# Conservative Surgery and Oncoplastic Surgery

4

Carlo Mariotti, Pietro Coletta, Sonia Maurizi, and Elisa Sebastiani

## 4.1 The Evolution of Breast Surgery

Breast cancer (BC) is a nosological entity of high social interest due to its high rate of occurrence, as well as to the devastating consequences that patients may suffer, both esthetically and psychologically, and also in terms of the economic and organizational commitment to research and public health that it entails.

It is needless to say that the importance of the breast for women goes beyond its mere biological function, since it is among the most significant symbols of femininity and sexuality.

The total or partial removal of the breast alters the patient's body image, with serious consequences for her daily/working life and relationships, often triggering psychological disorders, that vary in type and severity. Therefore, the surgical approach, besides pursuing oncologic radicality, needs to encompass an adequate cosmetic solution for the patient. These considerations, which nowadays seem to be obvious, are the outcome of a great conceptual evolution that has marked an epochal change in BC surgery, a revolution, which has lasted for more than a century and based on various elements:

- Scientific research, which, over the years, has gained a more and more refined knowledge of the biological factors that influence biological behaviour and natural history of the disease
- Improvement of diagnostic tools
- Increased treatment options
- Growth of cultural awareness of the problem for women
- Role of the mass media.

C. Mariotti (✉)
Department of Surgery, Breast Surgery Unit, Ospedali Riuniti University Hospital, Ancona, Italy
e-mail: mariotticarlo@alice.it

C. Mariotti (ed.), *Oncologic Breast Surgery,*
Updates in Surgery
DOI: 10.1007/978-88-470-5438-7_4, © Springer-Verlag Italia 2014

In fact, we have gone through the knowledge and the observation of an already locally advanced disease, due to a late diagnosis deserving a very destructive and invasive treatment for the patient, both physically and psychologically, to an early diagnosis of a small tumor, often not even palpable. This has allowed a more conservative treatment, which favors excellent cosmetic and functional outcomes, while rigorously respecting the principles of oncologic radicality.

William Halsted (1852–1922) considered to be the father of breast surgery, delineated radical mastectomy in 1894, which still bears his name, and has represented the surgical therapy of BC for about 100 years [1].

The revision of Halsted's concepts represented the first step towards modern breast surgery. The following aspects were questioned:

(a) The belief that BC first spreads through the lymphatic system and then into the blood stream
(b) The belief that BC, regardless of size, spreads cells throughout the parenchyma and the rich lymphatic network, and explaining why the total removal of the breast is always required
(c) The belief that all the lymphatic system, including that which penetrates the pectoral muscles, is entirely affected through the mechanism of "permeation", by the spreading of the cancer, making mandatory the removal of the pectoral muscles during the mastectomy.

Only later instead, it became clear that the lymphatic diffusion of the tumor almost always occurs exclusively through an embolic mechanism and not a permeative one.

Failures regarding local recurrence (LR), disease free survival (DFS) and overall survival (OS), has opened up new fields of surgical research. On the one hand, there were surgeons who supported a radical extremism (extended radical mastectomy [2, 3], and super-radical mastectomy [4]. On the other hand, those who encouraged the hypothesis of a different course of action, supported by the first attempts at a conservative approach, were more in line with new scientific ideas, technology and innovative therapies (chemotherapy and radiotherapy) and also more respectful towards women.

The first results were encouraging, although not in the long term, but they had the outstanding role of breaking down the barrier of scepticism about the effectiveness of therapies that were not "traditional".

The role of women has been of great relevance in this evolutionary process: knowledge and awareness of BC and of the options for treatment and cure, has given the patient the right to be part of the decision-making process of therapy.

The conservative cycle, which throughout the years influenced BC surgery first, then axillary surgery, and later radiotherapy and chemotherapy, emerged slowly, with the gradual abandonment of what had represented the therapeutic standard for a long time. The decline of "radicality thought" began in 1948 when the International Society of Surgery acknowledged the possibility of safeguarding the pectoralis major muscle during radical mastectomy, which later became known as the modified radical mastectomy of Patey [5, 6].

Ten years later, the first true conservative surgical treatment, lumpectomy combined with radiation, was proposed by surgeons from Guy's Hospital of London. The not brilliant outcomes, both in terms of survival and LR, held back, although temporarily, the development of conservative surgery. Between 1963 and 1968, a multicentral randomized study was being carried out to compare radical mastectomy with and without the dissection of the internal mammary chain. Published by Lacour in 1976, it involved five centers with 1453 patients enrolled, with an equal 5 year survival rate between the two procedures [7]. This data was consolidated by a similar study carried out by the Cancer Institute of Milan [8] with a 10-year follow-up and another study by Lacour in 1983 [9].

## 4.2 The Achievement of Conserving Surgery

The failures of aggressive surgery made way for the Milan I trial (Milan I 1973–1980), which marked the history of breast-conserving surgery (BCS). It was presented to the international scientific community by Veronesi in 1969 [10], with the proposal of a new surgical operation, the quadrantectomy, which employs the removal of the breast quadrant along with the tumor, the overlying skin, as well as the pectoralis muscle fascia, with a radial incision from the areola to the periphery of the breast. This treatment, which soon became known by the acronym QUART, was combined with an axillary lymphadenectomy and locoregional radiotherapy.

In this study, a clinical trial was carried out on 701 enrolled patients, comparing quadrantectomy with radical mastectomy, and no significant differences resulted in terms of DFS and OS in the long term . The results of this multicentral study had great impact and resonance on the scientific world and beyond. It was published for the first time in the New England Journal of Medicine, but it also appeared in nonscientific newspapers (The New York Times, 2nd June 1981) and represents a milestone in the history of breast surgery [11, 12].

At the same time, as support, a randomized French study appeared in scientific journals. It compared mastectomy and lumpectomy with the sampling of axillary lymph nodes, followed by radiotherapy on the mammary glands, obtaining the same results in terms of DFS, OS and LR after 10 and 15 years [13, 14].

Another fundamental study was the randomized American study NSABP B-06 of 1976 carried out on 1851 patients, which compared radical mastectomy, lumpectomy and lumpectomy with radiotherapy, obtaining the same results in terms of DFS and OS. This study has proved the role of radiotherapy in reducing LR after lumpectomy [15-17]; this data was confirmed later in 2000 by the study EORTC 10801 [18].

The above mentioned literature has radically changed traditional convictions, reinforcing the concept that the prognosis of BC is not closely linked to the extension of the locoregional treatment, but more to the characteristics of the disease (scientific research continued to clarify this aspect throughout the

years). A less aggressive local treatment does not affect the natural history of the disease.

At that point, the new challenge was:

- Extension of breast excision needed
- Adequate free margin
- Treatment to be combined with surgery
- Timing and modality of treatment.

In the Milan II trial, the Cancer Institute of Milan randomized 705 patients with T1 tumors and compared QUART with tumorectomy with axillary dissection and radiotherapy (TART). 10 years later, the real significant difference was in the percentage of locoregional recurrences of the TART group [19]. The role of radiotherapy was given importance by many subsequent studies, such as the Milan III trial, which was carried out on 567 patients with tumors up to 2.5 cm, where QUART was compared to quadrantectomy without radiotherapy (QUAD) [20].

In addition to these results were those obtained from "equivalent studies", which evaluated, as an endpoint, qualitative parameters on the improvement in the quality of life linked to every single surgical procedure, rather than the survival.

The 1980s were a historical breakthrough for the surgical treatment of BC; thanks also to the Italian School the entire way of treating breast cancer has been revolutionized; "from the maximum tolerable treatment to the minimum effective treatment", conservative surgery as a treatment for breast cancer went beyond the purely surgical facts and became a new philosophy and a new way of handling and approaching patients [21].

The following years brought about scientific confirmation and the consolidation of ideas. A conservative cycle started, initially focused on glandular surgery (breast-conservation therapy, BCT) and later able to influence another oncologic dogma, the axillary lymphadenectomy, by introducing the lymph node sentinel technique, and successively radiotherapy, which became increasingly PBI (partial breast irradiation), intra or postoperative . Finally, oncoplastic surgery and conservative mastectomy moved a step closer to less aggressive surgery, customized to the individual case, based on the instrumental, pathological or clinical data and discussed and agreed on with the patient.

Actual key points of the surgical treatment are:

- A detailed study of the disease (imaging, histological and biological assessment) and of the patient
- Choice of surgical treatment discussed and agreed on with the patient
- Local tumor control
  - Centering of lesion
  - Complete removal with free margin
  - Correct sending of the surgical specimen to the pathologist (patient's details, orientation of piece, specimen fixation)
- Esthetic, functional result.

### 4.2.1 Indications and Contraindications for BCT

The indications for BCT are, as follows:

- T < 3 cm, N0–1a
- No multifocality and multicentricity
- Good esthetic results expected
- Easy access to radiotherapy
- Availability of follow-up.

The contraindications for BCT are, as follows:

- I and II trimesters of pregnancy
- Multicentricity
- Previous radiotherapy
- Persistent positive margins after surgical treatments.

These are the "historical" indications of conservative surgery; the experience throughout these years, and the confirmations obtained through results, have led to the revisiting of clinical cases in which conservative surgery could be used by adding innovative oncoplastic surgical techniques: large tumors (T2 lesions), tumors with an extensive intraductal component, lobular histology, risk of margin close, unfavorable ratio between the volume of the breast and the size of the tumor (Fig. 4.1).

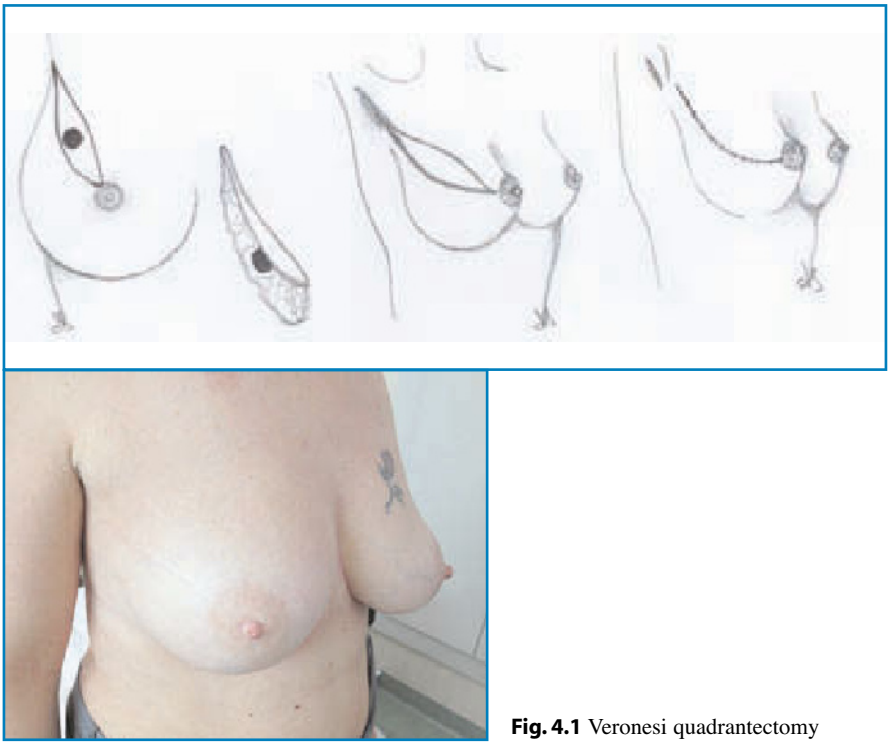

**Fig. 4.1** Veronesi quadrantectomy

However, BCS diffusion, success and oncologic safety have, over the years, shown some limitations and raised new questions:

- How much of the parenchyma is to be removed?
- Is it possible to operate conservatively on larger tumors?
- Is it possible to operate conservatively on tumors localized in small breasts or in quadrants at esthetic risk?
- To what extent does research on the cosmetic result respect oncologic safety?
- Which radiotherapy?

The need to obtain an adequate balance between oncologic radicality, extension of indications for conservative treatment and achievement of excellent cosmetic outcome, has established the oncoplastic surgical approach. This approach represents a further development in the surgical treatment of BC, respecting oncologic principles but, at the same time, preserving the esthetic integrity of the female body.

## 4.3 The Oncoplastic Surgery

This term was coined by Audretsch, in 1998, to indicate the necessity of combining and integrating plastic surgery techniques with oncologic surgery techniques for BC surgical treatment [22]; it was later used by Silverstein (2010): "oncoplastic breast surgery combines oncologic principles with plastic surgical techniques" [23].

Oncoplastic surgery (OPS) is the most advanced expression of BCS, since it aims at conserving the breast parenchyma while realizing an excellent cosmetic outcome for the patient, respecting the principles of oncologic radicality. This technical approach guarantees the pursuit of radical conserving surgery at its greatest extent and also guarantees demolitive surgery, conservation and cosmesis. It is a philosophy that requires a good knowledge of anatomy and surgical techniques, technical skills, adequate training, ability to grasp the cosmetic aspect and to foresee the achievable outcome, as well as a good ability to communicate with the patient.

"How can I remove this cancer with large margins of normal tissue while at the same time making the patient look as good or better than she looks now?" (Silverstein MJ) [23].

OPS involves:

- Removal of the ideal volume of breast parenchyma, to reduce the risk of LR
- Avoidance of breast deformity, especially for tumors situated in quadrants "at risk" (upper-inner and lower)
- Enlargement of indications for BCS and, therefore reduction of indications for mastectomy
- Ability to render BCS safer and better cosmetically.

Indications for oncoplastic surgery can be divided into:

1. Oncologic indications
   (a) Necessity of extensive breast resection (more than 20–40%) (average weight of the tissue resected with traditional technique, 40 g; oncoplastic, 220 g [24]; average volume with traditional technique, 117 $cm^3$, oncoplastic, 200 $cm^3$ [25])
   (b) Necessity of "margin free" (the risk of residual tumor is inversely proportional to the quantity of tissue removed around the tumor: the probability of residual tumor is 59% with 1 cm healthy tissue, 17% with 3 cm [26])
   (c) Large tumors (T2)
   (d) Tumors with extensive intraductal components or lobular histology
   (e) Patients not eligible for radiotherapy or mastectomy with reconstruction, because of age, comorbidities, size and characteristics of the breast
   (f) Patients who ask for breast conservation.
2. Cosmetic indications
   (a) Tumor size/breast size ratio (< 20%)
   (b) Location of tumor (central, lower or medial quadrants)
   (c) Request to reduce breast size
   (d) Significant ptosis and/or breast asymmetry.

The oncoplastic approach requires meticulous planning before the procedure:

- Tumor localization
- Size of the tumor
- Careful instrumental study (Mx, US, RM) of the spread of the tumor within the breast (localized, 55%; segmentally extended, 35%; irregularly extended, 10%) [27]
- Tumor size/breast size ratio
- Age of patient
- Comorbidity
- Probability of re-operation
- Contralateral reshaping
- Presence of donor sites for flaps
- Patient's choices and expectations
- Informed consent.

### 4.3.1 Oncoplastic Surgery: the Techniques

There are many surgical techniques that a breast surgeon needs to be aware of when planning an operation and for the optimization of the outcome: the cosmetic outcome depends on technique, volume that needs resecting and localization of the tumor; the various proposed classifications of surgical operations reflect the opinions and the experience available in literature and have for the most part a didactic purpose.

Yang's group, in Korea, proposes a classification based on the size of the

**Table 4.1** OPS techniques. (Modified from [28, 29])

| Volume replacement | Volume displacement |
|---|---|
| | **Glandular reshaping** |
| Lateral thoracodorsal flap | Parallelogram mastopexy lumpectomy |
| Thoracoepigastric flap | Purse-string suture |
| ICAP flap | Round-block technique |
| TDAP flap | Batwing mastopexy |
| LD myocutaneous flap | Tennis racket method |
| | Rotation flap |
| | **Reduction mammoplasty** |
| | Wise pattern (inverted T) |
| | Vertical pattern |

**Table 4.2** OPS techniques. (Modified from [32])

| Central tumors, occupying 10–20% of breast volume | Peripheral tumors, occupying 10–20% of breast volume | Excision of > 20–40% of breast volume, techniques of tissue transfer |
|---|---|---|
| Inferior pedicle (Grisotti) mammoplasty (central tumors involving the NAC) | Inferior to NAC: inverted T (WISE) mammoplasty, vertical scar mammoplasty | Latissimus dorsi mini flap |
| Benelli's round-block technique (central tumors not involving the NAC) | Inferior-outer/inner: J or L-mammoplasty | Thoracodorsal artery perforator lipodermal flap |
| | Lateral or medial to NAC: lateral and medial mammoplasty | Intercostal artery perforator flap |
| | Inframammary fold: IMF-plasty | |
| | Superior to NAC: inferior pedicle (Grisotti) mammoplasty; periareolar (Benelli) mammoplasty | |

*NAC*, nipple-areolar complex

excised breast tissue, which defines the possibility of reconstructing the breast defect with breast reshaping or with transposition of the remaining breast tissue, (volume-displacement techniques), or the necessity of undergoing an immediate resection-reconstruction with autologous tissue transfer (volume replacement techniques) (Table 4.1) [28–31].

White, from the British school, introduced two important elements: localization of the tumor with respect to the nipple-areolar complex (NAC) and the percentage of breast parenchyma to be resected (Table 4.2) [32].

When choosing a surgical technique other authors also take into consideration the density of the glandular tissue (almost entirely fatty, scattered fibroglandular densities, heterogeneously dense, extremely dense) [33]. An

**Table 4.3** OPS techniques. (Modified from [34])

| Tumor position | Procedures |
|---|---|
| Lower pole | Superior pedicle mammoplasty/inverted T or vertical scar |
| Lower-inner quadrant | Superior pedicle mammoplasty/V scar |
| Upper-inner quadrant | Batwing |
| Upper pole | Inferior pedicle mammoplasty/round-block mammoplasty |
| Upper-outer quadrant | Racquet mammoplasty/radial scar |
| Lower-outer quadrant | Superior pedicle mammoplasty/J scar |
| Central subareolar | Inverted T or vertical scar mammoplasty with NAC resection |

extremely dense breast parenchyma, highly vascularized, allows the detachment of the breast from the skin as well as the muscle without risking tissue necrosis. A different approach is necessary when treating a predominantly fatty breast scarcely vascularized. On the basis of these assumptions, Clough proposed a classification of OPS operations with two levels based on the amount of tissue excised, (more or less than 20%) tumor location and breast parenchymal density:

- Level I, excision volume less than 20% of the entire gland, requiring simple glandular remodeling techniques
- Level II, larger resected parenchyma, between 20 and 50%, requiring specific plastic surgery techniques (Table 4.3) [34].

Our attempt is to group all the operations that have conserving aims into the following classification:

1. **Techniques which involve or do not involve the repositioning of the NAC**
2. **Techniques that involve autologous tissue**
3. **Conserving mastectomies**
4. **Reconstruction techniques with fat grafting (Table 4.4).**

## 4.4 Conserving Surgery without NAC Repositioning

### 4.4.1 Local Glandular Flaps

Glandular resections carried out for small tumors result in minimal substance loss. In these cases, it is sufficient simply to suture glandular flaps to obtain a good cosmetic outcome. In the case of greater resections (up to 10% of breast volume), glandular suture might not be sufficient because the loss of substance could create tension or deformation. In this case, the gland needs to be detached, both superficially and deeply, creating "local glandular flaps" that can be used to fill the resective defect, while conserving a harmonious breast profile (Fig. 4.2).

**Table 4.4** Oncoplastic surgery techniques

| |
|---|
| **1. Breast-conservation surgery without NAC recentralization** |
| Local glandular flaps |
| **2. Breast-conservation surgery with NAC recentralization** |
| Inferior pedicle mammoplasty |
| Superior pedicle mammoplasty (inverted T scar) |
| V- or J-mammoplasty |
| Horizontal mammoplasty (batwing mastopexy) |
| Racqet technique |
| Grisotti flap (advancement and rotation) |
| Round-block technique (Benelli) |
| **3. Breast-conservation surgery and reconstruction with autologous tissues** |
| **3a. Local flaps** |
| Rhomboid flap |
| Lateral thoracic flaps |
| • TDAP (thoracodorsal artery perforator) |
| • Lateral thoracic flap/subaxillary flap |
| • Intercostal perforator flap (ICAP) |
| • Segmental latissimus dorsi (miniflap) |
| **3b. Free flaps** |
| • DIEP (deep inferior epigastric perforator) |
| • SIEA (superficial inferior epigastric artery) |
| • SGAP (superior gluteal artery perforator) |
| • IGAP (inferior gluteal artery perforator) |
| • TMG (transverse myocutaneous gracilis) |
| • Free TRAM (transverse rectus abdominis myocutaneous) |
| **4. Conservative mastectomies** |
| Skin sparing mastectomy |
| Nipple sparing mastectomy |
| Skin reducing mastectomy |
| **5. Breast-conservation surgery and reconstruction with fat transposition** |

## 4.5 Conserving Surgery with NAC Repositioning

### 4.5.1 Inferior Pedicle Mammoplasty

This technique is suitable for tumors in the upper central quadrant, near the NAC and, particularly, in the presence of a breast ptosis. In this case, areolar vascularization is ensured through the inferior pedicle, according to Ribeiro and Robbins [35, 36]. Quadrantectomy takes place at the junction of the two

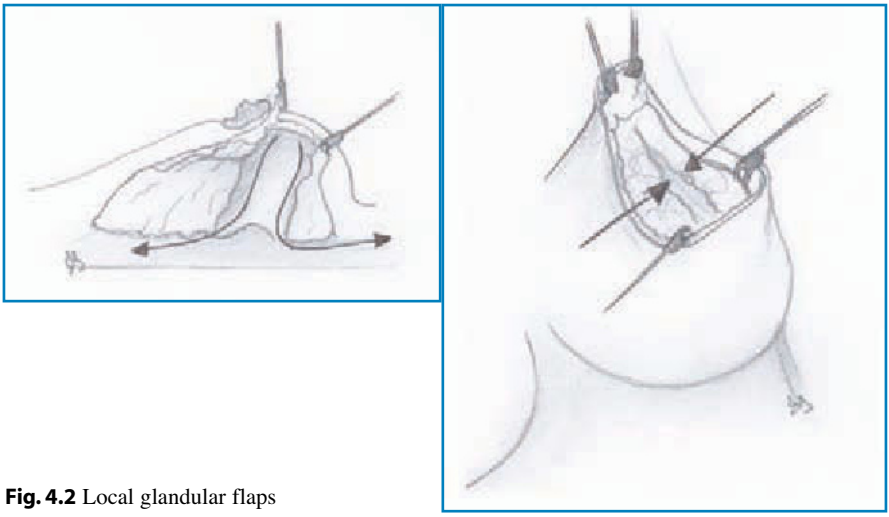

**Fig. 4.2** Local glandular flaps

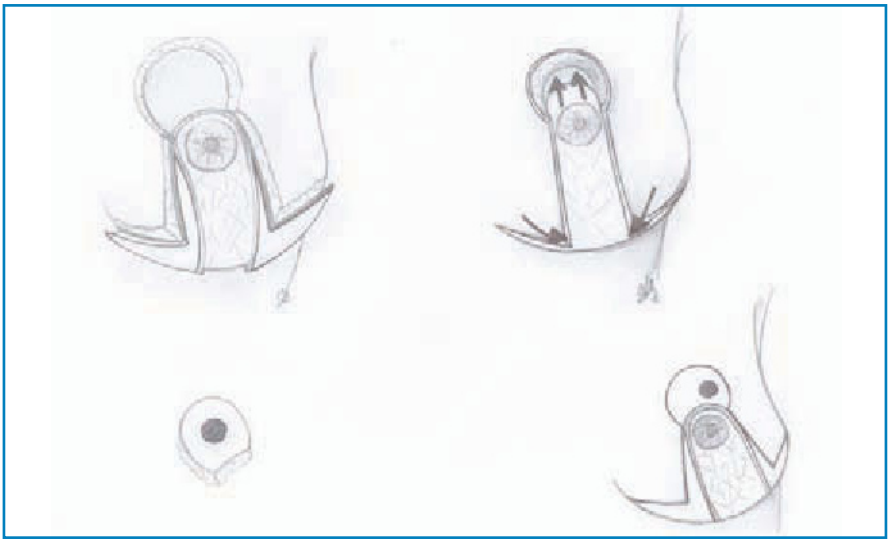

**Fig. 4.3** Inferior pedicle mammoplasty

upper quadrants in the upper central part. The de-epithelialization of the extended periareolar skin takes place caudally where the nipple will be repositioned. The glandular skin is then resectioned, together with the lesion in the upper central part, followed by subsequent glandular skin resectioning in the lower lateral and medial columns. The lower glandular flap is cranially sutured in the same position where the glandular resection took place and the NAC is also placed closer, correcting any resulting deformities. Glandular suturing takes place in the lower quadrants (Fig. 4.3).

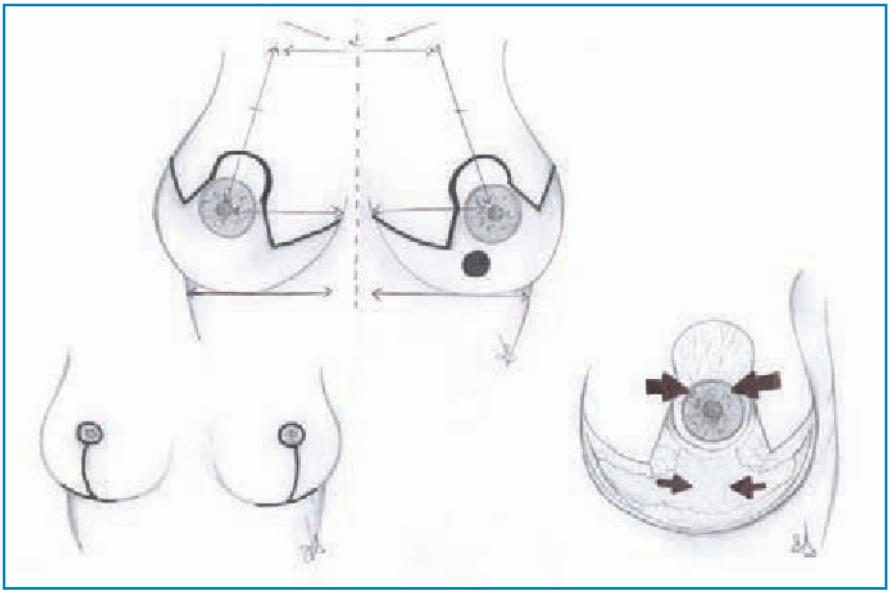

**Fig. 4.4** Superior pedicle mammoplasty with "inverted T scars"

### 4.5.2 Superior Pedicle Mammoplasty with "Inverted T Scars"

This technique can be used for tumors located in the inner lower quadrant. It begins with the de-epithelialization of the periareolar skin of the superior pedicle which is then detached together with the NAC, forming a very thin flap, supplied with blood from the superior pedicle, according to Pitanguy and Lejour [37, 38]. A skin incision is made in the inframammary fold along the entire length. A skin incision is then made at the top of the breast, at the edge, between the lower and upper quadrant, both medially and laterally. This is followed by an extensive resection of gland and skin in a caudo-cranial direction starting from the inframammary fold. The breast will be progressively resected and detached from the pectoral muscle.

Reconstruction starts with the reapproximation of the medial and lateral glandular columns towards the midline and ends with a skin suture made to obtain a smaller gland with a narrow base (Fig. 4.4).

### 4.5.3 V- and J-Mammoplasty

The **V-mammoplasty** is carried out when a tumor is located in the lower quadrants, particularly in the lower-inner quadrant of medium sized breasts with no ptosis. It is similar to mammoplasty with superior pedicle, but without incision of inframammary fold.

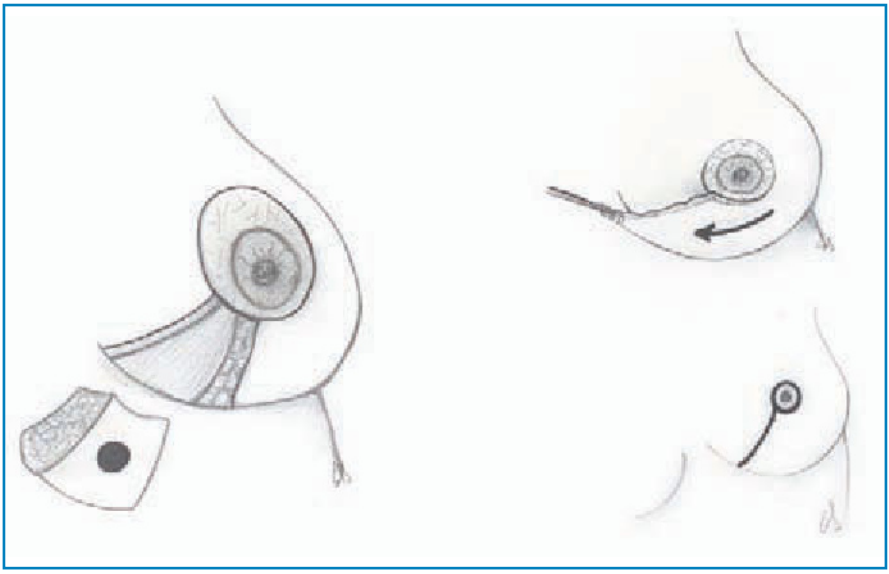

**Fig. 4.5** V-mammoplasty

The procedure involves the de-epithelialization of the periareolar region, followed by a V-shaped skin incision with a large base at the inframammary fold towards the inner quadrant. Once the surgical specimen is excised, a free glandular flap is created from the lateral margin of the resection, detaching the breast both in depth and superficially. The flap created is rotated clockwise or anticlockwise until it can be sutured to the medial or lateral flap. The procedure ends with the repositioning of the NAC (Fig. 4.5).

The **J-mammoplasty** is carried out when tumors are located in the lower-outer quadrants. The NAC is repositioned cranially to allow the best possible correction of any ptosis. Firstly, the procedure involves the de-epithelialization of the skin around the areola, followed by a skin incision that starts at the medial edge of the de-epithelialized area and continues, as before, up to the inframammary fold.

The second incision is contralateral to the first one starting from the lateral margin of the de-epithelialized area and, as before, continues up to the inframammary fold. The parcenchymal excision follows the skin in the form of a J.

The NAC is then repositioned centrally. The lateral and medial columns are placed next to one another and sutured once detached from the gland (Fig. 4.6) [39].

### 4.5.4 Horizontal Mammoplasty or Batwing Mastopexy

The batwing mastopexy is suitable for treating lesions in the upper quadrant and is particularly suitable for tumors in the upper-inner quadrant, at a higher

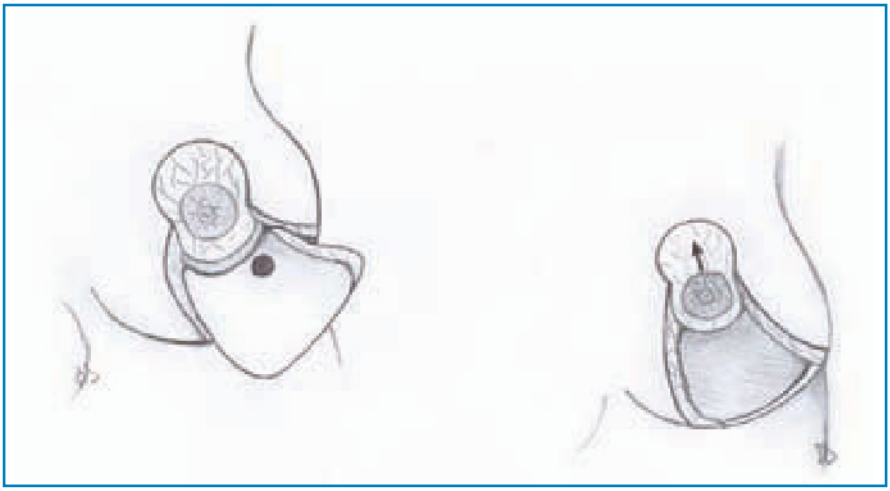

**Fig. 4.6** J-mammoplasty

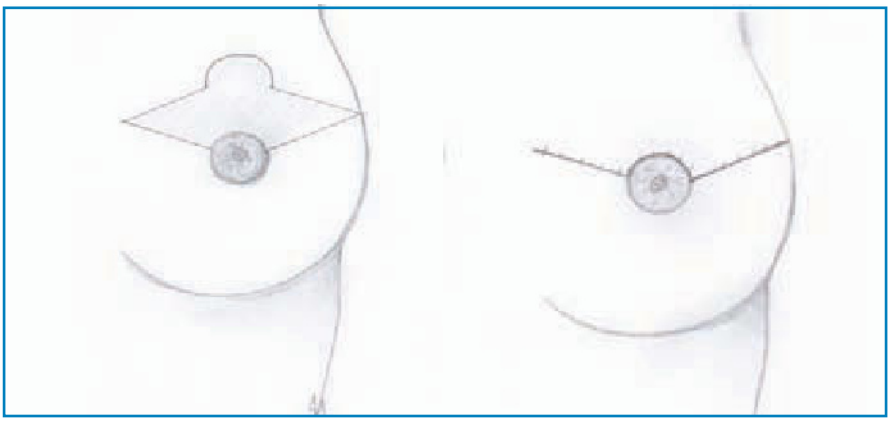

**Fig. 4.7** Horizontal mammoplasty (batwing mastopexy)

risk of deformity. It starts with a large omega skin incision, which includes the upper quadrants of the breast. It continues with the resection of the skin and the breast parenchyma in the upper quadrants (outer, central, inner) adjacent to the NAC, including the tumor. Once an adequate surgical safety margin is defined, the resection of the gland takes place reaching perpendicularly the pre-pectoral plan; the surgical specimen is then detached from the deep fascia. When the NAC and the breast parenchyma of the lower quadrants are reconstructed, they are sutured to the residual parenchyma of the upper breast hemisphere. At the end, the NAC and the breast are "cranialized" to correct the breast ptosis. In some cases this procedure can end up even without the central repositioning of the NAC (Figs. 4.7 and 4.8) [40].

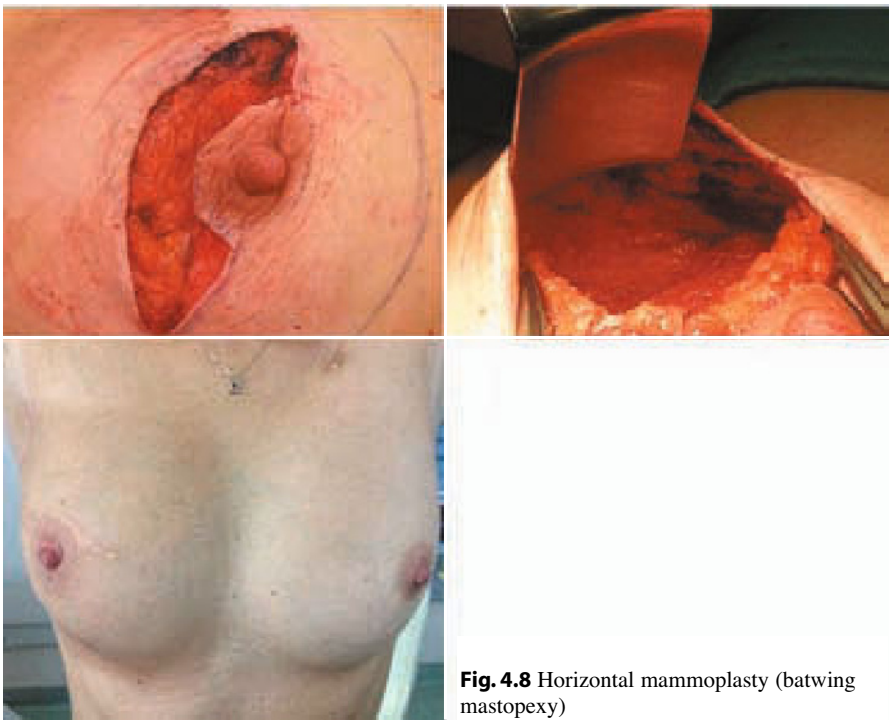

**Fig. 4.8** Horizontal mammoplasty (batwing mastopexy)

### 4.5.5 Lateral Mammoplasty or Racquet Technique

This technique is suitable for large tumors in the upper-outer quadrants, when the requested glandular resection is more than 20%. With this procedure, it is possible to remove the entire upper-outer quadrant, by sacrificing the skin overlying a tumor, from NAC to axilla. The procedure involves the de-epithelialization of the periareolar skin, followed by a lozenge-shaped skin incision in the location of the tumor. The sectioned area has the shape of a racket. Glandular detachment is carried out corresponding to upper-outer quadrant, from axilla to areola.

The mammary gland is then excised and the reconstruction is carried out to prepare, through detachment, two local glandular flaps (medial and lateral), which are placed next to one another and sutured together to fill the defect (Fig. 4.9) [41].

### 4.5.6 Advancement and Rotation Flap (Grisotti Flap)

Technique suitable for treatment of tumors in the retroareolar area. The procedure involves a periareolar incision with a skin circumference beyond the nip-

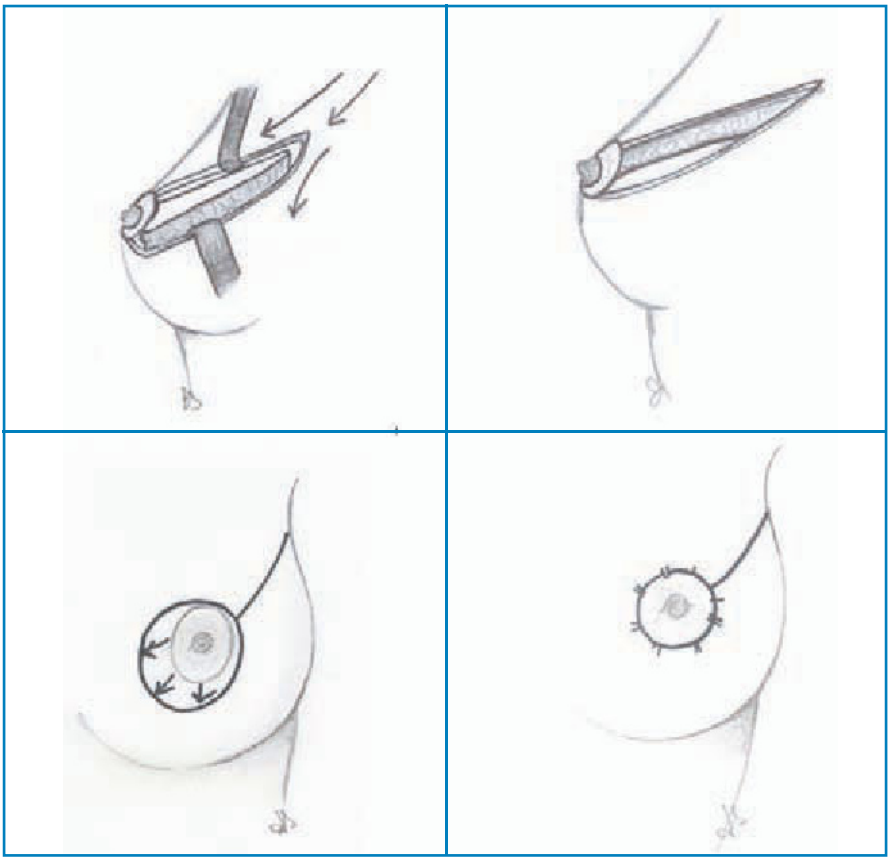

**Fig. 4.9** Lateral mammoplasty or racquet technique

ple. It proceeds with the de-epithelialization of the skin in the medial part of the junction between the two lower quadrants, reaching the inframammary fold, saving a piece of skin that will replace the nipple. Extensive resection of the breast under the areola is carried out, reaching the pectoral plane; the specimen, consisting of the gland whit the tumor, and the NAC is excised. The reconstructive phase involves glandular suturing to fill the resected area.

The piece of skin prepared earlier is moved together with its advancement flap and sutured proximally to build the new areola (Fig. 4.10) [42].

### 4.5.7 Round-block Technique by Benelli

Suitable for lesions in the upper central part, this technique is used for tumors in small/medium breasts, situated near the NAC but not spread into it. It can also be adapted to lesions in other breast quadrants.

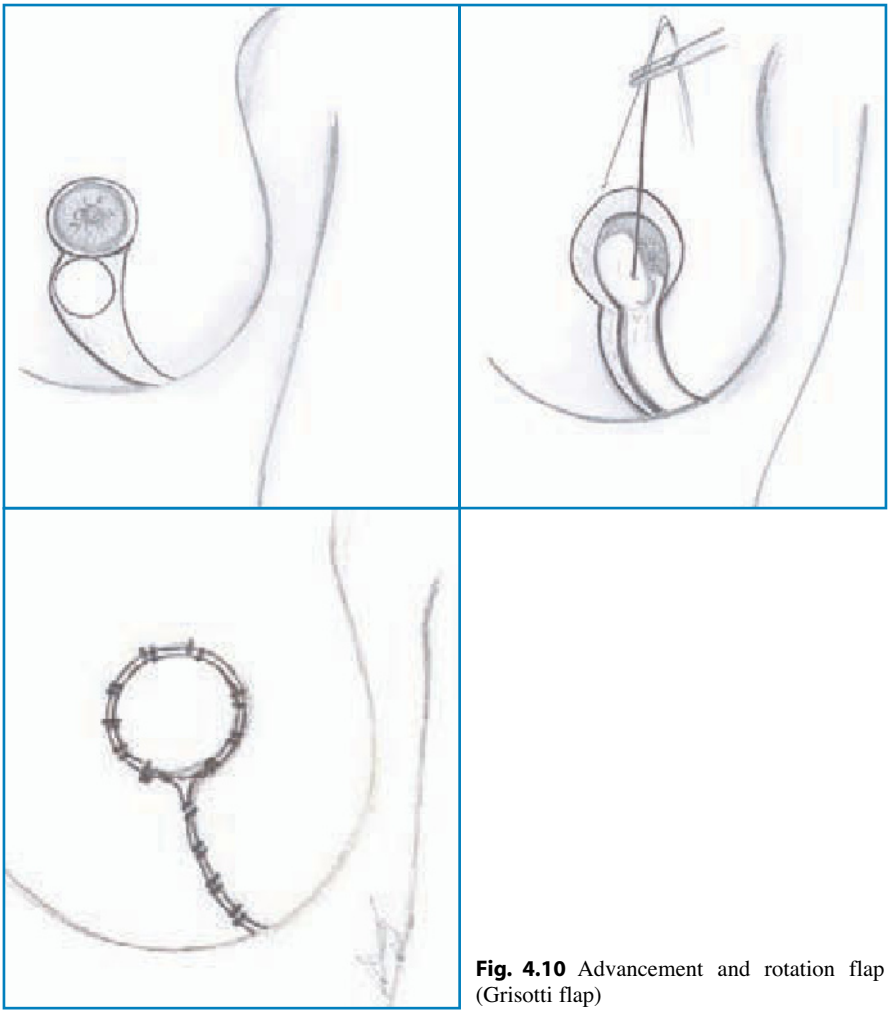

**Fig. 4.10** Advancement and rotation flap (Grisotti flap)

The procedure begins with two concentric incisions, the inner one being at the edge of the areola and the outer one at a distance dependent upon the location and size of the tumor, the location of the nipple and the degree of ptosis. The larger the tumor and the further it is from the nipple, the larger the distance between the two circumferences [43].

Subsequently, de-epithelialization of the skin between the two circumferences is carried out taking the precautions necessary to ensure the conservation of the blood supply to the derm. Starting from the outer edge of the de-epithelialized area, the superficial detachment of the gland from the subcutaneous layer is carried out; the gland is then dissected and detached from the

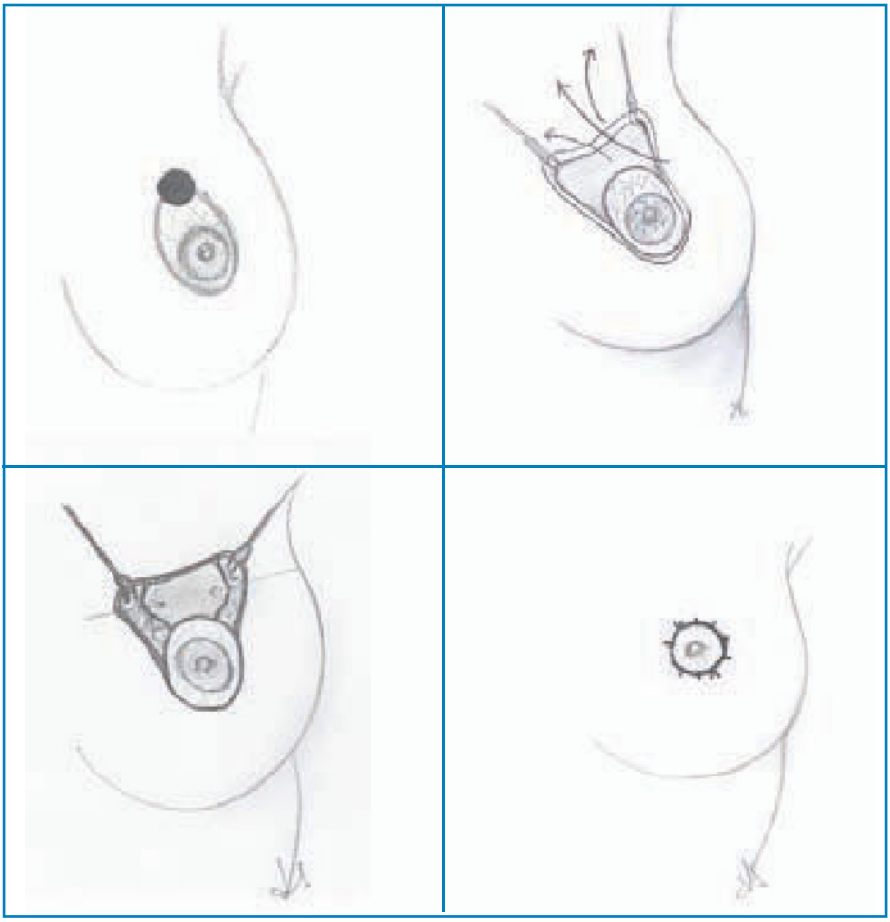

**Fig. 4.11** Round-block technique by Benelli

pectoral muscle and then excised. The reconstructive phase involves the preparation of local glandular flaps, with a superficial and deep glandular detachment, from the margins of the resection, which can be medially placed one near the other and sutured together at glandular points. Then the circumference of the external periareolar skin is sutured to the areola. The nipple is repositioned cranially. This operation results in a significant reduction of breast ptosis. The cosmetic outcome is satisfactory since it only leaves a surgical periareolar scar (Figs. 4.11 and 4.12).

**Fig. 4.12** Round-block technique by Benelli

### 4.5.8 Conserving Surgery and Reconstruction with Autologous Tissue

The use of volume replacement techniques in BCS, that is, the reconstruction of the gland with the transpositioning of autologous tissue, is necessary when the size and/or location of the glandular defect does not guarantee for a satisfactory cosmetic outcome with the sole use of residual breast tissue.

These techniques, which use autologous tissue, have the advantage of offering the reconstruction of a natural-looking "new breast" and, therefore, physical characteristics shared with contralateral one. Moreover, they allow to have a good inframammary fold and a breast size similar to the contralateral, thus avoiding the adjustment of the other breast. A further advantage is that no prosthetic materials are used, with the possibility of carrying out radiotherapy in safety. These operations are more invasive, resulting in longer hospital stay, longer postoperative period; most of all, they require surgical skills.

These techniques can also be used to correct deformities resulting from failed or incorrect glandular reconstruction, during BCS or after radiotherapy (Table 4.5) [44].

**Table 4.5** Deformities post BCS. (Modified from [44])

| | |
|---|---|
| Type I | Displacement of the nipple-areolar complex |
| Type II | Localized deficiency of parenchyma and/or skin |
| Type III | Generalized breast contracture with no localized defects |
| Type IV | Severe damage with heavily scarred parenchyma and skin |

The aforementioned techniques, require a flap donor site and are suitable when the tropism of the breast tissue area is altered, and when postoperative radiotherapy is mandatory.

## 4.6 Local Flaps

These are useful techniques, especially to correct defects in the outer quadrants of the breast, or for obese women with a large quantity of skin and fatty tissue on the lateral chest wall.

### 4.6.1 Rhomboid Flap

A flap of skin and fat, mainly on the lower lateral part of the chest wall, which can be used as a transposition flap to cover defects in the lower-medial outer quadrant (Fig. 4.13) [45, 46].

### 4.6.2 Lateral Thoracic Flap

*TDAP (Thoracodorsal Artery Perforator)*
This technique involves the fitting of a flap taken from the lateral and/or posterior thoracic region and transferred to fill the breast defect. The TDAP flap consists of skin and subcutaneous tissue from the skin-beam region of the posterior surface of the chest, whose blood perfusion is guaranteed by the perforating vessels of the thoracodorsal pedicle through the intramuscular course of the latissimus dorsi muscle; it has the advantage of conserving the functionality of this muscle. The thoracodorsal artery flows from the subscapular artery and descends along the lateral and deep surface of the latissimus dorsi muscle and supplies the perforating artery that feeds the skin of the lateral wall of the chest. The flap is raised to the level of the dorsal fascia. The dissection continues through the latissimus dorsi, conserving the latter and dissecting only an extremely confined area. Perforators are dissected up to the artery and the thoracodorsal vein. The flap is passed through a supramuscular tunnel between the front edge of the latissimus dorsi muscle and the receiving site. The flap is

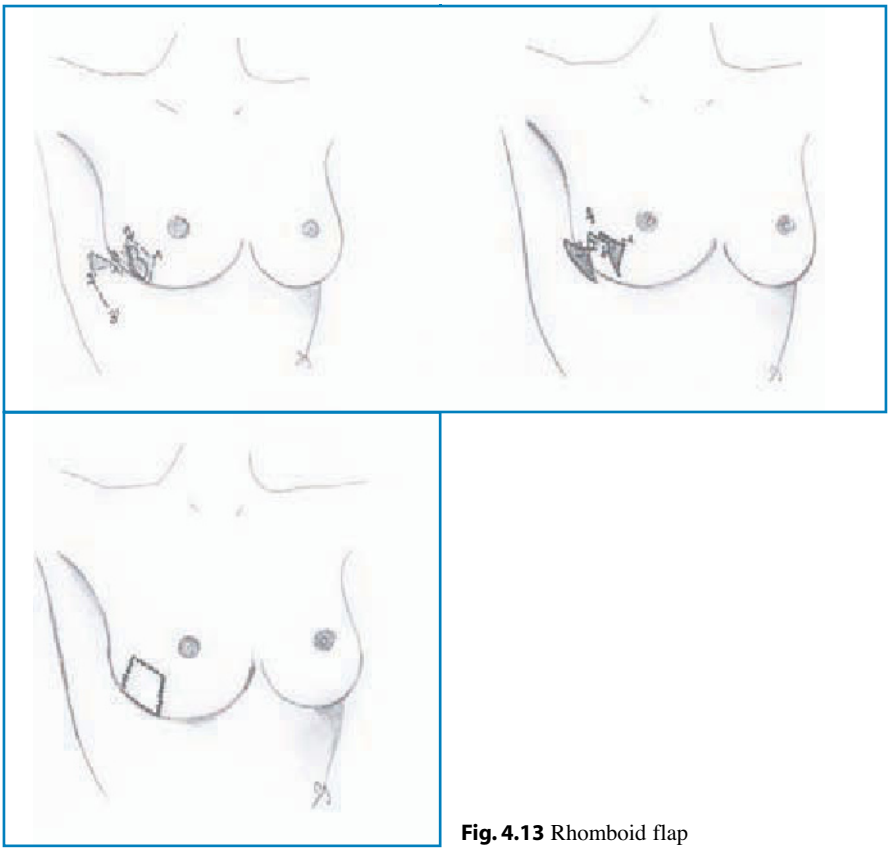

**Fig. 4.13** Rhomboid flap

then placed to fill the breast defect; finally, the donor area is closed linearly, resulting in a horizontal or oblique scar [47].

*Lateral thoracic flap/subaxillary flap*
These flaps are used in the reconstruction of the upper-outer quadrants; the size of these flaps varies, and they might not fill the glandular defect adequately (Fig. 4.14) [48].

*Intercostal perforator flap (ICAP)* [49]

*Segmental latissimus dorsi (miniflap)*
This technique, first described from Rainsbury, is proposed in BCS, as a filler of the glandular area, which has been removed. An axillary incision is used to access and prepare the muscular segment; the flap has good filling capacity and, in particular, it has good radiolucency which favors radiological follow-up and does not enhance scarring on the chest (Fig. 4.15) [50].

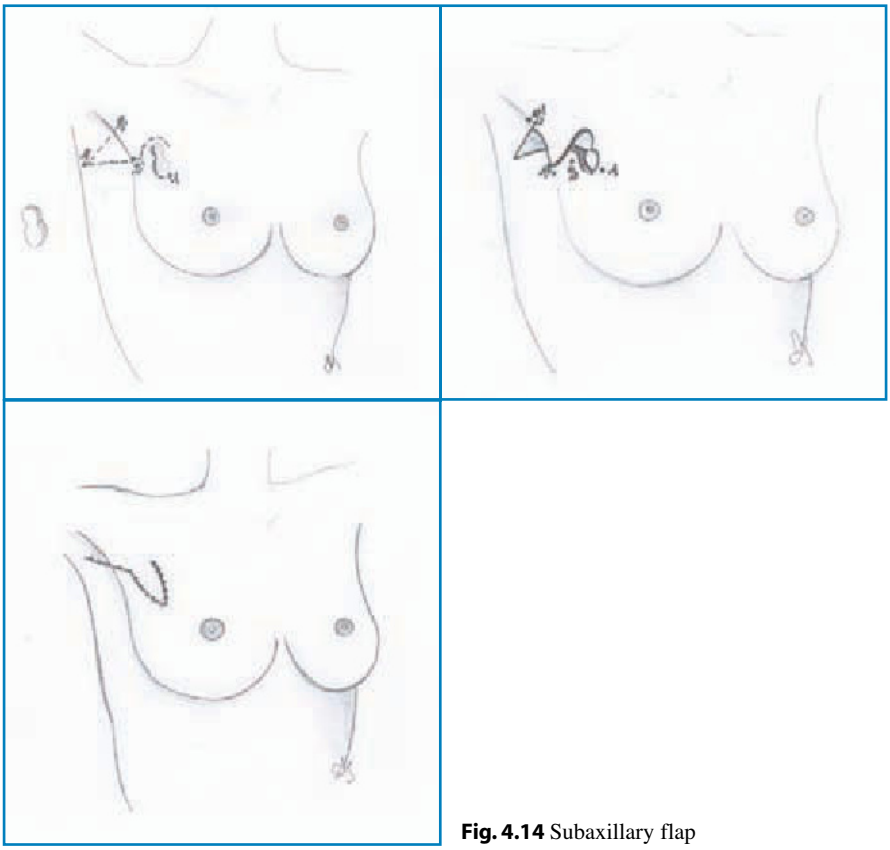

**Fig. 4.14** Subaxillary flap

## 4.7 Free Flaps (Remote Flaps)

Free flaps are rarely necessary after BCS, but are usually used in postmastectomy reconstruction; in fact, these are secondary free flaps, whose use is to be reserved in the case of failure in oncoplastic reconstruction, in the case of BCS deformity, or postradiotherapy complications. They ensure an excellent contribution of skin and adipose tissue. For further in-depth reading refer to the bibliographical referencing below:

- DIEP (deep inferior epigastric perforator)
- SIEA (superficial inferior epigastric artery)
- SGAP (superior gluteal artery perforator)
- IGAP (inferior gluteal artery perforator)
- TMG (transverse myocutaneous gracilis)
- Free TRAM (transverse rectus abdominis myocutaneous).

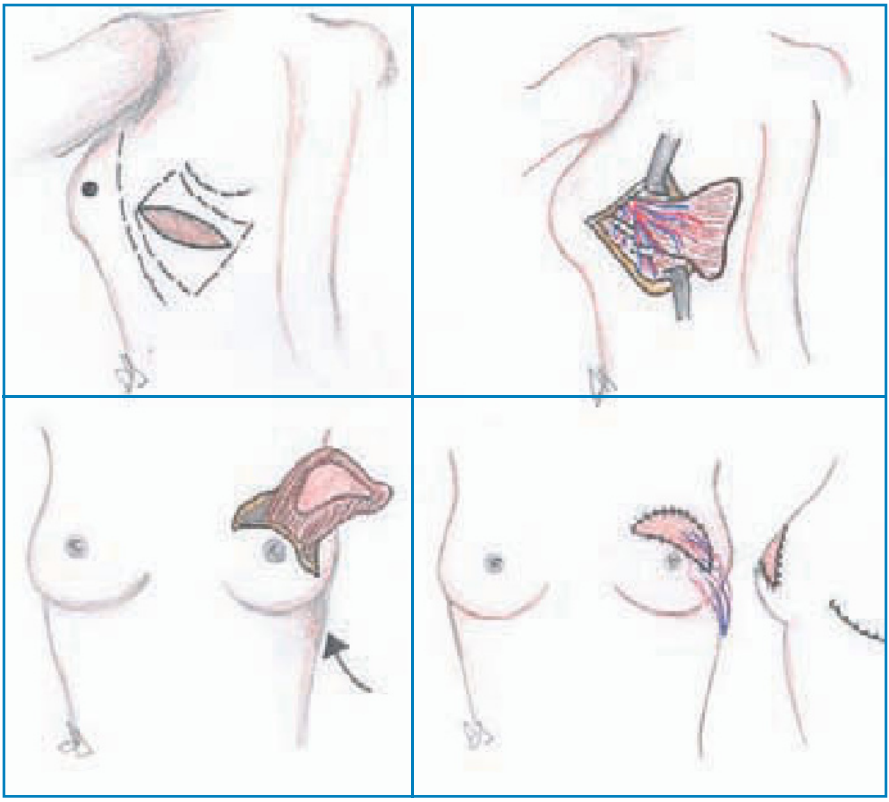

**Fig. 4.15** Segmental latissimus dorsi flap

## 4.8 Conservative Mastectomies

Conservative mastectomies are discussed in more detail in Chapter 5.

## 4.9 Fat Grafting

Fat grafting is discussed in more detail in Chapter 16.

## 4.10 Conclusions

Oncoplastic surgery in its most extensive form, is a step closer to ensuring an adequate surgical treatment of BC, complying with the strict standards of oncologic radicality, while aiming at obtaining the best possible cosmetic out-

come. In fact, it emphasizes the role of BCS from an oncologic (research of local control), reconstructive and technical (the complexity of some techniques) point of view. It follows that breast surgeons have acquired new competences, including plastic surgery, making it possible to choose the most adequate surgical technique for each single case. In this surgery, more than others, a careful selection of cases is needed and exhaustive information requested from patients, since high expectations of the outcome are present.

The refinement of the techniques has allowed for "more extensive" BCS, with surgical approaches unusual in traditional surgery and technical complexities overcome by adequate training. All of this is in search of rigorous and radical local control of disease, and, most of all, with respect for women and their bodies.

## References

1. Halsted WS (1898) Clinical and histological study of certain adenocarcinomas of the breast: and a brief consideration of the supraclavicular operation and of the results operations for cancer of the breast from 1889 to 1898 at the Johns Hopkins Hospital. Ann Surg 28:557–576
2. Handley RS, Thackray AC (1947) Invasion of the internal mammary lymph glands in carcinoma of the breast (The Bradshaw Lecture). Br J Surg 1:15-20
3. Urban JA (1951) Radical excision of the chest wall for mammary cancer. Cancer 4:1263-1285
4. Dahl–Iversen E, Tobiassen T (1963) Radical mastectomy with parasternal and supraclavicular dissection for mammary carcinoma. Ann Surg 157:170-173
5. Patey DH, Dyson WH (1948) The prognosis of the carcinoma of the breast in relation to type of operation performed. Br J Cancer 2:7–13
6. Madden JL (1965) Modified radical mastectomy. Surg Gynecol Obset 121:221–230
7. Lacour J, Bucalossi P,Caceres E et al (1976) Radical mastectomy versus radical mastectomy plus internal mammary dissection. Five-year results of an international cooperative study. Cancer 37:206–214
8. Veronesi U, Valagussa P (1981) Inefficacy of internal mammary nodes dissection in breast cancer surgery. Cancer 47:170–175
9. Lacour J, Lè MG, Caceres E et al (1983) Radical mastectomy versus radical mastectomy plus internal mammary dissection. Ten year results of an international cooperative trial in breast cancer. Cancer 51:1941–1943
10. WHO (1969) Minutes of the meeting of investigators on the evaluation of methods of diagnosis and treatment of breast cancer. WHO, Geneve
11. Veronesi U, Saccozzi R, Del Vecchio M et al (1981) Comparing radical mastectomy with quadrantectomy, axillary dissection, and radiotherapy in patients with small cancers of the breast. N Engl J Med 305:6–11
12. Veronesi U, Cascinelli N, Mariani L et al (2002) Twenty-year follow-up of a randomized study comparing breast conserving surgery with radical mastectomy for early breast cancer. N Engl J Med 347:1227–1232
13. Sarrazin D, Lè MG, Arriagada R et al (1989) Ten year results of a randomized trial comparing a conservative treatment to mastectomy in early breast cancer. Radiother Oncol 14:177–184
14. Arriagada R, Lè MG, Rochard F et al (1996) Conservative treatment versus mastectomy in early breast cancer: patterns of failure with 15 years of follow-up data. Institut Gustave Roussy Breast Cancer Group. J Clin Oncol 14:1558–1564
15. Fisher B, Redmond C, Fisher E et al (1985a) Five-year results of a randomized clinical trial comparing total mastectomy and segmental mastectomy with or without radiation in the

treatment of breast cancer. N Engl J Med 312:655–673
16. Fisher B, Redmond C, Poisson R et al (1989) Eight-year results of a randomized clinical trial comparing total mastectomy and lumpectomy with or without irradiation in the treatment of breast cancer. N Engl J Med 320:822–828
17. Fisher B, Anderson S, Bryant J et al (2002) Twenty-year follow up of a randomized trial comparing total mastectomy, lumpectomy, and lumpectomy plus irradiation for the treatment of invasive breast cancer. N Engl J Med 347:1233–1241
18. Van Dongen JA, Voogd AC, Fentiman IS et al (2000) Long-term results of a randomized trial comparing breast-conserving therapy with mastectomy: European Organization for Research and Treatment of Cancer 10801 trial. J Natl Cancer Inst 92:1143–1150
19. Veronesi U, Volterrani F, Luini A et al (1990). Quadrantectomy vs. lumpectomy for small size breast cancer. Eur J Cancer 26:671–673
20. Veronesi U, Luini A, Del Vecchio M et al (1993) Radiotherapy after breast-preserving surgery in women with localized cancer of the breast. N Engl J Med 328:1587–1591
21. Veronesi U, Stafyla V, Luini A, Veronesi P (2012) Breast cancer: from "maximum tolerable" to "minimum effective" treatment . Frontiers in Oncology 2:125
22. Audretsch WP (1998) Reconstruction of the partial mastectomy defect: classification and method. Surgery of the breast: principles and art. Lippincott Raven, Philadelphia, pp 155–196, 179–216
23. Silverstein MJ (2010) How I do it: oncoplastic breast-conservation surgery. Ann Surg Oncol 17:S242-S244
24. Clough KB, Lewis J, Couturaud B et al (2003) Oncoplastic techniques allow extensive resections for breast-conserving therapy of breast carcinomas. Ann Surg 237:26–34
25. Kaur N, Petit JY, Rietjens M et al (2005) Comparative study of surgical margins in oncoplastic surgery and quadrantectomy in breast cancer. Ann Surg Oncol 12:539–545
26. Holland R, Veling SH, Mravunac M et al (1985) Histologic multifocality of Tis, T1-2 breast carcinomas. Implications for clinical trials of breast-conserving surgery. Cancer 56:979–90
27. Amano G, Ohuchi N, Ishibashi T et al (2000) Correlation of three dimensional magnetic resonance imaging with precise histopathological map concerning carcinoma extension in the breast. Breast Cancer Res Treat 60:43–55
28. Yang JD, Lee JW, Cho YK et al (2012) Surgical techniques for personalized oncoplastic surgery in breast cancer patients with small- to moderate-sized breasts (Part 1): Volume displacement. J Breast Cancer 15:1–6
29. Yang JD, Lee JW, Cho YK et al (2012) Surgical techniques for personalized oncoplastic surgery in breast cancer patients with small- to moderate-sized breasts (Part 2): Volume replacement. J Breast Cancer 15:7–14
30. Yang JD, Kim MC, Lee JW et al (2012) Usefulness of oncoplastic volume replacement techniques after breast conserving surgery in small to moderate-sized breasts. Arch Plast Surg 39:489–496
31. Anderson BO, Masetti R, Silverstein MJ (2005) Oncoplastic approaches to partial mastectomy: an overview of volume-displacement techniques. Lancet Oncol 6:145–157
32. White J, Achuthan R, Turton P, Lansdown M (2011) Breast conservation surgery: state of the art. Int J Breast Cancer 2011:107981
33. American College of Radiology. Breast imaging reporting and data systems (BIRADS) (2003). American College of Radiology, Reston, VA
34. Clough KB, Kaufmann GJ, Nos C et al (2010) Improving breast cancer surgery: a classification and quadrant per quadrant atlas for oncoplastic surgery. Ann Surg Oncol 17:1375–1391
35. Ribeiro L (2002) Creation and evolution of 30 years of the inferior pedicle in reduction mammaplasties. Plast Reconstr Surg 110:960–970
36. Robbins TH (1977) A reduction mammaplasty with the areola-nipple based on an inferior dermal pedicle. Plast Reconstr Surg 59:64–67
37. Pitanguy I (1967) Surgical treatment of breast hypertrophy. Br J Plast Surg 20:78–85
38. Lejour M (1994) Vertical mammaplasty and liposuction of the breast. Plast reconstr Surg 94:100–114

39. Clough KB, Kroll S, Audresch W (1999) An approach to the repair of partial mastectomy defects. Plast Reconstr Surg 104:409–420
40. Acea Nebril BA, Castellano O (2011) Horizontal mammaplasty. Oncoplastic and reconstructive surgery of the breast (2nd edn.) Informa Healthcare, London pp. 161–169
41. Rapisarda IF, Krupa J, Benson JR (2011) Lateral mammaplasty. Oncoplastic and reconstructive surgery of the breast, 2nd edn. Informa Healthcare, London, pp. 170–175
42. Grisotti A (1994) Immediate reconstruction after partial mastectomy. Oper Techn Plast Reconstr Surg 1:1–12
43. Benelli L (1990) A new periareolar mammaplasty: the "round-block" technique. Aesthetic Plast Surg 14:93–100
44. Berrino P, Campora E, Santi P (1987) Postquadrantectomy breast deformities: classification and techniques of surgical correction. Plast Reconstr Surg 79:567–572
45. Limberg AA (1966) Modern trends in plastic surgery. Design of local flaps. Mod trends Plast Surg 2:38–61
46. Dufourmentel C (1964) An L-shaped flap for lozenge shaped defects: Principle-technique-applications. Transact Third Int Congr Plast Surg . Excerpta Medica, Amsterdam, pp 772–773
47. Angrigiani C, Grilli D, Siebert J (1995) Latissimus dorsi musculocutaneous flap without muscle. Plast Reconstr Surg 96:1608–1614
48. Kronowitz SJ, Chang DW, Robb GL et al (2002) Implications of axillary sentinel lymph node biopsy in immediate autologous breast reconstruction. Plast Reconstr Surg 109:1888–1896
49. Hamdi M, Van Landuyt K, de Frene B et al (2006)The versatility of the inter-costal artery perforator (ICAP) flaps. J Plast Reconstr Surg 59:644–652
50. Rainsbury R, Paramanathan N, Laws S et al (1998) Immediate latissimus dorsi miniflap volume replacement for partial mastectomy: use of intra-operative frozen sections to confirm negative margins. Am J Surg 196:139–147