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Comparison of Conventional 2D CC (Cranio-Caudal) + MLO (Medio-Lateral Oblique) Bi-Directional Photography and 2D-MLO + DBT-MLO (Digital Breast Tomosynthesis) in Mammography Examination

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Abstract

***Introduction:** Mammography (MMG) is an excellent examination for breast cancer detection and is widely used in both screening and clinical practice. However, the breast thickness and background the concentration of the mammary gland is large among individuals, and the mammary gland and cancer may overlap and it may not be possible to point out a lesion. In recent years, digital breast tomosynthesis (hereinafter referred to as DBT) has been introduced to solve these problems, and its usefulness has been reported in clinical practice. Therefore, in anticipation of a higher cancer detection rate etc., we compared the conventional 2D CC + MLO 2-way MMG examination with 2DMLO + DBTMLO 2-way MMG examination.*

***Materials and Methods:** The combination of 2D CC + MLO and 2DMLO + DBTMLO was read for 95 cases of breast cancer taking 2D CC and MLO and DBT MLO from May 2016 to October 2017. It was judged that the category 3 or more required detailed examination, cancer detection, and cancer detection rates were compared. Subjects were 28 to 87 years of age (median: 55 years), breast composition: high concentration 15.8% (15 cases), heterogeneous high concentration 47.4% (45 cases), mammary gland 28.4% (27 cases), Fatty was 8.4% (8 cases).*

***Results:** The cancer detection rate was 87% for the 2D CC + MLO combination and 94% for the 2DMLO + DBTMLO combination in 95 cases of breast cancer. The interpretation time was 95 minutes for the 2D CC + MLO combination and 110 minutes for the 2DMLO + DBTMLO combination.The breast cancer detected only by the combination of 2D CC + MLO was scattered in 1 case and was classified as Category 3 by FAD. Breast cancer detected only by the combination of 2DMLO + DBTMLO: 8 cases with uneven distribution of breast composition, 3 cases with scattered mammary gland, 3 cases with 5 cases with disordered construction, Category 4 with 3 cases with FAD was.*

***Conclusion:** Both 2D CC + MLO combination and 2DMLO + DBTMLO combination are considered useful for screening MMG examination. In particular, we would like to consider the introduction to medical examinations for the addition of MMG in DBT, but the issue of the amount of image information, the problem of exposure to radiation, the direction of imaging, the establishment of interpretation methods etc. are future issues.*

Keywords: *Mammography, Breast cancer, Digital Breast Tomosynthesis, Radiology*

Introduction

With the advent of Full field digital mammography (FFDM), digitization proceeds rapidly even in mammary gland X-ray examination, and digital breast tomosynthesis (DBT) mammary tomosynthesis examination has attracted attention as a new diagnostic imaging method.

Because DBT provides tomographic images with less mammary gland overlap, clinical usefulness has been reported for high density mammary glands that are difficult to delineate using conventional mammography.In this study, we examined whether mammography screening using tomosynthesis is useful.

Materials and Methods

The combination of 2D CC + MLO and 2DMLO + DBTMLO was read for 95 cases of breast cancer taking 2D CC and MLO and DBT MLO from May 2016 to October 2017. It was judged that the category 3 or more required detailed examination, cancer detection, and cancer detection rates were compared. The patients were 28 to 87 years of age (median: 55 years), breast composition: high concentration 15.8% (15 cases), heterogeneous high concentration 47.4% (45 cases), mammary gland 28.4% (27 cases), Fatty was 8.4% (8 cases).

Results

The cancer detection rate was 87% for the 2D CC + MLO combination and 94% for the 2DMLO + DBTMLO combination in 95 cases of breast cancer. The interpretation time was 95 minutes for the 2D CC + MLO combination and 110 minutes for the 2DMLO + DBTMLO combination.

The breast cancer detected only by the combination of 2D CC + MLO was scattered in 1 case and was classified as Category 3 by FAD(Figure 1). Breast cancer detected only by the combination of 2DMLO + DBTMLO: 8 cases without distribution of breast composition, 3 cases with scattered mammary gland (Figure 2), 3 cases with 5 cases with disordered construction, Category 4 with 3 cases with FAD was (Figure 3).

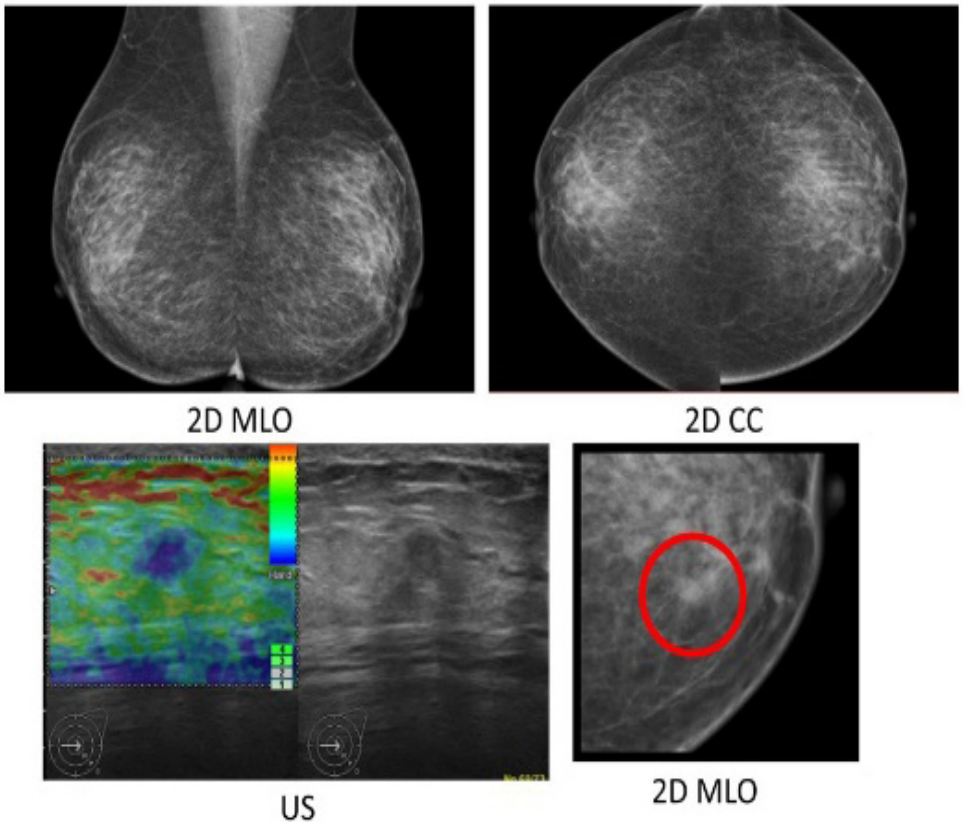

Figure 1. *The abnormal was found only 2D image (red circle) Category 3*

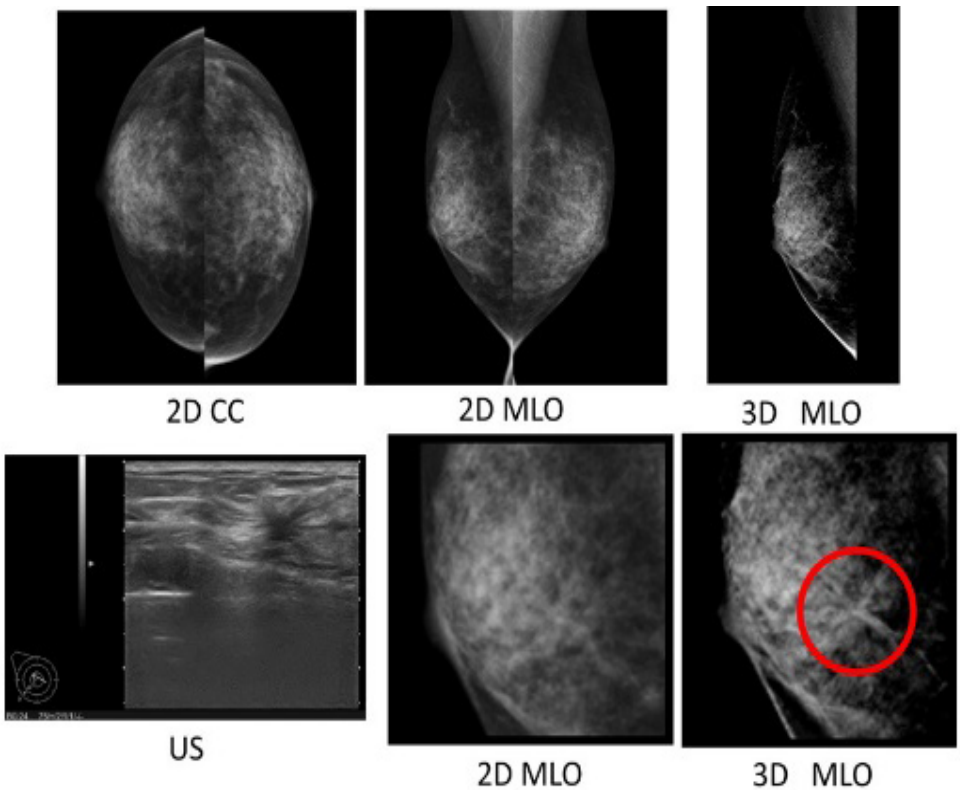

Figure 2. *The abnormal was found only 3D image (red circle) Category 4*

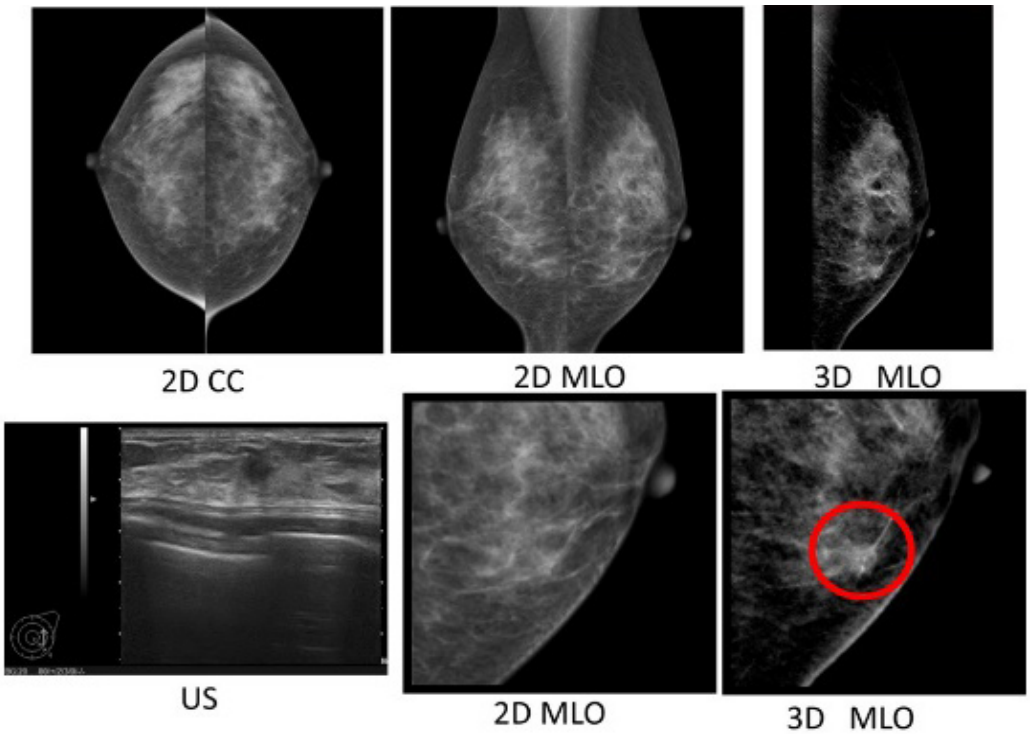

Figure 3. *The abnormal was found only 3D image (red circle) Category 3*

Abbreviations: 2D; 2-dimentional, 3D; 3-dimentional (tomosynthesis), MLD; medio-lateral oblique, CC; craniocaudal US; ultrasound,

Discussion

Regarding the mortality reduction effect, the history of tomosynthesis introduction has been short, and there are no reports of long-term follow-up observation results. In addition, there were no reports that examined tomosynthesis exposure in high density breasts. The studies for which sensitivity is indicated are reports of use in the diagnosis of tomosynthesis including secondary examination of screening. In screening, it is pointed out that cancer detection rates rise in Western studies, but because follow-up data are insufficient, accurate sensitivity is currently unknown (1-11). Therefore, we will introduce relevant articles on cancer detection rate and literature review.

The following studies were conducted to examine the usefulness of tomosynthesis screening by mammary gland concentration. In a retrospective study of Rafferty et al. (12) examined the screening results of tomosynthesis according to mammary gland concentration using data of multicenter collaboration from 13 facilities of Friedewald et al. (11), 2D alone 278,906, 2D and 173,414 combined with tomosynthesis A total of 452,320 exams are targeted. Scrutinizing rates required are fatty 55 / 1,000 (2D alone 57 / 1,000, p = 0.34), mammary dispersal 84 / 1,000 (2D alone 97 / 1,000, p <0.001), uneven high concentration 110 / 1,000 (2D alone 128) / 1,000, p <0.001), extremely high concentration 98 / 1,000 (2D alone 114 / 1,000, p <0.001), cancer detection rate is fatty 4.2 / 1,000 (2D alone 3.2 / 1,000, p = 0.10), mammary dispersal 5.3 / 1,000 (2D alone 4.4 / 1,000, p = 0.004), heterogeneous high concentration 6.1 / 1,000 (2D alone 4.5 / 1,000, p <0.001), extremely high concentration 3.9 / 1,000 (2D alone 3.8 / 1,000, p = It was the result of 0.88). With regard to the examination rate, among the high density breasts, a significant decrease was seen at both high density and high density in comparison with 2D alone, indicating the usefulness of tomosynthesis.

A systematic review of five studies comparing the utility of tomosynthesis in breast cancer screening 1) Two prospective studies in Europe (OTST study 2)-4), STORM study 5)-8)) and three retrospective studies in the United States 9) to 11) are adopted. Both are a comparison between 2D alone and 2D plus tomosynthesis, but due to differences in breast cancer rates, demographics, and screening methods in Europe and the United States, they are analyzed separately to reflect significant differences in practice. Among the European studies, STORM examinations5)-8) showed an increase in cancer detection rate of 0.81% (0.53% for 2D alone) and a decrease of 4.3% (5% for 2D alone) in cancer detection rate in 7,294 patients. In OTST trials 2) to 4), cancer detection rate is 0.80% (2D alone 0.61%), required review rate is 2.78% (2D alone 2.1%), and cancer detection rate is 0.94% (double scan) in 12,621 patients It was the result of 2D alone 0.71%) and the examination rate 3.67% (2D alone 2.9%). The rate of examination required varies with double reading methods, and in both two large-scale studies, the need for examination rate after consensus reading is currently the correct effect of tomosynthesis because prospective blinded consensus reading is not performed.

In the US study, Destounis et al. 9) has a cancer detection rate of 0.57% (2D alone 0.38%), a need rate of 4.2% (2D alone 11.45%), Lourenco et al. 10) for 524 people, 12 921 people with 2D tomosynthesis, 2D alone Cancer detection rate 0.46% (2D alone 0.54%), required review rate 6.4% (2D alone 9.3%) for 12,577 people, cancer detection rate 0.55 for 2D + tomosynthesis 173,663 people, 281, 887 people 2D alone % (2D alone 0.43%), required a review rate of 8.95% (2D alone 10.57%). The difference in scale between these three studies was large, and the breast cancer detection rate was higher in the two studies 9) 11) but lower than in the European studies, and the cause was differences in screening intervals (US 1 year, Europe 2) It is pointed out that yearly) and European prospective tests have double reading and relatively many elderly women are included. In these clinical studies, adding tomosynthesis to 2D alone increased the detection rate and indicated its usefulness, but there is a report that increases or decreases the review rate, and there is no constant consensus at this time, Additional research is needed.

Although not set for this outcome, Lee et al. 13) is a medical examination for high density breast women aged 50 to 74, and Kalra et al. It is reported that all are good at examination of the age group. However, because the insurance and screening systems differ

from country to country, it is currently the case that research on different types of screening programs is needed worldwide, and it is estimated that research results based on the Japanese system will also be needed in the future Be done.

Conclusion

Both 2D CC + MLO combination and 2DMLO + DBTMLO combination are considered useful for screening MMG examination. In particular, we would like to consider the introduction to medical examinations for the addition of MMG in DBT, but the issue of the amount of image information, the problem of exposure to radiation, the direction of imaging, the establishment of interpretation methods etc. are future issues.

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