Audit

Skin-sparing mastectomy in the UK – a review of current practice

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Background: Skin-sparing mastectomy (was first described in 1991 and has achieved popularity because it facilitates immediate breast reconstruction, preserving the infra-mammary fold and breast envelope. Little is known about the use of skin-sparing mastectomy in the UK.

Methods: All members of the BASO Breast Specialty Group were contacted in June 2001 with a questionnaire to determine the popularity of skin-sparing mastectomy, techniques used, indications, contra-indications and outcomes.

Results: Of 300 questionnaires sent, 130 were returned by September 2001. The number of respondents using skin-sparing mastectomy increased from 27 (21%) in 1997 to 95 (73%) in 2001. Of respondents, 35 (23%) avoided skin-sparing mastectomy because of their uncertainty about the benefits (22/35), indications (16/35) or oncological safety (13/35). Where skin-sparing mastectomy was performed, it was combined with immediate breast reconstruction in 90% of cases, using latissimus dorsi (84%), subpectoral (70%) or TRAM flap reconstruction (54%). Skin-sparing mastectomy was performed by breast surgeons alone (62%), or with a plastic surgeon (47%) and the preferred incisions were peri-areolar (68%) and elliptical (26%). Most respondents used skin-sparing mastectomy for prophylaxis, *in situ* cancer and early invasive disease and avoided skin-sparing mastectomy in patients with skin tethering (62%), where radiotherapy was planned (49%) and in smokers (28%). Complications seen by respondents included skin envelope necrosis (68%), haematoma formation (46%), cosmetic failure (41%) and local recurrence (12%).

Conclusions: Skin-sparing mastectomy is becoming popular in the UK, but experience is limited. The variation in indications and techniques indicate the need to establish evidence-based guidelines for the wider practice of skin-sparing mastectomy in the UK.

Key words: Skin-sparing mastectomy – Immediate breast reconstruction – Breast cancer

Of patients presenting with breast cancer, 40–50% require mastectomy because of tumour site or size, multicentricity and recurrence after breast-conserving surgery. Skin-sparing mastectomy was first described by Toth and Lappert in 1991.¹ Since its introduction in the UK, the popularity of skin-sparing mastectomy has increased because it facilitates immediate breast reconstruction, preserves the

infra-mammary fold and reduces scarring. When combined with immediate breast reconstruction, skin-sparing mastectomy allows the surgeon to create a life-like ptotic breast. As a result, the need for contralateral surgery to achieve symmetry is reduced when compared with skin-sacrificing mastectomy.

Skin-sparing mastectomy may have failed to gain acceptance amongst some surgeons because of

inexperience with the technique or because of perceived worries about oncological safety. This study was carried out to establish the current trends in the use of skin-sparing mastectomy in clinical practice today.

Methods

An anonymous questionnaire was sent to all members of the BASO Breast Specialty Group in June 2001 and 130/300 (43%) questionnaires were returned by September 2001. The questionnaire was designed to establish:

1. The proportion of respondents currently practising skin-sparing mastectomy and the trend since 1997.
2. The commonest reasons for avoiding skin-sparing mastectomy.
3. The techniques employed for resection and reconstruction.
4. The perceived indications and contra-indications to skin-sparing mastectomy.
5. The type and frequency of major complications of skin-sparing mastectomy.

A sample questionnaire is shown in Appendix 1.

Results

A steady increase was observed in the number of respondents performing skin-sparing mastectomy each year (Table 1). Of the respondents, 35 (27%) did not offer skin-sparing mastectomy as part of their service. Uncertainty regarding the surgical benefits was the most commonly acknowledged reason for avoiding skin-sparing mastectomy, occurring in 22 of 35 cases. Uncertainty of the indications was acknowledged in 17 cases and 12 cited concern about the oncological safety of skin conservation. Four respondents identified lack of surgical expertise as a precluding factor.

Of surgeons performing skin-sparing mastectomy, 90% reported that they 'always' or 'usually' performed skin-sparing mastectomy with immediate breast reconstruction. Of the respondents, 59 performed skin-sparing mastectomy and immediate breast reconstruction alone, without a plastic surgeon. One respondent reported that skin-sparing

Table 1 The number of respondents practising skin-sparing mastectomy (total number of respondents, 130)

Year	Cumulative number of respondents	Percentage of total
Before 1997	27	21
1997	36	28
1998	55	42
1999	68	52
2000	87	67
2001	95	73

Figure 1 Incisions used for skin-sparing mastectomy.

mastectomy was performed by plastic surgeons alone. In the remainder, skin-sparing mastectomy was carried out by breast and plastic surgeons working together.

The most popular technique was latissimus dorsi (LD) flap reconstruction, with 80 respondents performing this procedure regularly. Of the respondents, 67 used sub-pectoral implants and 53 performed transverse rectus abdominis myocutaneous (TRAM) flap reconstruction. Other techniques of autologous reconstruction were used after skin-sparing mastectomy by 12 respondents.

The responses regarding indications and contra-indications are shown in Table 2. Of the 95 respondents performing skin-sparing mastectomy, 82 would consider skin-sparing mastectomy suitable for prophylactic mastectomy in women at high-risk of breast cancer. Of these 95 surgeons, 10 (9.5%) used skin-sparing mastectomy only for carcinoma *in situ* (CIS), 22 used skin-sparing mastectomy

Table 2 Indications and contra-indications for skin-sparing mastectomy

	Number of respondents	Percentage of total
Indications		
Prophylaxis	82	86
Carcinoma <i>in situ</i>	90	95
T1	81	85
T2	60	63
T3	16	17
T4	2	2
Contra-indications		
Skin tethering by tumour	59	62
Smoking history	27	28
Marked ptosis	22	23
Prior or future radiotherapy	47	49

Respondents were asked to indicate those conditions for which they felt skin-sparing mastectomy was indicated and those circumstances in which they would consider not offering skin-sparing mastectomy.

only for CIS and T1 tumours, and 44 used skin-sparing mastectomy for tumours up to T2. Sixteen surgeons had experience of skin-sparing mastectomy for T3 and T4 cancers.

Variation in operative technique was observed. Of the 95 surgeons, 22 routinely infiltrated the subcutaneous plane with saline and adrenaline solution prior to skin-sparing mastectomy. The choices of incision are shown in Figure 1. The nipple–areola complex was routinely excised by 67 surgeons, but only 16 excised the skin over the tumour. Routine radiological examination of the specimen following excision was performed by 9 operators. Complications of skin-sparing mastectomy were observed. Skin envelope necrosis was reported by 65 surgeons (68%), significant haematoma by 46 (48%), local recurrence of breast cancer had been seen by 11 surgeons (12%), and cosmetic failure was reported by 39 surgeons (41%).

Discussion

Skin-sparing mastectomy has increased in popularity in the UK over the last 6 years as an alternative to conventional mastectomy. This study has demonstrated an increase in the number of surgeons offering skin-sparing mastectomy amongst the members of the BASO Breast Specialty Group. This may reflect the move towards immediate, rather than delayed, breast reconstruction in patients who are not suitable for breast conserving surgery. The results of this survey suggest that a number of surgeons are discouraged from offering skin-sparing mastectomy because of perceived, rather than actual, risks. Of respondents, 27% expressed concerns about the oncological safety of skin-sparing mastectomy, uncertainty about the indications or doubts about the surgical benefits.

With regard to oncological safety, all large series²⁻⁵ comparing skin-sparing mastectomy with conventional mastectomy report no significant increase in local recurrence rates when skin-sparing mastectomy is performed for carcinoma *in situ*, and for T1 and T2 tumours. Most local recurrences present as palpable skin-flap masses,⁶ and complete excision and local control of recurrence can be achieved in the majority. The low rate of local recurrence after skin-sparing mastectomy may reflect case selection. The role of skin-sparing mastectomy in the surgical management of advanced local disease has been studied by Foster *et al.*⁷ These authors concluded that skin-sparing mastectomy was safe and effective for stage IIB and stage III disease. Another smaller series⁸ identified factors associated with higher risk of local recurrence, including: stage II and III disease, large tumour size and tumour grade. Local recurrence in this series was a significant predictor of tumour-related death.

Uncertainty about the indications deterred 48% of

surgeons from skin-sparing mastectomy. This is reflected in the responses from those performing skin-sparing mastectomy which shows a variation in the stages of disease they treated using this approach.

Skin-sparing mastectomy facilitates the immediate reconstruction of a breast of normal shape, size and symmetry; a goal which is difficult to achieve with delayed reconstruction. The breast can be removed and reconstructed through a small central aperture, within an intact skin envelope without disturbing the inframammary fold, minimising scarring and the need for contralateral surgery. The advantages of skin-sparing mastectomy are limited to those able to access immediate or early breast reconstruction. The limited availability of immediate breast reconstruction in some regions may explain why 27% of respondents do not perform skin-sparing mastectomy.

Other reasons for not offering skin-sparing mastectomy may apply; skin-sparing mastectomy requires a period of extra training, which may be difficult to achieve.

The TRAM flap has been established as ‘the gold standard’ for breast reconstruction⁹ as it gives the most natural feeling breast and is less prone to the adverse effects of postoperative radiotherapy than an implant-based technique. TRAM flaps were performed by fewer than 50% of surgeons in this survey, a finding that is consistent with a recent survey of reconstruction in the UK.¹⁰ The reluctance of many surgeons to combine skin-sparing mastectomy with TRAM flap reconstruction, using LD flaps or sub-pectoral implants in preference, may be a reflection of several factors including inexperience and the characteristics of the patient population. TRAM flap reconstruction is associated with a poor outcome when the surgeon is relatively inexperienced¹¹ and few breast surgeons will have had the opportunity to gain sufficient experience.

Contra-indications to skin-sparing mastectomy identified by the respondents included skin tethering, radiotherapy, smoking and ptosis. Smokers reportedly have a higher risk of skin envelope necrosis than non-smokers¹² and 28% of respondents would consider not offering skin-sparing mastectomy to a patient who smoked. Skin-sparing mastectomy would be avoided by 49 of the respondents where the breast had been irradiated previously or where adjuvant radiotherapy was anticipated. Adjuvant irradiation is associated with a higher rate of cosmetic failure with implant-based reconstruction because of capsular contracture;¹³ therefore, elective skin-sparing mastectomy with implant-based LD flap or subpectoral reconstruction is not recommended where adjuvant radiotherapy is likely to be indicated.¹⁴

The variation in techniques identified by this survey reflects the status of skin-sparing mastectomy and

immediate breast reconstruction as an evolving procedure, but some points merit further discussion. Skin-sparing mastectomy was originally described by Toth and Lappert as: '[the removal of] the breast, nipple–areolar complex and the site of previous biopsies'. Yet 32% of surgeons performing skin-sparing mastectomy did not routinely excise the nipple and 85% did not routinely excise the skin overlying the tumour. Whilst there are bound to be variations between patients which may affect technique, major differences between surgeons need to be justified. Such variations may be attributable, in part, to differences in training. Skin-sparing mastectomy is currently performed by plastic surgeons and oncological breast surgeons, who have different training backgrounds.

This survey has established that members of the BASO Breast Specialty Group differ in their understanding of the indications and contra-indications for skin-sparing mastectomy. Surgeons' reported experience of the complications of skin-sparing mastectomy is also varied; undoubtedly, this reflects the workload and experience of the respondents. All the complications listed had been seen by surgeons in the survey, although, 29 surgeons (30%) reported they had not experienced any of those listed. We acknowledge this may suggest some degree of under-reporting of complications, which highlights one of the disadvantages of a questionnaire survey. Only 39 of the 95 respondents reported they had experience of poor cosmetic outcome after skin-sparing mastectomy and 31 surgeons had not seen native-skin necrosis after skin-sparing mastectomy, which in most series occurs to some degree in about 10% of cases.

Agreement about the definition of skin-sparing mastectomy needs to be reached for surgeons practising in the UK, if the results from their work are to be compared accurately and to ensure consistent training.

Conclusions

Skin-sparing mastectomy is becoming more popular in the UK but experience is limited. The current variation between surgeons identified in this survey typifies the introduction of a new technique into clinical practice and indicates the need for evidence-based guidelines for this and other oncoplastic procedures. These will help the orderly introduction of skin-

sparing mastectomy into clinical practice and the identification of units with sufficient experience to be able to offer comprehensive training in this field.

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APPENDIX 1

*UK survey of skin-sparing mastectomy (skin-sparing mastectomy)***General questionnaire**

Q1 How many new breast cancers are referred to your unit annually?

- ☐ < 50
- ☐ 50–100
- ☐ 100–150
- ☐ > 150

Q2 Does your unit offer skin-sparing mastectomy as an alternative to conventional mastectomy

- ☐ Yes
- ☐ No

Q3 If your unit does not offer skin-sparing mastectomy, please confirm the reasons and return the questionnaire

- ☐ Oncological risk
- ☐ Surgical risks
- ☐ Uncertain benefits
- ☐ Uncertain indications
- ☐ Other (please state)

Skin-sparing mastectomy specific questionnaire

Q4 When did you start to perform skin-sparing mastectomy?

- ☐ 2001
- ☐ 2000
- ☐ 1999
- ☐ 1998
- ☐ 1997
- ☐ Before 1997

Q5 When performing skin-sparing mastectomy, do you combine the procedure with immediate reconstruction?

- ☐ Always
- ☐ Usually
- ☐ Sometimes
- ☐ Never

Q6 When skin-sparing mastectomy is combined with immediate reconstruction on your unit, is the procedure performed by:

- ☐ Breast surgeons alone
- ☐ Breast and plastic surgeons
- ☐ Plastic surgeons alone

Q7 Which of the following types of reconstruction does your unit use regularly alongside skin-sparing mastectomy?

- ☐ Sub-pectoral
- ☐ Latissimus dorsi
- ☐ TRAM flap
- ☐ Other (please state)

Q8 In which of the following situations would you consider using skin-sparing mastectomy?

- ☐ Prophylaxis
- ☐ *In situ* tumours
- ☐ T1 tumours
- ☐ T2 tumours
- ☐ T3 tumours
- ☐ T4 tumours
- ☐ Other (please state)

Q9 In which of the following situations would you consider not using skin-sparing mastectomy?

- ☐ Skin tethering
- ☐ Smokers
- ☐ Ptotic breasts
- ☐ Pre/post radiotherapy
- ☐ Other (please state)

Q10 What type(s) of incision do you favour?

- ☐ Infra-mammary
- ☐ Peri-areolar
- ☐ Elliptical
- ☐ Radial
- ☐ Inverted T
- ☐ Lateral
- ☐ Other

Q11 When performing skin-sparing mastectomy, do you routinely:

- ☐ Excise the nipple?
- ☐ Excise the skin over the tumour
- ☐ X-ray the resected breast tissue
- ☐ Use subcutaneous infiltration with saline and/adrenaline

Q12 Which of the following complications have you encountered?

- ☐ Skin necrosis
- ☐ Haematoma
- ☐ Cosmetic failure
- ☐ Local recurrence
- ☐ Other (please state)