A multidisciplinary team approach minimises prophylactic mastectomy rates

D.R. Leff a, C. Ho a, H. Thomas a, R. Daniels a, L. Side c, F. Lambert f, J. Knight e, M. Griffiths b, M. Banwell b, J. Aitken d, G. Clayton g, S. Dua c, A. Shaw b, S. Smith a, V. Ramakrishnan b,*

a The Breast Unit, Broomfield Hospital, Chelmsford, Essex, United Kingdom
b St Andrew’s Centre for Burns and Plastic Surgery, Chelmsford, Essex, United Kingdom
c Institute for Women’s Health, University College Hospitals, London, United Kingdom
d West Suffolk NHS Foundation Trust, Bury St Edmunds, Suffolk, United Kingdom
e Breast Reconstruction Awareness Group, United Kingdom
f Psychological Therapies Department, Mid Essex Hospitals Services NHS Trust, Essex, United Kingdom
g The Breast Unit, Mid Essex Hospitals NHS Trust, Broomfield Hospital, Chelmsford, Essex, United Kingdom

Accepted 12 February 2015
Available online

Abstract

Background: Prophylactic mastectomy (PM) has become increasingly common but is not without complications especially if accompanied by reconstructive surgery. In patients with sporadic unilateral breast cancer, contralateral PM offers no survival advantage. Multidisciplinary team (MDT) communication and interaction may facilitate shared decision-making and curtail PM rates. The aim of this study was investigate the effect of a regional MDT meeting on PM decision-making.

Methods: We conducted an observational study involving retrospective review of prospectively recorded MDT meeting records for a 151 patient requests for PM from 2011 to 2014. Final MDT decisions were recorded as PM ‘accepted’, ‘declined’ or ‘pending’. For MDT sanctioned requests, the factors justifying PM were recorded. Where PM was declined, justification for MDT refusal was sought and recorded.

Results: Approximately half of all requests for PM have been upheld (53.0%) and 1/3 of requests have been declined (32.5%). Of those declined, low risk of contralateral breast cancer versus relatively high risk of systemic relapse were commonly cited as justification for PM refusal (45.7%). A proportion of patients who initiated PM discussion subsequently changed their minds (19.6%), or failed to attend clinic appointments (6.5%). Some patients were deemed medically unfit for complex reconstructive surgery (13%), or were declined on the basis of an apparent cosmetic drive for surgery (6.5%), concerns regarding depression or anxiety (2.2%) and/or if family history could not be substantiated (6.5%).

Discussion: MDT meetings facilitate cross-specialty interrogation of requests for PM, minimise unnecessary surgery and restrict PM to those likely to derive maximum benefit.

© 2015 Elsevier Ltd. All rights reserved.

Keywords: Risk reducing; Prophylactic; Mastectomy; Contralateral; Breast cancer; Multidisciplinary

Introduction

In the past two decades the number of contralateral risk reducing mastectomies performed in the United States (USA) has increased despite the fact that contralateral breast cancer (CBC) rates have decreased. In contrast to reports from other European centres, rates of bilateral mastectomy have increased in the United Kingdom (UK), without an increase in bilateral breast cancers which implies that UK trends in contralateral prophylactic mastectomy (CPM) may parallel those in the USA. At our regional reconstructive and cancer centre, we observed a simultaneous increase in referrals for genetic testing (the
“Jolie effect”) and staged requests for either CPM in patients with unilateral sporadic breast cancer and/or bilateral mastectomy in mutation carriers with a personal history of breast cancer. Given that the risk of CBC in patients with sporadic breast cancer is relatively low\cite{14,15} and that CPM offers little or no advantage in terms of overall and disease free survival\cite{15,22}, clinicians have become concerned about acceding to all requests for CPM. This is compounded by the knowledge that patients’ decisions are often motivated by fear of recurrence\cite{24} or misperceptions regarding the survival benefits of CPM,\cite{25} and that CPM is neither costless\cite{26,27} nor complication free, especially if reconstructive surgery is sought.\cite{28,29,30} This has led to calls for greater scrutiny in assessing requests for prophylactic mastectomy (PM), in order to reduce the costs and morbidity of unnecessary surgery.\cite{33,34}

Decisions regarding CPM in the context of prior breast cancer are, by definition, intrinsically multidisciplinary. In response to the rising referral rates, benefits of interdisciplinary team interactions\cite{35,36} and desire to curtail unnecessary CPM rates, a regional multidisciplinary team (MDT) meeting was established to scrutinise referrals for PM taking patients’ motivations for surgery on board. The aim of the current study was to review the benefits of a regional MDT in terms of clarity in PM decision-making. While protocols for MDT interaction have been previously published,\cite{35} they do not focus on improvements in decision-making, nor clarify the grounds on which requests for PM may be declined.

**Patients and methods**

**Risk reducing mastectomy multidisciplinary team and processes**

A regional quarterly MDT meeting was established in 2011 to discuss all requests for PM from patients referred to our centre, including patients with known risk mutations with or without a prior history of cancer, and patients with a prior history of breast cancer but without known risk mutations. MDT members encompass a breadth of specialties that include oncology, reconstructive surgery, cancer genetics and psychologists, ensuring a diverse skill set. Each MDT member reviews the patient in a clinic setting outwith of the meeting, and any member of the team can place a patient’s name on the list for discussion by faxing a written proforma to the RRM-MDT co-ordinator. Patients are only discussed at MDT once all relevant members have reviewed them on at least one occasion and the meeting is used to raise and resolve clinical concerns. The patient’s motivations for PM, details of family members affected, and results of genetic tests are discussed. MDT decisions are carefully documented such that the clinical justifications for acceptance or refusal of PM requests are transparent. Prior to MDT “sign off” all patients are required to attend Breast Reconstruction Awareness (BRA group) meetings, at which, women considering risk reducing surgery discuss any concerns with nurse specialists and patients who have been through similar experiences (http://breastreconstructionawareness.org.uk). Patients are included in the decision making process even though they are not physically present at the MDT. Team decisions broadly classified under three headings (i.e. “accepted”, “pending further investigation”, “declined”) are discussed with patients in clinic by core MDT members. Some decisions are dependent on obtaining more information (e.g. confirmation of family history of cancer or further clinical review, psychology assessment), and clinicians’ work with patients to achieve resolution and/or re-discuss the case if required. If the MDT declines a request for PM, then psychological support (e.g. anxiety management) and relevant clinical tests (e.g. surveillance) are provided. In the latter scenario it is unusual for a patient to then receive PM unless clinical circumstances change (e.g. more relatives diagnosed with cancer, thus modifying risk).

**Benchmark criteria for clinical decision making**

MDT decisions are arrived at through inter-disciplinary discussion and debate against objective and subjective criteria. Current family history guidance from the National Institute for Care and Health Excellence (NICE) suggests that patients with a high lifetime risk of developing breast cancer (defined as 30% or more) should have a discussion regarding the benefits of risk reducing surgery.\cite{37} Unaffected patients with proven genetic mutations typically fulfil these criteria and decisions are often more straightforward but other management options such as chemoprophylaxis and surveillance are also discussed. The same criteria are extended to patients with a prior history of unilateral BC, assuming CBC risks of approximately 0.7%/year risk of for patients with sporadic breast cancer and 3%/year for patients with proven genetic mutations. Certain patients with sporadic breast cancer may also meet these criteria if multiple family members are affected, even in the absence of a known high-risk mutation. Patients not fulfilling these objective criteria are discussed in detail but risk-reducing surgery is declined unless another valid indication is identified such as anxiety related to the challenges of imaging surveillance (e.g. frequent unidentified bright objects on MRI leading to repeat biopsies) or desire for reconstructive symmetry. Patients in whom family histories cannot be substantiated are declined risk-reducing surgery. Requests for CPM in breast cancer patients are contextualised with respect to prognosis and risk of distant relapse from the index cancer and those deemed at high risk of distant relapse are declined. Patients seemingly motivated entirely by cosmesis (i.e. incorrectly perceiving PM as a vehicle for augmentation), and those with confirmed psychoses are also declined surgery. Finally, patient’s who repeatedly failed to attend clinic appointments and those considered medically unfit are often declined complex reconstructive surgery.
Data acquisition and data analysis

Data acquisition was conducted within a scope of a quality improvement project, and registered as a service evaluation at Broomfield Hospital, Chelmsford, Essex. From prospectively completed MDT proforma(s), we retrospectively identified 151 patients who had requested PM between 2011 and 2014. All patients were female and over the age of 21. Record review was conducted of all cases and there were no exclusion criteria. Three reviewers (DRL, CH and RD) extracted the following demographic data for each case: age, family history and/or personal history of breast cancer, number of family members affected, and gene mutation status. Patients were stratified into three groups, namely: (a) sporadic breast cancer patients in whom gene tests were negative; (b) high-risk patients with a recognised gene mutation who already have a personal history of breast cancer and (c) patients without a prior history of breast cancer. For patients with a personal history of breast cancer we extracted the following data: histological subtype, grade, oestrogen receptor (ER), progesterone receptor (PR) and human-epidermal receptor-2 (HER2) status, presence or absence of nodal metastases and Nottingham Prognostic Index (NPI) as recorded on the proforma. If reconstructive surgery was performed then the type of procedure (e.g. implant reconstruction) was also recorded. When data was unavailable, one of four reviewers (DRL, HT, CH and RD) visited Trusts to review the medical records in person. 5-year and 10-year survival estimates which were retrospectively derived from proforma data and calculated using the PREDICT model (http://www.predict.nhs.uk/). Results of PREDICT models were not available to the MDT at the time of discussion.

Patients were stratified according to MDT decision-making, coded as either PM “accepted” when the MDT sanctioned the request, “declined” when the request for surgery could not be supported, and “pending” if a definitive decision had yet to be defined. If risk-reducing surgery was declined, the reason for refusal was recorded. For sanctioned requests, the factor(s) justifying PM were recorded.

Results

Cohort demographics

Between April 2011 and June 2014, 151 requests for PM were discussed by the regional MDT. The majority of referrals were from oncoplastic breast surgeons (38.7%); Plastics = 16.0%, Genetics 5.3%, Oncology = 2.0%, Obstetrics and Gynaecology = 0.7% and General Practitioners = 0.7%. Table 1 demonstrates that the majority of patients had a personal history of either sporadic breast cancer (i.e. non-BRCA1/2) or breast cancer associated with a high-risk genetic mutation (83.4%). Nearly half of patients discussed were confirmed gene-mutation carriers with prior breast cancer (47.0%). The majority of patients had family members diagnosed with breast cancer (Family history of breast cancer, n (%) yes = 128 (85.3); no = 16 (10.7); unknown = 6 (4.0)), had been reviewed by a Geneticist (82.7%) and undergone formal genetic testing [n (%) total tested = 118 (78.1); mutation identified = 86 (57.3), negative test = 25 (16.7)]. Table 2 demonstrates similarities between patients accepted and those rejected in terms of specific socio-demographic and disease parameters.

Prophylactic mastectomy justifications

As highlighted in Table 3, approximately half the patients discussed have had PM requests approved (53.0%) and 1/3 of requests have been declined (32.5%). Fig. 1 illustrates the spectrum of documented justifications recorded on MDT-meeting proforma(s) for either approving (Fig. 1a) or declining (Fig. 1b) requests for PM. Surgery was primarily approved on the basis of a genetic mutation known to increase the risk of CBC (73.8%). Certain patients with sporadic breast cancer whose request for PM was approved were deemed to be at higher than population risk for CBC on the basis of confirmed cancers amongst first and second-degree relatives (12.5%). A small proportion of requests were justified upon grounds of psychological (2.5%) or cosmetic benefits (i.e. improved symmetry – 1.2%).

Request for prophylactic mastectomy declined

CPM was most commonly declined on the basis that risk estimates of CBC failed to reach threshold (45.7%). A proportion of patients changed their minds after consultation with MDT members (19.6%) or did not attend clinic appointments or the BRA group meetings (6.5%). Patients deemed medically unfit for complex procedures were declined reconstructive surgery (13%), and to our knowledge these patients have not pursued simple mastectomy. Psychologists occasionally raised concerns if a patient’s motivation was driven entirely by cosmesis (6.5%) and/or if there were extenuating circumstances such as psychoses or depression that might compromise decision-making (2.2%). Finally, in a minority of patients, family history data could not be substantiated (6.5%). Although, NPI
Table 2
Comparisons in socio-demographic data, disease biology and disease stage according to RRM-MDT outcomes.

<table>
<thead>
<tr>
<th>Socio-demographic and disease parameters</th>
<th>PM request rejected at RRM-MDT [n= (%)]</th>
<th>PM request accepted at RRM-MDT [n= (%)]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive/Yes</td>
<td>Negative</td>
</tr>
<tr>
<td>Personal breast cancer history</td>
<td>24 (47.0)</td>
<td>27 (52.9)</td>
</tr>
<tr>
<td>Nodal involvement</td>
<td>8 (15.7)</td>
<td>17 (33.3)</td>
</tr>
<tr>
<td>ER status</td>
<td>18 (35.3)</td>
<td>8 (15.7)</td>
</tr>
<tr>
<td>HER2 status</td>
<td>3 (5.9)</td>
<td>21 (41.2)</td>
</tr>
<tr>
<td>BSO</td>
<td>16 (31.4)</td>
<td>25 (49.0)</td>
</tr>
<tr>
<td>Aromatase inhibitor received</td>
<td>16 (31.4)</td>
<td>24 (47.1)</td>
</tr>
<tr>
<td>Radiotherapy received</td>
<td>6 (11.8)</td>
<td>32 (62.7)</td>
</tr>
<tr>
<td>Chemotherapy received</td>
<td>20 (39.2)</td>
<td>27 (52.9)</td>
</tr>
<tr>
<td></td>
<td>18 (35.3)</td>
<td>29 (56.9)</td>
</tr>
</tbody>
</table>

data and the histopathological details of index cancers were discussed at MDT meetings, we were unable to identify patients in whom a decision to decline PM was motivated entirely by poor cancer prognosis. Table 4 compares prognostic data and survival estimates between patients in whom requests for PM were either declined or approved. Average 5- and 10- year survival estimates and NPI data were observed to be similar regardless of MDT decision-making. Critically, some patients with potentially poor prognosis from their index cancer may have still been offered PM.

Reconstructive decision-making

The majority of patients chose to undergo autologous reconstruction with the Deep Inferior Epigastric Perforator (DIEP) flap (43.8%), which may reflect regional expertise in this procedure. Implant based breast reconstruction was seemingly as popular as simple mastectomy (22.9% vs 20.8%).

Discussion

The results of this study suggests that MDT meetings to review PM requests may reduce unnecessary surgeries, and ensure that indications for risk reducing surgery are clinically justified. As a result of having an open forum for clinical debate, 1/3 of requests for PM that could not be justified through inter-disciplinary discussion were declined. However, it is challenging to be sure that the same decisions would not have arisen in the usual care setting, although extrapolating from the cancer setting, MDT working expedites treatment and ensures evidence based practice. A randomised study is required to compare the quality of decision making in the context of the usual care setting versus those obtained by the RRM-MDT. In our MDT meetings, CBC or LR risks that were no higher than the background population risk of breast cancer were the most commonly cited reason for declining PM in patients with a prior history of breast cancer. Conversely, an elevated CBC risk owing to a confirmed genetic mutation or a family history of breast cancer even in the absence of a genetic mutation ranked highest in the list of factors justifying CPM. Therefore, when confronted with a breast cancer patient requesting CPM it is crucial to establish their actual risk of contralateral and locally recurrent disease, not only because most women with unilateral cancer will not develop CBC, and CPM may over treat a large number of women, but also because many women over-estimate their risk. In the absence of any National or International consensus statements on the magnitude of CBC risk beyond which CPM would represent an ‘acceptable’ treatment, the regional MDT adopted the guidelines established by NICE which states that mastectomy should be discussed as a risk-reducing option in all patients at high risk, i.e. if a patient’s lifetime risk of breast cancer is greater than 30%. Several studies report a CBC risk of between 0.5 and 0.7%/year but this risk is known to vary depending on mutation status, family history, tumour biology and age at diagnosis. For example, breast cancer patients with a confirmed BRCA mutation are known to have a risk CBC that equates to 30% at 10-years. In the Women’s Environmental Cancer and Radiation Epidemiology study, patients who tested negative for the BRCA mutation had a 10-year cumulative risk of a CBC of approximately 9% for women with a first-degree relative with breast cancer, and nearly 16% for those who had a first-degree relative with bilateral breast cancer. Hence, patients who had a prior history of breast cancer and multiple affected first and/or second-degree relatives, even in the absence of a high-risk mutation, often had requests for PM upheld. This notwithstanding, risks of CBC in patients not fulfilling...
Table 4
Comparisons between accepted and rejected requests for prophylactic mastectomy in Nottingham Prognostic Index, 5-year and 10-year survival estimates using PREDICT models.

<table>
<thead>
<tr>
<th>Variable</th>
<th>PM request accepted by MDT</th>
<th>PM request rejected by MDT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PREDICT 5 year (%)</td>
<td>PREDICT 10 year (%)</td>
</tr>
<tr>
<td>Mean</td>
<td>81.7</td>
<td>67.2</td>
</tr>
<tr>
<td>Std</td>
<td>2.5</td>
<td>3.2</td>
</tr>
<tr>
<td>Median</td>
<td>87.5</td>
<td>71.6</td>
</tr>
<tr>
<td>Minimum value</td>
<td>36.1</td>
<td>23.3</td>
</tr>
<tr>
<td>Maximum value</td>
<td>96.1</td>
<td>91.4</td>
</tr>
</tbody>
</table>

Std = standard deviation; NPI = Nottingham Prognostic Index.

Figure 1. (a–b) Bar charts illustrating MDT decision-making and grounds for accepting and declining requests for prophylactic mastectomy.
high risk criteria are certainly real, and whilst beyond the scope of the current study given the limited duration of follow-up (i.e. 3 years maximum), to date we are aware of one CBC in a patient who was declined risk-reducing surgery by the regional MDT. Moreover, not all systems in European centres have rigid eligibility criteria for PM (i.e. such as NICE), and perhaps now is the time for Consortium to discuss, debate and develop standards against which decision-making can be assessed. This notwithstanding the MDT process could still be adopted in order to better understand how decisions for PM are being made.’

Clearly, in evaluating the risk benefit ratio for CPM it important to not only establish a patient’s risk of CBC but also to examine their risk of death from their index breast cancer.17 Surprisingly, 5 and 10-year survival estimates and NPI data did not seem to differ markedly between patients offered and those declined PM. One possible explanation is that 5-year and 10-year survival estimates were obtained offline and were not available to the MDT at the time of discussion. Nevertheless, NPI data was often documented in advance of the meeting, and histopathological (e.g. grade III) and staging information (e.g. node positive counts) were commonly available. This is critically important given that relevant studies suggest CPM has no or very limited survival advantage.18–23 A Cochrane Review of 1708 patients suggested that CPM is not associated with survival benefits and that the risk of distant metastases from the index cancer far exceed the risk of metastases from a potential CBC.18 Given these findings, proposed changes to the MDT proforma include mandatory requirements for survival estimates and NPI data in any breast cancer patients’ requesting PM. Our prediction is that more rigorous inclusion of this data would tend to further attenuate CPM rates.

Minimising PM rates has both physical and socio-economic benefits. Mastectomy is a substantial, irreversible operation, which is not without complications. Indeed, complication rates in published reports of PM range from 10 to 66%.21–31 The majority of our cohort ( ~80%) sought reconstructive surgery and the most complex autologous procedures were also the most popular. Breast reconstruction adds substantially to the morbidity20 and complications commonly affect the prophylactic side in bilateral mastectomy.21,32 Whilst in the main, patients selecting CPM are satisfied, a proportion of patients will experience regret, issues with body image, challenges forming sexual relationships and lack feelings of femininity.26–30 Moreover, whilst few studies explicitly examine cost-effectiveness of CPM, limited data suggests that CPM adds to net costs.26 Deshmukh and colleagues demonstrated that net costs of CPM were greater in every aspect of care (i.e. technical, professional, etc) and led to a 16.9% increase in mean total costs compared to surveillance. Regarding the current cohort, 51 patients have been spared PM, which based on a Health Resource Group code of £10,800 for mastectomy and autologous reconstruction results in a gross local saving of approximately £550,800. Moreover, extrapolating a 30% PM rejection rate to recently published national UK data may equate to approximately £20 m saved per year for the National Health Service (185 cases × £10,800 = £19,980,000). However, it must be acknowledged that any saving as result of minimising PM may be offset by the costs of on-going mammographic surveillance and the longitudinal costs of treating any subsequent CBC downstream.

Several limitations of this observational cohort study must be acknowledged. Firstly, retrospective data are prone to misclassification, selection and information bias. Patients requesting PM are a self-selected group who are motivated to understand and reduce their risk of breast cancer and who may differ from those who do not initiate the discussion around risk-reduction. However, unlike population data from the USA (e.g. SEER, NCDB) that lack clinical information such as the details of mutation status and family history, we were able to independently verify the results of genetic testing and confirm cancer pedigrees within families, which occasionally led to changes in management.

---

Table 5

Example case histories and MDT decisions on requests for risk-reducing mastectomy.

<table>
<thead>
<tr>
<th>Case summary</th>
<th>MDT discussion</th>
<th>MDT outcome lessons</th>
</tr>
</thead>
<tbody>
<tr>
<td>49y.o MF-BC 16 mm + 13 mm, G3, IDC, ER+, HER2-, WLE</td>
<td>Psychiatrist – deemed to be psychologically stable</td>
<td>Patient refused on grounds that lifetime risk did not meet NICE threshold of 30%</td>
</tr>
<tr>
<td>68y.o 11 mm, IDC, G3, ER+, HER2-, Node-, 5-year PREDICT 88.7%</td>
<td>Geneticist – no concerns articulated, Geneticist – LR/CBC risk 0.7%/year</td>
<td>Patient refused on grounds that lifetime risk did not meet NICE threshold of 30%</td>
</tr>
<tr>
<td>64y.o 2010 BC, mucinous + HG-DCIS, Mx and ANC, Adjuvant AI</td>
<td>Geneticist – LR/CBC risk = 0.7%/year suggest reject; Psychologist suggests patient unable to lead a normal life due to fear of recurrence</td>
<td>Patient accepted on grounds of extreme distress associated with fear of cancer recurrence/LR/CBC</td>
</tr>
<tr>
<td>48y.o referred for second opinion, no prior BC, concerned regarding strong FH; had BSO to reduce risk</td>
<td>Psychiatrist – motivated and understands risks/benefits of RRM; Geneticist – review of FH revealed patient’s father had bilateral Gynaecomastia surgery (not bilateral BC)</td>
<td>Patient declined following misleading/fictitious FH, after establishing facts risk did not meet NICE threshold</td>
</tr>
</tbody>
</table>

MF = multifocal, BC = breast cancer, IDC = invasive ductal carcinoma, G = grade, ER = estrogen receptor, HER2 = human epidermal receptor 2, WLE = wide local excision, HG-DCIS = high grade ductal carcinoma in situ, Mx = mastectomy, ANC = axillary node clearance, AI = Aromatase Inhibitor, FH = family history, BSO = bilateral salpingo-oophorectomy, LR = locoregional recurrence, CBC = contralateral breast cancer, NICE = National Institute of Health and Care Excellence.
(see Table 5). However, we were unable to investigate the temporal link between confirmation of a genetic mutation, a diagnosis of breast cancer and the desire for PM. Similarly, the relative importance of the time interval between a breast cancer diagnosis and the request for CPM could not be established since the time delay between breast cancer diagnosis and discussion at regional MDT meetings were not routinely recorded.

In summary, a risk-reducing MDT meeting helps establish the indications on which to proceed with or refute requests for PM and facilitates cross-specialty interrogation of these requests towards improved clinical decision-making. A substantial proportion of requests are likely to be deemed inappropriate if properly scrutinised by clinicians and efforts to reduce CPM where is it not warranted is an important step to move this field forward. MDT meetings may represent a feasible strategy toward this goal. Further work is required to better understand the relationship between the time delay following breast cancer diagnosis and treatment, and requests for CPM since there may well be a time point at which the risk of CBC outweighs the risk of death from metastatic disease.

Conflicts of interest

The authors have no conflict of interest to declare.

Acknowledgements

The authors would like to thank Beverley Poel for her help in maintaining the prospective MDT proforma and for her time in cross-referencing MDT outcomes with surgeons’ operative records. We are extremely grateful to Mr Ashraf Patel for helping the team complete patient records for whom demographic data was initially missing.

References


