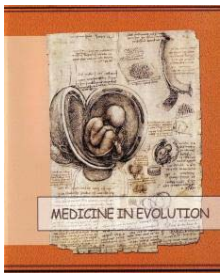
Is ultrasound screening after tomosynthesis justified in patients with a personal history of breast cancer?



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Abstract

Aim and Objectives: To evaluate the added value of breast ultrasound to screening tomosynthesis in women previously treated for breast cancer.

Material and Method: In the study were included 100 patients with previously diagnosed and treated breast cancer. The patients were examined with tomosynthesis and breast ultrasound. BI-RADS assements were made after tomosynthesis and ultrasound and compared with the final assesment.

Results: On tomosynthesis, 97% of the patients were normal or had benign changes (BI-RADS 1 or 2) and only 3 patients (3%) had highly suspicious for malignancy lesions (BI-RADS 5). On ultrasound, 97 patients (97%) had no pathological or benign finfindings, one had possible malignant finding (BI-RADS 4) and 2 had highly suspicious for malignancy lesions (BI-RADS 5). The major differencies between tomosynthesis and ultrasound were observed in BI-RADS 1 and 2 cases.

Conclusion: if the screeing is performed with tomosynthesis, supplimentary ultrasound examination is of no benefit. Even in patients previously treated for breast cancer, ultrasound does not bring informations that would change the manegement of these patients.

Keywords: tomosynthesis, ultrasound screening, risk patients

INTRODUCTION

Tomosynthesis or 3D mammography is a mammographic technique in which sectional images of the breast are aquired and than recombined in a 3D volume. It was aproved in 2011 by the FDA for both screening and diagnosis [1]. It has a higher sensitivity and specificity compared with the 2D digital mammography, diagnosing more breast cancers and reducing the recall rate in the screening programes [2, 3]. Breast ultrasound is the most frequently used examination method in adjunct to mammography. It has major advantages: it is cheap, can be repeated any time and it has a greater compliance among the patients compared with mammography. In patients with dense breasts, for which 2D mammography has a lower sensitivity [4] it can diagnose lesions not visible on mammographic images due to the overlaping glandular tissue [5]. Despite its advantages, it can not replace mammography for breast cancer screening and it is not justified as supplimentary screening examination for all women [5].

Aim and objectives

The aim of the study was to evaluate the added value of breast ultrasound to screening tomosynthesis in women previously treated for breast cancer and to establish if suplemmentary screening ultrasound in this group of patients diagnoses more relapses or contralateral breast cancers compared to tomosynthesis.

MATERIAL AND METHODS

In the study were included 100 patients with previously diagnosed and treated breast cancer. The patients were referred by the oncologist to our departement for the regular follow-up, with indication for mammography and breast ultrasound. We included in the study only patients for which both examinations were performed in the same day.

Mammographic examinations were performed on a GE Senographe Essential, after the departements' protocol: 2D images were aquired in medio-lateral projection and 3D images were aquired in both standard projections, medio-lateral oblique (MLO) and cranio-caudal (CC).

Ultrasound was performed on a GE Logiq S8 machine, using a 8-12 MHz linear transducer.

The examinations were interpreted/performed by the same phisician and the rezults were formulated according to the ACR BI-RADS lexicon (American College of Radiology, Breast Imaging Reporting and Data System). For each patient the type of breast was mentioned (ACR a-d), the pathological findings were described, and the conclusion and recommendations were made according to the BI-RADS lexicon.

In cases with suspicious findings, BI-RADS 4 and 5, tru-cut biopsy was performed with a 14G needle and the pathology report was considered the golden standard.

From the study were excluded the patients that had only one of the two examinations performed (indication from the oncologist only for mammography or ultrasound or refusal of the patient to have one of the two examinations performed), the patients with a final BI-RADS assessment of 0 (further examinations or comparision with previous examinations needed), 3 (probably benign findings but short follow-up reccommended) and 6 (malignancy proven by previous biopsy) and the patients that refused the biopsy or for which the pathological report was not available at the time when the study was conducted.

RESULTS

Only 3 patients were younger than 40 and only 3 older than 80 years of age, most of the patients being of 50-69 years old (figure 1).

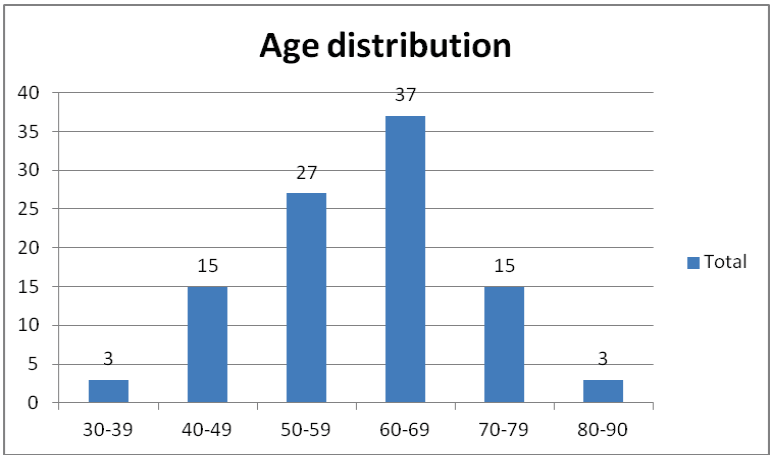

Figure 1. Age distribution of the patients

In the studied population, 57% of the patients had a heterogeneous or homogeneous breast structure (ACR c or d) while 43% had an adipose or predominantly adipose structure of the breast (ACR a or b) (table I).

Table I. Distribution of the breast types

Breast type	**Number of patients**
Adipose breast (ACR a)	6
Predominantly adipose (ACR b)	37
Heterogeneously glandular (ACR c)	52
Homogeneously glandular (ACR d)	5

After the mammographic examination, 97% of the patients were normal or had benign changes (BI-RADS 1 or 2) and only 3 patients (3%) had highly suspicious for malignancy lesions (BI-RADS 5) (figure 2).

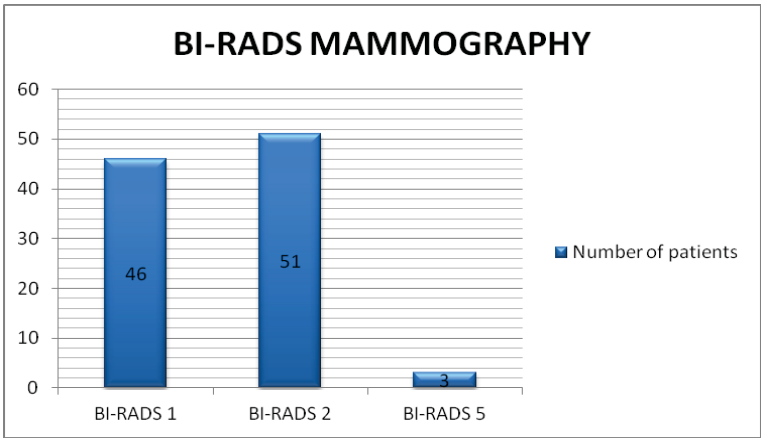

Figure 2. BI-RADS clasification after mammography

On ultrasound, 97 patients (97%) had no pathological or benign finfindings, one had possible malignant finding (BI-RADS 4) and 2 had highly suspicious for malignancy lesions (BI-RADS 5) (figure 3).

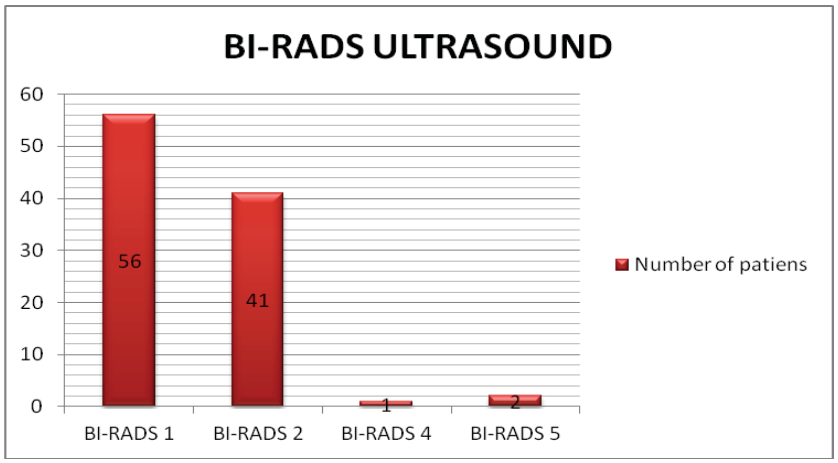

Figure 3. BI-RADS classification after ultrasound examination

After analyzing both examinations, the final BI-RADS assessment was BI-RADS 1 (normal) in 40% of the patients, BI-RADS 2 (benign findings) in 57% of the patients and BI-RADS 5 (high suspicion for malignancy) in 3 % of the patients (table II).

Table II. Final BI-RADS assessment

FINAL BI-RADS CLASSIFICATION	NUMBER OF PATIENTS
BI- BI-RADS 1	40
BI-RADS 2	57
BI-RADS 5	3

The diferencies between mammographic and ultrasound results are shown in table III.

Table III. Comparative BI-RADS assesment

	BI-RADS 1	BI-RADS 2	BI-RADS 4	BI-RADS 5
BI-RADS on mammography (number of patients)	46	51		3
BI-RADS on ultrasound (number of patients)	56	41	1	2
Final BI-RADS (number of patients)	40	57		3

DISCUSSIONS

Digital 2D mammography is the standard examination used for breast screening. In the dense breast it has a reduced sensitivity because lesions can be obscured by the glandular tissue. In the last decade, studies performed for the evaluation of the tomosynthesis have shown it's superiority over 2D mammography in diagnosing small lesions. Compared with 2D digital mammography, it depicts with 34% more cancers, at a smaller size and with higher accuracy [6]. Moreover, by eliminating the overlaping tissue, it reduces the rate of recalls by differentiating between superimposions and real lesions.

Even with tomosynthesis, in patients at high risk (>20%) of developing breast cancer (BRCA positive or patients with lymphoma and mediastinal radiotherapy), anual magnetic resonance imaging (MRI), performed in adition to mammography is recommended [7].

Patients with a history of breast cancer are also considered risk population but they are in the low risk group (<15%) and they do not have indication for MRI screening [8].

Ultrasound is the most used supplementary investigation, especially in women with dense breasts. Among other risk factors, the density of the glandular tissue is by itself a risk factor of developing breast cancer [9]. This is why more and more clinicians, when recommend a breast evaluation, recommend both mammography and ultrasound. If this aproach is justified in patients with risk factors and dense breast, performing both examinations for all groups of patients is time consuming and leads to higher costs with no real benefits for the patients.

In our study, we wanted to evaluate if supplementary ultrasound depicts more breast cancers than tomosynthesis in patients with a personal history of breast cancer. In the studied population, more than 50% of the patients had a dense glandular breast tissue (ACR c and d) which, combined with the personal history of breast cancer could be a rationale for indicating supplementary ultrasound examination to the annual screening mammography.

If tomosynthesis diagnosed three breast cancers that were corectly assesed as BI-RADS 5 lesions, on ultrasound only two of the three cases were assesed as BI-RADS 5 and one assesed as BI-RADS 4 due to the round shape and partially well defined contour. The lesion had same morphology on 2D mammography but on the 3D images the contour could be more clearly evaluated as ill defined and the associated architectural distorsion was observed.

The differencies between tomosynthesis and ultrasound were observed in BI-RADS 1 and 2 cases. These differencies are explained by the ability of ultrasound to diagnose small cystic lesions, not visible on mammography and by the visualisation of benign calcifications on mammography, calcifications not depicted, in most of the cases, by ultrasound. Anyway, these benign findings are not important for the manegement of the patients, cases assesed as BI-RADS 1 or 2 having the same indication for regular screening mammography.

CONCLUSIONS

Even if our study group was small, the results suggest that if the screening is performed with tomosynthesis, supplementary ultrasound examination is of no benefit. Even in patients previously treated for breast cancer, ultrasound does not bring informations that would change the manegement of these patients.

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