A Review of Breast Cancer Undetectable by Ultrasonography in a Screening Setting

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Summary. In 89 breast cancer lesions found during clinical breast cancer screening with combined usage of mammography (MMG) and ultrasonography (US) between February 1995 and August 2002, we found 13 cases were negative for US detection. In this study, we reexamined those cases of breast cancer undetectable by breast US. In the 12 US-negative lesions, a secondary extended examination performed using US showed 7 lesions were positive for detection; the remaining 5 lesions were still negative for US examination. In summary, of the 89 breast cancer lesions, US failed to detect 10 (11.2%) during clinical breast cancer screening.

Key words. Breast cancer screening, Breast ultrasonography

Introduction

We have previously reported the effectiveness of breast cancer screening by the combined usage of ultrasonography (US) and mammography (MMG) [1]. In this Chapter, to improve our screening technique of breast cancer we reviewed the cases of breast cancer with negative findings on ultrasonographic study.

Materials and Methods

In the period from February 1995 to August 2002, we detected 89 cases of breast cancer by a combination of US and MMG at our institute of health examination service. In those cases, 13 were undetectable by US screening. We tried further US detection by the full view of US with reference to the MMG findings. US examination was performed either by SSD-650CL or SSD-2000 with a 10-MHz mechanical sector probe (Aloka) or SSA-250A with an annular array probe (Toshiba). MMG were carried out with a mediolateral oblique view (MLO) by either Senograph 500T or 500TS (GE-CGR).

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Table 1. Result of reexamination by ultrasonography (US) for the 12 undetectable cases in the first US screening examination

Case	Age (years)	Stage	MMG	Histology	US (closer examination)
1	47	0	C	DCIS	Negative
2	48	0	C	DCIS	Negative
3	54	0	C	DCIS	Negative
4	67	I	C	IDC, papillotubular carcinoma	Negative
5	42	I	C	IDC, papillotubular carcinoma	Negative
6	50	0	C	DCIS	SE spots
7	54	0	C	DCIS	Hypoechoic area
8	58	0	C	DCIS	SE spots
9	66	I	C	Unknown	SE spots
10	35	I	C	IDC, papillotubular carcinoma	Hypoechoic area, SE spots
11	44	I	C	IDC, papillotubular carcinoma	Mass, SE spots
12	54	IIA	M	IDC, papillotubular carcinoma	Mass
13	45	IIIA	D	IDC, papillotubular carcinoma	No examination

C, microcalcification; M, mass; D, architectural distortion; DCIS, ductal carcinoma in situ; IDC, invasive ductal carcinoma; SE, strong echo

Results

Results of reexamination by US on the 13 US-undetectable lesions that had been shown positive by MMG are summarized in Table 1. Case 13 was not available for US reexamination. Further investigation by US was carried out in 12 of US-undetectable cases by a detailed closer method of examination. Five cases (cases 1–5) were still undetectable by the repeated US trial, but another 7 cases (cases 6–12) showed some evidences of abnormality. In cases 1 to 5, histology showed noninvasive ductal carcinoma or partially invasive ductal carcinoma papillotubular carcinoma. In 5 of those 7 cases (cases 6–10), we observed some strong echo spots in the area of the MMG-detected lesion. The 5 lesions showed similar histological findings: they could be delineated with US but required an extended examination after imaging microcalcifications using MMG. Case 11 and 12 were invasive ductal carcinomas, which could be detected as mass lesions by closer US reexamination (Figs. 1, 2).

Discussion

We have been using a combination of MMG and US in breast cancer screening since 1995. We have reported that in human dry dock examination, where high levels of accuracy are sought, a combined usage of MMG and US is advantageous [1]. In this study, we analyzed undetectable cancer cases using US and investigated the limits of cancer detection ability at the time of screening examination using the US examination method.

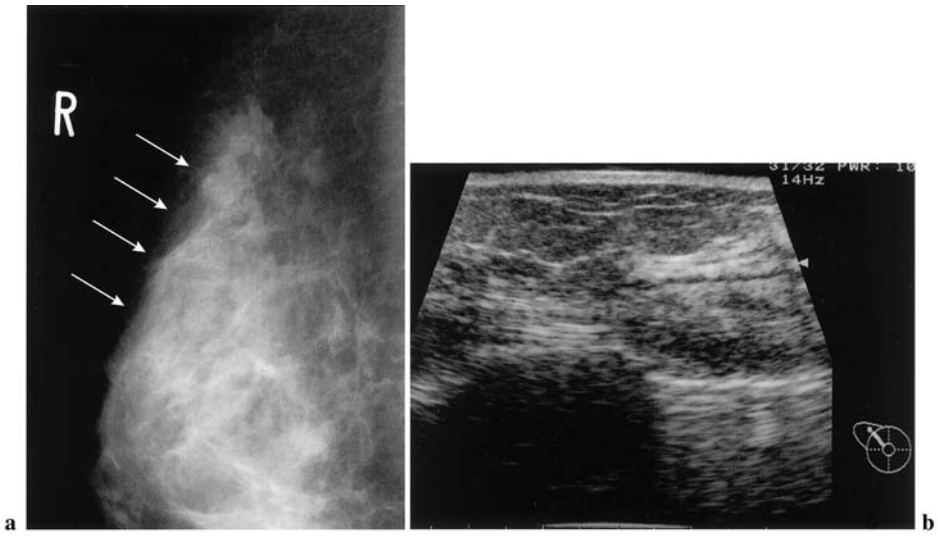

FIG. 1. Case 11. As we had detected microcalcification (*arrows* in **a**) by screening mammography (MMG), the case was recalled for closer examination. Multiple cysts in both mammary glands had been shown by screening US. On closer US examination, we were able to detect strong echo spots in dilated ducts and a mass lesion. We should be more careful in scanning around the nipple because the duct ectasia was overlooked in the multiple cysts, which suggesed the diagnosis of mastopathy. **a** Screening MMG. **b** Closer US examination

We investigated 12 lesions undetectable by US, with the exception of 1 case, which was unavailable for US reexamination. The 5 lesions were still undetectable during the secondary examination, and the remaining 5 lesions were, through diligent scanning with a probe, finally detected by high-frequency wave echoes of calcified lesions. These 10 lesions, which were detected as a microcalcification image by MMG, were cases of noninvasive ductal carcinoma or partially invasive ductal carcinama papillotublar carcinoma. It is thought that detection was difficult at the time of the first examination by US. Consequently, 10 lesions (11.2%) of the 89 cancer lesions discovered were difficult to detect using US. The limit of detection ability by US was about 90%. In the remaining 2 cases, however, some mass lesions were detectable by closer US examination. We looked for the reasons of this oversight. In 1 case, the mass was isoechoic to the fat tissue and located on the edge of the mammary ground, which made it difficult to detect. Metastatic axillary gland swelling also existed, however, suggesting we had a chance to detect it in the screening setting. Another case showed mastopathy with multiple cysts but also showed the duct ectasia, suggesting a chance to detect the mass with careful scanning around the nipple.

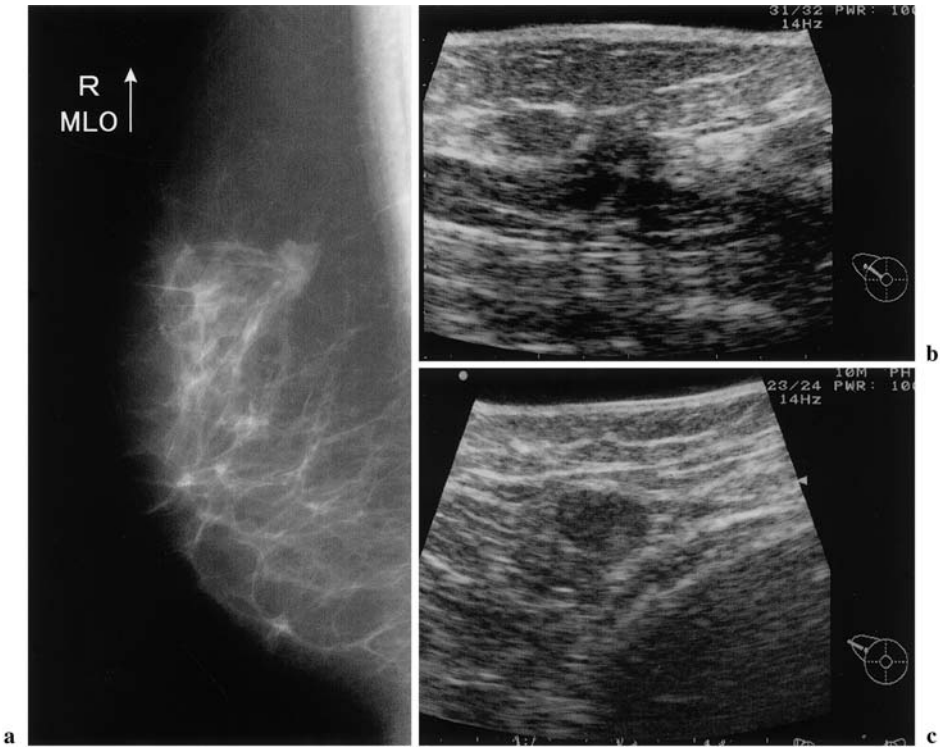

Fig. 2. Case 12. As we had detected a mass lesion by screening MMG, the case was recalled for closer examination. Reexamination revealed a mass in addition to a suggestive axillary gland swelling. The oversight might have occurred because the mass was isoechoic to the fat tissue and located on the edge of the mammary gland. However, we missed the chance to detect it because there was an axillary gland swelling. **a** Expansion photography in closer examination MMG. **b** Closer US examination (mass lesion). **c** Closer US examination (axillary gland swelling). *MLO*, mediolateral oblique view

Conclusions

With US, about 10% of breast cancer cases could not be detected. We should keep in mind the limitations of using only US in the screening of breast cancer. A continued effort is being made to improve our techniques of early diagnosis of breast cancer.

Reference

1. Nasu S, Yamasaki M, Tojo M, et al (2002) Efficacy of ultrasonography for breast cancer screening. Health Eval Promotion 29:804–805