



## Review

## Standardization of oncoplastic breast conserving surgery

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Accepted 10 January 2017

Available online ■ ■ ■

## Abstract

The emphasis on esthetic outcomes and quality of life after breast cancer surgery has motivated surgeons to develop oncoplastic breast conserving surgery (OPS). Training programs are still rare in most countries, and there is little standardization, which challenges the scientific evaluation of the techniques. The present article attempts to standardize OPS nomenclature, indications, and reconstruction choice selection embedded in a thorough review of the literature. We propose four breast conserving surgery (BCS) categories: Conventional tumorectomy, oncoplastic mastopexy, oncoplastic tumorectomy and oncoplastic reduction mammoplasty. The main volume displacement techniques are glandular re-approximation, use of tailored glandular or dermoglandular flaps and nipple–areola complex pedicles. We developed an indication algorithm based on the size and shape of the breast as well as the size and location of the tumor. A reconstruction algorithm suggests a selection of suitable tailored flaps and pedicles based on tumor location and vascular supply of the breast. The application of these algorithms results in known and novel OPS techniques, which are presented here with long-term results. We designed the algorithms to help tailor every operation to the individual patient in a standardized manner, since OPS is now on the rise, more than two decades after the publication of the first techniques. A rapidly increasing body of observational evidence suggests comparable rates of local recurrence between OPS and conventional BCS. Importantly, the rates of clear resection margins are in favor of OPS despite extended indications to larger tumors. Finally, OPS optimizes patient satisfaction by improving esthetic outcomes after BCS.

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*Keywords:* Breast cancer; Breast conserving surgery; Oncoplastic surgery

## Introduction

The potential advantages of breast conserving surgery (BCS) over mastectomy include higher patient satisfaction with cosmetic results and better quality of life.<sup>1</sup> A recent large survey of breast cancer survivors, however, showed that satisfaction with cosmetic outcomes was just slightly higher after BCS than after mastectomy without reconstruction, with obvious room for improvement.<sup>2</sup> Conversely,

many women who underwent mastectomy with autologous tissue reconstruction are more satisfied with the size, symmetry, and softness of the breasts compared with women who underwent BCS.<sup>3</sup> One reason for the lack of satisfaction after BCS is breast asymmetry, which is frequently reported by patients after conventional BCS and significantly correlated with poor psychosocial functioning.<sup>4</sup>

Oncoplastic breast conserving surgery (OPS) aims at overcoming those deficits in outcomes and improving patient satisfaction. The first OPS techniques were described more than two decades ago.<sup>5,6</sup> Since then the emphasis on esthetic outcomes and quality of life after breast cancer surgery has resulted in the development of various OPS techniques.<sup>7–9</sup> However, training opportunities are still

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rare in most countries. There is little standardization of OPS, which challenges the scientific comparability of the techniques among each other and to conventional BCS. Therefore, a new nomenclature and two algorithms are proposed here, which are designed to help surgeons select the optimal OPS procedure for the individual patient in a standardized manner.

## Methods

### *Nomenclature*

A nomenclature for conventional and oncoplastic BCS is proposed, which distinguishes four categories by the key steps of the procedure: Conventional tumorectomy, oncoplastic mastopexy, oncoplastic tumorectomy and oncoplastic reduction mammoplasty (see [Table 1](#), [Supplemental Digital Content 1](#)). Conventional tumorectomy refers to procedures with glandular re-approximation or direct wound closure following tumorectomy. Oncoplastic mastopexy is defined by non-oncological skin resection. This includes circumareolar mastopexy also referred to as donut or round block (Benelli) mastopexy, skin-to-fascia excision in the lower quadrants such as triangle excision or V-mammoplasty, and nipple repositioning with or without the use of pedicles.<sup>8,9</sup> Since nipple-repositioning to the center of the reconstructed breast is a key principle of OPS, many procedures fall into this category. Oncoplastic tumorectomy differs from conventional tumorectomy by its partial breast reconstruction technique. It consists of either the displacement of tailored glandular and dermoglandular flaps or volume replacement techniques, such as latissimus dorsi flap reconstruction. Oncoplastic reduction mammoplasty is defined by non-oncological breast tissue resection in addition to skin resection to reduce the volume of the breast for esthetic reasons. It commonly includes nipple repositioning by the use of pedicles in combination with breast re-shaping with tailored flaps.

### *Partial breast reconstruction*

Three categories of volume displacement techniques for partial breast reconstruction during OPS are proposed: Glandular re-approximation, the use of tailored glandular and dermoglandular flaps and nipple–areola complex pedicles. Successful partial breast reconstruction is crucial for the preservation of a natural shape of the breast and the avoidance of asymmetry. It depends on anatomical principles of the vascular supply of the breast (see [Table 2](#), [Supplemental Digital Content 2](#)). Most of the blood supply of the breast is provided by the lateral mammary artery and branches of the internal mammary artery (also called internal thoracic artery).<sup>10</sup> The contribution of the mammary branches of the posterior intercostal arteries allows to achieve high-volume displacement with tailored flaps and pedicles without resulting fat necrosis.

Glandular re-approximation is defined as epifascial and/or subcutaneous mobilization of the remaining breast tissue to bridge the cavity after tumorectomy. Due to the broad base of the mobilized tissue, the vascular supply is reliably provided by a random pattern. On the contrary, tailored flaps are circumferentially mobilized to allow wide advancement into the excisional defect. It is mandatory to preserve the main blood vessels at the base of the flap to avoid parenchymal ischemia with consecutive fat necrosis and tissue atrophy. Nipple–areola complex pedicles are de-epithelialized dermoglandular flaps designed to recentralize the nipple. The optimal width and thickness to ensure adequate arterial perfusion while avoiding venous congestion depend on the length of the pedicle.

## Results

### *Indication algorithm*

The first algorithm was designed to plan the surgical approach based on the location and size of the tumor and size and shape of the breast ([Fig. 1](#)). Dimensions in percentages are purposefully not provided to point out the importance of the location of the tumor in addition to the ratio of the size of the tumor to the size of the breast. The algorithm allows flexibility based on clinical judgment and in many situations offers several options to meet personal preferences. In order to address the need for objective measures, however, examples of corresponding cup sizes and clinical tumor stages are provided in the figure.

For small tumors, conventional BCS remains the default approach. For bigger tumors, oncoplastic techniques are generally preferred. Oncoplastic reduction mammoplasty is ideal in a patient with large and ptotic breasts irrespective of the location of the tumor. The specific reduction technique, however, is chosen based on the tumor location. For patients with small to medium size breasts, oncoplastic tumorectomy or oncoplastic mastopexy are the preferred techniques. Contralateral procedures can be offered to prevent asymmetry according to patient preference.

### *Reconstruction algorithm*

The second algorithm suggests specific tailored breast parenchymal flaps and pedicles for each of the OPS categories based on the location of the tumor, the anticipated volume loss and the vascular supply of the breast ([Fig. 2](#)). Similar to the indication algorithm, the reconstruction algorithm often offers more than one option to meet personal preferences. Alternative flaps and pedicles are written in italics in [Fig. 2](#). As a general rule, glandular re-approximation as the only form of reconstruction works well after the excision of tumors that are small in relation to the size of the breast. After medium to high volume tumorectomy, volume replacement from a donor site outside of the breast or volume displacement by the use of tailored

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