MRI Characteristics of BRCA – Associated Breast Cancers


Abstract

Background:
Magnetic Resonance Imaging (MRI) is the preferred imaging modality for monitoring and diagnosing breast cancer, especially in BRCA1 and BRCA2 mutation carriers. However, there is limited data on the radiographic features of BRCA-related breast cancers on MRI. This study evaluates the MRI characteristics of BRCA1/2-related breast cancers.

Methods:
A variety of BRCA-related breast tumors were morphologically similar to triple negative breast cancer (TNBC). The characteristics of tumors were more homogeneous and showed less heterogeneous enhancement than TNBC. MRI findings of BRCA-related breast cancers demonstrated variable characteristics. Hence any abnormality on MRI should be viewed with suspicion in these high-risk patients and warrant biopsy for histopathological confirmation.

Results:
A majority of BRCA-associated breast tumors had irregular shape and margin, showing contrast enhanced heterogeneity. Dynamic enhancement was not analyzed.

Conclusions:
Despite having a higher frequency of triple negative breast tumors in our cohort, our patterns did not demonstrate the previously described characteristics of triple negative tumors i.e. smooth margins, ring enhancement and high intratumoral vascularity. MRI findings of BRCA-related breast cancers demonstrate variable characteristics. Hence any abnormality detected on MRI should be viewed with suspicion in these high-risk patients and warrant biopsy for histopathological confirmation.

Introduction

The breast cancer susceptibility genes, BRCA1 and BRCA2, are believed to be responsible for majority of hereditary breast/ovarian cancer (1). For BRCA-2 mutation carriers the risk of developing breast cancer by age 55 years is 65%/95% confidence interval 44%-78% (2). The risk for BRCA-2 mutation carriers is 39%/53% (95% confidence interval 25%-59%) (3), which can be higher if the index breast cancer case was diagnosed at an age less than 53 years (4).

Several studies have demonstrated that Magnetic Resonance Imaging (MRI) is the preferred imaging modality for monitoring and diagnosis of breast cancer in BRCA-1 and BRCA-2 mutation carriers. However, there is limited data on the radiographic features of BRCA-related breast cancers on MRI. This study evaluates the MRI characteristics of BRCA1/2-related breast cancers. Methods:

All females BRCA-related cancer patients with a prior breast cancer were included in the study. MRI examination of all patients was performed prospectively at Beaumont Hospital between April 2011 and January 2013, which included a routine exam and a targeted breast MRI examination. T2-weighted images were interpreted by an evaluation radiologist for the following: a) characteristics of tumor shape, margins enhancement.

Review of Literature:
Previous studies have reported BRCA-related breast cancers are more homogeneous and show less heterogeneous enhancement than TNBC. MRI findings of BRCA-related breast cancers demonstrated variable characteristics. Hence any abnormality detected on MRI should be viewed with suspicion in these high-risk patients and warrant biopsy for histopathological confirmation.

Conclusions:
Future research is needed to further elucidate the unique MRI characteristics of BRCA-related cancers.

Results:
A majority of BRCA-associated breast tumors had irregular shape and margin, showing contrast enhanced heterogeneity. Dynamic enhancement was not analyzed.

Conclusions:
Despite having a higher frequency of triple negative breast tumors in our cohort, our patterns did not demonstrate the previously described characteristics of triple negative tumors i.e. smooth margins, ring enhancement and high intratumoral vascularity. The differences between our study findings and prior reports may be explained by small size or population differences.

MRI findings of BRCA-related breast cancers demonstrate variable characteristics. Hence any abnormality detected on MRI should be viewed with suspicion in these high-risk patients and warrant biopsy for histopathological confirmation.

Table 1: MRI characteristics

<table>
<thead>
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<th>BRCA-1</th>
<th>BRCA-2</th>
<th>Total (n=49)</th>
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</thead>
<tbody>
<tr>
<td>Round</td>
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<td>2</td>
</tr>
<tr>
<td>Lobulated</td>
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<td>3</td>
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<tr>
<td>Irregular</td>
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<td>17</td>
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<tr>
<td>Heterogeneous</td>
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<td>13</td>
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<tr>
<td>Smooth</td>
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<td>4</td>
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<tr>
<td>Lobulated</td>
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<td>3</td>
</tr>
<tr>
<td>Round</td>
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<tr>
<td>Total</td>
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Table 2: Pathological characteristics

<table>
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<th>BRCA-1</th>
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<tbody>
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<td>Pure DCIS</td>
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<td>3</td>
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<tr>
<td>Ductal carcinoma in situ</td>
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<td>18</td>
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<tr>
<td>Invasive cancer</td>
<td>28</td>
<td>28</td>
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References: