Oncoplastic Surgery

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32.1 Introduction

Oncoplastic surgery (OP) represents an important evolution in breast cancer treatment. As a surgical method and a technical refinement, it allows better aesthetic and oncologic outcomes. In this way, as a consequence of a more individualized approach, it can positively influence psychological aspects of patients and broadens indications for breast-conserving treatment (BCT). Therefore, the emphasis of this new phase in breast cancer surgery is on immediate reconstruction and contralateral surgery for symmetry whenever necessary, synergistically combining oncologic and aesthetic concepts by the surgical team or by a single surgeon [1–18].

Around 20–30% of BCT has unsatisfactory aesthetic outcomes and 10–40% of reoperations due to compromised margins [2–20]. In addition, defects after BCT tend to accentuate with radiotherapy, increasing asymmetry, which usually require flaps or lipofilling to correct them in the future. But, unfortunately, aesthetic outcomes after delayed partial breast reconstructions are many times unsatisfactory [18–30]. Then OP is the way to reduce the conflict in BCT of performing resections with free margins even in large and multifocal tumors and does not remove so much breast tissue, which could result in major deformities and asymmetry between the breasts [3–8].

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So, every effort should be made to identify better candidates to this surgical approach. If local-regional control represents the main target for oncologic surgeries, aesthetic outcomes and quality of life are also basic principles in BCT, from the very beginning [31, 32]. Then, in this chapter, it will be discussed OP history and evolution, and the indications and limits of Class I and Class II techniques in BCT.

32.2 History and Evolution

Historically it is difficult to precisely define the first time that a mammoplasty technique was used in BCT with the aim of reducing deformities and asymmetries. There were a number of nonacademic surgeons, in different countries, who were doing sporadically this kind of surgery, even before its appearance in the literature. One of its earlier applications was in the 1980s in France by Jean-Yves Petit (at that time at Institut Gustave Roussy), Jean-Yves Bobin (Centre Léon-Bérard), and Michel Abbes (Centre Lacassagne). Some years later, the OP concept was then originally coined by Werner Audrescht in German and posteriorly had a major diffusion after the publication of the classic paper from Krishna Clough and colleagues in 2003 (Fig. 32.1) [3, 9]. In Brazil, some breast surgeons like Antonio Figueira, Angelo Matthes, and Jorge Biazús were doing OP since the 1980s too. And, despite the lack of randomized trials, current evidence suggests at least equivalent oncologic outcomes, reduced re-excision rates, and superior aesthetic results when compared to lumpectomies (Table 32.1). Therefore, although it remains not a consensus, the original OP concept as "tumor-specific immediate reconstruction" [1] is not limited to BCT. Skin-sparing and nipple-sparing mastectomy techniques have incorporated OP principles doing a well-conducted oncologic resection followed by immediate breast reconstruction and contralateral symmetry in the same surgery.

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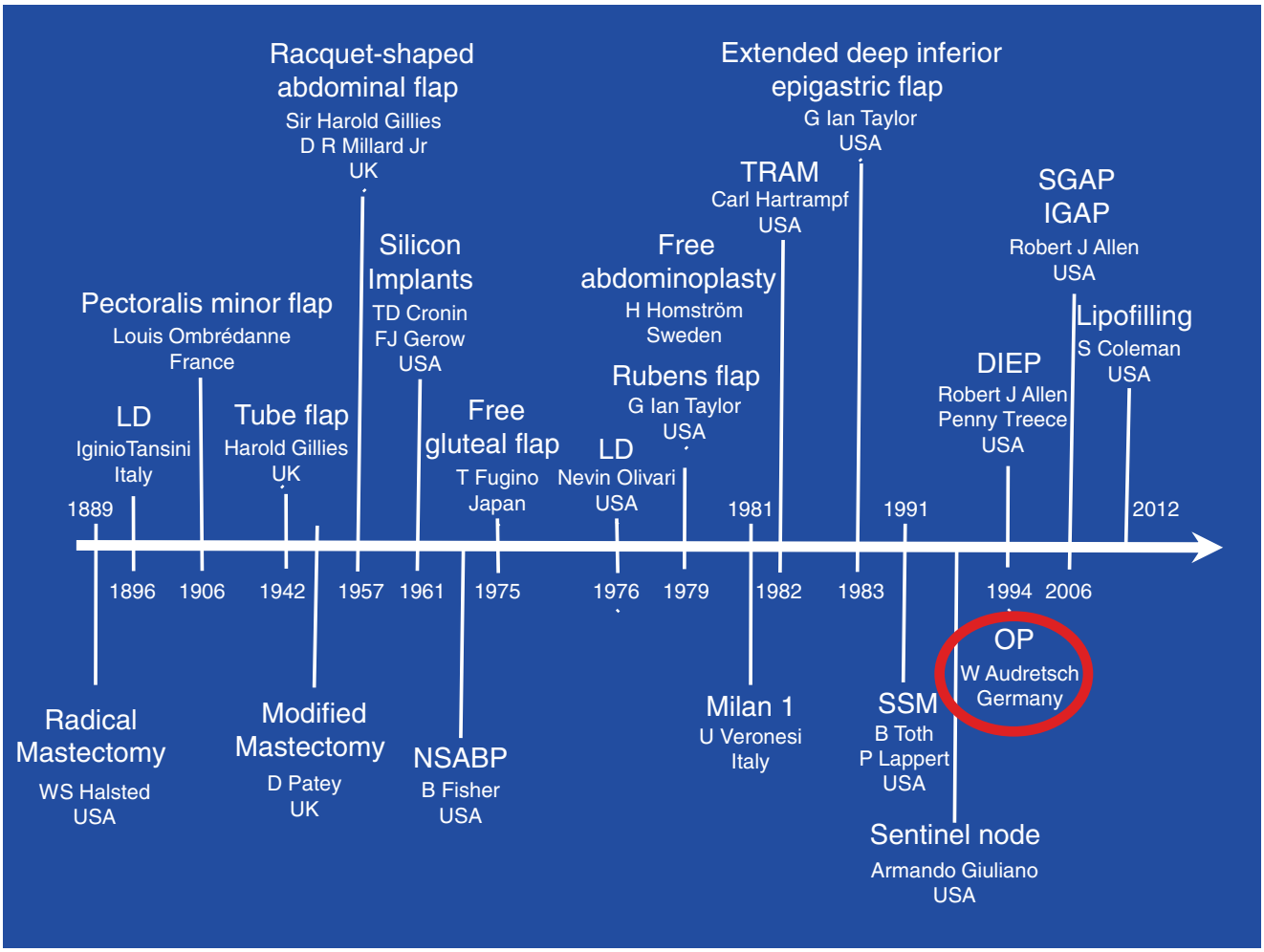

Fig. 32.1 Historical milestones in breast cancer surgery and in breast reconstruction

Table 32.1 Oncologic and aesthetic results in oncoplastic surgery

Author	Year	*n*	Tumor size (cm)	FW (months)	Margin involvement (%)	LR (%)	Cosmetic failure
Clough et al.	2003	101	3.2	46	10.9	6.9	12
Losken et al.	2007	63	NR	40	NR	2	5
Rietjens et al.	2007	148	3.2	74	5	3	8.9
Munhoz et al.	2008	209	NR	31	5.7	5.7	7.7
Fitoussi et al.	2010	540	2.9	49	18.9	6.8	9.7
Urban et al.	2012	109	1.5	NR	7.5	NR	NR

NR non-related

32.3 Oncologic and Aesthetic Outcomes

Although there are no randomized trials comparing OP with standard BCT and many reported series are retrospective and noncontrolled ones, the current data is enough to incorporate OP in current BCT (Fig. 32.2) [1–29]. In addition, OP follows the same BCT oncologic principles (Fig. 32.3). Haloua [26], in their review of 11 prospective oncoplastic studies, found 7–22% positive margin rate in OP, compared to the 20–40% in standard BCT. This difference resulted in lower re-excision rate. Santos, in Brazil, did a comparison between quality of life and aesthetic outcomes in OP and lumpectomy and found that excellent aesthetic outcomes are more frequent in OP [4]. A recent meta-analysis by Losken [27] also demonstrated larger resection volumes, increased satisfaction with aesthetics, and decreased rates of positive margins, re-excisions, and local recurrences for OP. No significant delay in adjuvant chemotherapy and radiotherapy was related

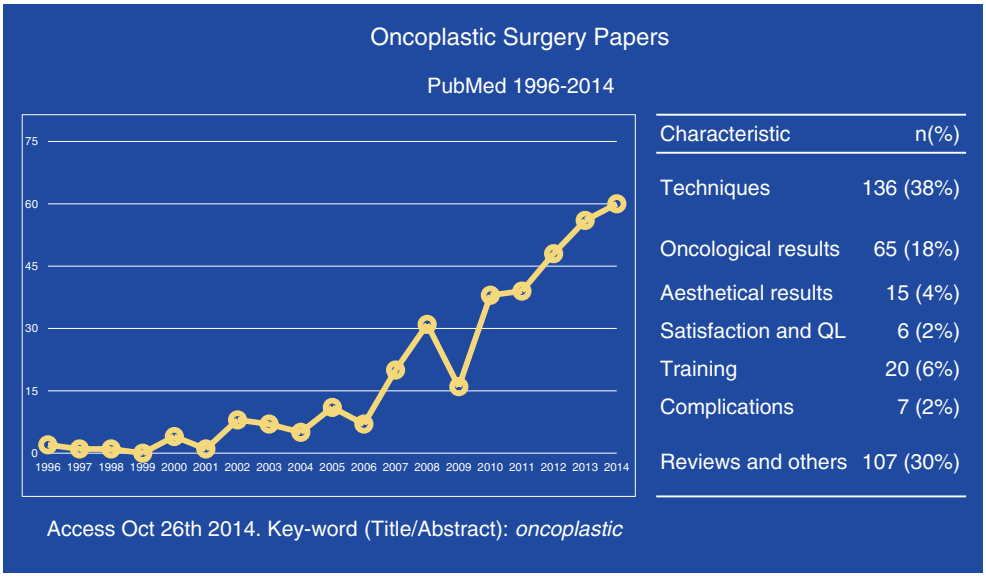

Fig. 32.2 Evolution and characteristics of oncoplastic surgery papers

despite the increased complexity of these surgeries [6–8, 26, 27]. Long-term survival has been equivalent to BCT series [26, 27]. A valid concern over the OP approach is the reliability of clips placed for the boost, although advances in intraoperative radiation therapy may make this less of an issue. Tissue rearrangement during oncoplasty might result in a larger, less exact boost during external beam radiation therapy, possibly resulting in a poorer aesthetic outcome and decreased local control of disease.

32.4 Patient Selection

Classically, the most frequent deformities after BCT are deficiency of glandular tissue and overlying skin retractions resulting from wide resections and late side effects after radiotherapy, deformity and/or retraction of the nipple and areola complex (NAC), and reduction of mammary ptosis and asymmetry of the inframammary crease as a consequence of fibrosis and retraction after radiotherapy. All these deformities are expected to be more evident when the relation tumor/breast is unfavorable, and they are also related to the tumor location and its proximity with the NAC and skin, and the boost. So, the most adequate technique for each patient should be determined according to the anticipation of the size and position of the future defect, tumor proximity with the skin and NAC, and clinical conditions of the patient [1–17].

Class II OP is more complex and time consuming than classic lumpectomy. Thus the selection of patients from oncological, aesthetical, and psychological point of view is critical. All attempts should be made to minimize the risk of positive margins, which are difficult and sometimes impossible to reassess in a second surgery [30], and to reduce and prevent complications that may delay adjuvant treatments. Therefore, there are some established indications for OP in BCT; the main ones are for patients with more than 20% of volume of mammary resection, and especially in the case of macromastia, where results from skin-sparing or nipple-sparing mastectomy are usually unsatisfactory, and OP approach may also favor radiotherapy planning.

Current indications and limits of Class II OP in BCT are in Table 32.2.

32.5 Preoperative Planning

Although the only significant element referred to as an aesthetical risk for BCT in Cochrane evaluation was the volume of mammary resection over 20%, in clinical practice there are many other risk factors that should be observed [8]. The choice of OP technique depends on tumor location and size, multifocality, multicentricity, bilaterality, breast size, ptosis, shape and symmetry, previous mammoplasties, and previous radiotherapy [8].

In some circumstances, some associated clinical conditions may also influence the choice of the most appropriate technique. Diabetic patients, obese patients, tobacco addicts, those with collagen diseases, and those above 70 years old are subject to risks concerning unsatisfactory aesthetic results, and skin healing complications are higher. Major resections and wide NAC dislocations may bring additional risks of fat necrosis and of partial or total NAC losses [8].

The ideal location for a tumor is within the mammoplasty area. When the tumor is close to the skin and out of this area, the OP procedure may be more complex, and it may require combined techniques, whose results are not

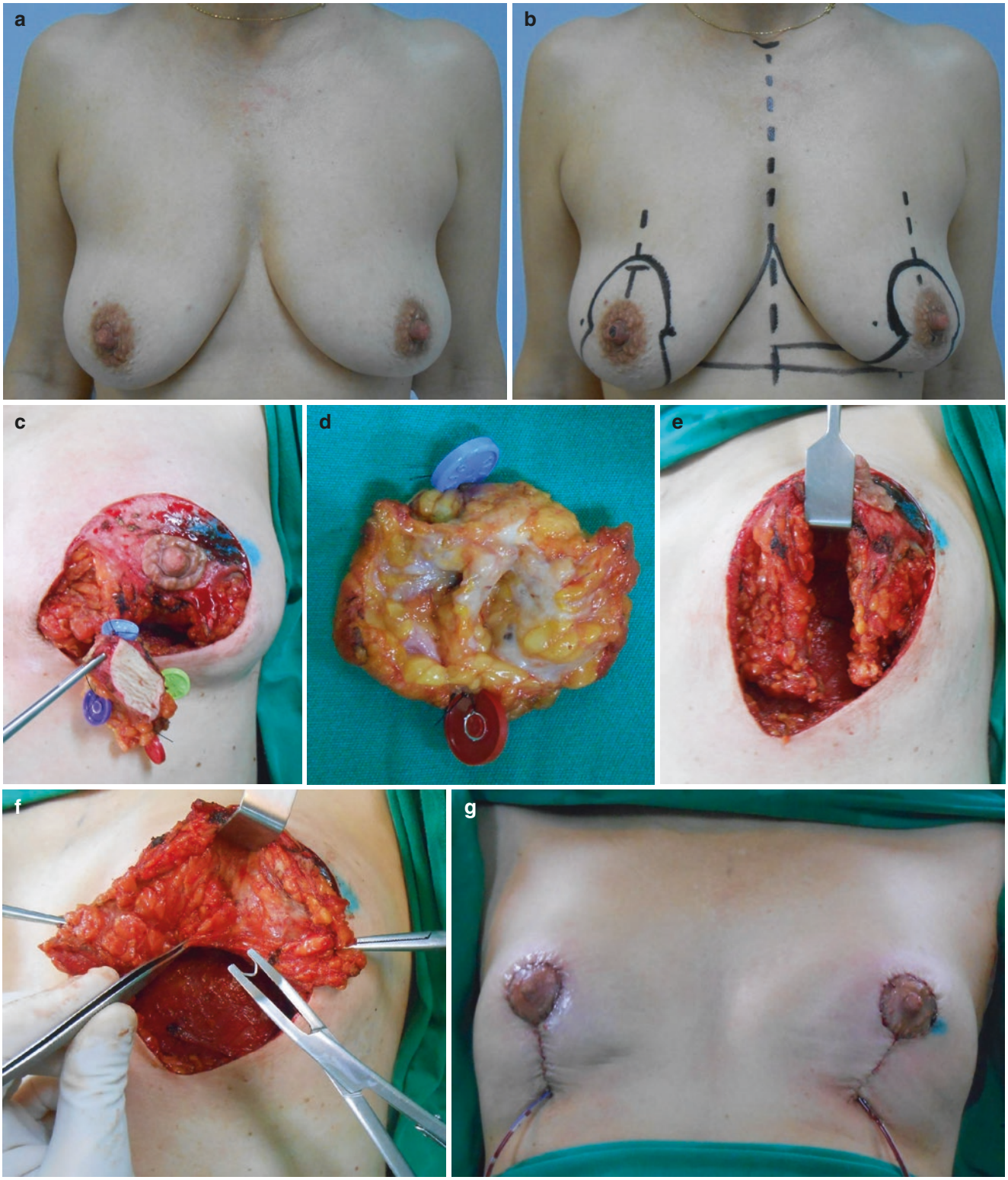

Fig. 32.3 Oncoplastic surgery step by step: (**a**) preoperatory view of a 50-year-old patient with T1cN0 breast cancer in the inferior quadrant of the left breast; (**b**) preoperatory draws for the surgical planning; (**c**) resection of the tumor (with skin over it); (**d**) tumor in the center and demarcation of the margins to guide the pathology; (**e**) the two pillars for partial breast reconstruction; (**f**) surgical clips for the boost; (**g**) final result with contralateral mammoplasty for symmetry

Table 32.2 Indications and relative contraindications for Class II oncoplastic surgery in breast-conserving surgery

Indications
• Resections over 20% of breast volume
• Macromastia
• Severe ptosis and asymmetry
• Need for large skin resections inside mammoplasty area
• Central, medial, and inferior tumors
• Previous plastic surgeries in the breast
Relative contraindications
• Extensive tumors located in medial regions
• Low-volume breasts, particularly those without ptosis
• Previously irradiated breasts
• Skin resections beyond mammoplasties zone in small-/medium-size breasts
• Tobacco addiction and uncontrolled diabetes
• Exaggerated patient's expectations with aesthetic outcomes

always satisfactory. In such cases skin-sparing or nipple-sparing mastectomy should be considered as an option. Flaps as the one from the *latissimus dorsi*, which has a different color and texture from the breast, usually bring unsatisfactory results and therefore should be considered as an exception [8].

High-volume breasts, with severe ptosis, allow for surgeries with wider margins and usually bring more satisfactory results. Patients with macromastias present a formal indication for OP due to better radiotherapy planning in a smaller and round breast. In cases of previous breast augmentation plastic surgery, it is necessary to take into consideration that the breast volume is not the real one, and consequently some considerable deformities may result. The biggest problem concerning OP is dealing with young patients, with conic breast, without mammary ptosis, and with low or medium volume. In such cases, according to the location or tumor size, local flaps offer a little chance of good results, so skin-sparing or nipple-sparing mastectomy with immediate reconstruction may be the best choice [8].

Basically, the flowchart for OP planning which we use in our practice takes into account both breast and tumor characteristics, and it is presented in Fig. 32.4.

32.6 Class I Techniques

32.6.1 Glandular Flaps

Class I techniques consists of moving glandular flaps around the defect caused by lumpectomies, in an attempt to cover it completely. It is preferentially indicated for premenopausal patients, when the glandular component of the breast is higher, therefore reducing the risks of liponecrosis in the postoperative period. This technique is also indicated in cases of tumors located in the upper quadrants, where the mammary gland is less thick; and even if there is a small filling defect, such a defect is not so visible. The opposite effect happens in the lower quadrants, where the mammary gland thickness is more evident and where adapted techniques are necessary. Glandular reshaping in lower portions of the breast is possible for small tumors and in a vertical or oblique way.

32.6.2 Central Quadrant Techniques

This represented a great innovation in early days of BCT, as up to some years ago having a retroareolar neoplasia was synonymous of mastectomy [17]. Immediate breast reconstruction techniques for central quadrant resections may vary according to breast volume, level of ptosis, and shape of ptosis (either vertical or lateral). Considering breast without ptosis or with slight ptosis, it is possible to use the glandular suture in tobacco pouch. Two or three layers of glandular suture in tobacco pouch allow for obtaining the central projection of the mammary cone, and the intradermal suture also in tobacco pouch would produce a residual scar within the area where the future NAC would be reconstructed, therefore causing the scar to disappear almost completely. The disadvantage of this technique is that there might be delay in the healing process. In medium- or large-size breasts with some degree of ptosis, it is possible to use Grisotti's technique, which is derived from the reduction mammoplasty techniques, with the rotation of infero-lateral glandular pedicle, preserving a coetaneous island that replaces NAC. This might be the first OP technique described in the literature, as it was a direct adaptation of plastic surgery technique to BCT [17]. For some large breasts, it is possible to do a reduction mammoplasty like Pitanguy's, but resecting the NAC.

32.7 Class II Techniques

The great diversity of mammoplasty techniques used in aesthetic surgery supports an increase in the indications of BCT. In most cases, reductive mammoplasties based on different pedicles can be transported to BCT. The level of mammary ptosis, differences of volume and shape detected in the preoperative stage, level of mammary liposubstitution, height, shape and size of the NAC, and mainly the size and location of the tumor are the most important factors to consider when choosing the technique of mammoplasty to be applied in BCT.

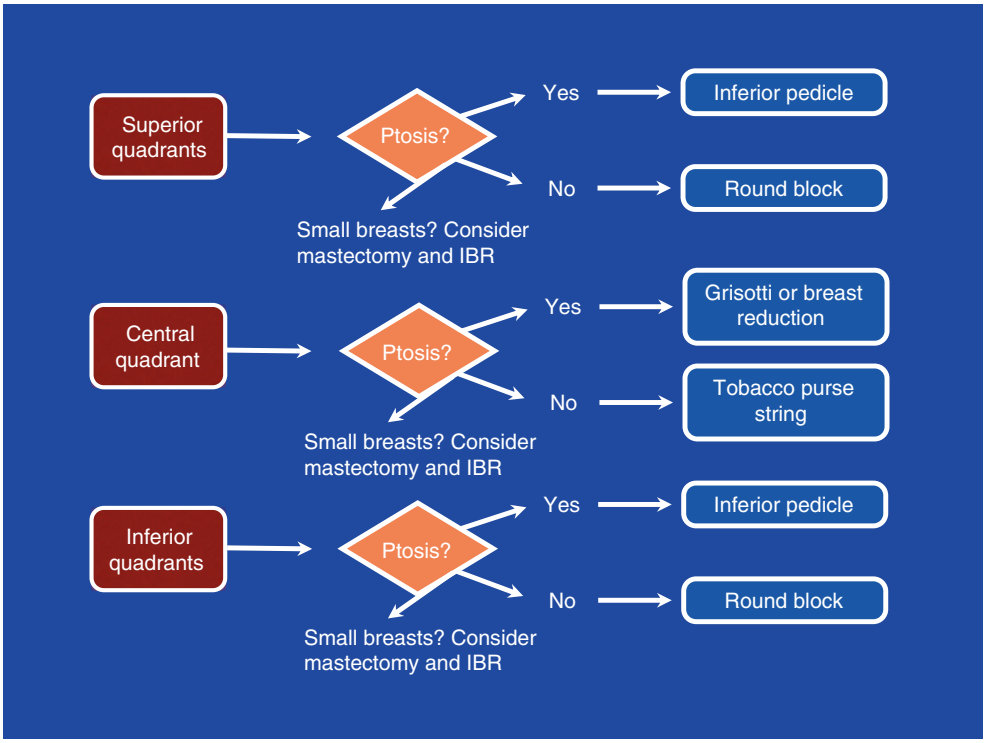

Fig. 32.4 Decision flowchart for Class II oncoplastic surgery in breast-conserving surgery

32.7.1 Periareolar Techniques

Class II techniques are inspired in reductive mammoplasty techniques proposed by Sampaio-Goes [33] and Benelli [34], in which a major glandular coetaneous undermining procedure for remodeling through a periareolar scar is performed. It is indicated for cases of non-ptotic (or with discrete ptosis) small- or medium-size breast. The great advantage of these techniques is that it allows lumpectomies in any part of the breast, except for the central quadrant.

32.7.2 Superior Pedicle Techniques

These techniques are based on superior vascular pedicles as those proposed by Pitanguy [35] and Lejour [36] in aesthetic surgery. They may be useful in cases of tumors situated in the lower quadrants and are appropriate for large and ptotic breasts or breasts medium size with some degree of ptosis. The decision whether perform only a vertical scar or an inverted "T" scar will depend on the level of hypertrophy and the level of ptosis. Considering smaller breasts and those with less ptosis, it is possible to perform only a vertical scar, and considering cases of larger breasts with a major ptosis, an inverted "T" scar will avoid the cutaneous excess. The format of the scar as vertical or inverted "T" can be central (more frequent), medial, or lateral, according to the location of the tumor and the need for skin removal.

32.7.3 Inferior Pedicle Techniques

These techniques are based on inferior-posterior vascular pedicles, as described by Ribeiro and Robbins, and they may be applied in cases of tumors situated in the upper quadrants of the breast [37, 38]. The preoperative drawing can be made in the same way and using measurements of Pitanguy's and Lejour's techniques, with a periareolar scar and inverted "T" or vertical/oblique inferior line. This is one of the most useful techniques, as there are many tumors in superior quadrants.

Conclusions

Surgeons play an influential role in the care of the breast cancer patient. OP allows for an oncologic-aesthetic-functional individualized surgical approach. Such an advance means a new philosophy in breast cancer surgery. It also brings new challenges for mentoring and training new generations of surgeons and opens new perspectives of research related to aesthetic results, quality of life, and local control of disease, as well as optimization of operative timing and reduction of both complications and costs. Finally, OP expertise is resulting in a higher standard of care for breast cancer patients.

References

1. Audretsch W, Rezai M, Kolotas C, Zamboglou N, Schnabel T, Bojar H (1998) Tumor-specific immediate reconstruction in breast cancer patients. Semin Plast Surg 11(1):71–99
2. Clough KB, Kroll SS, Audretsch W (1999) An approach to the repair of partial mastectomy defects. Plast Reconstr Surg 104(2): 409–420
3. Clough KB, Lewis JS, Couturaud B, Fitoussi A, Nos C, Falcou MC (2003) Oncoplastic techniques allow extensive resections for breast-conserving therapy of breast carcinomas. Ann Surg 237(1):26–34
4. Santos G, Urban C, Edelweiss MI, Zucca-Matthes G, Oliveira VM, Arana GH et al (2015) Long-term comparison of aesthetical outcomes after oncoplastic surgery and lumpectomy in breast cancer patients. Ann Surg Oncol 22:2500–2508
5. De Lorenzi F, Loschi P, Bagnardi V, Rotmensz N, Hubner G, Mazzarol G et al (2016) Oncoplastic breast-conserving surgery for tumors larger than 2 centimeters: is it oncologically safe? A matched-cohort analysis. Ann Surg Oncol 23(6):1852–1859
6. Kaur N, Petit JY, Rietjens M, Maffini F, Luini A, Gatti G et al (2005) Comparative study of surgical margins in oncoplastic surgery and quadrantectomy in breast cancer. Ann Surg Oncol 12(7):539–545
7. Rietjens M, Urban CA, Petit JY et al (2007) Long-term oncologic results of breast conservation treatment with oncoplastic surgery. Breast 16:387–395
8. Urban C, Lima R, Schunemann E, Spautz C, Rabinovich I, Anselmi K (2011) Oncoplastic principles in breast conserving surgery. Breast 20(Suppl 3):S92–S95
9. Delay E (2008) Plea for the development of oncoplastic surgery in breast cancer surgery (French). Ann Chir Plast Esthét 53(2):85–87
10. Petit JY, Garusi C, Greuse M, Rietjens M, Youssef O, Luini A et al (2002) One hundred and eleven cases of breast conservation treatment with simultaneous reconstruction at the European institute of oncology (Milan). Tumori 88(1):41–47
11. Rietjens M, Petit JY, Contesso G, Bertin F, Gilles R (1997) The role of reduction mammaplasty in oncology. Eur J Plast Surg 20(5):245–250
12. Smith ML, Evans GR, Gurlek A, Bouvet M, Singletary SE, Ames FC et al (1998) Reduction mammaplasty: its role in breast conservation surgery for early-stage breast cancer. Ann Plast Surg 41(3):234–239
13. Losken A, Elwood ET, Styblo TM, Bostwick J III (2002) The role of reduction mammaplasty in reconstructing partial mastectomy defects. Plast Reconstr Surg 109(3):968–975
14. Spear SL, Pelletiere CV, Wolfe AJ, Tsangaris TN, Pennanen MF (2003) Experience with reduction mammaplasty combined with breast conservation therapy in the treatment of breast cancer. Plast Reconstr Surg 111(3):1102–1109
15. Stolier A, Allen R, Linhares L (2003) Breast conservation therapy with concomitant breast reduction in large-breasted women. Breast J 9(4):269–271
16. Fitoussi AD, Berry MG, Famà F, Falcou MC, Curnier A, Couturaud B et al (2010) Oncoplastic breast surgery for cancer: analysis of 540 consecutive cases. Plast Reconstr Surg 125:454–462
17. Galimberti V, Zurrida S, Zanini V, Callegari M, Veronesi P, Catania S et al (1993) Central small size breast cancer: how to overcome the problem of nipple and areola involvement. Eur J Cancer 29A(8):1093–1096
18. Clough KB, Cuminet J, Fitoussi A, Nos C, Mosseri V (1998) Cosmetic sequelae after conservative treatment for breast cancer: classification and results of surgical correction. Ann Surg Oncol 41(5):471–481
19. Jeevan R, Cromwell DA, Trivella M, Lawrence G, Kearins O, Pereira J et al (2012) Reoperation rates after breast conserving surgery for breast cancer among women in England: retrospective study of hospital episode statistics. BMJ 345:e4505
20. McCahill LE, Single RM, Aiello Bowles EJ, Feigelson HS, James TA, Barney T et al (2012) Variability in reexcision following breast conservation surgery. JAMA 307(5):467–475
21. Sacchini V, Luini A, Tana S, Lozza L, Galimberti V, Merson M et al (1991) Quantitative and qualitative cosmetic evaluation after conservative treatment for breast cancer. Eur J Cancer 27(11): 1395–1400
22. Al-Ghazal SK, Blamey RW, Stewart J, Morgan AA (1999) The cosmetic outcome in early breast cancer treated with breast conservation. Eur J Surg Oncol 25(6):566–570
23. Olivotto IA, Rose MA, Osteen RT, Love S, Cady B, Silver B et al (1989) Late cosmetic outcome after conservative surgery and radiotherapy: analysis of causes of cosmetic failure. Int J Radiat Oncol Biol Phys 17(4):747–753
24. Bulstrode NW, Shrotria S (2001) Prediction of cosmetic outcome following conservative breast surgery using breast volume measurements. Breast 10:124–126
25. Berrino P, Campora E, Santi P (1987) Post-quadrantectomy breast deformities: classification and techniques of surgical correction. Plast Reconstr Surg 79(4):567–572
26. Haloua MH, Krekel NM, Winters HA, Rietveld DH, Meijer S, Bloemers FW et al (2013) A systematic review of oncoplastic breast conserving surgery: current weaknesses and future prospects. Ann Surg 257(4):609–620
27. Losken A, Dugal CS, Styblo TM, Carlson GW (2014) A meta-analysis comparing breast conservation therapy alone to the oncoplastic technique. Ann Plast Surg 72(2):145–149
28. Schaverien MV, Doughty JC, Stallard S (2014) Quality of information reporting in studies of standard and oncoplastic breast-conserving surgery. Breast 23(2):104–111
29. Landercasper J, Attai D, Atisha D, Beitsch P, Bosserman L, Boughey J et al (2015) Toolbox to reduce lumpectomy reoperations and improve cosmetic outcome in breast cancer patients: the American Society of Breast Surgeons Consensus Conference. Ann Surg Oncol 22:3174–3183
30. Munhoz AM, Montag E, Arruda E et al (2009) Immediate reconstruction following breast-conserving surgery: management of the positive surgical margins and influence on secondary reconstruction. Breast 18:47–54
31. Fisher B, Anderson S, Bryant J, Margolese RG, Deutsch M, Fisher ER et al (2002) Twenty-year follow-up of a randomized trial comparing total mastectomy, and lumpectomy plus irradiation for the treatment of invasive breast cancer. N Engl J Med 347(16):1233–1241
32. Veronesi U, Cascinelli N, Mariani L, Greco M, Saccozzi R, Luini A 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(16):1227–1232
33. Góes JC (2003) Periareolar mastopexy: double skin technique with mesh support. Aesthet Surg J 23(2):129–135
34. Benelli L (1990) A new periareolar mammaplasty: the "round block" technique. Aesthet Plast Surg 14(2):93–100
35. Pitanguy I (1967) Surgical treatment of breast hypertrophy. Br J Plast Surg 20(1):78–85
36. Lejour M (1999) Vertical mammaplasty: early complications after 250 personal consecutive cases. Plast Reconstr Surg 104(3):764–770
37. Ribeiro L, Accorsi A Jr, Buss A, Marçal-Pessoa M (2002) Creation and evolution of 30 years of the inferior pedicle in reduction mammaplasties. Plast Reconstr Surg 110(3):960–970
38. Robbins TH (1977) A reduction mammaplasty with the areola-nipple based on an inferior dermal pedicle. Plast Reconstr Surg 59(1):64–67