Mini-Review

Oncoplastic breast conserving surgery

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Abstract: Oncoplastic breast conserving surgery is a fundamental component of the repertoire for the management of breast cancer. It facilitates removal of large volumes of breast tissue, and can improve cosmetic outcomes and patient satisfaction whilst maintaining good oncological principles, reducing re-excision and mastectomy rates and assisting in adjuvant radiotherapy planning.

We review the various techniques for oncoplastic breast conserving surgery that have emerged over recent years and describe their utilisation in excising tumours from various locations within the breast, and the pertinent patient specific factors that must be considered in technique selection. Finally complications and the evidence for the oncological safety specific to this type of surgery are discussed.

Key Words: Oncoplastic; breast; breast cancer; breast surgery; breast conservation

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Introduction

Breast conservation surgery with adjuvant radiotherapy is widely accepted as a treatment modality for women with early stage breast cancer. Prospective, randomised trials, with 20 years outcome reported in some studies, have reported no difference in breast cancer mortality and overall survival when compared to women treated with mastectomy (1-4).

Breast conservation success is based around the principles of complete removal of the tumour with adequate surgical margins whilst preserving the natural shape and appearance of the breast. Historically, breast conservation has not always achieved a good cosmetic result, which has had the resultant sequelae of negative patient reported outcome scores, for example body image and quality of life. The deformities caused by poorly planned breast conservation surgery are often severe and difficult to manage with high levels of complications and dissatisfaction (5).

Oncoplastic breast conserving surgery techniques have emerged over recent years, facilitating the achievement of better cosmetic results whilst maintaining good oncological principles. The term "oncoplastic", is a Greek derived word which literally translated means "moulding of tumour". It first appeared in the literature in 1996 (6). Audretsch (7), considered by some as the father of oncoplastic surgery, described the technique of reconstructing a partial mastectomy defect in 1998 as a further refinement of breast conservation avoiding mastectomy. Since its introduction, oncoplastic breast surgery has enabled surgeons to remove greater volumes of tissue successfully, and thus reducing mastectomy and re-excision rates. The breast oncoplastic service is now a core component of the breast multidisciplinary team. Here we review various strategies for oncoplastic breast reconstruction and discuss the oncological principles.

The decision making process

When considering a patient for an oncoplastic breast conserving procedure, the following points must be considered:

- volume of tissue to be excised;
- tumour location;
- breast size and glandular density;
- patient related risk factors, particularly smoking, obesity, diabetes, previous surgery;

❖ adjuvant therapies.

Excision volume is the single, most predictive factor for breast deformity (8). It is reported in the literature that there is a substantial risk of deformity once over 20% of the breast is excised (9).

Tumour location is another important consideration. Excision of tumours from the upper inner quadrant and lower pole of the breast are at particular risk of leaving a severe deformity. For example, excision of tumours from the lower pole carries the risk of a "bird's beak" deformity (10).

Breast conservation is contraindicated when clear margins cannot be assured without performing a mastectomy, in patients with T4 tumours, or in the setting of extensive multicentric disease, extensive malignant microcalcification or inflammatory breast cancer (11).

Pre-operative and successive post-operative views should be taken for consenting patients undergoing oncoplastic breast conserving surgery with a standard set of views acquired in a studio setting. There should be a full and tiered consent process for this that must be followed with each patient (12).

Technique selection

Clough *et al.* (8) have described the use of a bi-level classification system in selecting the most appropriate technique of oncoplastic breast conservation surgery. If less than 20% of the breast volume is to be excised then they advocate the use of a level I procedure encompassing the following steps:

❖ skin incision;
❖ extensive skin undermining following the mastectomy plane to facilitate both tumour resection and glandular redistribution once the tumour has been removed;
❖ nipple areola complex (NAC) undermining;
❖ full thickness glandular excision;
❖ glandular defect closed with tissue reapproximation;
❖ if required, an area in the shape of a crescent bordering the areola is de-epithelised and the NAC repositioned.

Should more than 20% of the breast need to be excised, more complex procedures, requiring specific training in oncoplastic breast surgery should be employed. Patients should be counselled thoroughly in the pre-operative setting regarding resultant scars using oncoplastic techniques and the potential requirement for symmetrisation procedures.

These techniques can be broadly categorised into volume displacement and volume replacement techniques.

Volume displacement

Volume displacement involves the principle of mobilising local glandular or dermoglandular flaps and transposing them into the resection defect. This employs predominantly mammoplasty techniques. The result is a net loss of breast volume from which arises the potential requirement for contralateral symmetrisation procedures. Type I procedures, as described by Clough *et al.* (8) also employ the use of glandular remodelling as part of volume displacement, but with lesser volume excisions than type II procedures.

There are a range of mammoplasty techniques which can be utilised. The tumour location will influence both Selection of the most appropriate skin incision/excision pattern, and where appropriate pedicle utilised for nipple repositioning. A range of approaches have been advocated, and in general divide the breast into quadrants or "zones" for planning the surgical approach (8,13). Schematically rotating the nipple areola pedicle opposite the site of tumour excision allows the application of these techniques for a variety of tumour locations (8).

Skin excision pattern

Wise pattern type

These allow extensive excision of lower outer or lower inner quadrant tumours. In addition, modifications of the Wise pattern technique have been described (14). These techniques as described by Cutress *et al.*, facilitate excision of a tumour outside the standard Wise pattern markings. This is particularly useful for tumours within the upper outer quadrant or upper inner quadrants of the breast. Through modification of the skin incision, the skin overlying the tumour can also be removed en bloc.

Vertical scar/Lejour type

For inferior pole or retroareola tumours. This technique allows a similar location and volume of tissue to be excised as seen with the superior pedicle mammoplasty techniques, but avoids the scar running along the inframammary fold (15).

Nipple areolar complex pedicle

Inferior pedicle

For tumours located within the superior aspect of the breast (11-1 o'clock). Traditional Wise pattern incisions can be used with this mammoplasty technique. The blood supply to the nipple-areola complex is maintained through

its inferior and posterior glandular attachments as the tumour resection involves the upper pole. The inferior pedicle is deepithelised and advanced upwards and into the glandular defect left from the tumour resection. Resection of glandular tissue from the inner and outer lower breast quadrants is performed in sufficient volume to allow closure and optimisation of breast shape (8). The resultant scars are periareolar with an inverted T, as traditionally seen in breast reduction patients.

Superior pedicle

For tumours located within the inferior aspect of the breast (4-8 o'clock). This mammoplasty technique uses a similar pattern of incisions as the inferior pedicle technique and results in a similar set of scars. The nipple-areola complex can however be dissected away from the surrounding breast tissue and maintained on a superior dermoglandular pedicle.

Round block/Benelli technique

For upper pole tumours, in particular those located in the 12 o'clock position. This technique utilises a periareolar incision, and begins by making two concentric incisions around the areola. The intervening skin is then deepithelised. The outer edge of the deepithelisation is then incised and the skin envelope is undermined in the mastectomy plane. The nipple-areola complex maintains its blood supply through the posterior glandular base. Wide excision of the tumour is then performed onto the pectoralis fascia. The medial and lateral glandular flaps are then mobilised off the pectoralis muscle and approximated. The two periareolar skin incisions are then sutured together for closure.

Grisotti flaps

For central tumours, requiring excision of the nipple-areola complex (16). In addition to maintaining the desirable breast shape, this technique also aids the reconstruction of a nipple-areola complex through preservation of a skin island on an advancement flap (17).

Volume replacement

Using these techniques, autologous tissue is harvested and transferred from a remote site into the resection defect. This can be performed as either a pedicled or free flap. Traditionally this has involved the use of latissimus dorsi flaps (18). However newer technique are evolving, for example, lateral intercostal artery perforator flaps which are based on intercostal perforators arising from the costal groove (19). These confer an advantage over thoracodorsal artery perforator flaps (TDAP) and latissimus dorsi miniflaps by enabling preservation of the thoracodorsal pedicle should a mastectomy and latissimus dorsi flap breast reconstruction be required in the future.

Complications of oncoplastic breast conserving surgery

Glandular necrosis is a pertinent issue affecting volume displacement techniques, and are more likely to occur with type I procedures than with excision alone due to the greater glandular mobilisation. This is a particular problem when the breast is predominantly made up of fatty rather than glandular tissue and there is extensive mobilisation of the tissue with wide areas of skin undermining and dissection of the gland from pectoralis major (8). Areas of fat necrosis may ultimately become infected, leading to post-operative healing problems and potentially delays in adjuvant therapies.

In order to reduce the risk of glandular necrosis, as mentioned previously an assessment of glandular density as part of the pre-operative surgical planning is particularly important. Patients can then be offered appropriate procedures on an individual by individual basis.

Where volume displacement is performed using breast reduction or type II techniques, all complications associated with the reduction technique used may additionally occur. Finally complications specific to volume replacement techniques include donor site morbidity and the risk of flap loss.

Oncological safety

It remains a standard of care to use adjuvant radiotherapy in all patients undergoing breast conserving surgery regardless of technique. There is an established body of evidence within the literature from randomised controlled trials that reports significantly lower rates of local recurrence and better oncological outcomes if breast conserving surgery is used in combination with adjuvant radiotherapy compared to surgery alone (20).

To date, the published literature supports the use of oncoplastic breast conserving surgery, in comparison to historical standard techniques. Clough *et al.*, have reported a prospective analysis of a 100-patient series undergoing the

more complex type of oncoplastic breast surgery, with 5-year overall and disease-free survival rates of 95.7% and 82.8% respectively (21). Rietjens *et al.*, have reported an overall local recurrence rate of 3% in their series involving similar surgical techniques (22). A systematic review of studies of oncoplastic breast conserving surgery demonstrated higher rates of complications, but these did not impact on delays in adjuvant therapies or oncological outcomes (23).

Indeed, there is increasing evidence that reduction mammoplasty techniques, within the setting of oncoplastic breast conserving surgery, can result in excision of the tumour with wider surgical margins and more effective radiotherapy planning (21,24,25). It has been reported that patients with large, pendulous breasts treated with standard breast conserving surgery receive a much higher radiotherapy dose and hence demonstrates the advantage to a reduction in breast size achieved with reduction mammoplasty techniques (26).

Conclusions

Oncoplastic breast conservation surgery is a significant advancement in the surgical management of breast cancer. It facilitates the removal of large volumes of breast tissue with significantly improved cosmetic outcomes and patient satisfaction whilst maintaining good oncological principles, potentially reducing re-excision rates (27) and mastectomy rates and assisting in adjuvant radiotherapy planning. Within the UK there are now clear good practice guidelines for the provision of an oncoplastic breast surgery service (12).

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