

Interval Breast Cancers: Mammographic Features in Preceding Mammography

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INTRODUCTION

Interval breast cancer is defined as a carcinoma occurring within two years after a negative screening (1). However, when we review the latest screening mammograms retrospectively, abnormalities are occasionally found. If abnormalities were seen on the most recent screening mammograms retrospectively, they would be classified as misinterpreted or a missed carcinoma. Misinterpreted or missed carcinomas cause iatrogenic delay in diagnosis and treatment. However, frequently it is difficult to call the findings abnormal when they are subtle. In this article, we demonstrate various mammographic features retrospectively detected on mammograms in misinterpreted or missed breast cancers, try to find and classify the reasons, as well as cases of true interval cancers.

CASE

We found 16 interval cancers from 1998 to 2002. The histopathologic types included 14 ductal cancers and two lobular cancers. The mean age at the time of diagnosis was 51.6 years. The mean interval between screening and the time of diagnosis was 14.8 months. The final pathologic size of the tumors were = 10mm in four,

1120mm in seven, 21-30mm in two, and = 31mm in three. All 16 cases presented as masses on mammogram at the time of diagnosis. Five masses were associated with architectural distortion, and two were associated with microcalcifications. Nine cases were missed or misinterpreted cancers and seven cases were true interval cancers. The abnormalities on the preceding screening mammography of missed or misinterpreted cancers were mass (N=7), mass with architectural distortion (N=1), and architectural distortion only (N=1).

True interval cancer

Cases without pathologic changes on the preceding screening mammograms are called as true interval carcinoma (2) (Fig. 1), because they are not present at the initial screening but develop and become sufficiently symptomatic to be detected during the interval between the first and subsequent screening (3). The absence of abnormal findings on screening mammograms does not prove that cancer tissue is absent, particularly in the presence of dense breast parenchyma (Fig. 2, 3). Common occurrence of dense breast tissue frequently associated with mammographically occult lesions combined with the absence of previous mammographic examinations in younger women attending their first invitation influences the sensitivity of screening in this particular group (4). In one study there was no statistically significant difference in the parenchymal patterns of the various mammographic categories of interval cancer, although all of the mammographically occult tumors occurred in dense breasts (5). However, Mendelson et al.

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(6) reported that mammographic density is a strong risk factor for breast cancer detected in the interval after a negative mammogram. Women with extremely dense breasts have a six - fold greater risk of developing interval cancer independent of age, menopausal status, use of hormone replacement therapy or body mass index (6).

Occasionally, a true interval cancer has developed within a nonspecific density (Fig. 4). The reported proportions of true interval cancers are 49-66% (2 - 4). The subset of true interval cancers appears to be comprised of more rapidly growing tumors. Associations have been reported between interval cancers and measures of tumor aggressiveness, such as nodal metastasis and high histologic grade (1).

Missed or misinterpreted cancer.

Cancer may be detected in the interval after a nega-

tive mammogram because the readers have missed subtle or minimal signs on the screening mammogram. Tumors can be masked by characteristics of the breast or the tumor or because rapid tumor growth leads to cancers that truly do arise in the interval after screening (7). One way by which mammographic density certainly increases the risk of interval cancer is by obscuring the tumor. Partial masking also contributes to readers' missing the signs of malignancy (7). One possible mechanism that could link an increase in breast stroma to tumor aggressiveness, is the action of growth factors produced in stroma (7).

Some mammographically typical tumors are overlooked at screening. Other carcinomas show detectable but only of nonspecific mammographic signs of malignancy. Those are missed or misinterpreted cancer. Distinct tumors can develop within an area of asymmetry or density (Fig 5 - 7), architectural distortion (Fig 8)

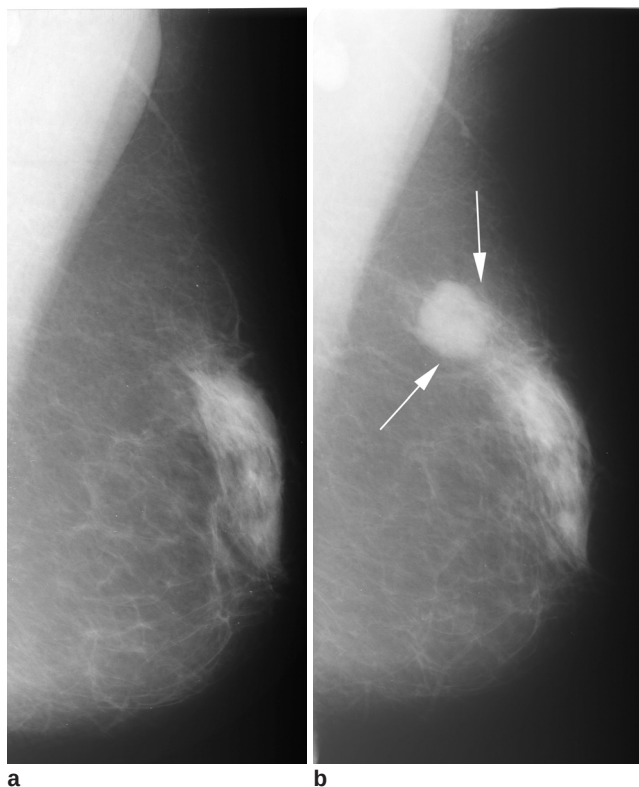


Fig. 1. Mediolateraloblique(MLO) mammograms of the left in a 47-year-old woman demonstrate a true interval cancer.
a. Screening mammogram shows no abnormality.
b. Mammogram obtained 16 months later shows a well -defined high -density nodule (arrows) with ipsilateral axillary lymph node enlargement. The nodule was confirmed as invasive ductal cancer (long diameter:2.8cm). Breast -conserving surgery was performed.

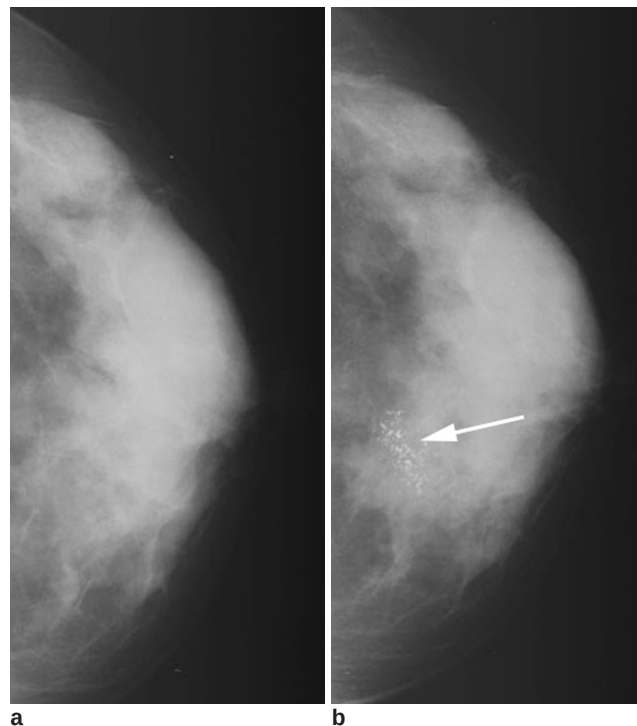


Fig. 2. Left craniocaudal (CC) mammograms in a 40-year-old woman demonstrate a true interval cancer.
a. Screening mammogram shows diffuse dense breast without abnormalities.
b. An ill-defined irregular high -density with pleomorphic microcalcifications (arrows) in the inner portion of the left breast was confirmed as invasive ductal cancer (long diameter:2cm). Mastectomy was performed.

or density with architectural distortion. In one study, the most common abnormality in latest screening mammography was an asymmetric density or a developing opacity (2) that was either not recognized or misinterpreted as benign (2). Burrell et al reported that the most common missed abnormality is an architectural distortion (in nine of 20 cases (45%)) (5). Past studies have found that 25% - 50% of interval cancers were in fact visible on the screening mammogram in retrospect (1, 2, 8).

CONCLUSION

Detection of interval cancers is important because they contribute significantly to mortality in the screened population. Cancers are misinterpreted depend mainly on the skill of the team and occasionally because of misinterpretation of the mammograms (9). Comparing true interval cancers to overlooked or misinterpreted tumors is of special interest to all radiologists involved in mammographic screening. Understanding the appearance of various abnormalities

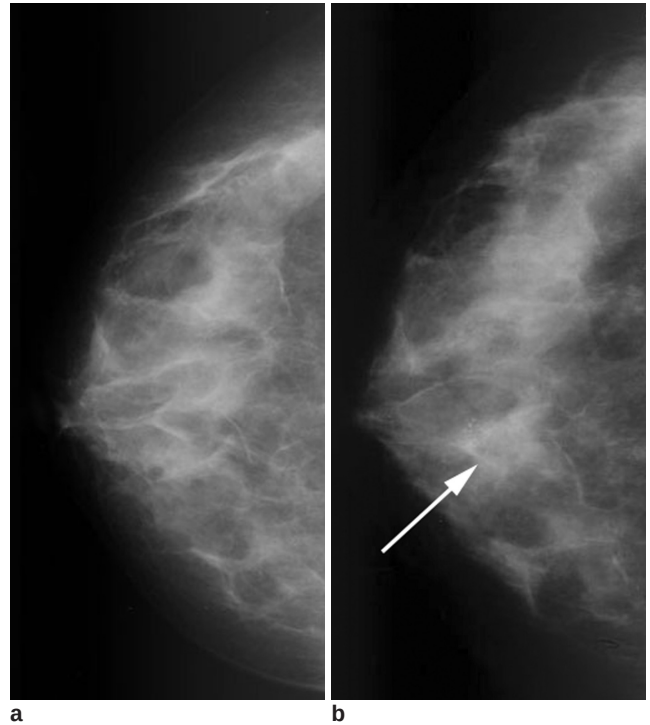


Fig. 4. Right CC mammograms in a 54-year-old woman demonstrate a true interval cancer.

a. Screening mammogram shows no abnormality.

b. An ill-defined irregular high-density mass (arrows) in the medial aspect of the right breast on 19-month follow up mammogram was confirmed as invasive ductal cancer (long diameter:3 cm). Mastectomy was performed.

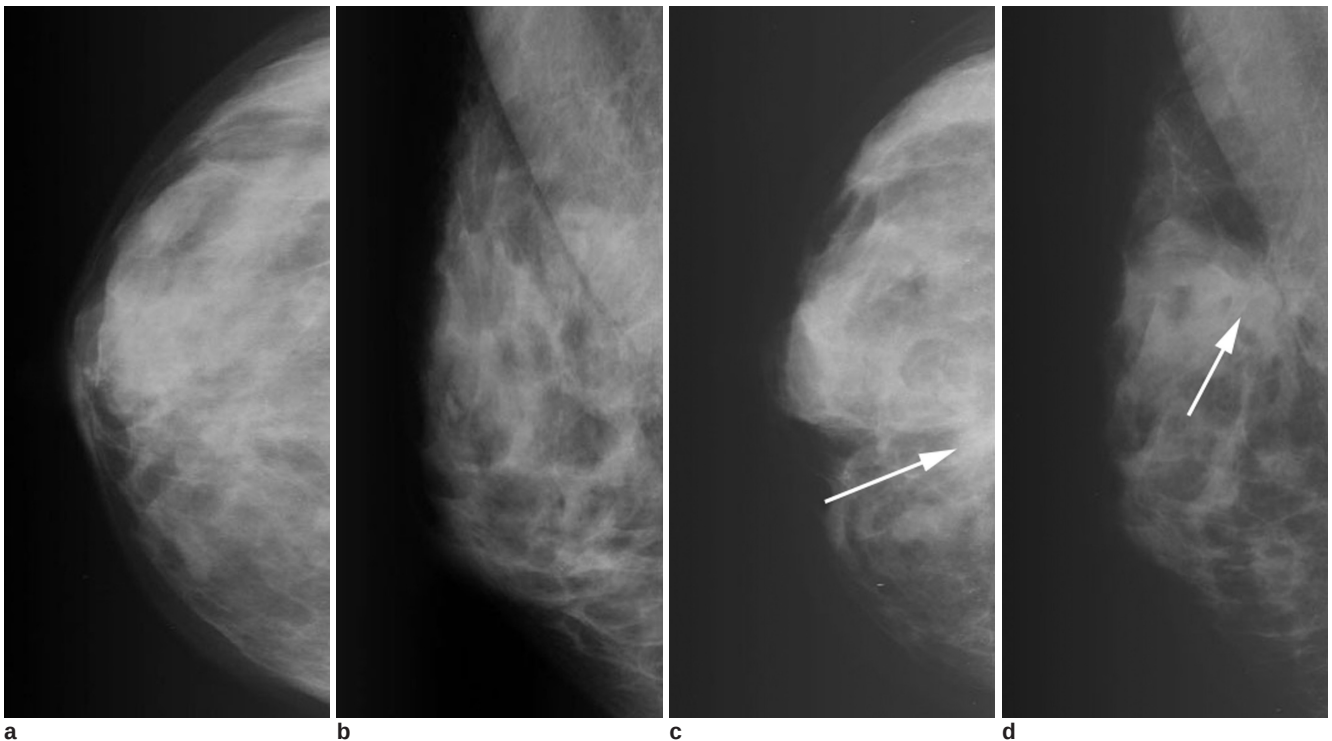


Fig. 3. Right breast mammograms in a 37-year-old woman demonstrate a true interval cancer.

a, b. Screening mammograms show a heterogeneously dense breast parenchyma without focal abnormalities.

c, d. An ill-defined irregular high-density mass (arrows) with architectural distortion in the 12 o'clock area of the right breast on 26-month follow up was confirmed as invasive lobular carcinoma (long diameter:3.8 cm). Mastectomy was performed.

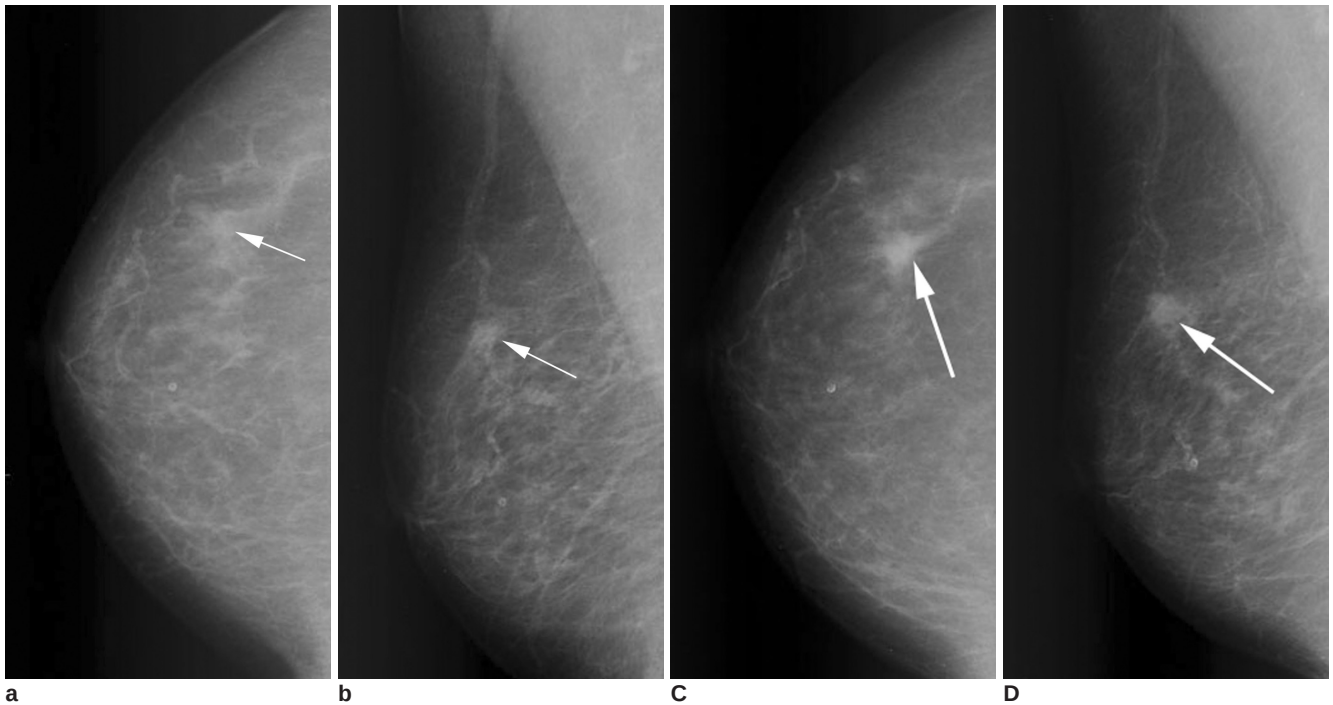


Fig. 5. Right breast mammograms in a 77-year-old woman demonstrate a missed or misinterpreted cancer.

a, b. Screening mammograms retrospectively show a tiny lesion (arrows) in the upper outer quadrant of the right breast. However, this was not interpreted as abnormal.

c, d. Mammograms obtained 23 months later show an 1.3cm, ill-defined, irregular, high-density mass (arrows) that has developed at the same site. The mass was confirmed as an invasive ductal cancer (long diameter: 1.3 cm). Mastectomy was performed.



Fig. 6. Left MLO mammograms in a 55-year-old woman demonstrate a missed or misinterpreted cancer.

a. Screening mammogram retrospectively shows a tiny lesion (arrow) in the upper portion of the left breast. However, this was not interpreted as abnormal.

b. Mammogram obtained 14 months later shows an ill-defined irregular high-density mass (arrows) that has developed at the same site. The mass was confirmed as invasive lobular carcinoma (long diameter: 0.8 cm). Breast conserving surgery was performed.

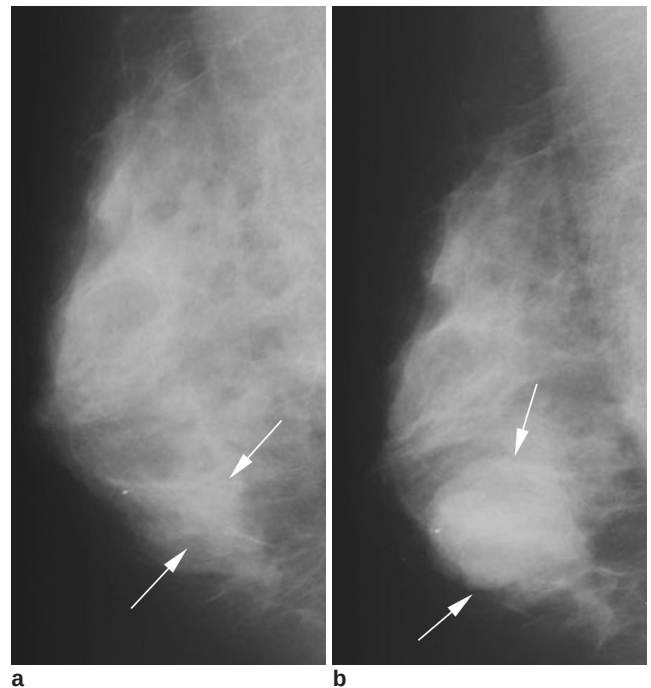


Fig. 7. Right MLO mammograms in a 47-year-old woman demonstrate a missed or misinterpreted cancer.

a. Screening mammogram retrospectively shows a small iso-dense mass (arrows) in the lower portion of the right breast. This was not detected.

b. Mammogram obtained eight months later when the woman presented with a palpable cancer, shows an obvious mass (arrows). The mass was confirmed as invasive ductal cancer (long diameter: 2.9 cm). Mastectomy was performed.

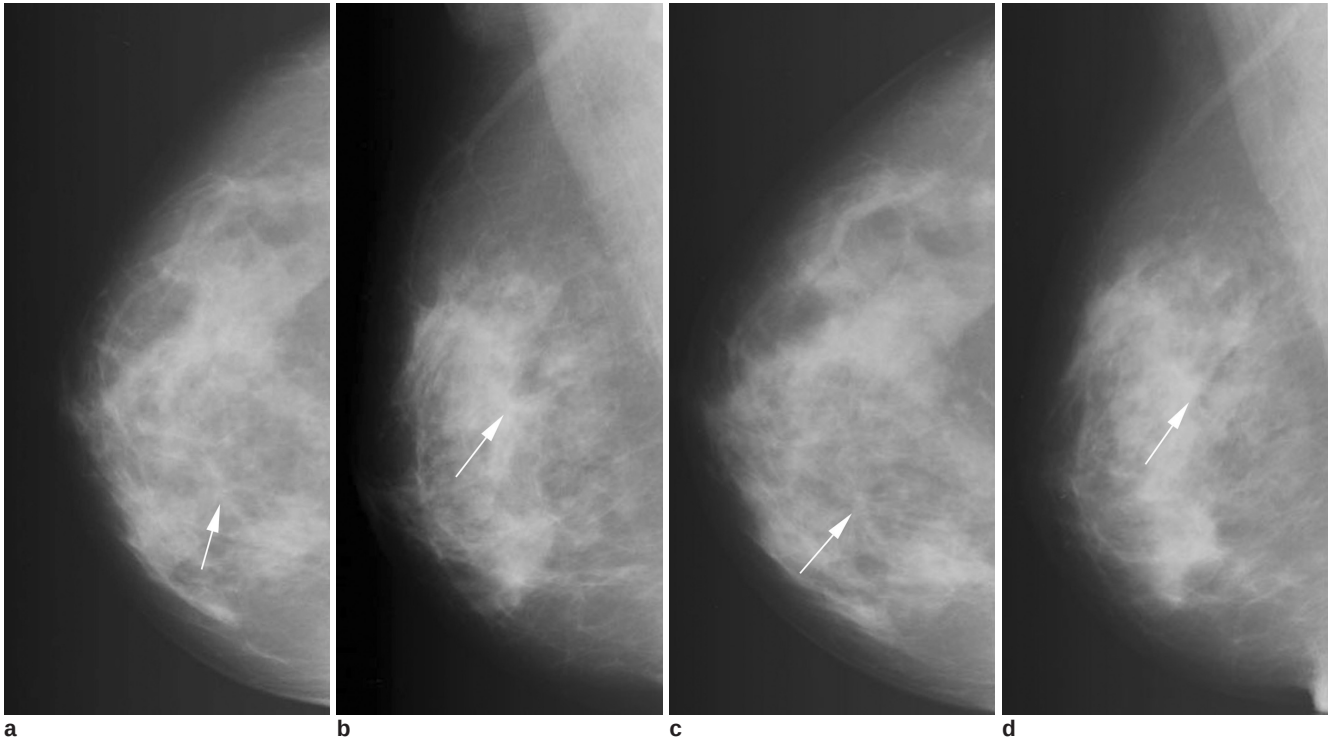


Fig. 8. Right breast mammograms in a 56-year-old woman demonstrate a missed or misinterpreted cancer.

a, b. Screening mammograms retrospectively show an architectural distortion (arrows) in the upper inner quadrant of the right breast. This was not detected.

c, d. Mammograms obtained 14 months later show an obvious architectural distortion (arrows). The lesion was confirmed as an invasive ductal cancer (long diameter:0.9 cm). Mastectomy was performed.

as they appear in the latest screening mammography of interval breast cancer is helpful to reduce the number of the misinterpreted or missed carcinomas.

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