A review of current practices in breast conservation surgery in the UK

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ABSTRACT

INTRODUCTION The aim of this study was to assess whether surgeons in the UK were practising wide excision consistent with current guidelines and current evidence.

PATIENTS AND METHODS Questionnaires were sent to 200 breast surgeons throughout the UK to determine current practices in breast conserving surgery.

RESULTS When performing a wide excision for invasive cancer, 61% of respondents always remove full thickness of breast tissue and 37% usually do. Of surgeons, 60% rarely use specimen X-ray for palpable lesions. However, 91% always take specimen X-rays in impalpable lesions, but 9% do not always take specimen X-rays for impalpable lesions. In 93% of units, the pathologist always reports the distance to the nearest margin. For both invasive and *in situ* cancer, there is a wide variation in what is considered an adequate radial margin. There is wide variation in the practice of re-excision. Of surgeons, 50% indicated that they wish wider margins in the presence of an extensive *in situ* component and 39% wish wider margins in younger women.

CONCLUSIONS The results show a large variation in practice with many surgeons not treating patients in accordance with current guidelines and evidence.

KEYWORDS

Breast conservation surgery – Wide excision – Margins

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The aim of breast conserving surgery (BCS) is to excise all invasive and *in situ* cancer and to achieve long-term disease control whilst at the same time minimising local morbidity and ensuring a good cosmetic result. BCS is as effective as mastectomy in terms of disease outcome and overall survival¹ but confers the advantages of better cosmesis, less psychological morbidity, improved body image, sexuality and self-esteem.²

Not all patients are suitable for BCS and appropriate selection has a major influence on both short- and long-term outcome. The choice in unifocal cancers is determined by a balance between tumour size and breast volume. Clinical and pathological factors also influence patient selection for BCS because of their impact on local recurrence. These include young age (under 35–39 years), an extensive *in situ* component associated with an invasive tumour, grade 3 histology and the presence of lymphatic/vascular invasion.^{3,4}

Excising skin directly overlying a cancer is only necessary if a carcinoma is very superficial or tethered to skin. Routine excision of skin when performing a wide excision

falls outwith current guidelines.^{5,6} Specimens should be immediately orientated prior to submission to the pathologist. The use of radio-opaque markers in conjunction with an intra-operative specimen X-ray allows any margins to be fully assessed and re-excised if necessary.

The histological factor which most frequently shows an association with local recurrence is the presence of an extensive *in situ* component (EIC) within and surrounding an invasive cancer. EIC is also a predictor of residual disease within the breast.⁵ Reports indicating that local recurrence rates were 3–4 times higher in cancers with EIC took no account of margins.^{10–12} Further studies suggest that it is only patients who have both EIC and involved margins in whom local recurrence rates are unacceptable; if clear margins are obtained, there is not an increased rate of local recurrence in patients with EIC.^{15,14}

The most important surgically related factor for local recurrence is completeness of excision. Ideally, there should be a clear rim of normal tissue (≥ 1 mm) around the carcinoma.¹⁴ Controversy has surrounded how much extra

tissue should be removed and what constitutes an involved or positive margin. Almost all studies have reported increased local recurrence rates in patients who have tumours with involved margins compared to those who do not (relative risk of 1.4–9).^{7–18} This was despite the fact that those with involved or close margins received higher doses of radiotherapy than patients with clear margins in almost half these series. There is no suggestion that patients with narrow margins (< 2 mm) have a worse rate of local recurrence than those with wider margins (2–5 mm). Patients with extensive positive margins have an unacceptably high rate of local recurrence (27% at 8 years in one study¹⁵). A recent review of all the literature concludes that wider margins do not equate with an improved rate of local control.²⁷ The presence of lobular carcinoma *in situ*¹⁹ and atypical ductal hyperplasia (ADH)²⁰ at the margins has also been shown not to significantly increase local recurrence rates. Clear margins are crucial in younger women; if wider margins are important then it is likely to be in women under 45 years of age.¹⁷

The overall recurrence of ductal carcinoma *in situ* (DCIS) following BCS alone is about 25% at 8 years' follow-up, with up to 50% of recurrences being invasive disease.^{21–25} As with invasive cancers, an inadequate excision is the most important risk factor for local recurrence.^{21,24,25} One study reported that clear margins (> 1 mm) had an 8.1% recurrence rate compared to 37.9% recurrence when excision margins were close ($\leq$ 1 mm), but there was no improvement in recurrence rates in more widely excised lesions.²² High-grade tumours, poorly differentiated tumours and those showing comedo necrosis have also been shown to be risk factors for recurrence. A further risk factor for recurrence irrespective of tumour grade or type is a young age (< 40 years) at diagnosis. The EORTC 10853 trial^{21,25} found that women less than 40 years of age at diagnosis were more likely to recur than older women. None of the major trials have found any statistical significance between recurrence and tumour size. The NSABP-B17,²³ EORTC-10853²¹ and UK/ANZ DCIS²⁶ trials all found a significant reduction in ipsilateral recurrence following radiotherapy, although there was no overall effect on survival.

Patients and Methods

The Edinburgh Breast Unit sent out questionnaires to 200 breast surgeons (identified using BASO registration details) throughout the UK asking a wide array of questions regarding their practice of breast conserving surgery.

Results

Of the 200 questionnaires that were sent out, 127 were completed and returned. All of those replying were specialist

registrars (only 3) or consultants (124) who individually treated at least 50 cases of breast cancer annually. Of respondents, 87% worked in units that treated 100–500 cases annually.

Single focus of invasive carcinoma

With regard to a single focus of invasive carcinoma, the survey found:

1. 98% of surgeons always or usually take a full thickness of breast during wide local excisions.
2. 94% orientate the specimen for the pathologist, 57% use sutures alone and the rest use a combination of sutures and metal clips together, metal clips alone or coloured beads.
3. 60% rarely take specimen X-rays for palpable lesions, 12% always use them.
4. 91% always take specimen X-rays for impalpable lesions.
5. 18.3% of surgeons always or usually take cavity shavings, the rest do so infrequently. Bed biopsies are always or usually taken by 13.4%.
6. Surgeons report that 7% of pathologists do not always report the distance of the invasive and *in situ* cancer to the nearest margin.

Figure 1 shows that 65% of surgeons want to have a margin of more than 2 mm when excising a single focus of invasive cancer. Only 7% were prepared to accept margins of less than 1 mm as long as there were not actually malignant cells at the limit of excision and 24% wanted a margin of at least 1 mm.

Following full thickness excisions, if the anterior margin is less than 1 mm, 61% would not re-excise, 33% would. If the anterior margin is 1 mm, 71% would not re-excise, 20% would. If the posterior margin is less than 1 mm and excision is to the pectoral fascia, 69% would not re-excise, 15% rarely re-excise, and 10% usually or definitely re-excise (Fig. 2).

With regard to radiotherapy given to the tumour bed, 60% thought an increased dose of local radiotherapy would be given if the margins were close but clear, 30% thought that the dose would not change, and 10% did not know.

When asked about margins in the presence of EIC 46% of surgeons wanted wider margins, 46% did not want wider margins and 8% did not know. There was a wide variation in the practice of re-excision.

If there was lymphatic or vascular invasion at the margin of excision, but both the invasive and *in situ* disease were 10 mm clear of the margins 17% would re-excise, 24% would consider mastectomy, and 51% would not consider any further surgery.

Figure 1 Accepted radial margins of excision for a single focus of invasive cancer.

Of respondents, 91% would not alter their treatment plan if there was atypical ductal hyperplasia at the margin of excision, but both the invasive and *in situ* disease were 10 mm clear of the margins. The remaining 9% of surgeons indicated that they would re-excise or perform mastectomy. If lobular carcinoma *in situ* (LCIS) was at the margin 20% of surgeons would re-excise, 17% would consider mastectomy, and 60% would not alter their surgical treatment plan.

Ductal carcinoma in situ

With regard to ductal carcinoma *in situ* (DCIS), surgeons were asked what they would do with a 2-cm area of microcalcification:

1. 43% of surgeons always remove a full thickness of breast tissue, 39% usually do and 17% do so sometimes.
2. With regard to adequate radial margins of excision 17% wanted 1 mm or more, 20% wanted 2 mm or more,

Figure 2 Re-excision rates for different clearance margins for invasive cancer.

Figure 3 Acceptable margins of excision for a 2-cm focus of DCIS.

39% wanted 5 mm or more and 20% wanted 10 mm or more (Fig. 3).

3. If the anterior margin is less than 1 mm, 28% would excise skin and subcutaneous fat, whereas 61% would perform no further surgery (Fig. 4).
4. If the anterior margin is 1 mm, 17% would excise skin and subcutaneous fat whereas 75% would perform no further surgery.

5. If the margins were 10 mm clear of DCIS but there is ADH at the margin 11% would re-excise, 2.4% would consider mastectomy, but 84% would not alter their surgical treatment plan.

6. If the margins were 10 mm clear of DCIS but there is LCIS at the margin 18% would re-excise, 17% would consider mastectomy, but 61% would not alter their surgical treatment plan.

Figure 4 Re-excision rates for varying clearance margins for DCIS.

Discussion

These data show that there are large variations in the practice of breast conserving surgery in the UK. Although some of this variation can be explained by a lack of clinical evidence, there is a worrying diversity of practice relating to areas where there is well-founded evidence.

A review of a large number of published studies on surgical margins for early-stage breast cancer²⁷ concluded that it is 'absolutely unacceptable to have tumour cells at the cut edge of the excised specimen, regardless of the type of post-surgical adjuvant therapy'. Some 7% of surgeons replying to this questionnaire believed that a margin of less than 1 mm is acceptable as long as there are no malignant cells actually at the cut edge. Theoretically this is entirely reasonable. In practice, pathological assessment of tumour margins to this degree is not always accurate. A rim of 1 mm of normal tissue is the minimum for the pathologist to be certain of clear margins and could be argued to be an acceptable definition of clear margins. The review of margins concluded that there is no evidence from the literature to suggest that wider margins will increase local control. Despite this, 65% of surgeons want more than 2 mm margins for invasive cancers. Anterior and posterior margins appear to be not as important³⁰ as most recurrences in breast tissue are related to the radial margins. If full thickness of breast tissue is taken, it is not clear any further tissue needs to be taken, yet re-excision is practised by 20–30% of surgeons if the anterior margin is 1 mm or less.

With *in situ* lesions, a large proportion of surgeons wished to have wider clearance margins than evidence suggests is necessary, particularly with the added benefit provided by adjuvant therapies. Lagios and Silverstein²⁸ have suggested that if margins are clear of DCIS by 1 cm, radiotherapy is unnecessary. Other studies have also shown that providing the disease is excised (≥ 1 mm) wider excisions do not improve local control.²² However, conflicting data do exist. The EORTC study showed a high local recurrence rate in patients treated with wide local excision alone, even in those with wide margins. A prospective study from Boston, Massachusetts, widely excising predominantly low- or intermediate-grade DCIS with a 1 cm margin but not giving radiotherapy had to be abandoned because of an unacceptably high rate of local recurrence.²⁹ There is also no reason why the situation for DCIS should be different from invasive disease as many invasive cancers have areas of DCIS associated with them.

Re-excision in cases where the margins are clear of invasive or *in situ* disease but have lymphovascular invasion (LVI), ADH, or LCIS at the margins has no evidence base. Patients with LVI have an increased rate of local recurrence after mastectomy, so converting to mastectomy for this reason is not logical. Many of the surgeons who replied to the

questionnaire did re-excise in these situations. Almost a fifth of surgeons routinely take cavity shavings. Given the evidence that wider margins are not beneficial and these shavings remove more tissue, this is difficult to justify. Shavings of the closest margin to confirm completeness of excision in contrast seems more logical.

Despite increasing volumes of data on what are acceptable, safe and appropriate margins in breast conserving surgery, there is no uniform practice. Wider margins remove a larger volume of tissue which has deleterious effects on cosmesis, body image and problems with sexuality.² Surgeons should operate on the basis of best evidence but, as this survey shows, many do not.

Conclusions

Guidelines are required for breast conserving surgery. These should be based on the following principles:

- complete excision of all invasive and *in situ* disease is essential
- re-excision for atypical ductal hyperplasia, lymphovascular invasion and lobular carcinoma *in situ* has no evidence base
- routine X-ray of specimens to confirm completeness of excision appears of value
- lateral margins are important – 1 mm may be enough and wider margins do not reduce rates of local recurrence but do influence cosmetic outcome. Re-excision for clear margins of ≥ 1 mm appears illogical. Anterior and posterior margins are less important if a full thickness of breast tissue is excised
- routine cavity shavings and bed biopsies which remove more tissue may influence cosmesis; although widely used, the evidence to support their routine use is limited.

Surgeons need to apply these principles and amend their practice accordingly.

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