Magnetic Resonance Imaging / Formation image de résonance magnétique

Use of Breast Magnetic Resonance Imaging in Women Diagnosed With Atypical Ductal Hyperplasia at Core Needle Biopsy Helps Select Women for Surgical Excision

Yoav Amitai, MD[a,*], Tehillah Menes, MD[b], Orit Golan, MD[a]

[a]Department of Radiology, Tel-Aviv Sourasky Medical Center, Sackler School of Medicine, Tel Aviv University, Tel Aviv, Israel
[b]Department of Surgery, Tel-Aviv Sourasky Medical Center, Sackler School of Medicine, Tel Aviv University, Tel Aviv, Israel

Abstract

Purpose: The study sought to investigate the role of breast magnetic resonance imaging (MRI) in patients diagnosed with atypical ductal hyperplasia (ADH) at core needle biopsy (CNB).
Methods: The breast MRI database at our centre was queried for studies performed between January 2010 and December 2016 for the clinical indication of ADH diagnosed at CNB. Medical files were reviewed for demographic data, clinical information, and radiology and pathology reports. Pathological results of the surgical specimens were considered the gold standard for comparison with breast MRI findings. In women not undergoing excision, at least 2 years of follow-up was used to ascertain the benign nature of the finding.
Results: Fifty patients were included in the study. Thirty-one (62%) patients had surgical excision of the ADH lesion, and 7 (23%) were upgraded to malignancy. Breast MRI accurately identified 6 of the 7 cases. Six of the 12 women (50%) with positive MRI findings at the biopsy site were upgraded to malignancy on surgical pathology, compared with only 1 of 19 (5%) with negative MRI findings. Forty-nine percent of the women with a negative MRI did not undergo surgical excision of the ADH lesion, compared with 8% of the women with a positive MRI ($P = .009$), with no cancer diagnosed during follow-up. The sensitivity, specificity, negative predictive value, and positive predictive value of breast MRI for predicting upgrade to malignancy were 86%, 83%, 97%, and 46%, respectively.
Conclusions: MRI may have a role in the management of women diagnosed with ADH on CNB, to minimize diagnostic excisional biopsies.

Résumé

Objet : L'étude évalue le rôle de l'imagerie par résonance magnétique (IRM) mammaire pour les patientes chez qui une hyperplasie canalaire atypique a été diagnostiquée par biopsie au trocart.
Méthodes : Nous avons interrogé la base de données d'IRM de notre centre afin de trouver les études réalisées entre janvier 2010 et décembre 2016 indiquant un diagnostic d'hyperplasie canalaire atypique posé à la suite d'une biopsie au trocart. Pour obtenir les données démographiques et cliniques ainsi que les résultats des rapports de radiologie et de pathologie, nous avons consulté les dossiers médicaux des patientes. Les résultats d'IRM ont été analysés par rapport aux résultats de pathologie des prélèvements chirurgicaux. Chez les femmes n'ayant pas subi d'excision, nous avons examiné au moins deux années de suivi pour nous assurer de l'absence de tumeur cancéreuse.
Résultats : L'étude a été menée auprès de 50 patientes; 31 d'entre elles (62 %) avaient subi une excision chirurgicale, dont sept (23 %) chez qui la lésion a été par la suite classée parmi les lésions malignes. L'IRM mammaire a été efficace dans six cas sur sept. Chez 6 des 12 femmes (50 %) aux résultats d'IRM positifs au site de la biopsie, la nature maligne de la lésion a été confirmée par pathologie chirurgicale, alors que chez les femmes aux résultats d'IRM négatifs, ce rapport était d'une sur 19 (5 %). Quarante-neuf pour cent des femmes aux résultats d'IRM négatifs n'ont pas subi d'excision chirurgicale, contre 8 % des femmes aux résultats d'IRM positifs ($P = .009$), et aucun cancer n'a été diagnostiqué durant le suivi. La sensibilité, la spécificité, la valeur prédictive négative et la valeur prédictive positive de l'IRM mammaire pour prévoir l'évolution de la lésion en tumeur cancéreuse ont été établies comme suit: 86 %, 83 %, 97 % et 46 % respectivement.

* Address for correspondence: Yoav Amitai, MD, Department of Radiology, Tel-Aviv Sourasky Medical Center, Sackler School of Medicine, Tel Aviv University, Weizmann 6, Tel Aviv 4946123, Israel.

E-mail address: yoavslava@yahoo.com (Y. Amitai).

Conclusion : L'IRM peut jouer un rôle dans la prise en charge des femmes ayant reçu un diagnostic d'hyperplasie canalaire atypique par suite d'une biopsie au trocart, afin de réduire au minimum le recours à l'excision-biopsie comme méthode de diagnostic.

In recent years, core needle biopsy (CNB) has become a widely used technique for the investigation of palpable and nonpalpable breast lesions. This has resulted in increased detection of high-risk lesions, ranging from 3%–9% of all breast biopsies according to different studies [1–5]. As many high-risk lesions harbor malignancy, they are typically referred for excision [6–9].

Atypical ductal hyperplasia (ADH) is included in the group of high-risk breast lesions, and is associated with variable rates of upgrade to malignancy on surgical excision (7%–65%, depending on needle diameter, size of the lesion, number of foci of ADH, and other factors), mainly to low-grade ductal carcinoma in situ (DCIS) [10–16]. This upgrade rate, caused by the limited material obtained during percutaneous biopsy, has resulted in the recommendation to excise ADH diagnosed on CNB [10–12,15–18].

The use of magnetic resonance imaging (MRI) in breast imaging has increased over the last decade. Its main advantage is its high sensitivity in detecting invasive carcinoma and DCIS [19–21]. Few studies have investigated the role of breast MRI in the characterization of high-risk breast lesions as a way to predict the likelihood of malignancy and to reduce the number of diagnostic breast surgeries [22–25]. To our knowledge, only 1 study focused on the role of breast MRI in a cohort of women with ADH [26].

The goal of this study was to investigate the role of breast MRI in patients diagnosed with ADH at CNB, and to assess its value in excluding malignancy.

Materials and Methods

This retrospective study was approved by the institutional review board at our institution.

Patient Population

The breast MRI database at our centre was queried for studies performed between January 2010 and December 2016 for the indication of ADH diagnosed at CNB. Women with newly diagnosed breast cancer or DCIS other than ADH were excluded from the study. High-risk patients were included as long as the MRI was performed for the evaluation of ADH diagnosed at CNB.

Medical files of patients included in the study were reviewed for demographic data, clinical information, and radiology and pathology reports.

Breast Biopsy

CNBs were performed using stereotactic or sonographic guidance. The breast radiologist performing the biopsy determined the type of image guidance.

Stereotactic biopsy was performed using a dedicated vacuum-assisted device (ATEC, Hologic, Bedford, MA) with a 9-gauge needle. On average 12 cores were obtained per patient.

Ultrasound (US)-guided biopsy was performed with an automatic biopsy system (Magnum biopsy instrument, Bard, Covington, GA) using a 14-gauge needle. Five cores were obtained in each procedure.

A metallic clip was inserted in all cases to mark the biopsy site. Postbiopsy mammography was performed at the discretion of the radiologist.

MRI Technique

From January 2010 to September 2014 all MRI studies were performed with a 1.5T imaging system (Signa, GE Healthcare, Milwaukee, WI), and from October 2014 onward all studies were performed with a 3T magnet (Skyra, Siemens, Erlangen, Germany). Patients were scanned in the prone position. A dedicated breast coil was used for all examinations. In premenopausal women, the scan was performed during the second week of the menstrual cycle. After obtaining axial fat-saturated T2-weighted images (repetition time/echo time 5270/89 ms or 4328/101.4 ms), an axial T1-weighted 3-dimensional gradient-echo sequence was performed before and after injection of contrast material. The image parameters from January 2010 to September 2014 were as follows: repetition time/echo time $= 8.89/1.7$ ms; flip angle $= 10°$; matrix size $= 512 \times 512$; field of view $= 38 \times 38$ cm^2. From October 2014 onward image parameters were: repetition time/echo time $= 5.3/2.4$; flip angle $= 10°$; matrix size $= 384 \times 384$; field of view $= 38 \times 38$ cm^2. For contrast-enhanced sequences, a rapid bolus injection of gadolinium-based contrast agent was used with a calculated dose of 0.2 mmol/kg of body weight and at an injection rate of 2 mL/s. Dynamic sequences included 1 precontrast and 5 postcontrast acquisitions. The first contrast enhanced dynamic sequence was performed 60 seconds after injection and was followed by 4 additional scans. Subtraction images were obtained as well. All MRI studies were processed using a commercially available computer-aided detection system (CADstream, Merge Healthcare, Chicago, IL).