Case Report / *Olgu Sunumu*

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Chronic Hematoma Mimicing Recurrent Breast Carcinoma and Contribution of Magnetic Resonance Imaging to the Diagnosis

Meme Karsinomunda Rekürren Kitle-Geç Dönem Hematom Ayrımında Manyetik Rezonans Görüntüleme

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ABSTRACT

Local recurrence of breast carcinoma after breast conservative therapy is an unwanted situation with a high possibility. Paranchymal distortion and edema secondary to surgery and radiotheraphy results in difficulties in the mammographic and ultrasonographic evaluation of the breast. After treatment of breast carcinoma, sensitivity of mammography decreases below the normal population. Breast magnetic resonance imaging (MRI) can be helpful in the discrimination of scar tissue in the region of operation from local recurrence. Advanced MRI applications such as diffusion weighted imaging (DWI) and proton (^{1}H) MR spectroscopy also have contribution in diagnosis. In this case report we aimed to determine the contribution of MRI and advanced MRI techniques to a lesion which was detected by conventional methods in an operated breast carcinoma patient.

Key words: Breast cancer, diffusion weighted imaging, hematoma, magnetic resonance imaging, proton magnetic resonance spectroscopy

ÖZET

Meme kanserinin lokal rekürrensi meme koruyucu tedavi sonrası istenmeyen ve büyük olasılığı olan bir durumdur. Parankimal distorsiyon, cerrahiye sekonder ödem ve radyoterapi mammografik ve ultrasonografik değerlendirimi zorlaştırır. Meme karsinomunun tedavisi sonrası, mammografinin sensitivitesi normal popülasyonun altındadır. Meme manyetik rezonans görüntüleme (MRG), operasyon alanında skar dokusunun ayrımında yardımcı olabilir. Difüzyon ağırlıklı görüntüleme (DAG) ve proton (^{1}H) manyetik rezonans (MR) spektroskopi gibi ileri MRG uygulamalarının da tanıya katkısı vardır. Bu olgu sunumunda, MRG ve ileri MRG tekniklerinin konvansiyonel yöntemlerle opere meme karsinomlu bir hastada saptanan bir lezyonun tanıya katkısının değerlendirmeyi amaçladık.

Anahtar sözcükler: Meme kanseri, difüzyon manyetik rezonans, hematom, manyetik rezonans görüntüleme, proton manyetik rezonans görüntüleme

Introduction

Recurrence of disease at locoregional and distant sites occurs frequently in women who have undergone primary treatment for breast cancer. Locoregional recurrence occurs in up to 35% of patients by 10 years after mastectomy or breast-conserving therapy (1). Mammography is less sensitive in the treated breast than in the untreated breast due to surgery and radiation-induced changes in the parenchymal pattern (2). Magnetic resonance imaging (MRI) is a very useful method in diagnosis of breast lesions which cannot be characterized by mammography, ultrasonography (US) and physical examination (3). Advanced MRI applications such as diffusion weighted imaging (DWI) and proton (^{1}H) magnetic resonance (MR) spectroscopy also have contribution in diagnosis (4, 5).

In this case report we aimed to determine the contribution of MRI and advanced MRI techniques (DWI and single voxel ^{1}H MR spectroscopy) to a lesion which was detected by conventional methods in an operated breast carcinoma patient.

Case Report

A 67-year-old patient with the diagnosis of invasive ductal carcinoma was evaluated in her third post-operative year, after breast conservation therapy. In clinical examination, right breast was smaller than the left breast and skin and subcutaneous tissues were thicker secondary to the postoperative and post-irradiative changes. Routine control included conventional mammography and breast US imaging. When compared with previous mammograms, an irregular shaped mass lesion, 2.5-3 cm. in size was determined on the retroareolar region of the right breast (Figure 1a, b). With these findings she was examined by breast US as well. A well-defined, hypoechoic solid mass with posterior acustic shadowing was detected at the same region with the mammogram on the right breast. (Figure 1c). No vascular signal was detected with color Doppler US examination (Figure 1d).

With mammographic and US findings, the lesion was suspicious for recurrent breast carcinoma and categorized as BIRADS 4. She was evaluated with conventional breast MRI imaging for recurrence prior to tru-cut biopsy. We applied conventional breast MRI with 1.5 Tesla MR device (Signa HDx; General Electric, Milwaukee, WI, USA). The routine sequences were axial Short TI Inversion Recovery (STIR),

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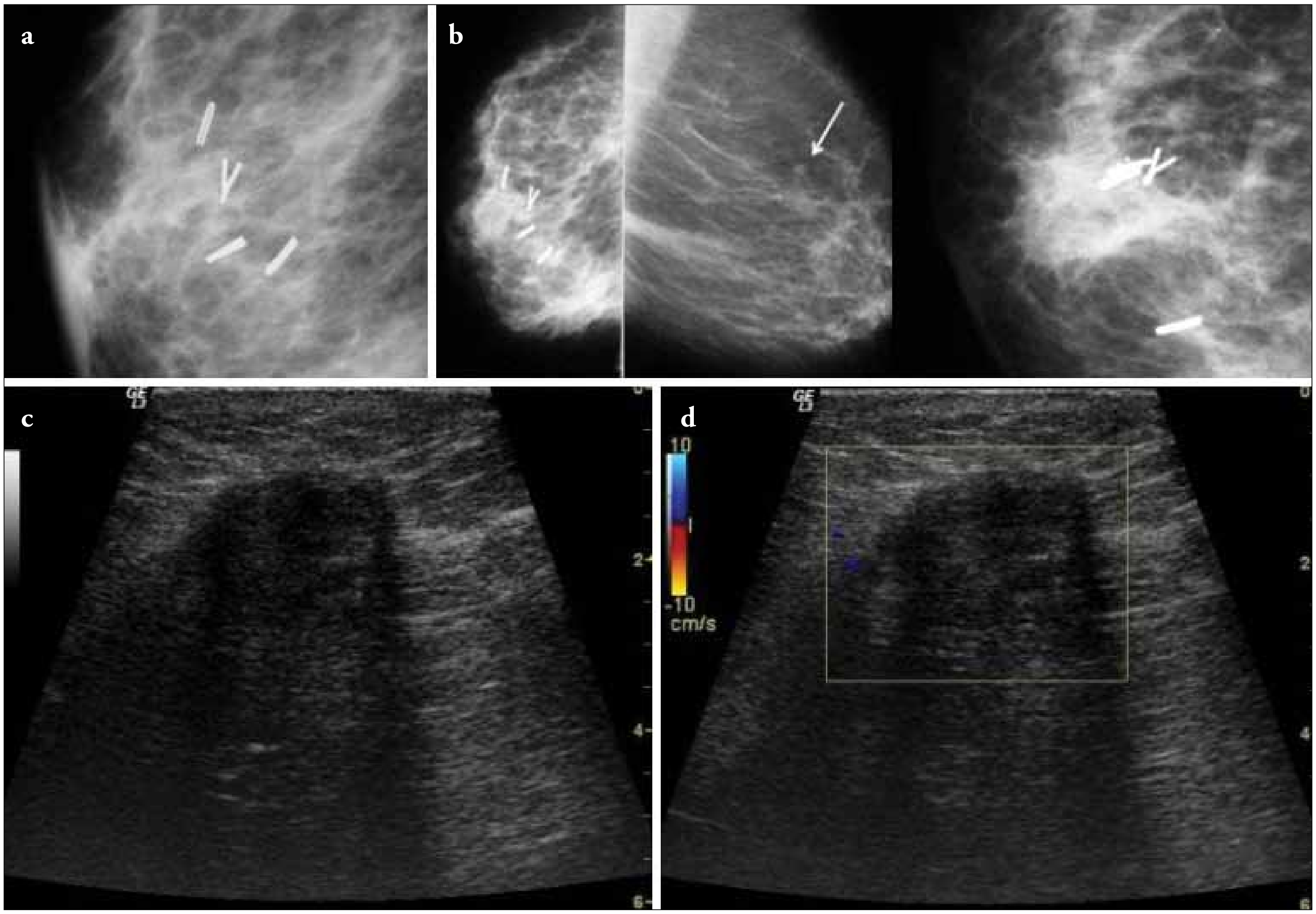

Figure 1. Second year control mammogram of a breast carcinoma patient after breast conservative therapy, demonstrating asymmetrical increased density and thickening of skin and subcutaneous tissue and postoperative metallic clips on the operation region (a), Third year control mammogram with local increase of density, on the operation region. Left breast was evaluated as normal except a benign intra-mammarian lymph node (arrow) (b). Hypoechoic solid mass with clear distal acustic shadowing (c), There is no vascular signal in color Doppler US examination (d)

sagittal Fast Spin Echo (FSE) Fat Saturated T2-wieghted (W), sagittal 3D VIBRANT [Postcontrast Fat Saturated T1W, which relies on fast MRI sequences obtained before, during and after the rapid intravenous (IV) administration of 0.1 mmole/kg a gadolinium (Gd)]. Two precontrast and six post-contrast series were obtained. Contrast enhanced images were subtracted from the first precontrast images digitally and subtraction images were obtained.

Within a conducted research in our clinic, we added advanced MRI techniques such as DWI and BREASE (single voxel ^{1}H MR spectroscopy). DWI were applied before contrast administration with b=0 and b=600 values. After contrast administration, a single voxel was placed on the lesions on axial STIR images and BREASE sequence was obtained. After MRI examination, all sequences were postprocessed on Advantage Windows Work Station. Dynamic contrast curves of the lesion and Apparent Diffusion Coefficient (ADC) maps were obtained. Advanced MRI techniques such DWI and single voxel ^{1}H MR spectroscopy were added also.

In conventional breast MRI, left breast was normal. The lesion on the right breast was hyperintense in axial STIR and sagittal T2W sequences and there was a hypointense rim (Figure 2a, b).

In unenhanced Fat Saturated sagittal T1W sequence the lesion was hyperintense. After contrast material administration no enhancement of the mass lesion was detected. The subtraction images revealed a thin hyperintense rim of enhancement (Figure 2c-e).

Images were evaluated on work station and Region of Interests (ROIs) were drawn in the centre of the lesions. Dynamic enhancement curve patterns in this lesion were not compatible with any curve pattern. The curve patterns were represented ferromagnetic artifacts due to hemorrhagic decay products (Figure 3).

In DWI with a b value of 600, there was high signal in the rim of the lesion and the central part of the lesion had no signal. In ADC maps, peripheral rim was hypointense and the central part was hypointese. Signal intensity of the peripheral rim was evaluated as diffusion attenuation and mean ADC value was calculated 1.11x10^{-3}mm^{2}/s. These findings were evaluated as ferromagnetic artifacts of hemorrhagic decay products (Figure 4a, b).

In single voxel ^{1}H MR spectroscopy imaging, there was no prominent choline peak at 3.2 per parts million (ppm) (Figure 4c).

The lesion was evaluated as chronic hematoma and categorized as BIRADS 2 with its hypointense rim, signal characteristics and no enhancement after contrast administration. After these radiological examinations, The patient was taken under the routine follow up procedure. For all these described processes written informed consent was obtained from patient who participated in this case.

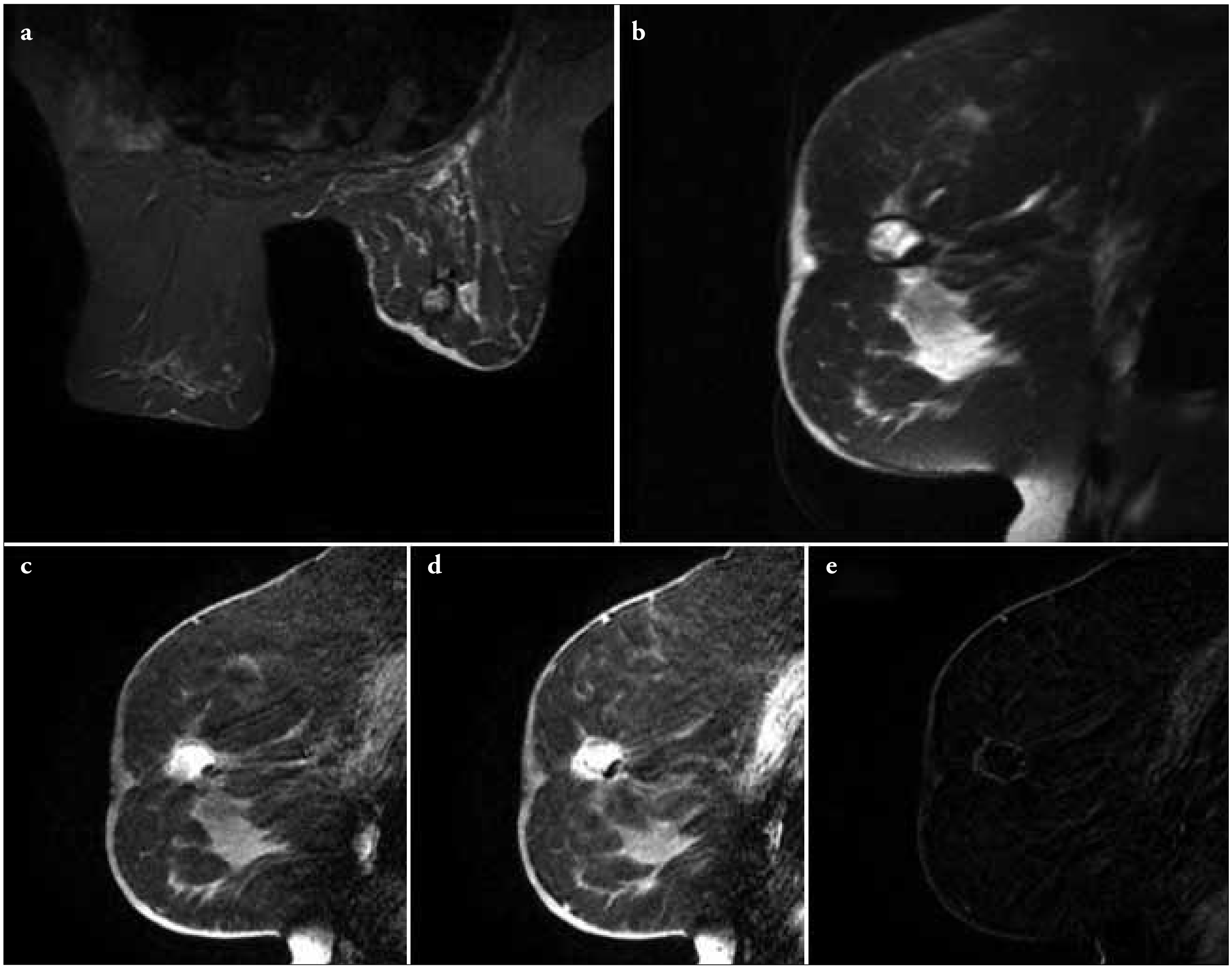

Figure 2. In axial STIR image there is a hyperintense lesion with hypointense rim on the right breast (a), In sagittal T2W image with fat suppression the lesion has the same signal characteristics with axial STIR sequence (b). Sagittal Fat Saturated Unenhanced T1W image, the lesion is hyperintense (c), sagittal Fat Saturated Enhanced T1W image, with no obvious enhancement in the lesion (d), sagittal substracted image, shows a thin hyperintense rim of enhancement (e)

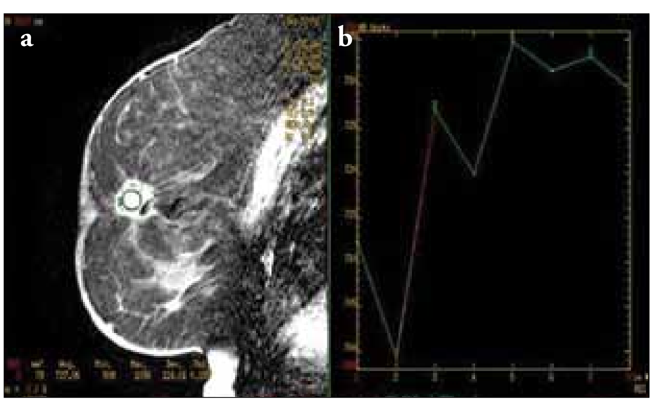

Figure 3. In sagittal Fat Saturated Enhanced T1W image, dynamic enhancement curve pattern is not compatible with any enhancement pattern. This pattern was evaluated as ferromagnetic artifacts representing hemorrhagic decay products

Discussion and Conclusions

Local recurrence of breast carcinoma after breast conservative therapy is an unwanted situation with a high possibility. Parenchymal distortion and edema secondary to surgery and radiotheraphy results in difficulties in the mammographic and US evaluation of the breast. After treatment of breast carcinoma, sensitivity of mammography decreases below the normal population. It is reported that, about 25-45% of breast carcinoma recurrences can be diagnosed by mammography (6, 7).

Breast MRI can be helpful in the discrimination of scar tissue in the region of operation from local recurrence. This is one of the first and main indications of breast MRI. In order to prevent false positive results, it is recommended that, MRI application should be planned at least 6 months after benign surgery, 18 months after breast conservative therapy and radiotheraphy. If it is constrained, these timings can be 3 months and 9 months respectively.

Radiotheraphy, is a treatment which can change the structure of breast tissue resulting in difficulties in breast imaging. Application of additional interventional examinations to these patients has its own complexities also. Dynamic breast MRI, is an non-invasive method which can evaluate whole breast tissue. Enhancement patterns of breast lesions can be helpful to reach correct diagnosis and eliminate the need to apply additional diagnostic methods (8).

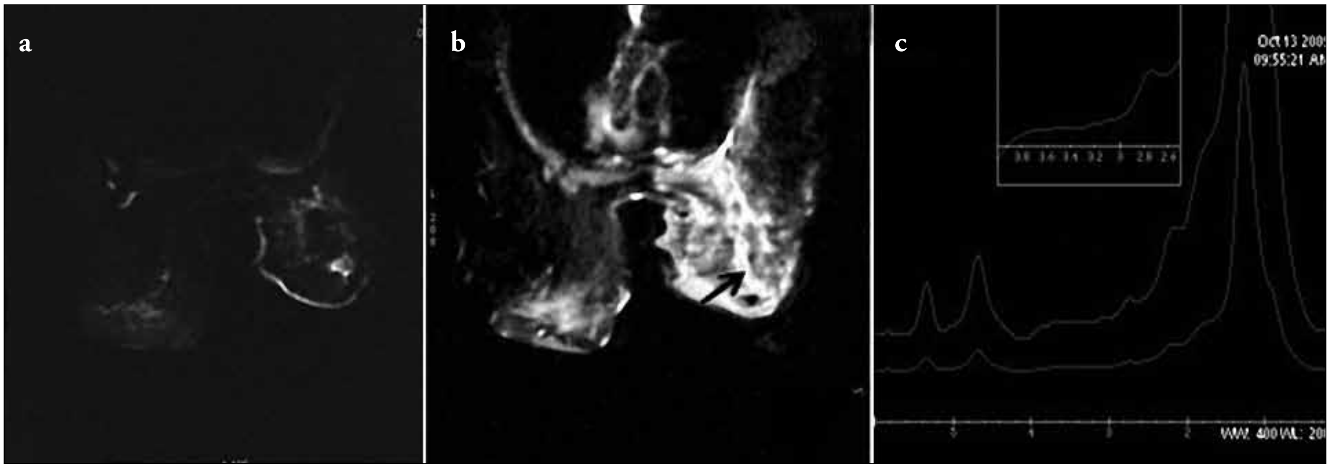

Figure 4. In DWI with b 600 value there is signal increase in the rim of the lesion on the right breast (a), in ADC map the rim of the lesion is hypointens compatible with attenuated diffusion. *Mean ADC value is 1.11 x10^{-3}mm^2/s* Central part of the lesion is hyperintense. (b), In single voxel MR spectroscopy there is no prominent choline peak at 3.2 ppm (c)

It is important to understand different MRI patterns in various stages of hemorrhage. Hemoglobin (Hb) is the main oxygen transporting protein in the blood and it is made of four different protein subunits. There is mainly ferrum atom in Hb structure. Different signal characteristics of hemorrhages in MRI depend on the structure of Hb and a variety of oxidation materials of Hb (9). In chronic hemorrhages, clot can occur after the decay of nearly whole of the protein and liquid. Ferrum atoms that come from metabolized Hb molecules accumulate in hemosiderin and ferritin molecules. Because of the sensitivity effects depends on supraparamagnetic ferrum cores, hemosiderin is hypointense in all MRI sequences in fact this effect is distinct in T2W and gradient echo sequences (10). In our case the breast lesion had a hemosiderin rim and signals compatible with chronic hematoma in the central part of the lesion. Dynamic curve pattern which was obtained from a ROI in the central part of lesion was not compatible with any defined pattern. This was evaluated secondary to ferromagnetic artifacts of hemorrhagic decay products.

Malignant tumors, which have high cellular density, show attenuated diffusion in DWI, and ADC values are low. Since the cellular density of benign lesions is low, they show no diffusion attenuation, and the ADC values are high (11, 12). In our case, the lesion was benign and as reported in the literature, there was no diffusion attenuation.

Pathological situations change the chemical contents of tissues and organ (13, 14). Choline takes part in cellular membrane turn-over and is a marker of cellular proliferation. In malignancies, choline signal increases as a result of both high intracellular phosphocholine and high cellular density in the lesion. Moreover, it was reported that high choline content was compatible with the increase of angiogenetic activity (15). However this method has false negatives and false positives due to differences in the content of the lesions as well as secondary to technical and user dependent issues. In our case, the lesion was benign and had no choline peak.

Radiotheraphy and surgery change the structure of the breast tissue considerably and this may cause difficulties in imaging resulting in the need for additional invasive diagnostic methods. Dynamic breast MRI, is an optimal method which can evaluate the whole breast tissue non-invasively, especially in the post-operative patient.

Conflict of Interest
No conflict of interest was declared by the authors.

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Informed Consent: Written informed consent was obtained from patients who participated in this case.

Author Contributions
Concept - Ş.Ö.; Design - Ş.Ö., I.B.; Supervision - Ş.Ö.; Funding - M.T.; Materials - M.T.; Data Collection and/or Processing - I.B.; Analysis and/or Interpretation - I.B., Ş.Ö.; Literature Review - I.B.; Writer - I.B.; Critical Review - Ş.Ö.

Çıkar Çatışması
Yazarlar herhangi bir çıkar çatışması bildirmemişlerdir.

Hakem değerlendirmesi: Dış bağımsız.

Hasta Onamı: Yazılı hasta onamı bu olguya katılan hastalardan alınmıştır.

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