

Breast Cancer in Women Under 40 Years: Preoperative Detection by Mammography

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Abstract

Introduction: This article assesses the diagnostic sensitivity of mammography in the preoperative detection of breast cancer in young women. **Materials and Methods:** We retrospectively reviewed 1010 women with breast carcinoma between January 1996 and September 2002. The patients were identified from pathological reports. Of these, 237 women were below 40 years of age, accounting for 23.5% of all breast cancers. Only 76 of 237 patients had mammograms performed prior to surgery. Seventy-five of the 76 patients also had ultrasonography performed. Histological types were reviewed and the proportions of each type were compared with those found in a consecutive series of 773 breast carcinomas in women above 40 years of age seen during the same period in our hospital. The breast patterns, as seen on mammograms, were classified as follows: fatty, scattered fibroglandular, heterogeneously dense and homogeneously dense. Specific features of a mass, microcalcifications, architectural distortion and asymmetrical density were evaluated. **Results:** Of the 76 patients who had mammograms performed prior to surgery, 81 cancers were found. The patients' age ranged from 25 to 40 years, with a mean of 36.4 years. The breast parenchymal patterns were homogeneously dense in 6.6%, heterogeneously dense in 67.1% and had scattered fibroglandular density in 26.3%. Abnormal mammographical findings were present in 93.8%. The most common mammographical findings were mass in 60% and microcalcifications, with or without associated breast abnormality, in 28.7%. The most frequent tumour (82.7%) was invasive ductal carcinoma, which is not significantly different to those found in older women ($P = 0.895$). Ultrasonography showed solid masses in 73 patients and was negative in the other 2 patients. **Conclusion:** Mammography is a useful imaging technique in providing preoperative detection and diagnosis of breast carcinoma in women below 40 years of age with clinical suspicion of malignancy. Mass and microcalcifications are the most common abnormal mammographical findings and invasive ductal carcinoma is the most common tumour found in our study.

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Introduction

The incidence of breast cancer peaks between the ages of 45 and 55 years.¹ Approximately 7% of breast cancers occur below 40 years of age.²⁻⁴ Early diagnosis and treatment of breast carcinoma are essential for good prognosis. However, diagnosis and treatment are more likely to be delayed in young women due to a low index of suspicion. The value of mammography in screening and diagnosis of breast cancer in women above the age of 40 is well recognised.⁵ The clinical use of mammography in the evaluation of young women with a breast mass has also been questioned because of the low prevalence of cancer and the dense breast parenchymal breast tissue limiting mammographic evaluation.^{4,6-8} However, some studies reported much better mammographical detection of breast cancer in young women due to advances in mammographical

equipment and better reporting by radiologists specialised in breast diseases.⁹⁻¹¹ Apparently contradictory findings in the literature have led us to review our experience of breast carcinoma presenting in women below 40 years of age. We aimed to study whether mammography was sensitive enough to detect breast carcinoma in young women.

Materials and Methods

We defined young women as being 40 years old or younger. We retrospectively reviewed 1010 women diagnosed with breast carcinoma between January 1996 and September 2002 at our institution. The patients were identified from pathologic reports. Of these, 237 women were below 40 years of age, accounting for 23.5% of all breast cancers. Only 76 of 237 patients had mammograms performed prior to surgery and constituted the subjects of

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TABLE I: MAMMOGRAPHICAL FINDINGS IN 80 BREAST TUMOURS

Finding	No. of lesions (%)
Mass	48 (60)
Microcalcifications alone	9 (11.3)
Mass with microcalcifications	11 (13.8)
Architectural distortion with calcifications	1 (1.3)
Asymmetrical density with calcifications	2 (2.5)
Asymmetrical density	4 (5)
Normal mammogram	5 (6.3)

this study. Indications for mammography were evaluated. Mammograms were retrospectively reviewed by 2 radiologists who specialised in breast imaging. These radiologists were aware that each patient had breast carcinoma but were blinded with respect to the location of the tumours and the mammographical reports. The tumours of all patients were staged according to the TNM classification. Histological types were reviewed and the proportions of each type compared with those found in a consecutive series of 773 breast carcinomas in women above 40 years old seen during the same period in our hospital. Mammograms were performed using a dedicated film-screen unit (LoRad MIII; Damburg, Conn, USA). The breast patterns, as seen on mammograms, were classified as follows: fatty, scattered fibroglandular, heterogeneously dense and homogeneously dense. Specific features of: mass, microcalcifications, architectural distortion and asymmetrical density were evaluated. Additional ultrasonography (US) was also performed in all symptomatic patients. We analysed data with descriptive statistics. Chi-square test was used to determine statistical significance.

Results

Eighty-one cancers were found in 76 women in whom preoperative mammograms were performed. The age of the 76 patients ranged from 25 to 40 years, with a mean age of 36.4 years; 23 patients were aged between 25 and 35 years, and the rest were aged between 36 and 40 years. Two patients had previous contralateral breast carcinomas. Three patients had multicentric carcinomas and 2 patients had synchronous bilateral breast carcinomas. One of these 2 cases had unilateral mammogram because the lesion on one side was huge and non-compressible. Therefore, 80 cancers were evaluated on mammograms. Only 1 patient had a familial history of breast carcinoma (sister). The reasons for mammography in these patients included breast mass ($n = 73$), bloody nipple discharge ($n = 1$), searching for occult breast carcinoma in post-excisional biopsy of an invasive ductal carcinoma ($n = 1$) and screening ($n = 1$). Four patients were lactating at the time of diagnosis.

The breast parenchymal patterns were homogeneously dense in 6.6% (5/76), heterogeneously dense in 67.1% (51/

76) and showed scattered fibroglandular density in 26.3% (20/76). Abnormal mammographical findings were detected in 93.8% (75/80). The most common abnormal mammographical finding was mass, which was either circumscribed ($n = 8$) (Fig. 1) or irregular ($n = 40$) (Fig. 2). Of the 8 circumscribed masses, 2 were found to be due to mucinous carcinoma, 3 were malignant phyllodes tumour, 1 was invasive ductal carcinoma, 1 was medullary carcinoma and 1 was non-Hodgkin's lymphoma (NHL). The other findings were microcalcifications alone (Fig. 3), mass with microcalcifications (Fig. 4), architectural distortion with microcalcifications, asymmetrical density with microcalcifications (Fig. 5), asymmetrical density alone (Fig. 6) and normal finding (Table I). Of the 5 patients who had a palpable cancer with normal mammograms, 1 had scattered fibroglandular density (Fig. 7), 3 had a heterogeneously dense breast and 1 had a homogeneously dense breast. US showed solid masses in all 73 patients who presented with breast masses and was negative in the other 2 patients. Comparison of the histological studies with a review of 773 breast carcinomas occurring in patients above 40 years of age is shown in Table II. Most patients had invasive ductal carcinoma. This was not significantly different ($P = 0.895$) between the 2 groups. Inflammatory breast carcinoma was found in 4 patients and 3 of these were in lactation (Fig. 8). There were 2 patients with stage 0, 17 patients with stage I, 47 patients with stage II, 7 patients with stage III, and 3 patients with stage IV disease.

Discussion

The reported incidence of breast carcinoma in young women varies from 0.3% to 25%.¹ Nevertheless, breast carcinoma is the leading cause of cancer mortality in

TABLE II: HISTOLOGICAL TYPES OF CARCINOMA IN WOMEN BELOW 40 YEARS OLD COMPARED TO THOSE ABOVE 40 YEARS OLD

Carcinoma type	<40 years $n = 81$ (%)	>40 years $n = 773$ (%)	<i>P</i> value
Ductal carcinoma <i>in situ</i>	4 (4.9)	24 (3.1)	ns
Invasive ductal carcinoma	67 (82.7)	657 (85)	0.895*
Mucinous carcinoma	4 (4.9)	19 (2.5)	ns
Medullary carcinoma	1 (1.2)	2 (0.3)	ns
Invasive lobular carcinoma	-	4 (0.5)	ns
Invasive papillary carcinoma	-	2 (0.3)	ns
Invasive micropapillary carcinoma	-	1 (0.1)	ns
Tubular carcinoma	-	1 (0.1)	ns
Malignant phyllodes tumour	4 (4.9)	5 (0.6)	ns
Non-Hodgkin's lymphoma	1 (1.2)	1 (0.1)	ns
Unknown precise subtype	-	57 (7.4)	ns

ns: not significant

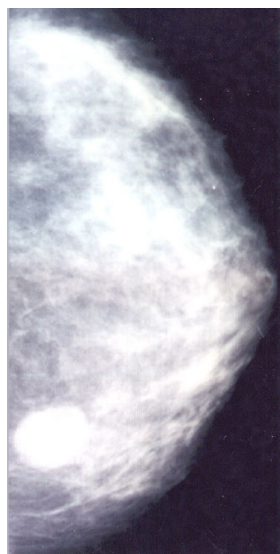


Fig. 1. Mucinous carcinoma in a 40-year-old woman. Left craniocaudal mammogram shows a circumscribed, high-density mass in the inner quadrant.



Fig. 2. Invasive ductal carcinoma in a 37-year-old woman. Right craniocaudal mammogram shows a 1-cm spiculated mass in the inner quadrant (arrow).

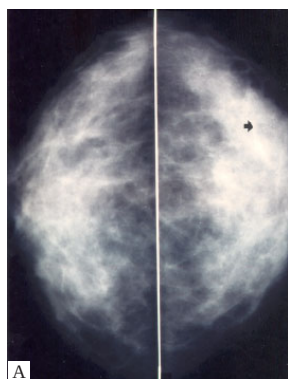


Fig. 5. (A) Bilateral craniocaudal mammograms show heterogeneously dense breasts and a slightly increased density with microcalcifications in the left outer quadrant (arrow). (B) Ultrasonography shows a hypoechoic mass with calcifications.

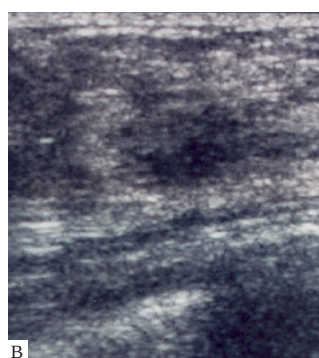


Fig. 7. Negative mammograms in a 40-year-old woman who presented with a palpable mass in the left breast. (A) Bilateral mediolateral oblique mammograms show scattered fibroglandular densities without mass or microcalcification. (B) Ultrasonography of the palpable mass at the left outer quadrant shows an irregular hypoechoic mass.

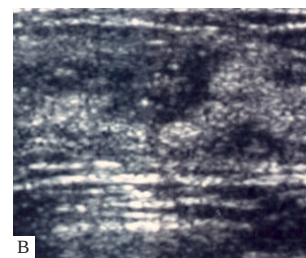
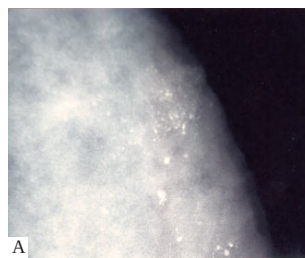


Fig. 3. Invasive ductal carcinoma in a 40-year-old woman who presented with a palpable mass. (A) Left craniocaudal mammogram shows a dense breast with multiple malignant calcifications in the outer quadrant. No mass is seen. (B) Ultrasonography shows an irregular hypoechoic mass with calcifications.



Fig. 4. Left mediolateral oblique mammogram shows an ill-defined mass (arrowheads) with linear microcalcifications (arrow).

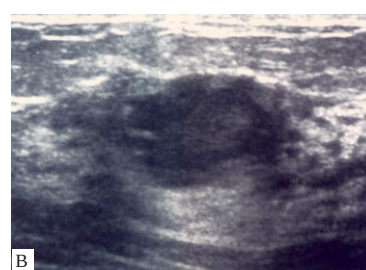
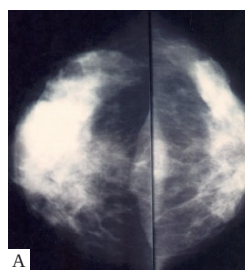


Fig. 6. A 29-year-old woman who presented with a lump in her right breast. (A) Bilateral craniocaudal mammograms show heterogeneously dense breasts with increased density in the outer quadrant of the right breast. (B) Ultrasonography of the right breast shows an irregular solid mass. Histology revealed invasive ductal carcinoma.

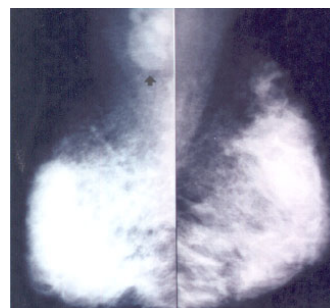


Fig. 8. Inflammatory carcinoma in a 37-year-old woman 4 months post-partum. Bilateral mediolateral oblique mammograms show dense breasts with increased density in the right side and enlarged right axillary nodes (arrow).

women aged 15 to 35 years.² In this study, 23.5% of all breast cancers in our institution were found in women aged 40 years or younger. This may be explained by the relatively large number of young women in our population (270,892 women are aged between 25 and 40 and 129,577 women are aged between 45 and 60).¹² Diagnosis of breast cancer in women below 40 years of age may be delayed because of the large number with benign diseases and an ignorance of the potential for carcinoma development in young women.^{2,7,13,14} Backhouse et al¹⁵ reported a delay in diagnosis of up to 1 year in 12% of these young patients. A delay in diagnosis is more likely to occur in patients who are in pregnancy or lactation due to the multinodular consistency of the breasts. This may cause difficulty in examination. Therefore, breast cancer during pregnancy or lactation is at a more advanced stage than those found in non-pregnancy.¹⁶ In our series, we had 4 cases of inflammatory breast carcinoma and 3 of these were found during lactation.

Mammography has been thought to be less accurate in the diagnosis of breast cancer in young women.^{4,6,7} It is underutilised¹³ due to concern over ionising radiation and an impression that breasts in these women are dense. However, some authors⁹⁻¹¹ have shown that mammography in women below 35 years old with breast carcinoma showed abnormal findings in more than 86%. Mammography was also underutilised in our study because breast masses that are clinically suggestive to be benign lesions are managed directly by the surgeons without undergoing imaging. Therefore, surgeons should be aware of the possibility of breast carcinoma in young women presenting with breast masses and preoperative breast imaging should be performed. The 2 basic breast imaging techniques consist of mammography or US or both. The choice of primary breast imaging in evaluation of women with symptoms is partly based on age. In general, women younger than 35 years should start with an US examination, while women older than 35 years should be examined with mammography as the primary breast imaging modality.¹⁷

The increased breast density may cause obscuration of a soft tissue mass, but not microcalcifications. Ferranti et al¹⁸ reported that microcalcifications were more common in young women than in older women with breast carcinoma. These microcalcifications were associated with the presence of *in situ* lesions. Therefore, microcalcifications seem to be a favourable sign, both in terms of tumour detection and prognosis. Most of our patients had either heterogeneously-dense or homogeneously-dense breasts but we were able to identify abnormal mammograms in 93.8% of patients. All 5 negative mammograms did not show microcalcification. In 1 of these 5 patients, there was scattered fibroglandular breast density, but no mass. However, we did not miss a cancer in these patients because additional US showed

suspicious abnormalities. In our practice, we usually do additional US in all symptomatic patients, especially in young women, regardless of mammographical findings, because we believe that combining both mammography and US has a greater sensitivity than either US alone or mammography alone.^{19,20}

Breast density was not a significant factor in visualisation of the lesions. Though mammography is of value in the diagnosis of clinically suspicious abnormality of the breast and evaluation for occult lesions,²¹ a negative result from mammography cannot exclude carcinoma in the presence of clinically suspicious lesions. Further investigation, either by US or fine needle aspiration biopsy, should be performed.^{4,19,20,22,23} In young women, pathological features of carcinoma are reported to have an increased incidence of medullary carcinoma and ductal carcinoma *in situ* and a decreased incidence of lobular and tubular carcinomas.¹⁴ Most of our patients had invasive ductal carcinoma, which was not significantly different from those found in older women. The number of tumours in other histological subtypes in each group was too small for statistical evaluation. The majority of our patients were referred for mammography because of abnormal physical findings in the breasts, but one patient was referred for the first breast cancer screening. However, we do not suggest routine screening in women below 40 years of age.

In conclusion, breast cancer in women below 40 years of age is not rare. Mammography is underutilised due to an ignorance of the potential for carcinoma evaluation in young women. Mammography is a useful imaging technique in the preoperative detection of breast carcinoma in women below 40 years of age with clinical suspicion of malignancy. Mass and microcalcifications are the most common abnormal mammographical findings, and invasive ductal carcinoma is the most common tumour found in our study.

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