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Screening breast magnetic resonance imaging in women with atypia or lobular carcinoma in situ

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ABSTRACT

Background: Atypical lesions and lobular carcinoma in situ (LCIS) are associated with an increased risk of breast malignancy. The utility of breast magnetic resonance imaging (MRI) screening in this cohort of women after excision of a high-risk lesion has not been previously established. The objective of this study was to investigate outcomes of breast MRI surveillance in this subgroup of high-risk patients.

Materials and methods: We performed a retrospective review of women who required excision of an atypical lesion or LCIS who underwent at least one screening breast MRI from April 2005–December 2011. We collected information on demographics, number of second-look imaging studies recommended, number of biopsies performed and pathologic outcomes.

Results: A total of 179 patients met the inclusion criteria, including 131 (73%) with atypical lesions and 48 (27%) with LCIS. Second-look imaging was recommended for 31 of 131 (23.7%) patients with atypical lesions and 8 of 48 (16.7%) with LCIS. Ten biopsies were performed in the atypical cohort (7.6%) with two revealing a malignancy (Positive Predictive Value [PPV] of 20%). In the LCIS cohort, five biopsies were performed (10.4%) with one revealing a malignancy (PPV of 20%).

Conclusions: The benefit of breast MRI surveillance in patients after excision of atypical lesions or LCIS has not been clearly delineated previously. Our data demonstrate that the use of screening breast MRI in this cohort results in additional work-up in one-fifth of patients, but a PPV of only 20%. Large, prospective studies would be needed to determine whether breast cancer outcomes differ between patients undergoing conventional breast screening and those undergoing conventional breast screening plus breast MRI surveillance.

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1. Introduction

Breast cancer remains the most common solid organ malignancy in the United States with 296,980 new diagnoses estimated in 2013 [1]. In the general population, lifetime risk of

breast cancer development is approximately 12%, and yearly screening mammograms are currently recommended for the asymptomatic woman after age 40 [2–4]. The recommendations for screening, however, are not as clear in women who are at an increased risk of breast cancer development.

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This includes women with a genetic predisposition [5], family history of breast cancer [6], history of mantle radiation [7], and/or high-risk pathologic lesions on breast biopsy [8]. These high-risk pathologic findings include lobular carcinoma in situ (LCIS) as well as atypical lesions, such as atypical ductal hyperplasia and atypical lobular hyperplasia. Atypical lesions confer an approximate 20% lifetime risk of breast cancer development [8], whereas LCIS has been shown to increase the risk to 25% [9]. As a result, more aggressive breast cancer surveillance strategies are often recommended in this cohort. The utility of breast magnetic resonance imaging (MRI) in this high-risk category of women has not been previously established. The objectives of this study were to investigate outcomes of breast MRI surveillance in this subgroup of high-risk patients by calculating the number of second-look imaging studies performed and biopsies recommended based on the MRI results and determining the rates of occult malignancy detection.

2. Materials and methods

After obtaining Institutional Review Board approval, we performed a retrospective review of the prospectively maintained high-risk pathologic lesions database collected at Washington University. The patients were identified based on their history of a core biopsy and subsequent excisional biopsy showing any atypical lesion (atypical ductal hyperplasia and atypical lobular hyperplasia) or LCIS. Women diagnosed with one of these lesions who also underwent at least one screening breast MRI after excision from April 2005–December 2011 at the Siteman Cancer Center at Washington University were selected. Patients with known BRCA gene mutations or hereditary cancer syndromes were excluded, but patients with a family history of breast cancer (at least one first-degree relative) were included. However, none of the patients with familial risk underwent breast MRI before their personal finding of atypia or LCIS. The breast MRI was used for screening purposes, given the elevated lifetime risk of breast cancer development associated with these lesions, only after the high-risk lesion had been fully excised. We collected information on age, Gail model lifetime risk assessment for women with atypical lesions, number of second-look imaging studies recommended after MRI, number of image guided biopsies performed and pathologic findings for each biopsy.

3. Results

One hundred seventy-nine patients met the inclusion criteria, including 131 (73%) with previous atypical lesions and 48 (27%) with previous LCIS. The median age of women in the atypical cohort was 45 with a range of 18–67, whereas in the LCIS cohort, the median age was 46 with a range of 22–76. Gail lifetime risk assessment scores were calculated for the patients in the atypical cohort. The median Gail risk score was 21.6% with a range of 7.3%–45.8%. Gail scores were not calculated for the LCIS cohort because of the lack of validation of this risk assessment model in this subgroup of patients.

After the first MRI, second-look imaging, which is defined as targeted imaging focused on a new lesion that was occult

Table 1 – Pathologic results of biopsies performed on MRI-detected abnormalities.

Previous history of atypical lesions N = 10	Previous history of LCIS N = 5
Ductal carcinoma in situ	Ductal carcinoma in situ
Invasive tubular carcinoma	Stromal fibrosis
Sclerosing adenosis	Stromal fibrosis
Intraductal papilloma	Stromal fibrosis
Fibroadenoma	Breast cyst
Stromal fibrosis	
Stromal fibrosis	
Stromal fibrosis	
Stromal fibrosis	
Apocrine metaplasia	

on previous mammography, was recommended in 31 of 131 (23.7%) patients in the atypical cohort and 8 of 48 (16.7%) in the LCIS cohort. This led to 10 biopsies in the atypical group (7.6%) with 2 biopsies revealing a malignancy with ductal carcinoma in situ and invasive tubular carcinoma, respectively (PPV of 20%). In the LCIS cohort, five biopsies were performed (10.4%) with one showing malignant pathology with ductal carcinoma in situ (PPV of 20%). The benign biopsy results showed sclerosing adenosis, intraductal papillomas, fibroadenomas, stromal fibrosis, apocrine metaplasia, and fibrocystic changes. See Table 1 for an outlined description.

A total of 48 patients had at least two MRIs, including 40 patients with a previous diagnosis of atypia and 8 patients with a history of LCIS. In the atypia cohort, four patients (10%) required second-look imaging studies and all four underwent an image guided biopsy. No malignancies were found on biopsy after the second MRI. The benign pathologic findings included intraductal papillomas, dense fibrous tissue, stromal fibrosis, and fibroadenoma. Two patients (25%) in the LCIS cohort who underwent a second MRI required second-look imaging and neither required a biopsy. A third MRI was performed in six patients with atypia, one of which (16.7%) required second-look imaging. No biopsies were performed. A fourth MRI was done in two patients and a fifth

Table 2 – MRI studies conducted and biopsies performed.

MRI	Atypical lesions	LCIS
MRI number 1	131	48
2nd look imaging required, n (%)	31 (23.7)	8 (16.7)
Biopsy performed	10	5
Cancers detected	2	1
MRI number 2	40	8
2nd look imaging required, n (%)	4 (10)	2 (25)
Biopsy performed	4	0
Cancers detected	0	N/A
MRI number 3	6	4
2nd look imaging required, n (%)	1 (16.7)	0
Biopsy performed	0	0
MRI number 4	2	2
2nd look imaging required, n (%)	0	0
MRI number 5	1	0
2nd look imaging required, n (%)	0	N/A

N/A = not applicable.

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