

Personal Experience on Ultrasound and Mammography Accuracy Affection by Breast Density

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Abstract: Objective: We sought to determine the accuracy affection of ultrasound and mammography by breast density when it comes to breast cancer identification. Materials and Methods: We chose a group of 170 women, positive for breast disease, with one or more lesions present, of whom we had histological examination of the lesions. 72 lesions were found to be cancer, and 98 lesions were classified as benign. Based on breast density, the groups were further subdivided in group 1: ACR density 1 – 2, and group 2: ACR density 3 – 4. The sensitivity and specificity of both modalities in both groups were assessed. Values of $p < 0.05$ were considered statistically significant. Results: Category 1 – 2 women, had no statistically significant differences in the sensitivity and specificity of both modalities used ($p = 1$) ($p = 0.1$). Category 3 - 4 women had a much higher rate of ultrasound sensitivity ($p = 0.03$) OR for mammography positive result was 0.25 (95% CI 0.11 - 0.58). Conclusion: Breast density clearly influences the sensitivity of mammography, hence ultrasound after mammography is a very important adjunct to identify breast lesions and their characteristics and most importantly into early detection of breast malignancies.

Keywords: ultrasound examination, mammography, breast density, radiological modalities, ACR, BIRAD-S, breast cancer, benign breast lesions, histopathology results, breast cancer risks

1. Introduction

The most frequently used modalities in screening for breast disease and most important early detection of breast cancer, are ultrasound and mammography. While mammography is used widely after the age of 40, and is part of the protocols for women who have personal or family history of breast cancer, it has its limitations when it comes to dense breast. Breast density, refers to the prevalence of fibroglandular tissue, a feature which is associated with greater risk of developing breast cancer. According to ACR BIRAD-S, breast density is classified on a scale 1-4, which includes a diapason of 1) almost entirely fatty breast structure to 4) extremely dense breast. In women classified as BIRAD-S 3-4, mammography is very limited and here we experience higher number of false negative results, because of heterogenicity and dense tissue which makes it very complicated to interpret images (white breast – white cancer). In contrast to mammography dense breast tissue on ultrasound looks hyperechoic whereas carcinomas look hypoechoic. Although breast density tends to decrease with age, in women with dense breast this structure may persist.

2. Materials and Methods

As we do not have the possibilities of developing clinical trials and because politics oriented to health care problems, that need regular screening fail to provide protocols, we are presenting for the first time (as far as the authors are concerned) a very modest sample of patients based on personal databases that compare both modalities with all breast structure features. A group of 170 women, positive for breast disease and/or family history for breast cancer were analyzed all women had completed a questionnaire before imaging diagnosis procedures initiated. We went through all patients' data, regarding clinical notes, image files saved and histopathological reports: Lesions present were all examined by histopathology analysis, resulting in

72 lesions diagnosed as cancers and 98 benign lesions. Breast parenchyma was characterized according to the BIRAD-S protocol on a scale 1 to 4:

1. Almost entirely fat breast
2. Scattered fibroglandular tissue
3. Heterogenous breast
4. Extremely dense breast

Based on such features women were classified GROUP 1- “fatty breasts” (ACR BIRAD-S 1,2) and GROUP 2- “dense breasts” (ACR BIRAD-S 3,4). Images of the lesions were additionally interpreted and findings were classified using BIRAD-S lexicon as:

1. No significant abnormalities
2. Benign findings
3. Probably benign
4. Suspicious lesion – suspicious findings
5. Highly suggestive of malignancy - malignant lesions

Lesions under BIRAD-S 1,2 and 3 were all considered negative findings whereas BIRAD-S 4 and 5 positive one. Sonography assessment was performed using “Sonoline G60” “GE Logiq P5” and “Acuson x 300” by the same radiologist.

3. Statistical Analysis

This is a retrospective study based on a personal database. All imaging reports, ultrasound and mammography reports, clinical notes and histopathological reports were reviewed. Values of $p < 0.05$ were considered statistically significant. Positive and negative results in patients with breast cancer were assessed for both modalities used.

Results: This study included clinical data's of 170 patients which underwent histological examinations of their breast lesions, resulting in 72 cancers and 98 benign lesions.

Patient's age varied from 18 – 75 y.o.

Mean age of patients with breast cancer was 55.4 +/- 10.9 while mean age of patients with benign lesions was 47.8 +/- 8.5.

According to ACR classification of breast structure 11% had extremely dense breast (category 4), with a higher prevalence in women under 40.

In the first group, ACR 1 -2, ultrasound sensitivity was 2.9% and the specificity 14.8% higher. No statistically significant differences were found between the 2 modalities in GROUP 1 (p=1).

In the second group, ACR 3 -4, ultrasound in women with dense breast with a higher sensitivity of 3.2% compared to mammography (p=0.03), whereas the specificity 13.9% higher (p=0.26).

With the increase of breast density OR for a positive mammographic result was 0.25 (95% CI 0.11-0.58), OR for a positive ultrasound results 0.52 (95% CI 0.19-1.37), which shows a relation between breast density and OR of a positive mammographic results but not OR and a positive ultrasound result OR for a negative mammographic result was 0.75 (95% CI 0.45 -1.25) and for ultrasound use, OR 0.76 (95% CI 0.42-1.30)

4. Discussion

Breast cancer remains an issue of health care problems, having to be faced in developed and less developed countries, in resourceful and restricted resourced countries. Especially in Albania, where we lack of health politics oriented to screening, or protocols for follow-ups, early diagnosis of breast disease (in general but mostly focused on early breast cancer detection), and tailored solutions to patient's need is the next step to be taken. For every women presenting with symptoms of a breast disease, the next step is diagnostic imaging modalities like ultrasound or mammography or both. As seen by the results mentioned above, we need to be careful choosing the modality in patients with dense breasts.

5. Conclusions

Results and everyday practice indicate that dense breast is an important predictor of mammographic accuracy as it is on the other hand the age of women undergoing such diagnostic approach. Being aware of this important fact, brings to our attention the need of ultrasound as first choice modality, and on the other hand, as a very accurate modality as an adjunct to mammography.

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