

THE MAMMOGRAPHIC CALCIFICATIONS IN BREAST CANCER

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Objective: This study was performed to exam the relationship between mammographic calcifications and breast cancer. **Methods:** All of the 184 patients with breast diseases underwent mammography before either an open biopsy or a mastectomy. The presence, morphology, and distribution of calcifications visualized on mammograms for breast cancer were compared with the controls who remained cancer free. Statistical comparisons were made by using the χ^2 test. **Results:** Of the 184 patients with breast diaeases, 93 malignant and 91 benign lesions were histologically confirmed. Calcifications were visualized on mammograms in 60 (64%) of 93 breast cancers and 26 (28%) of 91 non breast cancers. The estimated odds ratio (OR) of breast cancer was 4.5 in women with calcifications seen on mammo-grams, compared with those having none ($P < 0.01$). Of the 60 breast carcinomas having mammographic calcifi-cations, 28 (47%) were infiltrating ductal carcinomas. There were only 8 (24%) cases with infiltrating ductal cancers in the group of without calcifications seen on the mammograms ($P < 0.05$). **Conclusion:** Our finding sug-gests that mammographic calcification appears to be a risk factor for breast cancer. The granular and linear cast type calcification provide clues to the presence of breast cancer, especially when the carcinomas without associated masses were seen on mammograms.

Key words: Breast neoplasms, Mammography, Imaging diagnosis

The calcification on mammograms appears sig-

nificant imaging characters in diagnosis of breast cancer. The purpose of this study was to investigate the frequencies and distributions of calcifications in malignant and benign breast diseases respectively, as well as the correlation between mammographic calcifications with pathologic types of the breast carcinomas.

PATIENTS AND METHODS

Between 1994 and 1995, 184 patients had either an open biopsy or a mastectomy which histologically proved the diagnosis of malignant and benign diseases. Preoperative mammograms were available for all of the 184 patients in this study. Mammo-graphy was performed with conventional screen-film technique. The films on craniocaudal, mediolateral oblique of each breast of the women were obtained. Frequently, cone-compression spot films, magnifi-cation films were obtained for the characterized calcified lesions when it was necessary.

All the mammograms were reviewed by an experienced radiologist who had no pathologic information. The appearance of the mammographic calcifications was recorded respectively in the groups of breast cancer and non breast cancer from the mammograms review. The benign and malignant calcifications seen on the mammograms were studied for number, size, shape, spatial arrangement and background tissues in an attempt to simulate their evaluation in a clinical setting. Correlations were sought between mammographic calcifications and

pathologic types of breast cancer. The statistical comparisons were made by using the χ^2 test.

RESULTS

In the study period, 93 patients with the diagnosis of breast cancer and 91 women with the benign diseases underwent mammography. Their age ranged from 35 to 80 years (mean, 49 years). The appearance of mammographic calcifications was essentially divided between breast cancer and non breast cancer (Table 1). Calcifications were evident at baseline in at least one breast in 60 (64%) of 93 cases, and in 26(28%) of 91 controls. The odds ratio (OR) of breast cancer was 4.5 in women with calcifications on mammograms, compared with those having none ($P<0.01$). The 93 patients in the study included 60 patients with calcifications seen on the mammograms. Of these women, 43 (71%) had malignant calcifications. Among those calcified lesions, 58% were granular, 13% were granular with several linear. The distribution of calcifications on mammograms was not significantly different between the groups of breast cancer and non breast cancer.

Table 1. The comparison of mammographic calcifications in breast cancer and non breast cancer

	Breast cancer	Non breast cancer
Calcifications	60	26
Granular	35	6
Linear	8	0
Round	9	10
Variable	8	10
Non calcifications	33	65

The correlation between mammographic calcifications and pathologic types was shown in Table 2. The calcifications were seen more commonly in cases of infiltrating ductal carcinoma than in any other kind of pathologic types of breast cancer. Of the 60 breast carcinomas having mammographic calcifications, 28 (47%) were infiltrating ductal carcinomas. There were only 8 (24%) cases with infiltrating ductal cancers in the group of without calcifications seen on mammograms. The odds ratio (OR) was 2.7 ($P<0.05$).

Table 2. Correlation between mammographic calcifications and pathologic types of breast cancers

Pathologic types	Calcifications	Non calcifications
	No. (%)	No. (%)
Infiltrating ductal carcinoma	28 (47)	8 (24)
Simplex carcinoma	20 (33)	8 (24)
Medullary carcinoma	0	8 (24)
Mucinous carcinoma	0	2 (6)
Others*	12 (20)	7 (22)

*Including infiltrating lobular carcinoma, scirrhous carcinoma, apocrine carcinoma, papillary carcinoma and lipid-secreting carcinoma.

DISCUSSION

In the radiographic studies, a wide variance in the frequency of mammographic calcifications in women with breast cancer has been reported. Dershow et al.¹ have reported calcifications in 98% seen on mammograms. However, Ikeda and Anderson² have showed only 62% of all intraductal cancers characterized by calcification. In our data, 93 cases of mammographically detected breast cancer were reviewed, 64% were presented by calcification. The disparity in the percentage of calcified lesions can be attributed mostly to patient selection, such as the different proportions of symptomatic or palpable of breast cancers in the studies, as well as the different histologic definition of intraductal cancer used in those investigations. Those types of disparity limit the comparisons between the studies in some way. However, in spite of patient selection and the definition of breast cancer applied to those studies were different, the frequency of calcification in women with breast cancer in China was relatively lower than those reported by Dershow and Ikeda, because all of the cases of breast carcinomas, rather than intraductal cancers alone, were included in our investigation. In addition, the proportions of the women aged 49 years or less with breast cancer may be related to the frequency of mammographic calcification.³ Because the younger women were more likely to have dense tissue surrounding the mammographic lesions, which could have obscured a soft-tissue abnormality as well as the fine calcified lesions in breast parenchyma.

Calcifications within the breast parenchyma have always been important because they are commonly

found histologically in relation breast cancer. Tomas reported that the estimated relative risk (RR) of breast cancer was 1.68 in women with calcifications compared with those having none, and some types of mammographic calcifications appear to be independent risk factors for breast cancer.⁴ If these results are confirmed by other investigators, mammographic calcifications could serve as an additional indicator of women at high risk for breast cancer who may benefit from intensified follow-up.

Before the widespread use of mammographic screening, intraductal cancer was considered a relatively uncommon lesion that accounted for 5% breast carcinoma,⁵ but it is encountered increasingly in asymptomatic women undergoing mammographic screening, where 15–25% of screening-detected cancers are ductal carcinoma in situ (DCIS).⁶ The discovery of DCIS is largely the responsibility of the radiologist. It is found that 40%–50% of breast biopsies performed for nonpalpable cancers are done on the basis of calcifications alone.⁶ Although there is a wide spectrum of mammographic appearances of intraductal cancer, the presence of calcified lesions on mammograms was usually associated with breast carcinomas. The granular or linear cast type calcification has a predictive value for malignant tumor.³ Knowledge and experience with identification of

mammographic calcifications will be important in detection of breast cancer, especially when the carcinomas without associated masses were seen on mammograms.

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