



Factors influencing patient decision-making between simple mastectomy and surgical alternatives

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Background: Despite similar survival rates, breast-conserving therapy (BCT) remains a distant second choice after simple mastectomy for patients with early-stage breast cancer in Singapore. Uptake of reconstruction after mastectomy is also low (18 per cent). The aim of this study was to explore the factors influencing a patient's choice for mastectomy when eligible for BCT, and why patients decline reconstruction after mastectomy.

Methods: Patients from the National Cancer Centre Singapore, who were eligible for BCT but chose mastectomy without reconstruction, between December 2014 and December 2015 were included. An interviewer-administered questionnaire focusing on patients' reasons for choosing mastectomy over BCT and not opting for immediate breast reconstruction after mastectomy was used. Tumour characteristics were retrieved from medical records. Spearman's rank correlation coefficient, Mann-Whitney *U* and Kruskal-Wallis tests were used to analyse the correlation between the patient's self-rated influential factors and variables. Statistical significance was taken as $P < 0.050$.

Results: Ninety-one patients were included (90.1 per cent response rate). The main reasons for choosing mastectomy over BCT were: fear of cancer recurrence (considered very important in 74 per cent), the perception that health outweighs breast retention (49 per cent) and the possibility of second surgery for margins (40 per cent). Key factors for rejecting immediate reconstruction after mastectomy were: patient-perceived 'old age' (very important in 53 per cent), concern about two sites of surgery (42 per cent) and financial cost (29 per cent). Given a second chance, 19.8 per cent of patients would undergo BCT instead of mastectomy.

Conclusion: This study has identified the considerations that women in Singapore have when deciding on breast cancer surgery. Some perceptions need to be addressed for women to make a fully informed decision, especially as one-fifth regret their initial choice.

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Introduction

Breast-conserving therapy (BCT) for early-stage breast cancer has been shown to have similar, if not better, overall survival rates compared with mastectomy^{1–3}. Indeed, BCT is the preferred locoregional treatment in most western countries, with reported rates ranging from 65 to 70 per cent^{3,4}. In parts of Asia, rates of BCT range between 60 and 65 per cent^{5,6}. In comparison, uptake of BCT in Singapore is much lower at 30–40 per cent^{7–9}. This is despite the

fact that the majority of breast cancers are diagnosed in Singapore at an early stage (32.7 per cent stage I and 38.5 per cent stage II)¹⁰, and access to radiotherapy is readily available throughout the small city state.

Among women in Singapore who chose to have a mastectomy, only 18 per cent underwent reconstruction after mastectomy¹¹. This again differs from the West and other parts of Asia, where reported rates of reconstruction after mastectomy are approximately 60 per cent^{3–6,11}.

Singapore is a relatively small country and its healthcare is based on a co-payment system with government subsidies for breast cancer surgery, breast reconstruction and adjuvant radiotherapy. Common factors that limit use of BCT, such as geographical access to adjuvant radiotherapy and affordability of healthcare, are not expected to be major problems in this population. Furthermore, the expertise for BCT and reconstruction after mastectomy, both autologous and implant-based, is also readily available. It is therefore surprising that simple mastectomy is the preferred operation in this population.

This study aimed to explore the reasons why women who could have BCT choose to undergo mastectomy, and why these women decline reconstruction after mastectomy.

Methods

The study had Institutional Ethics Review Board approval. Women with breast cancer were identified from the clinics of five consultant breast surgeons at the National Cancer Centre Singapore (NCCS), between December 2014 and December 2015. Patients who were documented to have had preoperative discussions that offered them the choice between BCT and mastectomy by their primary breast surgeon, but who chose to undergo a simple mastectomy, were recruited.

An interviewer-administered face-to-face questionnaire was conducted. The interview was conducted in English or Mandarin in a single 15-min session during the patient's follow-up visit at NCCS. The questionnaire consisted of five parts (*Appendix S1*, supporting information).

The first part recorded the patient demographics, such as age at mastectomy, race, highest level of education, marital status and whether they were working at the point of diagnosis.

The second part of the questionnaire examined reasons for choosing mastectomy over BCT. The reasons included in the survey were based on similar studies done in other countries^{12–14}, such as patient's age, family history of breast cancer, existing co-morbidities, fear of cancer recurrence, concerns about radiotherapy, avoiding risk of second surgery for margins, cost, sexuality, the perception that health is more important than retaining a breast, and length of time away from work. In the third part, patients' reasons for not undergoing breast reconstruction after mastectomy were explored. Factors such as the woman's subjective perception of her age, marital status, cost, longer hospital stay, undesirable cosmetic outcome with reconstruction, concerns about two surgery sites (one for donor site) and sexuality were listed. For both parts 2 and 3, respondents were

required to rate each reason on a three-point Likert scale (ranging from not important to very important).

The questionnaire also asked the patients who they considered had influenced their decision-making. The last part assessed satisfaction following simple mastectomy, including asking patients whether they would make a different choice if they could choose again.

Tumour characteristics such as tumour size, stage, location and receptor status were retrieved from patients' medical records.

Patients in this study were counselled before surgery that the radiotherapy regimen for BCT consisted of 15–20 daily fractions lasting 10 min each session. They were informed about common side-effects such as skin changes and rare but important complications such as cardiotoxicity and radiation-induced sarcoma. Patients were also counselled that BCS has a 10–20 per cent possibility of requiring re-excision for involved margins (intraoperative frozen-section examination of margins is not done at NCCS).

Statistical analysis

R statistical software v3.3.2 (R Foundation for Statistical Computing, Vienna, Austria) was used for data analysis. Spearman's rank correlation coefficient, Mann–Whitney *U* and Kruskal–Wallis tests were used to analyse the correlation between the patient's self-rated influential factors and variables such as demographics, tumour characteristics and decision-making-related factors. Statistical significance was taken as $P < 0.050$.

Results

A total of 101 women were approached, with a response rate of 90.1 per cent (91 patients). Demographic data are shown in *Table 1*. The median age of the women at the point of mastectomy was 60 (range 25–83) years. The survey was performed a median of 48 (0–205) months after mastectomy. The racial mix of the participants was proportionate to the resident population of Singapore. The majority of patients who chose simple mastectomy (without reconstruction) over BCT were married (74 per cent) and had a secondary school education or lower (79 per cent). Almost half of the women (46 per cent) were working at the time of diagnosis of breast cancer.

Table 2 lists the tumour characteristics of the patients included in the study. In keeping with the criterion that the patient must have been eligible for both mastectomy and BCT, the majority of tumours were early-stage (93 per cent were stage I–II) and almost all (97 per cent) of the tumours were 50 mm or less in size. The majority

Table 1 Patient demographics

	No. of patients* (n = 91)
Age at mastectomy (years)†	60 (25–83)
Height (cm)†	154.5 (132.0–173.5)
Weight (kg)†	57 (36.4–88.6)
BMI (kg/m ²)†	23.9 (16.6–36.4)
Time after mastectomy (months)†	48 (0–205)
Ethnicity	
Chinese	79 (89)
Malay	6 (7)
Indian	2 (2)
Other	2 (2)
Missing	2
Highest education level	
None	7 (8)
Primary	25 (28)
Secondary (O-level)	39 (43)
Tertiary (A-level)	6 (7)
Diploma	8 (9)
University	5 (6)
Missing	1
Marital status	
Single	17 (19)
Married	67 (74)
Divorced	2 (2)
Widowed	4 (4)
Missing	1
Working at the point of diagnosis	
Yes	41 (46)
No	48 (54)
Missing	2
Previous contralateral mastectomy	
Yes	3 (3)
No	88 (97)

*With percentages in parentheses unless indicated otherwise; †values are median (range).

(72 per cent) were unifocal cancers, with 28 per cent multifocal and none multicentric, as would be expected in a cohort offered BCS. Most cancers (68 per cent) were hormone-positive, 10 per cent were HER-2-enriched, and 21 per cent were triple-negative.

Patients' ratings of the importance of various factors in their decision to choose mastectomy over BCT are shown in Table 3. The top three factors that influenced the choice of mastectomy were: fear of cancer recurrence (74 per cent), the perception that health was more important than retaining a breast (49 per cent), and wishing to avoid the risk of a second surgery for margins (40 per cent).

Patient demographics and tumour characteristics were not significantly correlated to these top three patient-ranked factors. Hormone receptor status ($P=0.173$) and nodal status ($P=0.957$) showed no correlation with patients' fear of cancer recurrence.

The top three factors cited by patients for declining breast reconstruction after mastectomy were patient-perceived 'old age' at the time of mastectomy

Table 2 Tumour characteristics

	No. of patients (n = 91)
Tumour stage	
I	39 (43)
II	45 (50)
III	6 (7)
Missing	1
Tumour size (mm)	
≤ 20	47 (53)
21–50	39 (44)
> 50	2 (2)
Missing	3
Tumour location	
Upper outer quadrant	40 (47)
Lower outer quadrant	10 (12)
Upper inner quadrant	8 (9)
Lower inner quadrant	6 (7)
Central	22 (26)
Missing	5
Cancer focality	
Unifocal	63 (72)
Multifocal	25 (28)
Missing	3
Nodal status	
N0	67 (74)
N1	17 (19)
N2	4 (4)
N3	2 (2)
Missing	1
Hormone receptor status	
Triple negative (ER/PR–, HER-2–)	16 (21)
Luminal 'A' (ER/PR+, HER-2–)	38 (49)
Luminal 'B' (ER/PR+, HER-2+)	15 (19)
HER-2-enriched (ER/PR–, HER-2+)	8 (10)
Missing	14
Preoperative breast MRI	
Yes	4 (4)
No	87 (96)

Values in parentheses are percentages. ER, oestrogen receptor; PR, progesterone receptor; HER-2, human epidermal growth factor receptor 2.

(53 per cent), concern about two sites of surgery (42 per cent) and cost of treatment (29 per cent) (Table 4).

Correlation between patients' self-rated influential factors and clinicopathological factors showed that the older a patient was, the more influential her age was in influencing her decision ($r_s = 0.61$, $P < 0.001$). In addition, the more educated the patient, the stronger her concern about two sites of surgery for an autologous flap reconstruction ($r_s = 0.22$, $P = 0.047$). Concern regarding cost of treatment was not correlated with any patient or tumour characteristic.

Some 97 per cent of women indicated that their own viewpoint was the most important in choosing a mastectomy over BCT (Table 5), followed by their surgeon's viewpoint as the next most influential

Table 3 Patient self-rated importance of factors in the decision to choose mastectomy over breast-conserving surgery

	Very important	Somewhat important	Not important
Fear of cancer recurrence	67 (74)	11 (12)	13 (14)
Health is more important than retaining a breast	44 (49)	45 (51)	0 (0)
No risk of second surgery for margins	36 (40)	20 (22)	35 (38)
Concern about radiotherapy	32 (36)	13 (15)	44 (49)
Age	29 (32)	18 (20)	43 (48)
Family history of breast cancer	15 (16)	11 (12)	65 (71)
Existing co-morbidities	12 (13)	10 (11)	68 (76)
Cost of treatment	9 (10)	17 (19)	64 (71)
Time away from work	8 (9)	7 (8)	75 (83)
Sexuality	2 (2)	11 (12)	77 (86)

Values in parentheses are percentages.

Table 4 Patient self-rated importance of factors in the decision to choose simple mastectomy over mastectomy with breast reconstruction

	Very important	Somewhat important	Not important
Age	44 (53)	14 (17)	25 (30)
Concern about two sites of surgery	35 (42)	13 (16)	35 (42)
Cost of treatment	24 (29)	13 (16)	46 (55)
Longer hospital stay	22 (27)	11 (13)	50 (60)
Undesirable cosmetic outcome with reconstruction surgery	18 (22)	18 (22)	47 (57)
Cosmesis	17 (21)	16 (20)	49 (60)
Marital status	14 (17)	20 (24)	49 (59)
Sexuality	1 (1)	8 (10)	74 (89)

Values in parentheses are percentages.

Table 5 Patient self-rated importance of stakeholders in the decision to choose mastectomy over breast-conserving surgery

	Very important	Somewhat important	Not important
Self	88 (97)	3 (3)	0 (0)
Surgeon	46 (51)	19 (21)	26 (29)
Spouse (married)	23 (32)	14 (19)	35 (49)
Breast care nurse	23 (25)	18 (20)	50 (55)
Primary care physician	22 (25)	8 (9)	59 (66)
Internet	0 (0)	76 (88)	10 (12)

Values in parentheses are percentages.

perspective. However, the surgeon's viewpoint was rated as very important by only 51 per cent of women. Breast care nurses (25 per cent) and primary care physicians (25 per cent) were almost as influential as patients' spouses (32 per cent) in the decision-making process.

Most respondents (89 per cent) felt that the outcome of the simple mastectomy matched their expectations as based

Table 6 Patients' reflections after mastectomy

	Yes	No
Is your quality of life worse after mastectomy?	17 (19)	74 (81)
Was having the mastectomy what you expected from descriptions from your surgeon or breast care nurse?	81 (89)	10 (11)
If you could choose between the two procedures again, would you choose breast-conserving surgery instead?	18 (20)	73 (80)
Do you wish you had had a breast reconstruction at the time of surgery?	2 (2)	88 (98)
Would you consider a breast reconstruction now or in the future?	3 (3)	88 (97)

Values in parentheses are percentages.

on the perioperative information and counselling provided by their breast surgeon or breast care nurse (Table 6). Some 19 per cent felt their quality of life was worse after the simple mastectomy, and 20 per cent would choose BCT if given another chance. These two groups of patients tended to be those who had their mastectomy done earlier (at 71.7 and 82.6 months of follow-up respectively), compared with the other patients in the study (57.8 months' follow-up).

Only two women (2 per cent) wished they had undergone immediate breast reconstruction, and three (3 per cent) would consider a delayed breast reconstruction. Of these patients, only one woman felt that she would choose BCT if given a second opportunity.

Discussion

This is the first study in Singapore to explore the factors that influence women with breast cancer to choose a mastectomy over BCT, as well as their perceptions of their choice of surgery. The respondents in this study were largely aged over 50 years, of Chinese ethnicity, and of secondary school level of education and below. The demographic profile of the recruited patients was similar to that of patients who chose to undergo mastectomy in other studies^{12–16}.

The fear of cancer recurrence was the main reason why the women chose a mastectomy over BCT, followed closely by the perspective that 'health is more important than retaining a breast'. This attitude was pervasive, despite all patients receiving counselling and printed materials that indicated that BCT was an effective treatment with similar survival to mastectomy. During the survey, patients would explain that they wanted to have the lowest possible risk of a locoregional recurrence, even if such a recurrence might not compromise survival. Conceptually, the women felt that undergoing mastectomy removed not only the cancer, but also the organ from which the cancer arose,

thereby affording them a greater sense of security^{14,17}. In this study, this fear of a cancer recurrence was independent of hormone receptor and nodal status of the tumour.

Previous studies have shown that, even with deliberate preoperative patient education regarding the similar survival rates of BCT and mastectomy, fear of recurrence was still a significant influential factor, with reasons given such as mastectomy being a more complete procedure¹⁴ and having peace of mind by removing the breast⁴. This fear of cancer recurrence as a deciding factor for choosing mastectomy is similar to the findings of previous studies from western countries^{4,14,18}, as well as in Hong Kong¹⁹. Interestingly, a study performed in Malaysia¹² found no significant difference in terms of fear of cancer recurrence between women who chose mastectomy and those who chose BCT.

The possibility of requiring a second operation for involved margins was the third most common reason cited for not choosing BCT. Re-excision rates for positive margins after BCT range from 17 to 68 per cent²⁰. Previous studies^{12,19} have had differing results regarding the importance of this factor to patients, with Lam and colleagues¹⁹ showing that 'avoiding having further surgery in the future' was a key consideration in women who choose simple mastectomy over BCT, whereas Teh and co-workers¹² reported otherwise. In the present study, this factor was shown to play a prominent role. Unfortunately, the questionnaire was not designed to examine the underlying reason, for example whether it was the fear of a second operation, the cost associated with it, or needing to bear the burden of cancer for a prolonged duration.

Only four participants had preoperative MRI of the breast, and three patients had undergone a previous contralateral mastectomy. Therefore, the probability that these patients opted for mastectomy based on results of preoperative breast MRI, or chose a second mastectomy after a previous one, was unlikely to have had a strong influence.

Another interesting finding was that a very high proportion of women (97 per cent) felt they relied on themselves to make the decision to undergo mastectomy. The importance of the opinions of their breast surgeon and spouse was a distant second (51 per cent) and third (32 per cent) respectively. These findings mirror those of other studies^{12–14,21–23}, which found that patients who were given the freedom to choose tended to opt for a mastectomy. Although this result differs from that of a previous study of Asian American women in 2002²⁴, where patients placed more importance on their doctors' recommendations, it may indicate the differences in perceptions of Asian women across the decades, and in different countries.

In the present study nearly one-fifth of women regretted their decision to undergo mastectomy and felt that they would choose BCT if they had the opportunity to choose again. A similar proportion felt that their quality of life after mastectomy had worsened. These findings were found despite 89 per cent of respondents indicating that they had been adequately prepared by their primary breast surgeon and breast care nurse about what to expect from a simple mastectomy, and that the results of a simple mastectomy matched their expectations. Despite optimal preoperative preparation and managing expectations, living with a simple mastectomy clearly has its challenges, which may not be wholly anticipated before surgery. Fortunately, the majority do not regret their choice, possibly due to the fact that 97 per cent of the women felt they had made their own decision. It is known that patients who are more independent in their decision-making have less regret, regardless of the eventual outcome²⁵.

Similar to previous studies^{16,26,27}, the main reasons for patients in the present study to decline immediate breast reconstruction were the patient's perception of her age and concerns about two sites of surgery. Concern over the financial costs of treatment is more apparent in Asian studies²⁶, and was evident in the present study. In Singapore, healthcare payment is a co-payment system whereby healthcare-related costs are subsidized partially by the government and the rest is borne by the consumer (patient). In addition, breast reconstruction could increase the time away from work, and almost half of the women interviewed were working at the time of cancer diagnosis. This is similar to a previous study from Hong Kong¹⁷, in which women were concerned about the financial burden of cancer treatment on themselves and their family, especially as breast reconstruction after mastectomy is deemed non-medical.

The main limitations of this study include it being retrospective, with its attendant element of recall bias, the relatively small sample size, and recruitment of patients from a single institution. However, the NCCS does treat the majority of breast cancers diagnosed in Singapore, and the findings probably reflect the Singapore population accurately. Finally, patients who had a choice between mastectomy and BCT but chose to undergo BCT were not included in the study. Exploring reasons why patients select BCT over simple mastectomy would provide the most comprehensive understanding of why patients make the decisions they do.

The heterogeneity of reasons reported in the literature as to why women choose mastectomy over BCT when given a choice between the two options indicates that regional differences exist, and are most likely multifactorial in nature. Overall, the results of this study differ from those

of previous studies, even studies of Asian women. This may be due to Singapore being a multiracial and multicultural society where people are exposed to various cultures, both western and Asian. As a result, this may manifest as patients with a unique mindset and perspective on how they wish to be treated for breast cancer if given a choice.

Disclosure

The authors declare no conflict of interest.

References

- Fisher B, Anderson S, Bryant J, Margolese RG, Deutsch M, Fisher ER *et al.* Twenty-year follow-up of a randomized trial comparing total mastectomy, lumpectomy, and lumpectomy plus irradiation for the treatment of invasive breast cancer. *N Engl J Med* 2002; **347**: 1233–1241.
- van Maaren MC, de Munck L, de Bock GH, Jobsen JJ, van Dalen T, Linn SC *et al.* 10 year survival after breast-conserving surgery plus radiotherapy compared with mastectomy in early breast cancer in the Netherlands: a population-based study. *Lancet Oncol* 2016; **17**: 1158–1170.
- Agarwal S, Pappas L, Neumayer L, Kokeny K, Agarwal J. Effect of breast conservation therapy *vs* mastectomy on disease-specific survival for early-stage breast cancer. *JAMA Surg* 2014; **149**: 267–274.
- Collins ED, Moore CP, Clay KF, Kearing SA, O'Connor AM, Llewellyn-Thomas HA *et al.* Can women with early-stage breast cancer make an informed decision for mastectomy? *J Clin Oncol* 2009; **27**: 519–525.
- Park EH, Min SY, Kim Z, Yoon CS, Jung KW, Nam SJ *et al.*; Korean Breast Cancer Society. Basic facts of breast cancer in Korea in 2014: the 10-year overall survival progress. *J Breast Cancer* 2017; **20**: 1–11.
- Park Y, Kitahara T, Takagi R, Kato R. Current status of therapy for breast cancer worldwide and in Japan. *World J Clin Oncol* 2011; **2**: 125–134.
- Wang WV, Tan SM, Chow WL. The impact of mammographic breast cancer screening in Singapore: a comparison between screen-detected and symptomatic women. *Asian Pac J Cancer Prev* 2011; **12**: 2735–2740.
- Pathy NB, Yip CH, Taib NA, Hartman M, Saxena N, Iau P *et al.*; Singapore–Malaysia Breast Cancer Working Group. Breast cancer in a multi-ethnic Asian setting: results from the Singapore–Malaysia hospital-based breast cancer registry. *Breast* 2011; **20**(Suppl 2): S75–S80.
- Sim Y, Tan VK, Ho GH, Wong CY, Madhukumar P, Tan BK *et al.* Contralateral prophylactic mastectomy in an Asian population: a single institution review. *Breast* 2014; **23**: 56–62.
- Peng LH, Ling A, Li FL, Min KS, Lee E. *Singapore Cancer Registry Annual Registry Report 2015*; 2017. Health Promotion Board, National Registry of Diseases Office: Singapore. https://www.nrdo.gov.sg/docs/librariesprovider3/Publications-Cancer/cancer-registry-annual-report-2015_web.pdf?sfvrsn=10 [accessed 19 June 2017].
- Ng YY, Tan VK, Goh TL, Yong WS, Wong CY, Ho GH *et al.* Trends in post-mastectomy reconstruction in an Asian population: a 12-year institutional review. *Breast J* 2017; **23**: 59–66.
- Teh YC, Shaari NE, Taib NA, Ng CH, See MH, Tan GH *et al.* Determinants of choice of surgery in Asian patients with early breast cancer in a middle income country. *Asian Pac J Cancer Prev* 2014; **15**: 3163–3167.
- Ward S, Heidrich S, Wolberg W. Factors women take into account when deciding upon type of surgery for breast cancer. *Cancer Nurs* 1989; **12**: 344–351.
- Nold RJ, Beamer RL, Helmer SD, McBoyle MF. Factors influencing a woman's choice to undergo breast-conserving surgery *versus* modified radical mastectomy. *Am J Surg* 2000; **180**: 413–418.
- Liu JJ, Zhang S, Hao X, Xie J, Zhao J, Wang J *et al.* Breast-conserving therapy *versus* modified radical mastectomy: socioeconomic status determines who receives what – results from case–control study in Tianjin, China. *Cancer Epidemiol* 2012; **36**: 89–93.
- Chagpar A. Access to breast reconstruction after mastectomy and patient perspectives on reconstruction decision making. *Breast Dis* 2015; **26**: 153–154.
- Lam WW, Fielding R. The evolving experience of illness for Chinese women with breast cancer: a qualitative study. *Psychooncology* 2003; **12**: 127–140.
- Fisher CS, Martin-Dunlap T, Ruppel MB, Gao F, Atkins J, Margenthaler JA. Fear of recurrence and perceived survival benefit are primary motivators for choosing mastectomy over breast-conservation therapy regardless of age. *Ann Surg Oncol* 2012; **19**: 3246–3250.
- Lam WW, Fielding R, Ho EY, Chan M, Or A. Surgeon's recommendation, perceived operative efficacy and age dictate treatment choice by Chinese women facing breast cancer surgery. *Psychooncology* 2005; **14**: 585–593.
- Jeevan R, Cromwell DA, Trivella M, Lawrence G, Kearins O, Pereira J *et al.* Reoperation rates after breast conserving surgery for breast cancer among women in England: retrospective study of hospital episode statistics. *BMJ* 2012; **345**: e4505.
- Katz SJ, Lantz PM, Janz NK, Fagerlin A, Schwartz K, Liu L *et al.* Patient involvement in surgery treatment decisions for breast cancer. *J Clin Oncol* 2005; **23**: 5526–5533.
- Rippy EE, Ainsworth R, Sathananthan D, Kollias J, Bochner M, Whitfield R. Influences on decision for mastectomy in patients eligible for breast conserving surgery. *Breast* 2014; **23**: 273–278.
- Caldon LJ, Collins KA, Wilde DJ, Ahmedzai SH, Noble TW, Stotter A *et al.* Why do hospital mastectomy rates vary? Differences in the decision-making experiences of women with breast cancer. *Br J Cancer* 2011; **104**: 1551–1557.

- 24 Tam Ashing K, Padilla G, Tejero J, Kagawa-Singer M. Understanding the breast cancer experience of Asian American women. *Psychooncology* 2003; **12**: 38–58.
- 25 Groopman J, Hartzband P. The power of regret. *N Engl J Med* 2017; **377**: 1507–1509.
- 26 Nozawa K, Ichimura M, Oshima A, Tokunaga E, Masuda N, Kitano A *et al.* The present state and perception of young women with breast cancer towards breast reconstructive surgery. *Int J Clin Oncol* 2015; **20**: 324–331.
- 27 Somogyi RB, Webb A, Baghdikian N, Stephenson J, Edward KL, Morrison W. Understanding the factors that influence breast reconstruction decision making in Australian women. *Breast* 2015; **24**: 124–130.

Supporting information

Additional supporting information can be found online in the Supporting Information section at the end of the article.