Introduction

Breast cancer mortality in the UK is among the highest in the world, with approximately 28 deaths per 100,000 women per annum. This equates to around 48,000 new breast cancer diagnosed and 11,500 deaths attributable to breast cancer each year. Approximately 1 in 9 women in the UK will develop breast cancer at some time during their life [1].

Between 1st April, 2012 and 31st March, 2012, 2,303,302 women were screened by the UK NHSBSP in England, Wales, Northern Ireland and Scotland. Of the 19,339 cancers detected in women of all ages; 79% were invasive, 20% non-invasive and 1% micro-invasive [2].

Immediate reconstruction rates after mastectomy were almost twice as high for non/micro invasive cancers (44%) than for invasive cancers (24%). It is expected that almost all women who have been recommended a mastectomy will be offered Immediate or delayed reconstruction. However there are no statistics how many total Skin sparing mastectomies are performed in UK each year.

Skin Sparing Mastectomies (SSMs) and Immediate Breast Reconstruction (IBR) preserves the natural shape, skin, sensation, gives better cosmetic results, minimizes scars and psychological trauma [4-7].

However with the increased amount of breast tissue remaining compared to previous Non-Skin Sparing Mastectomy (NSSM), achieving oncologic safety is a priority therefore oncological safety in terms of local and systemic recurrence is a concern. The objective of this audit was to determine the demographics of the patients undergoing Skin Sparing Mastectomy (SSM) for breast cancer at Pinderfields General Hospital, to determine the recurrence rate and to evaluate our practice against published evidence.

Methods

A retrospective review was performed of patients who underwent SSM from May 2007 to May 2010 at Pinderfields District General Hospital, Wakefield, UK and who has had follow up for minimum of 3 years. We obtained our patient list from the Breast Surgery database. Information on patient demographics, tumour size, treatment and follow up were collectively obtained from theatre record, e-Win Dip letters, Pathology Viewer reports, Patient Archiving and Communications System (PACS) radiological reports and the Integrated Clinical Environment (ICE) reports.

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Results

Total 59 SSM were performed on 57 patients with mean follow up of 51 months and maximum follow up of 72 months.

Distribution of cancers included DCIS -26, Invasive-33 cases.

Total number of SNB-33(56%), ANS-14(24%), and ANC-16(27%). Only 8 patients were found to have positive nodes. Receptors ER/PR Positive-28 (47.5%), Triple negative-9 (15.25%) and HER 2 Positive-8 (13.6%). Anterior margins involved in 1(1.7%) and Posterior Margins involved in 1(1.7%).

Local recurrence rates in Pure DCIS -1/26 (3.8%), Invasive -2/33 (6.1%) and Total Recurrences 3/59 (5.1%). Mean Recurrence time was 31 months.

Conclusion:

All of the local recurrences occurred in the scar or in the skin overlying the site, suggesting that a change in practice to remove the skin overlying the tumour may be warranted.

Keywords: Breast cancer; Skin sparing mastectomies; Sentinel node biopsy; Tamoxifen; Chemotherapy
using patent blue and radioactive Tecthium-99. If the procedure is planned in the morning, the radioactive injection is given the day before. Likewise, the injection is given in the morning if the procedure is planned for the afternoon. The patent blue is injected in theatre before the procedure takes place. At our institution, Axillary Node Sampling (ANS) is defined as the removal of any 4 axillary nodes and Axillary Node Clearance (ANC) is a complete levels 1 to III clearance of the axillary contents.

**Results**

A total of 57 patients underwent SSM at Pinderfields General Hospital from May 2007 to May 2010 and all of them have had a minimum of 36 months follow up by the time of this audit. Two patients had bilateral breast cancer which brings the total of SSM surgeries performed to 59.

The mean period of follow up was 51 months and the maximum time was 72 months at the time of this audit. The mean age of presentation was 51 years (range 33 to 68). There were 27 cases of DCIS (45.8%) and 32 cases (54.2%) of invasive cancer (Table 1). 6.3% of the Invasive Cancers were Grade I, majority were of Grade II at 75% and the remaining 18.7% were Grade III. For DCIS, 7.4% were low grade, 18.5% were intermediate grade and 74.1% were high grade.

The sizes of the tumours are shown in the Table 3. Majority of the invasive cancers were small, measuring less than 20mm (40.6%), while the majority of DCIS tumours were larger than 20mm (39%). The most common reasons for SSM to be performed in the small cancers were the failure of Wide Local Excision (WLE) in the past and the presence of a central tumour which made a Lumpectomy procedure unsuitable. Other reasons SSM was performed in these small cancers are shown in the Table 2.

Comedo-type DCIS have been reported as being more aggressive and associated with higher probability of invasive ductal carcinoma [10], whilst lympho-Vascular Invasion (LVI) is strongly associated with metastatic breast cancer [11]. Comedo Necrosis (CN) was found in 48.1% of the DCIS tumours and LVI was found in 31.3% or the invasive tumours (Table 3). Sentinel Node Biopsy (SNB) was performed on 59.3% of DCIS patients and 43.8% of Invasive patients, whilst ANS was performed on the remaining 40.7% of the DCIS patients. For invasive cancers, 12.5% had a SNB prior to ANC and 3% had ANS prior to ANC. 34.4% of DCIS patients and 43.8% of Invasive patients, whilst ANS was performed on the remaining 40.7% of the DCIS patients. For invasive cancers, 12.5% had a SNB prior to ANC and 3% had ANS prior to ANC. 34.4% of DCIS patients and 43.8% of Invasive patients, whilst ANS was performed on the remaining 40.7% of the DCIS patients. For invasive cancers, 12.5% had a SNB prior to ANC and 3% had ANS prior to ANC. 34.4% of DCIS patients and 43.8% of Invasive patients, whilst ANS was performed on the remaining 40.7% of the DCIS patients. For invasive cancers, 12.5% had a SNB prior to ANC and 3% had ANS prior to ANC. 34.4% of DCIS patients and 43.8% of Invasive patients, whilst ANS was performed on the remaining 40.7% of the DCIS patients. For invasive cancers, 12.5% had a SNB prior to ANC and 3% had ANS prior to ANC. 34.4%

The clearance from the anterior and posterior margins were considered clear of the cancer if the margins were measured at least 2mm from the tumour cells in DCIS and 1mm for Invasive Cancer. For DCIS there was only 1 case where both the anterior and posterior margins were involved and all invasive cancers did not have any margins involvement.

The tumours were tested for Oestrogen (ER), Progesterone (PR) and HER-2 receptor. Majority of the DCIS and invasive cancers were ER and PR positive 37.03% and 56.3% respectively. 3.70% of the DCIS patients were triple positive and 25.9% were triple negative. For invasive cancers, 15.6% were triple positive and 6.3% were triple negative (Table 3).

A total of 37 patients had Hormone therapy and the agent used is shown in the table 5. One of the patient stopped Tamoxifen and opted for an Oophorectomy. 12 of the patients had radiotherapy and 21 patients had chemotherapy.

5.1% of the patients had recurrence within a mean of 31 months. 3.7% were from DCIS cancers and 6.3% was invasive (Table 6).

The recurrence cases were looked into and the first case was found

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Table 1:  
**Patient Demographics**

<table>
<thead>
<tr>
<th>Age</th>
<th>DCIS</th>
<th>Invasive</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-39</td>
<td>8</td>
<td>13.60%</td>
</tr>
<tr>
<td>40-49</td>
<td>18</td>
<td>30.50%</td>
</tr>
<tr>
<td>50-59</td>
<td>21</td>
<td>35.60%</td>
</tr>
<tr>
<td>&gt;70</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>45.80%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Side</th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>32</td>
<td>54.20%</td>
</tr>
<tr>
<td></td>
<td>27</td>
<td>45.80%</td>
</tr>
</tbody>
</table>

Table 2:  
**Reasons for SSM in small cancer (<20mm)**

<table>
<thead>
<tr>
<th>Total</th>
<th>Recurrence after WLE in the past</th>
<th>BRCA +ve</th>
<th>BRCA +ve and recurrence after WLE in the past</th>
<th>Strong family history of breast cancer</th>
<th>Central tumour</th>
<th>Patient choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>21</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3:  
**Tumour Characteristics**

<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>DCIS</th>
<th>Invasive</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-19</td>
<td>2</td>
<td>3.40%</td>
</tr>
<tr>
<td>20-29</td>
<td>2</td>
<td>3.40%</td>
</tr>
<tr>
<td>30-39</td>
<td>5</td>
<td>8.50%</td>
</tr>
<tr>
<td>&gt;40</td>
<td>8</td>
<td>13.60%</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>48.10%</td>
</tr>
</tbody>
</table>

| Comedo Necrosis | Positive | 13 | 48.10% |
| Lympho-vascular Invasion | Positive | 10 | 31.30% |
| Receptors Status | DCIS Total | 27 | Invasive Total | 32 |
| Triple negative | 7 | 25.90% | 2 | 6.30% |
| Triple positive | 1 | 3.70% | 5 | 15.60% |
| PR positive | 0 | 1 |
| ER positive | 9 | 4 |
| ER and PR positive | 10 | 37.03% |
| Only HER2 positive | 0 | 2 |
| Stage | DCIS / N0 | 28 |
| T1 N0 M0 Stage IA | 23 |
| T1 N1 M0 Stage IB | 1 |
| T2 N0 M0 Stage II A | 2 |
| T3 N0 M0 Stage II B | 1 |
| T3 N2 M0 Stage III A | 1 |
| T3 N3 M0 Stage III C | 3 |
in a 61 years old lady who had a left SSM with ANC. The tumour was a high grade invasive ductal carcinoma mixed with a Grade III DCIS with the invasive tumour size of 15mm and an overall total of 19mm. It was LVI and CN negative with no multifocality. The anterior and posterior margins after the SSM were well clear. Tumour receptor positivity was ER 5, PR 5 and HER2 negative. None of the 17 lymph nodes resected from the ANC were positive. She had Arimidex hormone therapy and no further chemotherapy or radiotherapy. The local recurrence was found 42 months after the surgery in a hard subcutaneous nodule behind the scar measuring 1.5mm. It was a recurrent invasive ductal carcinoma and hormone markers were triple negative (Table 7).

The second case was a 36 years old lady who had a right SSM, with SNB and reconstruction. The tumour was a large high grade DCIS measuring 95mm in size and Grade III histologically. It was positive for CN but negative LV and no multifocality. Both anterior and posterior margins were involved and tumour receptor was ER 8, PR 0 and HER2 negative. The SNB was negative and she had radiotherapy. The recurrence was found in the scar tissue 21 months post-surgery and the tumour was a 2mm DCIS intermediate grade which was successfully excised.

The third case was found in a 47 years old female who had a left sided SSM with a submuscular implant inserted. The tumour was found to be an invasive ductal carcinoma with mixed features of ductal and lobular tumour, Grade I. Two foci were identified, 15mm and 9mm. They were positive for CN and LV. Anterior margins were clear and posterior margins were 6mm clear. Tumour receptors were ER 7, PR 8 and HER2 negative. 4 sentinel nodes were identified and excised and none were positive. She had Tamoxifen and no other chemotherapy or radiotherapy. The recurrence was found in a superficial skin nodule on the mastectomy flap, 30 months after the surgery. The excised tumour was a 9mm, Grade I invasive ductal carcinoma which was 4mm from the inferior margin. It was noted that two out of the three local recurrence cases did not have radiotherapy and all three did not have chemotherapy.

There were two further patients who were found to have metastatic disease. The first was a 49 years old female with BRCA-1 gene. She had a left WLE and ANC in 2002 which found an 11mm a typical medullary carcinoma with negative axillary lymph nodes. This tumour was ER and PR negative. She then had a right WLE and ANC in 2006 which found invasive ductal carcinoma and DCIS, 18mm in size, Grade III. This tumour was triple positive and was multifocal with CN and LV1. She had a posterior margin involvement but clear anterior margins. The ANC had one positive lymph node and she subsequently had radiotherapy, chemotherapy and Tamoxifen. She then had bilateral SSM in 2008 which did not reveal any cancerous tissues. However, she was found to have brain metastasis and died in 2010. Her time of recurrence was 53 months.

The second patient was a 30 years old lady who initially had a left SSM with ANC, primary reconstruction and right breast reduction in 2008. She had DCIS in her left breast measuring 12mm, Grade III and was triple negative. It was multifocal but CN and LV1 negative. Anterior margin was involved (1mm) but posterior margin was clear (3cm). None of the lymph nodes from the ANC were positive. She had neoadjuvant chemotherapy and adjuvant radiotherapy. She was diagnosed with brain metastasis in 2010 and died in 2010. Her time of recurrence was 24 months.

**Discussion**

Numerous studies have compared the Local Recurrence (LR) rates of SSM with NSSM and no significant difference was found, thus accepting SSM as oncologically safe a procedure as NSSM [12-15]. Meta-analysis has also concluded that SSM is oncologically safe for early stage breast cancer and for those with small tumour size [16,17].

A review of literature has shown that the recurrence rates for SSM...
range between 0% to 7% [18-20].

Several retrospective studies have analyzed the local recurrence rates of DCIS after SSM to be lower with smaller, lower stage tumours with less invasive characteristics [21]. These rates vary between 0 to 3% [12,13,19,22,23]. Clear margins are very important in Oncological Breast surgery but variable studies have been reported about margin status after SSM.

In term of local recurrence studies have shown no statistical difference between NSSM and SSM however at the same time SSM has been reported independent predictor of close or positive margins [24-27].

Horiguchi et al. [28] defined close margin as within 5mm and did find margin status significant on multivariate analysis. More over Cao et al. [29] found that 38% of 168 SSMs had a positive superficial specimen margin. A thicker ASM (Additional Skin Margins) had residual breast tissue in 53% of cases, and it was an independent predictor of residual disease.

A study by Carlson et al. [30] of 539 patients with a mean follow up of 65 months found LR of 3, 10 and 11% for T1, T2 and T3 tumours respectively. This study noted that tumour size, nodal status and LVI were significant predictors of recurrence. Newman et al. [15] and Krool and Khoo [19] specifically studied patients with T1 and T2 tumours and Newman et al. [15] found a 6.2% recurrence after SSM and Immediate Reconstruction (IR) after a mean follow up time of 26 months. Krool and Khoo [19] found similar figures, a 7% LR with SSM and IR. Spiegel and Butler [13] followed 117 invasive cancer patients and reported 5.6% LR after 9.8 years follow up. Three studies by Lim et al. [14], Foster et al. [31], and Downes et al. [32] studied the LR in stage IIB/III breast cancer after SSM and reported recurrence rates of 4.6%, 4% and 2.6% respectively.

Our institution reports a local recurrence rate of 5%, which are 3 of 59 patients. The tumour characteristics of these three patients were analyzed in more depth. Our first patient had high grade invasive carcinoma and Grade III DCIS, whilst the second patient had a very large and multifocal tumour. Both the anterior and posterior margins were involved in this second patient which prompted adjuvant radiotherapy. The third patient had CN and LVI positive tumour which is recognized to increase the risk of recurrence. As noted that none of these patient who suffered local recurrence had chemotherapy as none had positive lymph nodes. Only one had radiotherapy because of involved surgical margins.

Conclusion

Our recurrence rates are comparable to other published data. There is benefit in ascertaining the cancer size and distance from the skin before proceeding to surgery. All of the local recurrences occurred in the scar or in the skin overlying the site, suggesting that a change in practice to remove the skin overlying the tumour may be warranted.

References


