

Oncoplastic Breast Surgery: The Balance Between Oncological Safety and Good Cosmetic Result

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Original Research Article

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Abstract:

Breast-conserving surgery combined with postoperative radiotherapy has become the preferred treatment for the early-stage breast cancer as it has equivalent survival to that of mastectomy. It is sometime challenging to completely excise the cancer with adequate surgical margin while preserving the natural shape and appearance of the breast. Oncoplastic breast surgery emerged as an approach to allow wider excision when required to achieve clear margin without compromising acceptable breast volume and shape. It is based on the principle of plastic surgical techniques for reshaping the breast after oncological excision of breast cancer. This review article will focus on the basic surgical options and approaches to oncoplastic breast surgery.

Keywords: Breast conserving surgery, Oncoplastic surgery, Therapeutic mammoplasty, perforator flap.

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INTRODUCTION

The role of breast conserving surgery (BCS) was established during the 1980s, when Umberto Veronesi in Italy and Bernard Fisher in the USA separately published their randomized trials showing that overall survival after BCS plus adequate radiotherapy was similar to that following mastectomy^{1,2}.

Breast conserving surgery:

Quality of life is better after breast-conserving surgery. Therefore, breast-conserving surgery should be performed if technically possible and there are no contraindications. Careful patient education and counseling is important as some women have a misconception about the oncological safety of breast preservation. There are only two absolute contraindications as mentioned in Table 1,

Table 1: Contraindications of breast-conserving

Absolute contraindications:

1. Inflammatory breast cancer.
2. Failure to achieve a negative margin without causing breast deformity.

Relative contraindications:

1. Women who prefer mastectomy (after adequate patient education).
2. Multifocal/multicentric breast cancer.
3. Contraindication for radiotherapy: Collagen vascular disease, previous chest wall, or Mantle radiotherapy.
4. Strong family history of breast cancer or proven BRCA-1 and BRCA-2 gene mutation carrier.

However, women's request for mastectomy must be respected. There are numerous issues to be taken account when planning breast conserving surgery highlighted in Table 2.

Table 2: Factors to be considered before breast conserving surgery

- | |
|--|
| <ol style="list-style-type: none"> 1. The size of the tumor versus the volume of the breast (Tumour to breast ratio). 2. Location of the tumor. 3. Density of breast parenchyma. 4. Degree of ptosis. 5. BMI and body configuration of the patient. 6. Previous breast surgery and scar. |
|--|

Breast conserving surgery, wide local excision only, no oncoplastic procedure required: When the tumour is 10% or less of the breast volume, simple wide local excision without any oncoplastic procedure may give a good cosmetic result. Impalpable tumour will need localization either by guidewire, radioactive occult lesion localisation (ROLL), radioactive seed localization or intraoperative US localization.

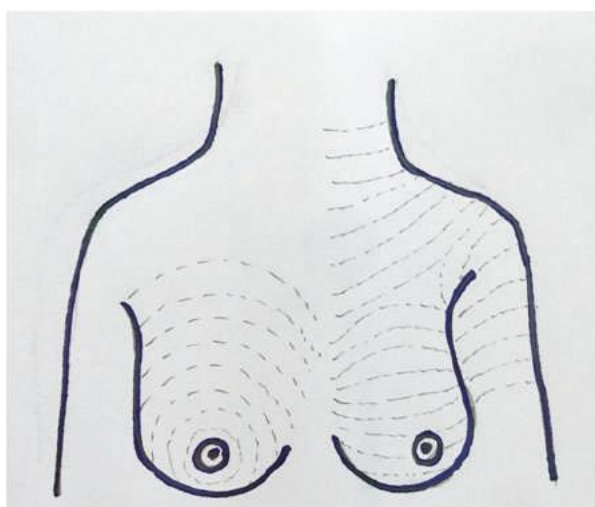


Figure 1: (a) Langer's line (b) RSTL (Resting skin tension line) of Kraissl's.

Placement of incision has great cosmetic value. Knowledge of Langer's lines and Kraissl's lines would help surgeon to make an incision that enhances cosmetic outcome (Figure 1). Incisions that follow the maximum resting skin tension lines (Kraissl's line) produce the most cosmetically acceptable scars³.

In majority of cases, it is necessary to excise the whole thickness of tissue down to pectoral fascia. If the cancer is superficial and there is a significant amount of tissue deep to the cancer, it may not be necessary to remove the full thickness of breast tissue. Likewise, if the cancer is deep, more tissue can be left superficially on the skin flap.

Oncoplastic surgery:

The extent of surgical excision or the volume of resected breast tissue is the most important factor affecting cosmesis. Where more than 10% of breast volume needs to be resected oncoplastic technique should be planned as it allows wider excision of breast cancer without risking major local deformity. Until evolution of oncoplastic surgery, surgical options have been limited to simple wide local excision or mastectomy. The oncoplastic surgery provide a 'third option' that avoids the need for mastectomy in many patients⁴.

Types of Oncoplastic surgery:

After tumour excision the defect can be reconstructed by one of the two ways:

- 1) Volume displacement surgery: In this technique, the defect after tumour excision is reconstructed by recruiting and transposing local dermo glandular flap.
- 2) Volume replacement surgery: The defect is reconstructed by importing volume from elsewhere.

Comparison of these two techniques has been given in Table 3.

Table 3: Comparison of two types of surgery

	Volume displacement	Volume replacement
Scar	Only in Breast	Breast & Donor site
Contralateral surgery	Mostly required	Mostly not required
Operative time	1-2 hours	2-3 hours
Recovery time	1-2 weeks	4-6 weeks
Complications	Parenchymal necrosis nipple necrosis	Flap loss Donor site morbidity

Choices of Oncoplastic Techniques:

The choice of technique depends on a number of factors, including the extent of the resection, the location of tumour, timing of surgery (immediate or delayed), experience of surgeons and the expectation of patient.

Volume displacement Oncoplastic surgeries:

Local breast parenchyma is repositioned to fill the defect using either simple advancement of tissue (Level I) or more complex pedicles (Level II).

Level I Oncoplastic surgeries:

A level I approach includes skin and glandular undermining including nipple-areolar complex (NAC) when needed. Level I procedures should be able to be performed by all breast surgeons without specific training in oncoplastic surgery.

If less than 20% of breast volume is excised then the Level I procedure is adequate. Typical Level I technique involved intraparenchymal flap with dual-plane mobilization, (mobilization of breast parenchyma from subcutaneous tissue at the superficial plane and from pectoral fascia at deeper plane). Invariably this procedure requires NAC re-centralization (Figure 2).

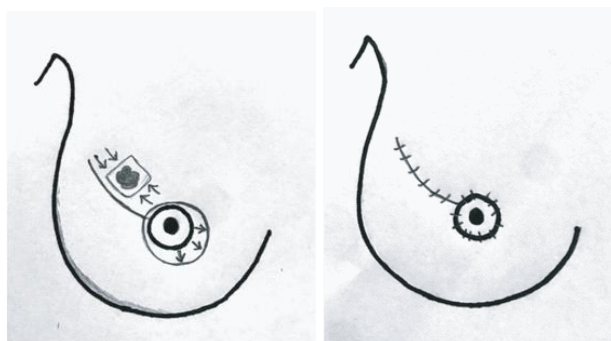


Figure 2: Level I oncoplastic technique. (a) Tumour excision in the upper outer quadrant and de-epithelialization opposite the tumor bed (b) NAC re-centralization.

Level I oncoplastic procedure is best performed in women in dense breast tissue. Women with fatty breast may be at risk of fat necrosis. Other techniques like batwing flap and round block procedure (Figure 3) also regarded as Level I technique⁵

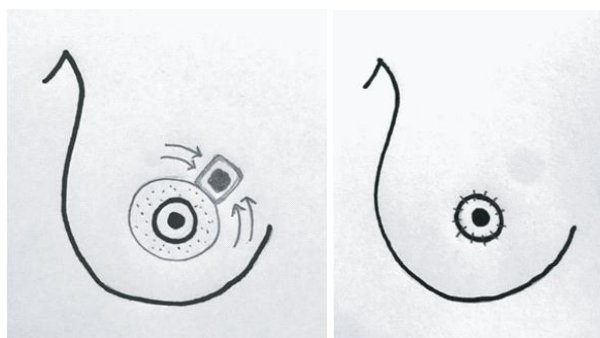


Figure 3: Level I oncoplastic technique. Round block reconstruction (a) Doughnut incision and de-epithelialization with tumour excision and mobilization of tissue to close the defect. (b) Closure of the wound.

Level II Oncoplastic Surgeries:

Level II oncoplastic surgery should be considered when 20-50% of the breast volume is to be excised or the cancer is in a cosmetically challenging location (e.g., Inferior quadrants). Usually the breast is large, ptotic, fatty breast where extensive dual plane mobilization will cause fat necrosis. Level II techniques, generally called therapeutic mammoplasty, are derived

from breast reduction principles that involve skin excision and glandular mobilization to allow major volume resection. To perform Level II procedure, surgeons need additional plastic surgical training. Surgeons need to be familiar with different types of skin incisions (wise pattern, vertical, J-mammoplasty and pedicles (inferior pedicle, superior-medial pedicle, superior pedicle, dual pedicles)⁶ (Figure 4).

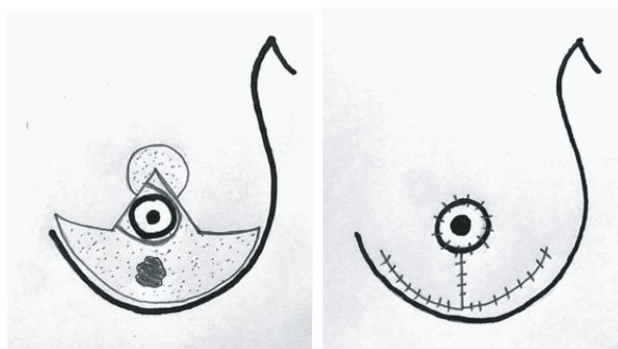


Figure 4: Level II oncoplastic technique, Therapeutic mammoplasty. (a) Wise pattern skin incision and superior-medial pedicle designed. Deepithelialization and excision of dermo glandular tissue along with lower pole tumour. (b) Closure of wise pattern incision.

There are wide range of Level II oncoplastic techniques. To simplify the selection of a Level II oncoplastic technique, a quadrant-per-quadrant atlas has been developed⁷.

Level II oncoplastic surgery generally results in a smaller, round, and perky breast than the contralateral breast. Hence contralateral symmetrisation operation is commonly required.

Volume Replacement Surgery:

Volume replacement surgery should be considered when resection of more than 20% of breast volume in a small to medium-sized breast or cancer is in cosmetically challenging location (like central, medial or inferior quadrant). In many cases volume replacement surgery can extend the possibility of breast conservative surgery and avoid mastectomy. Deformity resulted from previous breast conserving surgery can also be corrected by volume replacement surgery. It is also considered when patient declined contralateral symmetrisation surgery. High quality focused plastic surgical training is required before performing volume replacement surgeries.

There are several different approaches to volume replacement techniques have been developed, including myocutaneous flap, perforator flaps, lipomodelling and implants.

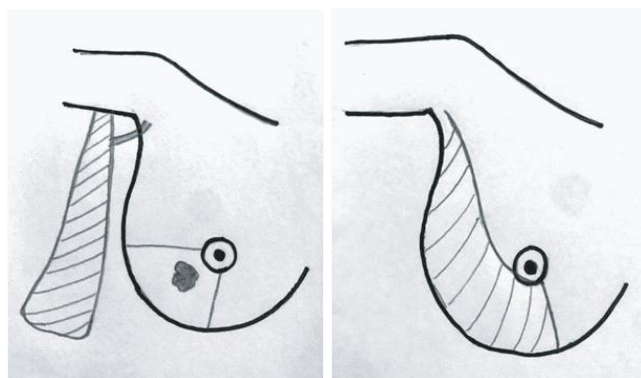


Figure 5: Volume replacement oncoplastic technique, Latissimusdorsi (LD) mini flap. (a) LD flap harvested on thoracodorsal pedicle. (b) Partial breast reconstruction by LD mini flap after tumour excision.

1. Latissimus Dorsi (LD) myocutaneous flap:

For partial breast reconstruction, autologous LD flap is the most popular and widely practised option because of its versatility (Figure 5). It requires sacrifice of one of the important muscles from back, which sometimes is not acceptable for active women. It has a steep learning curve, more operating time and extended recovery period. Donor site morbidity is another drawback⁸.

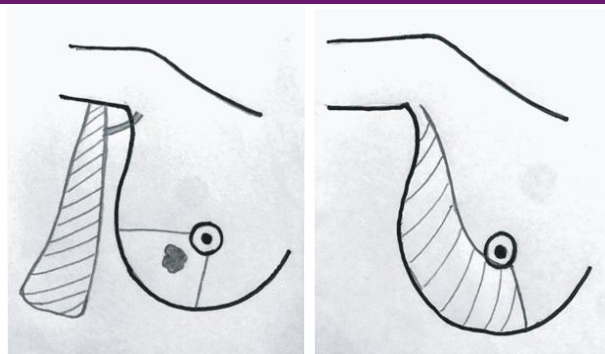


Figure 5: Volume replacement oncoplastic technique, Latissimusdorsi (LD) mini flap. (a) LD flap harvested on thoracodorsal pedicle. (b) Partial breast reconstruction by LD mini flap after tumour excision

2. Perforator flaps:

Thoracodorsal artery perforator flap (TDAP flap)⁹, lateral intercostal artery perforator flap (LICAP flap)^{10,11} (Figure 6) and anterior intercostal artery perforator flap (AICAP flap) are gaining popularity.

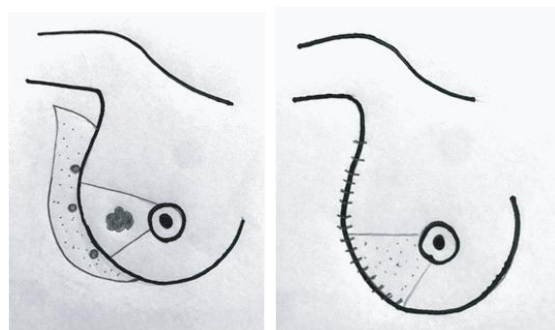


Figure 6: Volume replacement oncoplastic technique, Lateral intercostal artery perforator (LICAP) flap. (a) LICAP flap harvested on lateral intercostal artery perforators, de-epithelialization of the flap. (b) Insetting of the flap on the post-excision defect through the lateral breast wound.

Perforator flaps provide skin and subcutaneous tissue for volume replacement, quick to perform, faster recovery and less morbidity than LD flap.

3. Lipomodelling:

Stem cells harvested from fat are injected to the defect. Immediate lipomodelling is practised in some centres. However, this technique mainly used in delayed settings to correct defect resulted from previous breast-conserving surgery¹².

CONCLUSION

As surgical practice guidelines continue to evolve in the field of breast-conserving surgery, the values of oncoplastic surgery continue to expand. Oncoplastic surgery extends the role of breast-conserving surgery by enabling complete excision of a greater range of tumours without compromising cosmesis. Where simple wide local excision and level I oncoplastic surgery can be taught and performed by breast surgeons, oncoplastic surgeons need training and experience in both surgical oncology and plastic and reconstructive surgery.

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