

Review Article

Follow-Up of Patients with Breast Cancer: Role of Breast MRI in the Early Detection of New Breast Tumors (on the Basis of Two Cases)

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Submitted: 09 December 2016

Accepted: 18 January 2017

Published: 20 January 2017

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Keywords

- Breast cancer
- Breast MRI
- Breast cancer
- Surveillance
- Guideline

Abstract

Background: Breast Magnetic Resonance Imaging (MRI) follow-up is recommended in women at high risk (either genetic risk or family history) of breast cancer. However, its use is not extended in the case of patients with personal history of breast cancer, although this is a risk factor for new malignant breast tumors. We present two cases diagnosed only by MRI in patients with a history of breast cancer.

Method: Two cases of patients with a personal history of breast cancer underwent both mammography and breast ultrasound as follow-up are presented.

Results: Two patients of 38 and 42 years of age diagnosed of unilateral breast cancer 3 and 7 years ago, respectively. Both of them were clinically asymptomatic and follow-up in their health centers only by mammography in case 1 and with both mammography and breast ultrasound in case 2, being reported as without pathological findings. In both cases, only the breast MRI allowed to diagnose a new tumor in the contralateral breast.

Conclusions: In the follow-up of patients with a personal history of breast cancer, breast MRI allows the detection of non-visualized tumors with routine mammographic and breast ultrasound controls. Therefore, we recommend its use along with mammography, especially if they have undergone reconstructive surgery.

ABBREVIATIONS

MRI: Magnetic Resonance Imaging; Bi-Rads; Breast Imaging Reporting and Data System; 18f-Fdg Pet/Ct: Positron Emission Tomography with 2-Deoxy-2-(Fluorine-18) Fluoro-D-Glucose Integrated with Computed Tomography

INTRODUCTION

Patients with a personal history of breast cancer are at risk of developing a new breast tumor, either in the same breast or in the contralateral breast [1-3].

However, the follow-up by imaging of such patients is quite variable and may not take into account such circumstance [4,5]. Breast Magnetic Resonance Imaging (MRI) is not always included, although some international guidelines of clinical practice so

advice [1].

We present two patients with a history of unilateral breast cancer who subsequently developed a new and small tumor in the contralateral breast, neither palpable nor visualized with conventional imaging techniques. With regard to both cases, we conducted a review of the literature, about the follow-up of such patients by means of imaging procedures, with special emphasis on the contribution of breast MRI.

METHODS

Case 1

A 38-year-old patient with a history of multiple in filtrating ductal carcinoma of the right breast 3 years ago. Locoregional staging was then carried out using breast MRI. No malignant

lesions were observed then in the left breast. The patient had no known personal or family history of risk for the development of neoplasias. Pathological locoregional staging was: T1cN0.

The patient underwent complete oncoplastic surgery and, after completing the systemic treatment, continued the usual oncological follow - up with only annual bilateral mammography consultations. All mammographic reports were within normal parameters so far, and the patient is clinically asymptomatic at present.

Case 2

A 42-year-old female patient with a history of infiltrating ductal carcinoma of the left breast 7 years ago. Locoregional staging by breast MRI was: T2 N2. No malignant lesions were then observed in the right breast. She did not present any previous antecedents, neither personal nor familiar, of risk.

She was treated by mastectomy with immediate reconstruction. She has been followed up in several health centers by both bilateral mammography and ultra sonography of the breasts, every year, without finding any pathological lesions (Figure 1). The patient is clinically asymptomatic.

RESULTS

Case 1

After the patient requested a second opinion at another Center, a breast MRI was indicated by an expert gynecologist in breast cancer, with a suspicious mass in the upper - inner quadrant of the left breast (Figure 2). The subsequent ultrasound study using Mode B (Figure 3) confirms the presence of a mass of 0.64 cm in size, with moderate criteria of suspected malignancy.

An eco guided core needle biopsy is performed and the result of infiltrating ductal carcinoma and low risk genomic profile is confirmed. A locoregional staging of T1b N0 was established.

Case 2

A breast MRI is indicated by an expert gynecologist in breast cancer, and a suspicious mass is observed (Figure 4A) in the upper inter quartile line of the right breast. A "second look" ultrasound study using Mode B (Figure 4B) confirms the presence of a mass of 0.56 x 0.64 cm in size and with moderate criteria of suspected malignancy. An echo guided core needle biopsy is performed and the diagnosis of infiltrating ductal carcinoma and high risk genomic profile is confirmed. Locoregional staging was established as T1b N0.

DISCUSSION

Breast MRI has been revealed as a fundamental imaging technique in the management of breast cancer in various situations [1-3] as a screening method in high-risk asymptomatic women with both high genetic and familiar risk, initial locoregional staging, evaluation of response to neo adjuvant therapy and subsequent follow - up of patients with conservative surgery, when inconclusive findings of local recurrence are observed using conventional methods (mammography and breast ultrasound). And also in the routine follow - up of patients with

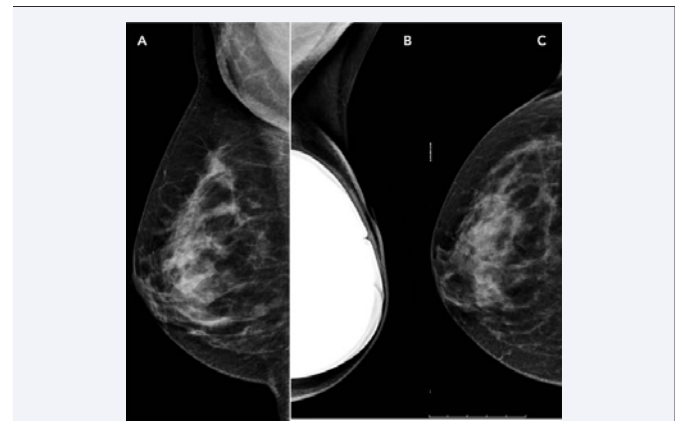


Figure 1 Case 2: Medio-lateral oblique view of right (A) and left (B) breast, as well as right crano-caudal view (C). Notice the left breast implant (previous surgery). Mammography can be considered "normal".

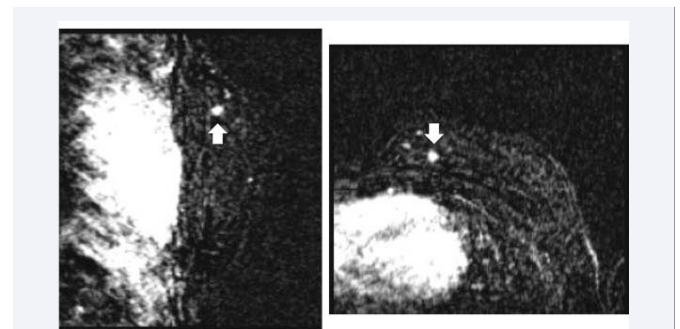


Figure 2 Case 1: Dynamic breast MRI, at first minute. Notice (arrow) a suspicious mass (BI-RADS 5) in the inner upper quadrant of the left breast.

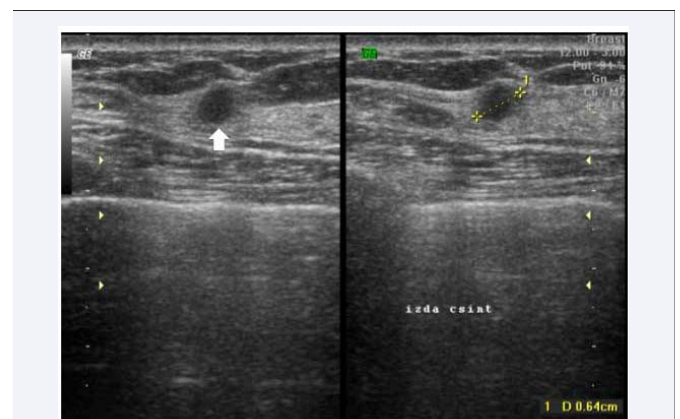


Figure 3 Case 1: The ultrasound shows (arrow and calipers) a moderately suspicious (BI-RADS 4a) mass, of 0, 64 cm in size, correlated with the breast MRI finding.

a personal history of breast cancer due to the risk of developing new malignant tumours [1-3], even if there is no family history as in the two cases presented; although some authors estimate that this risk is intermediate [6-7] or minimal [8], except when there is a family history.

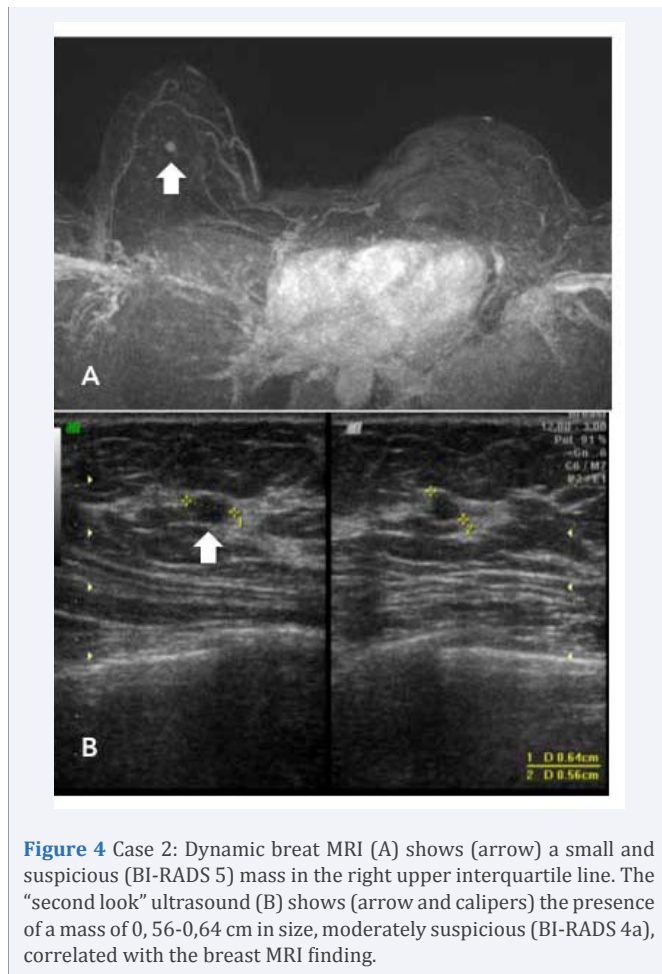


Figure 4 Case 2: Dynamic breast MRI (A) shows (arrow) a small and suspicious (BI-RADS 5) mass in the right upper interquartile line. The "second look" ultrasound (B) shows (arrow and calipers) the presence of a mass of 0,56-0,64 cm in size, moderately suspicious (BI-RADS 4a), correlated with the breast MRI finding.

Breast MRI is a technique that allows detection of malignant lesions not visible with conventional radiological techniques, in the process of initial locoregional staging. In the follow-up of patients with a personal history of breast cancer, Sensitivity and Specificity rates of 84.6 % and 95.3 % have been reported [9], compared to rates obtained with mammography of 23.1 % and 96.4 %, respectively. Therefore, breast MRI is a much more sensitive procedure than mammography, with a similar specificity, when faced with a kind of patient in whom the early detection of new tumors is fundamental. In our multidisciplinary and interdisciplinary group, what is currently indicated in the routine follow-up of all patients with a personal history of breast cancer, at least biennially?

However, the use of breast MRI has not been widely consolidated in the routine follow-up of such patients, despite the fact that they meet criteria of risk of developing a new tumor in the same breast or in the contralateral one. These patients are estimated to have a 30 % - 50 % chance of developing a second cancer in one of the breasts and an annual risk of developing a new breast tumor from 0.5 % to 0.75 % [10].

In recent years, there has been a certain increase in the use of breast MRI in this type of patients. In 2007 [5], only 7 % of patients with a personal history of breast cancer were reported to have had MRI, compared with 15 % reported in the year 2015 [4]. The reasons may be diverse, namely: on the one hand, the

usual saturation of the units of magnetic resonance by other type of explorations economically more profitable that relegate the breast MRI to the background. On the other hand, the diversity in the characteristics and limitations of health coverage in the different countries [11]. And, finally, the existence of diverse and varied protocols of follow-up [4,5,7,11], in which a minimal [8] or intermediate [6] risk is estimated, and in which the contribution of the breast MRI is not taken into account in comparison to the conventional methods.

The usual follow-up based on mammography, so common in most Centres, may not be sufficient in the case of tumors that may be unnoticed in the mammography, especially having either "c" or "d" density patterns of the BI-RADS System [12] or when tumor sets in blind peripheral areas, as it might have happened in case 1. More advanced mammographic techniques, such as digital tomo synthesis, have not yet demonstrated their superiority to digital mammography in the diagnosis of tumor recurrence [13] and, therefore, some authors [14-16] propose to add the breast ultrasound as a routine. However, even adding routine breast ultrasound, small tumors may be initially undetectable (although later visible during the second look ultrasonography!), as happened in case 2. In both cases, however, the echographic semiology was only moderately suspicious (BIRADS 4a), unlike the BIRADS 5 pattern on the breast MRI. Therefore, if we had relied only on the echographic findings, we would not have established such a degree of suspicion of malignancy. The "benign" echographic semiology of some malignant tumors, especially the sub centimetric lesions such as the cases presented here, has been previously described by other authors [17,18].

Other procedures have been described [19], such as 18F-FDG PET/CT, in association with serum tumor marker assays, for monitoring locoregional recurrence and distant metastases, which may be effective, although this technique is much less accessible (and more expensive) than MRI in most health Centers.

A lower risk of new tumors in the contralateral breast has been reported [20] in patients who underwent breast MRI during locoregional staging of the initial tumor, as was done in the two cases presented. However, both patients developed contralateral recurrence of T1 N0 tumors after a follow-up period of 3 (case 1) and 7 (case 2) years, respectively.

Although the number of cases presented is very small, according to our experience, like other authors [2,7,21,22], we believe that breast MRI should be incorporated, together with mammography, into the routine follow-up of the patient with a personal history of breast cancer, as well as in all women with high risk factors, in general [23]. In the latter group of women, only oblique mammographic projections [24] will be taken along with breast MRI. Oblique projections usually cover the entire mammary glandular volume (with remarkable reduction of radiation dosage) allowing detection of small accumulations of malignant calcifications not always visible [25] or specific [26] on the breast MRI.

In order to interpretate and integrate the information of the various imaging methods, reduce the inter observer variability and thus the risk of over diagnosis, it seems very important that all imaging methods be interpreted by a single trained radiologist or a small trained group of the same team.

Like other authors [27-30], considering the follow-up of at-risk breast cancer women, this strategy seems cost-effective, because it combines breast MRI Sensitivity (and mammography, in the case of calcifications) with the Specificity of mammography, with a significant reduction of ionizing radiation due to a complete mammographic control. This is our study protocol in this kind of patients for several years.

Possible previous surgical procedures (immediate reconstructive surgery, routinely performed in our multidisciplinary team) changing the morphology, behavior [31] and distribution [32] of the breast tissue, leading to various post-surgical changes (fat necrosis and others), as well as the need to control the regional lymphatic structures [33,34] (including the internal mammary lymph nodes), are additional arguments in favor of including the breast MRI in the routine follow-up of patients with a personal history of breast cancer.

CONCLUSIONS

Patients with a personal history of breast cancer are at risk of developing another breast tumor, either in the same breast or in the contralateral one. Such tumors may not be detected with conventional methods and, when they are, may show a poorly suspicious or “benign” ultrasound appearance.

On the other hand, more and more patients have a history of previous reconstructive surgery, with alteration of the normal disposition and behavior of the mammary tissues, with possible doubts or no visualization of lesions with conventional imaging methods. Similarly, not only the mammary tissue but also the lymph node structures (including the internal mammary chain) must be controlled because they are frequently affected by metastatic processes. For all these reasons, we believe that the aforementioned objectives can be either effectively or efficiently covered by using mammography (only mediolateral oblique projections) along with breast MRI for the routine follow-up of these patients.

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Cite this article

López-Ruiz JA, Mieza-Arana JA, Urueña-González J, Giménez-Garai E, Regalado-Bilbao J, et al. (2017) Follow-Up of Patients with Breast Cancer: Role of Breast MRI in the Early Detection of New Breast Tumors (on the Basis of Two Cases). *J Cancer Biol Res* 5(1): 1093.