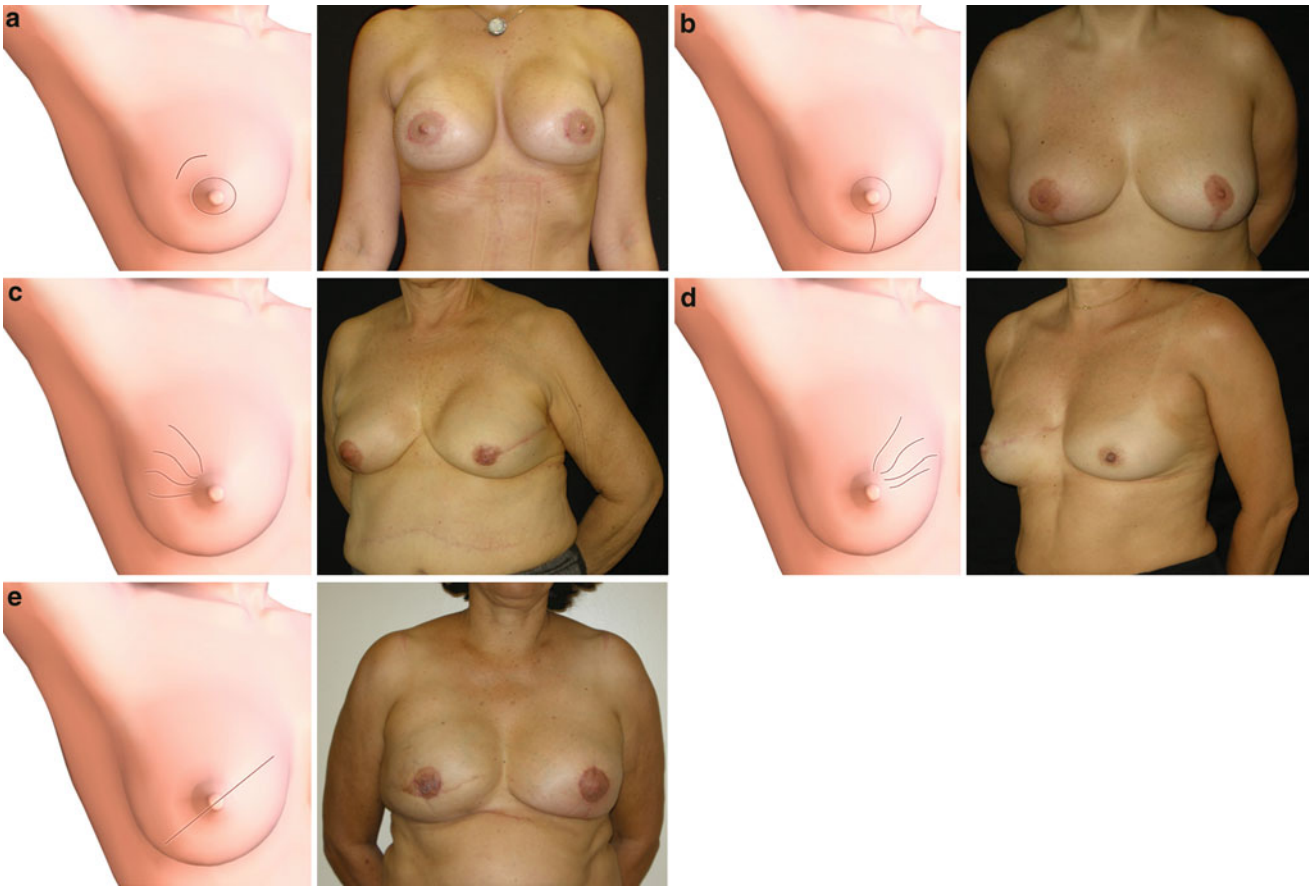

Fig. 8.3 Scar types: **a** type 1–periareolar scar; **b** type 2—scar on the lower pole; **c** type 3—scar on the upper lateral quadrant; **d** type 4—scar on the upper medial quadrant; **e** type 5—scar crossing over quadrants

8.7 Classification of Aesthetic Results According to the Position of Scars (Sampaio and Fraga)

According to the principles of the position and quality of scars in breast reconstruction, the scars may be classified into five types in decreasing order as a function of the aesthetic results (Fig. 8.3):

1. Periareolar scar (most favorable)
2. Scar on the lower pole
3. Scar on the upper lateral quadrant
4. Scar on the upper medial quadrant
5. Scar crossing over quadrants (least favorable)

8.8 Reconstruction in Total Mastectomies

Attention to the breast subunits favors the aesthetic results of reconstruction. Scars on the inframammary fold and lateral wall of the chest have better quality than scars on the medial and upper pole.

The total reconstruction of one breast segment affords better results than the reconstruction of one quadrant because it avoids the patch-like appearance.

The approach to reconstruction that emphasizes the importance of the breast aesthetic units affords surgeons the possibility of choosing the best surgical technique and of offering patients differentiated and more attractive results.

8.9 Classification of Breast Reconstruction Results According to the Position of the Flap (Sampaio and Fraga)

According to the principles of flap position and scar quality in mastectomies, we may classify the reconstruction types from the aesthetic point of view into four types in decreasing order (Fig. 8.4):

1. Flap in the lower pole (most favorable)
2. Flap in the upper pole
3. Full breast reconstruction
4. Central flap crossing over quadrants (least favorable)

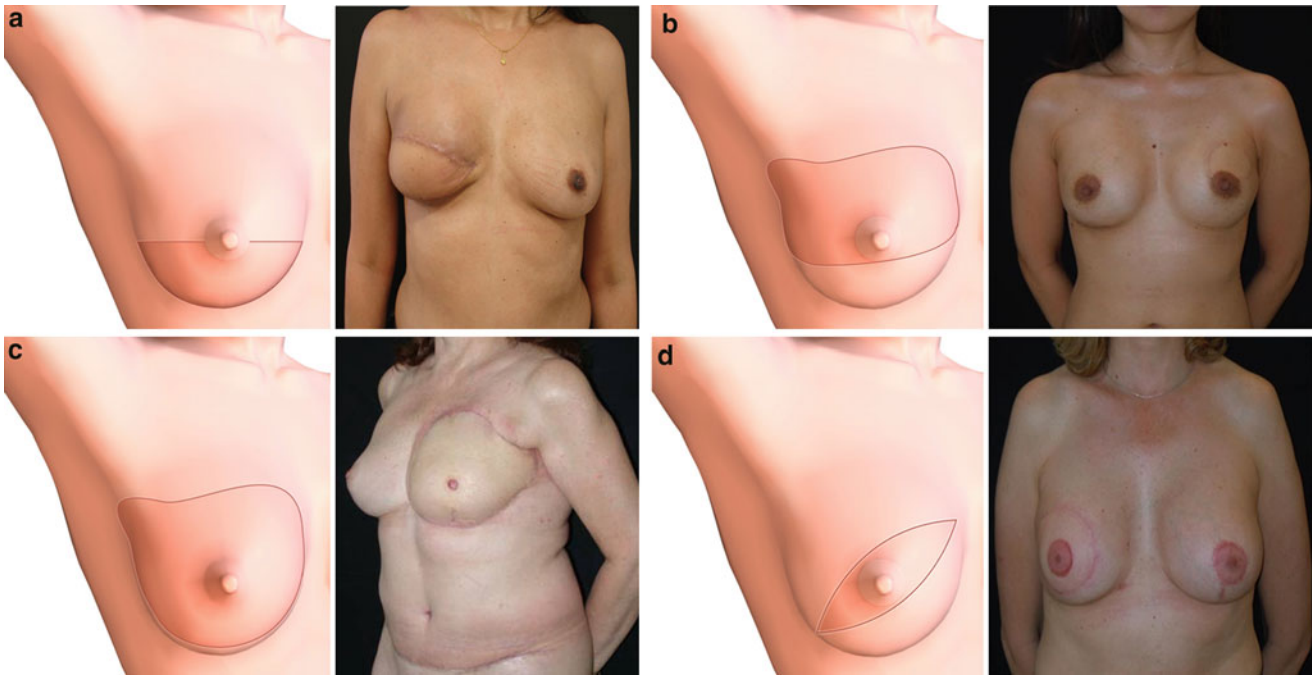

Fig. 8.4 Reconstruction types: **a** type I—flap in the lower pole; **b** type II—flap in the upper pole; **c** type III—full breast reconstruction; **d** type IV—central flap crossing over quadrants

8.10 Long-Term Results of Breast Reconstructions

8.10.1 Psychological Aspects

A series of studies performed in the last 25 years considered the psychological aspects of patients who underwent mastectomy.

The earliest reports described a wide range of disorders, ranging from depression to the loss of the body image and eventually to suicide attempts.

Recently, more thorough studies have defined the psychosocial traumas related to mastectomies, which include loss of femininity and mood, and interpersonal and conjugal disorders.

Breast reconstruction acts as a "reverse mastectomy," and it provides the most effective means of restoring biopsychosocial well-being.

The most frequently performed types of breast reconstruction are expanders, implants, expander prostheses, and autogenous flaps (TRAM and latissimus dorsi flaps).

In 2000, Wilkins et al. [12] compared the psychological benefits of breast reconstruction on the basis of the time and type of procedure. They concluded that both immediate and delayed reconstruction promote substantial psychological benefits and that the type of reconstruction (expander/implants versus pedicled or free TRAM flap) in immediate reconstruction does not significantly affect the psychological status [12].

In delayed reconstruction, the use of expanders/implants promotes greater improvement of vitality and well-being, whereas the use of autogenous flaps is associated with more remarkable improvement of the body image [12].

8.11 Complications of Postmastectomy Breast Reconstructions

In 2002, Alderman et al. [13] assessed, the complications associated with the time and type of reconstructions as well as other variables, such as body mass index, radiotherapy, chemotherapy, age, and smoking. A total of 326 patients were analyzed, and the complications were classified as total or partial [13].

The results showed that immediate reconstructions are associated with a higher (statistically significant) rate of both total and partial complications compared with delayed reconstructions [13].

The body mass index is a variable associated with higher (statistically significant) rates of complications independently of the time and type of reconstruction [13].

No significant differences were observed in the rate of complications for the remaining variables or the type of procedure. However, certain evidence suggests higher rates of total and partial complications with the use of implants combined with radiotherapy and in patients who undergo reconstruction with a TRAM flap and have chemotherapy [13].

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