A Study of Breast Cancer Undetectable by Mammography or Ultrasonography

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ABSTRACT

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 20 cases were negative for MMG and 13 were negative for US detection. In this study we reexamined those cases of breast cancer undetectable either by MMG or breast US. The 11 of the 20 MMG negative cases, lesions were still undetectable by secondary extended examination using MMG, however, we found 9 lesions were positive for MMG by refined technique of delineation. 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 it failed to detect 14 lesions (15.7%) by MMG, and 10 lesions (11.5%) by US in a course of clinical breast cancer screening.

Key Words Breast Cancer Screening; Mammography; Breast Ultrasonography

INTRODUCTION

We have previously reported effectiveness of breast cancer screening by combination usage of ultrasonography (US) and mammography (MMG).

MATERIALS AND METHODS

In a series of 89 cases of breast cancer detected by a combination usage of breast ultrasonography and mammography during a period of February 1995 to August 2002, 20 lesions were undetectable either by US or MMG. Age group distribution of the 89 cases were as follows; Four cases were age between 30 to 39, 47 were age 40-49, 27 were age 50-59, and 11 cases were age 60-69.

In the screening examination of our health check-up, MMG was carried out medio-lateral oblique view either by Senograph 500T or 500TS (GE-CGR) and US examination was performed either by SSD-650CL or SSD-2000 with a 10 MHz probe (Aloka) or SSA-250A with an annular array probe (Toshiba). The secondary examination was performed with reexamination of MMG and US in the out-patients specializing in breast diseases.

RESULTS

Frequency and stage of undetectable cancer lesions by MMG or US at screening setting

The cancer stage and histological findings of 20 cancer lesions, which have been undetectable, by MMG at the first screening examination is listed in Table 1. The undetectable cancer lesions by US screening are shown in Table 2.

The age distribution of those undetectable cases is illustrated in

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<th>Table 1</th>
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* DCIS: ductal carcinoma in situ

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* C: microcalcification M: mass D: Architectural distortion
** DCIS: ductal carcinoma in situ
*** SEspot: strong echo spot
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Fig. 1 The frequency of cancer lesions undetectable by MMG or US 
(n= ) : Numbers in parenthesis shows total number of cases in 
each age group.

Fig. 2 The stage of cancer lesions undetectable by MMG or US.

Fig. 1. The number of lesions undetectable by MMG was 1 for 30 
year-olds (25.0%); 10 for 40 year-olds (21.3%); 7 for 50 year-olds 
(25.9%); and 2 for 60 year-olds (18.2%). The number of lesions 
undetectable by US was 1 for 30 year-olds (25.0%); 5 for 40 year-
olds (10.6%); 5 for 50 year-olds (18.5%); and 2 for 60 year-olds 
(18.2%).

The stages of lesions undetectable using MMG or US are dis-
played in Fig. 2. Using MMG there was 1 undetectable lesion in 
Stage 0 (5.0%); 15 lesions in Stage I (75.0%); 3 lesions in Stage 
IIA (15.0%); and 1 lesion in Stage IIB (5.0%). By US, with the 
exception of one indeterminate stage in 0 and I, the number of 
undetectable cancers in stage classification was 6 in Stage 0 
(46.1%); 5 in Stage I (38.5%); 1 in Stage IIA (7.7%); and 1 in 
Stage IIIA (7.7%).

Reexamination of MMG undetectable lesion

A summary of further extended MMG study of the 20 lesions 
undetectable at time of the first examination by MMG but detected 
by US is shown in Table 2. Case 13 were not available for US reexamination. In 
case 1 to 5, lesions were not delineated even by the reexamination 
by US. The 5 lesions between case 6 and 10 were able to be deline- 
eated with US, but required an extended examination after imag-
ing microcalcifications using MMG. Case 11 and 12 were inva-
sive carcinomas detected as a mass lesion by US during a reexami-
nation.

DISCUSSION

We have been using a combination of MMG and US in breast 
cancer screening since 1995. At this time, cancer detection rates 
by US are a bit higher than by MMG. We have reported that in 
human dry dock examination, where the high levels of accuracy 
are sought, a combined usage of MMG and US is advantageous[11]. In 
this study we analyzed undetectable cancer cases using MMG 
or US, and investigated the limits of cancer detection ability at the 
time of screening examination using each examination method.

The frequency of undetectable cancer lesions using MMG and 
US were 22.5% and 14.6%, respectively. Many of the cases, espe-
cially those in their 40s, showed higher rates of undetection by 
MMG (21.3%) than with US (10.6%). In terms of stages of unde-
tected lesions, about 80% were in early stage such as Stage 0 or 
Stage I. By US, non-invasive lesions in Stage 0 were half of the 
total of undetectable cancer lesions.

Next we examined the causes why the lesions were or were not 
detectable during secondary extended examinations and were not 
detectable at the time of the first examination. It was thought that 
for the 20 lesions undetected by MMG, detection by MMG would 
be difficult for the 11 lesions not delineated with MMG even dur-
ing extended secondary examination and for the 3 lesions delineat-
ed only using spot photography. Accordingly, there were 14 
lesions considered difficult to detect using MMG at the time of the 
screening examination. This was 15.7% of the total number of 89 
cancer lesions detected. In other words, the limit of detection abil-
ity using MMG for breast cancer was about 84%. The age compo-
sition for these 14 lesions was relatively high for younger subjects: 
1 case in the 30s and 8 cases in the 40s. There were also 4 lesions 
in Stage II of cancer. We should try to raise the accuracy of clin-
ical breast examination in breast cancer screening by using MMG 
in conjunction with clinical breast examination.

We investigated 12 lesions undetectable by US, with the excep-
tion 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 high frequency wave echoes of calcified 
lesions. These 10 lesions, which were detected as a microcalcifi-
cation image by MMG, were cases of noninvasive ductal carcino-
ma or partially invasive papillotubular 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 detec-
tion ability by US was about 89%. In the future we must investi-
gate accuracy standards in breast cancer examinations using US 
alone where cases are detected in human dry dock.
CONCLUSION

With MMG, about 16% of breast cancer cases were unable to detect, while with US, the rate was about 11%. We should keep in mind the limitations of using only US or only MMG in the screening of breast cancer. Accordingly we recommend the combined usage of MMG and US for a breast cancer screening.

REFERENCE