Factors affecting the palpability of breast lesion by self-examination

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ABSTRACT

Introduction: This study aims to assess the accuracy of detection of breast lesion by breast self-examination and to assess different factors affecting the accuracy.

Methods: All consecutive Chinese female patients, who attended our breast imaging unit in 2001, completed our questionnaire, had retrievable hard copy films, and had more than three years clinical follow-up, were recruited for this study. Different factors, such as age, menopausal status, previous experience of breastfeeding, family history of breast cancer, previous history of mastectomy or lumpectomy, hormonal therapy, oral contraceptive pills and previous history of mammography, were correlated with accuracy in self-detection of breast lesions retrospectively. The nature, size and location of the lesion, and breast size based on imaging, were also correlated with the accuracy in self-detection of breast lesions.

Results: A total of 163 questionnaires were analysed. 111 patients detected a breast lesion themselves and 24 of these lesions were false-positives. A total of 173 lesions (27 cancerous, 146 benign lesions) were documented by either ultrasonography and/or mammography, and confirmed by either histology or three-year clinical follow-up. The overall sensitivity in detecting both benign and malignant breast lesions was 71% when number of breast lesions was used as the denominator, and up to 78% sensitivity was achieved when number of patients was used as the denominator . History of mastectomy, and size and nature of the lesions were found to affect the accuracy of self-detection of breast lesions.

Conclusion: Overall, breast self-examinations were effective in the detection of breast lesions and factors such as size of lesion, nature of the lesion and history of mastectomy affect the accuracy of the detections. Breast self-examination should be promoted for early detection of breast cancer.

Keywords: breast cancer, breast lesion, breast self-examination

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INTRODUCTION

Breast cancer is one of the commonest cancers among women. More than 200,000 women are diagnosed with invasive breast cancer in the United States each year.[1] Early detection of breast cancer allows for more effective treatment options,[2-3] and screening programmes have been proven to reduce mortality. Many women present to their physicians for physical examination after identifying a breast abnormality themselves,[2] therefore highlighting the importance of the role of breast self-examination and increasing self-awareness in compliance in screening programmes. Some authors think that breast self-examination creates a lot of false-positives and unnecessary anxiety among patients, and should not be recommended.[4,5] In this study, we evaluated the accuracy in detection of different breast pathologies and the role of different factors affecting the palpability of breast lesion by self-examination.

METHODS

All patients attending the breast-imaging unit of our centre for the first time were invited to fill in a questionnaire. The questionnaire was filled on a voluntary basis. The questionnaires requested the participant to fill in background information, such as the age, whether the patient had menopause, previously breastfed, family history of breast cancer, history of mastectomy and/or lumpectomy, hormonal therapy and/or oral contraceptive pills, and whether the patient had previous mammography examination done in other centres. During the medical consultation, the patient was asked if a palpable breast lesion was detected by the patient herself, and whether she had experienced any pain or any nipple discharge. On the average, about 750 new patients attended our breast imaging centre. All questionnaires filled in 2001 were retrieved for analysis. Only patients with retrievable hardcopy films and more than three years of clinical follow-up were considered for the analysis. A total of 163 questionnaires were analysed in this study.

All patients ≥ 35 years of age would have both ultrasonography (US) of the breast and mammography performed. All patients < 35 years of age would have US of the breast performed only. Mammography

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would only be performed in this group of patients if the clinical suspicion for malignancy was high. All US of the breast were performed with a 10 MHz linear array transducer from the Diasonic VST Masters Series (Diasonics Ultrasound Inc, CA, USA). All mammographical examinations were performed with a dedicated film-screen equipment, Senographe DMR Mammography System (GE Healthcare, Bucks, United Kingdom). Two standard views (mediolateral oblique and craniocaudal views) were obtained and additional views were added when required. All US and mammography examinations were interpreted by one of the six attending radiologists, all of whom were fully qualified and had more than two years' experience in the interpretation of breast images. The US and mammography examinations were read together so as to decide whether the "breast lesion" detected by the patients was genuine. All solid breast lesions detected by either US or mammography or both, would have either fine-needle aspiration or core biopsy performed, as decided by the attending radiologist. Cystic lesions with no solid component identified would either be left alone and followed-up by further imaging, or have fine-needle aspiration performed. We routinely requested that our patients localise the "palpable lesion" to the radiologist if no lesion was identified by both US and mammography. The "palpable breast lesion" was then re-scanned by US to ensure that no lesion was missed. The results of all fine-needle aspirations and core biopsies performed were retrieved. The clinical records of the patients in the subsequent three years were also retrieved and analysed.

The thickness of the breast(s) of individual patients was measured by an observer, based on the hardcopy films. It was difficult to define the thickness of breast due to various factors. One might use the mammography images and measure the thickness of breast tissue as reflected by the craniocaudal view. The compression of the breast was difficult to standardise in different examinations and would therefore affect the measurement of the thickness of the breast. In this study, the thickness was artificially defined as the distance between the subcutaneous layer and the anterior surface of the pectoralis major muscle at the 12 o'clock position, based on the US images. The measurement would reflect the thickness of the breast, though the limitations were well-anticipated. The thickness measured at other positions might vary more significantly with the posture of the patient and the relative position of the breast and the chest wall. For patients with two breasts, at least three measurements were taken from both left and right breasts, and the mean thickness was calculated. For patients with previous mastectomy, only measurements from either the right or left breast would be taken. For all lesions localised by US, the depth of the lesion(s) was also measured. The depth of the lesion was defined by the distance between the posterior surface of the dermis and the anterior surface of the lesion, again, at least three measurements were taken and the mean value was calculated. The size of the lesion was taken as the maximum dimension of the lesion identified by US. For lesions identified by mammography but not US, the size of lesion was taken as the maximum diameter of the lesion based on the unmagnified mammography view.

The results were analysed using the Statistical Package for Social Sciences version 13.0 (SPSS Inc, Chicago, IL, USA). Chi-square test was used to establish the association of individual factor and the self-detection of the breast lesion. Mann-Whitney U-test was used when an individual factor involved a continuous value. Any p-value < 0.05 was taken as significant. Logistic regression was used to evaluate the significance of individual factors.

RESULTS

All 163 questionnaires were filled by Chinese female patients (age range 16–87 years and mean age 45.3 years). The history provided by the questionnaires was presented at Table I. Out of all 163 patients, 111 patients (68.1 %) felt a palpable breast lesion. All 111 patients felt one palpable lesion only. The other patients presented with mastalgia (51 patients) and nipple discharge (seven patients). Six patients presented with mastalgia and a palpable breast lesion. Nine patients had previous mastectomy, and therefore a total of 317 breasts were examined. The size of the breasts as reflected by the depth of breast tissue ranged from 2.0 cm to 8.0 cm, (mean 4.71 cm). A total of 173 lesions were detected by either one or both examinations. The size of the lesions ranged from 0.5 mm to 82.0 mm (mean of 14.4 mm ± 11.7 mm). The location of the lesions ranged from 0 cm (just beneath the skin) to 6.0 cm (mean depth of 1.5 cm).

Of all 173 lesions, 27 lesions were carcinoma or carcinoma *in situ,* as confirmed by their biopsies. The other 139 lesions were benign lesions, as confirmed by fine-needle aspiration or core biopsy. Seven cysts had not been aspirated during the first attendance. However, none of these benign lesions or cysts was proven to be malignant in the three years follow-up. Six carcinomas *in situ* with size ranging from 8 mm to 1.5 cm, could not be palpated by the patients. Of all the 146 benign lesions, 102 lesions could be identified by patients. Out of these 102 lesions, the size ranged from 0.5 mm to 82 mm, with the mean size of 13.8mm ± 12.2mm. 65 were fibroadenomata and 37 were cysts.

There were altogether 167 lesions detected by breast self-examinations. 24 lesions could not be identified by imaging. 50 lesions identified by imaging could not be detected by patients themselves. The sensitivity was therefore 71% (95% confidence interval [CI] 64–78) and the positive predictive value of 84% (95% CI 83–92) when

Table I. Background information of all 163 patients.

History	No. (%)	p-value
Age (years)		
< 20	4 (2.5)	0.286
21–30	17 (10.4)	
31–40	38 (23.3)	
41–50	61 (37.4)	
51–60	18 (11.0)	
61–70	11 (6.7)	
71–80	12 (7.4)	
> 80	2 (1.2)	
Menopause		
Yes	55 (33.7)	0.197
No	108 (66.3)	
Mastectomy		
Yes	9 (5.5)	0.005
No	154 (94.5)	
History of breast feeding		
Yes	56 (34.4)	0.07
No	107 (65.6)	
Previous breast lumpectomy		
Yes	28 (17.2)	0.306
No	135 (82.8)	
Previous mammography		
Yes	41 (25.2)	0.822
No	122 (74.8)	
Family history of breast cancer		
Yes	15 (9.2)	0.701
No	148 (90.8)	
History of hormonal replacement		
Yes	12 (7.4)	0.674
No	151 (92.6)	
History of oral contraceptives		
Yes	73 (44.8)	0.369
No	90 (55.2)	

calculations were based on lesions. The sensitivity was 78% (95% CI 71–86), specificity of 64% (95% CI 50–78), positive predictive value of 84% (95% CI 77–91), negative predictive value of 55% (95% CI 41–68), likelihood ratio of 2.17 (95% CI 1.47–3.21) and overall accuracy was 74.2%, when the calculations were based on patients.

When all lesions, benign or malignant, that were identified by the patients were considered, chi-square test showed no association between accuracy in self-detection of breast lesions and age (p = 0.286), menopause (p = 0.197), previous breast surgery (p = 0.306), history of previous mammography (p = 0.822), family history of breast cancer (p = 0.701), hormonal replacement (p = 0.674), contraceptive pills (p = 0.369) and experience of breast feeding (p = 0.07). However, there was an association between mastectomy and accuracy in self-detection of breast lesion (p = 0.005). Malignant lesions were more easily and more accurately detected by the patients (p < 0.005). For the size of the lesion, breast size, breast depth and lesion depth, continuous values were used for analysis. Patients could detect the lesion more accurately when the lesion was larger (p = 0.05). However, there was no definite relationship between the breast size, the lesion depth and the accuracy in detection of breast lesions.

DISCUSSION

Better survival and prognosis can be achieved by early detection of breast cancer. Screening programmes including annual mammograms and clinical breast examinations are therefore recommended for women older than 40 years of age. False-negatives associated with mammography are higher in young dense breasts and therefore women older than 20 years of age are recommended to do monthly breast examinations, and women between 20 and 39 years of age should have a clinical breast examination every three years. Guidelines are modified for women with risk factors, particularly those with a strong family history of breast cancer. Despite all these recommendations, compliance to the screening programme is affected by the availability of resources and the initiatives of the women. Women often present to the physicians when they have concerns about having breast cancer or when there are signs or symptoms. Breast pain is a common presenting problem but mastalgia is rarely associated with breast cancer. It is more commonly related to fibrocystic changes in premenopausal women. Most women seek medical attention when they detect a mass in the breast. Our findings agreed with their observations. Up to 68.1% of our patients present with a self-detected breast lesion. Approximately 90% of all breast masses are caused by benign lesions, usually fibroadenoma, in women in their 20s and 30s, and cysts in women in their 30s and 40s.[6]

Mammography definitely plays an important role in reduction of breast cancer-associated mortality.[7] Rosen et al have showed that out of 3,459 screening mammograms, a total of 74 cancers were detected, out of which ten were non-palpable malignancies.[6] The incidence of non-palpable breast malignancy was similar in our study (6/27 or 22.2%). However, it is well known that there are false-negatives in mammography. With the current recommended screening guidelines, Bancej et al estimated that 30 invasive cancers would be missed for every 100,000 screened.[8] In a study performed in a community setting from 1995 to 1998 as part of the National Breast and Cervical Cancer Early Detection Programme, it was found that 5.1% of malignancies were detected by clinical breast examination in patients over 40 years of age, when these patients had a negative, benign or probably benign mammography findings.[9] Similar findings were also documented by Bancej et al.[8] One population-based analysis, relying on women's recall of the method of breast cancer detection, found that the proportion of breast cancers detected by medical practitioners (9.3%) was lower than

either the proportion of cancers that were self-detected (71.2%) or the proportion identified by mammography (19.6%) among women aged 20–44 years.[10] In our study, up to 77.8% of breast cancers could be detected by the patients themselves; the results were therefore similar to Coates et al's studies.[9] The detectability of breast cancer by breast self-examinations was therefore much higher than the sensitivity of the 54%–59% of detection of breast cancers by medical practitioners.[9,11-12]

The sensitivity of clinical breast examinations depends on a variety of factors, such as patient's age, tumour characteristics, tumour size, ethnicity, body weight, menopausal status, hormone use, density and nodularity of the patient's breast tissue.[13-16] Few studies have studied the physical factors affecting the sensitivity of breast self-examinations. One study assessing the physical factors affecting the palpability of lesion detected by either self-detection or clinical examination showed that only the size of the lesion and the depth of the breast mass would affect the palpability of the lesion.[17] In our study, we found that both tumour nature and the size of the lesion were important factors affecting the palpability of the breast lesion. On the other hand, the breast, size and the depth of the lesion did not affect the palpability of the breast lesion. Age and menopausal state, which might reflect the lumpiness and nodularity of the breast tissue, did not play a significant role either. The accuracy of the palpability of breast lesion, therefore, is as effective in a younger age group with denser breast tissue as in an older age group. Our findings therefore agree with the previous studies that breast self-examinations might be especially effective in younger women who have denser breast tissue and more false-negative mammographies.[18-20] We have used both US and mammographies, and a three-year follow-up to document the presence and nature of the lesions. The accuracy and sensitivity of palpable lesion by self-examination technique reported in this study is therefore reliable.

Concern for one's own health is an important drive for doing breast self-examinations.[21] There are conflicting results as to whether education and instruction would improve the accuracy of breast self-examination.[5,22] In our study, we have found that there is no association between accuracy in self-detection of breast lesion and previous lumpectomy for benign lesion, family history of breast cancer, hormonal therapy, breastfeeding, and use of contraceptive pills. Patients with mastectomy, however, had a much better accuracy in breast self-examination. We can infer from this that concern for one's own health is the most important factor for practising breast self-examination effectively. Patients who underwent mastectomy due to breast cancer are likely to have more concern for recurrence. Other factors, such as previous lumpectomy for benign lesions, previous breastfeeding, hormonal therapy, previous mammography for various reasons, and contraceptive pills, might raise the breast awareness of the patients and were therefore evaluated in this study. Patients with a positive history of the above factors, however, do not show the same concern as the mastectomy group. Patients who had undergone mastectomy might be more exposed to instructions of proper breast self-examination techniques, and therefore were more accurate in self-detection of breast lesions. As the sample size is small (only nine patients with mastectomy), one should interpret the data with care.

It is still controversial whether breast self-examination can reduce mortality.[5-23] One might argue that breast self-examination results in an unnecessary rise in expenses and procedures due to the benign lesions detected. We have shown that breast self-examination had a high sensitivity (71%–78%). Breast self-examination makes women more breast-aware, which in turn may lead to early diagnosis of breast diseases. It might contribute more to the early detection of breast cancer in women under 35–40 years of age, for whom mammography is not recommended. It is also useful in women who do not follow the guidelines for varying reasons. It will be particularly useful in places where resources are limited with no screening programme. Currently, breast self-examination is recommended by the National Breast Cancer Centre in Australia and the American Cancer Society. In conclusion, the overall accuracy of detection of breast lesions by the patient is 71% per lesion and 78% per patient. The factors affecting accuracy in detection of breast lesion include lesion size, nature of lesion and previous history of mastectomy. Patients should be encouraged to practise self breast palpation and seek medical consultation when there is any suspicion.

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