Comparison of Preoperative ABUS and MRI in Newly Diagnosed Women with Breast Cancer

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Abstract

Background: Women with newly diagnosed breast cancer may harbor additional sites of malignancy that are missed by mammography (MMG) in either the affected or contralateral breast. Supplemental imaging modalities, such as magnetic resonance imaging (MRI) or hand-held whole breast sonogram (US), add diagnostic value to MMG, but have many disadvantages that limit their widespread implementation. In women without a known diagnosis of breast cancer, Automated Breast Sonography (ABUS), in addition to MMG, has been shown to double the screening detection rate for breast cancer as compared to MMG alone. The purpose of this study was to compare the overall sensitivity and specificity of ABUS to MRI for detection of ipsilateral and contralateral occult breast cancer in newly diagnosed breast cancer patients. ABUS has potential to provide a relatively inexpensive and well-tolerated alternative to MRI in women with newly diagnosed breast cancer.

Methods: This is a prospective single institution study enrolling women >18 years of age from 2013-2016 with a new diagnosis of breast cancer. Participating women underwent both MRI and ABUS (Arm 1) or ABUS alone (Arm 2) if MRI was contraindicated or not tolerated. Occult lesions seen on supplemental imaging were evaluated by experienced breast radiologists and clinical correlation was used to determine the need for additional biopsy to document extent of disease, or change in surgical plan to include excision of the additional lesion. We anticipated ABUS would identify at least 75% of the occult breast cancer identified by MRI.

Results: A total of 110 women diagnosed with breast cancer consented to receive supplemental imaging with either MRI+ABUS (Arm 1, n=91) or ABUS alone (Arm 2, n=19). There were 49 occult breast lesions detected by either ABUS or MRI (39 ipsilateral and 10 contralateral). Of the 49 occult lesions, 30 underwent additional percutaneous biopsy to document extent of disease. The remaining 19 were either presumed malignant or surgical excision with mastectomy was already planned and further sampling was not clinically necessary. The sensitivity of ABUS and MRI to detect occult breast cancer was determined using McNemar’s test. The sensitivity of ABUS to detect additional occult breast cancer in women with a known diagnosis of breast cancer is 18.2% (95% CI 7.6-46%). None of the occult lesions identified by ABUS alone that underwent biopsy were malignant (n=3). Of the 14 biopsy proven occult breast cancers found on MRI, only 2 were also seen on ABUS.

Conclusion: MRI is far superior to ABUS in the detection of occult foci of breast cancer when a woman has a known diagnosis of breast cancer. Many of the additional occult foci detected on MRI were not seen on ABUS. If MRI is contraindicated in a woman with a known breast cancer, ABUS could be used for supplemental imaging if indicated. However, the sensitivity of ABUS for occult breast cancer is significantly lower than MRI, and ABUS should not replace MRI for women who can tolerate this exam.

Acknowledgements

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Objectives

• Mammogram and ultrasound may undercall the size of a breast cancer and may miss additional foci in the ipsilateral or contralateral breast (occult foci)
• Rate of detection of occult breast cancer by MRI is 15% in the ipsilateral breast and 3-4% in the contralateral breast
• MRI has limitations including cost, availability of this resource, and patient factors such as weight, body habitus, claustrophobia, gadolinium sensitivity, and certain implantable device incompatibility
• ABUS has been used in the screening setting, and improves cancer detection by a factor of 2 to mammographic screening alone
• ABUS may be a cheaper, more well tolerated alternative exam to MRI to detect occult foci in a woman with a known breast cancer

Methods

• Single institution, prospective study
• Inclusion criteria
  • Women >18 years of age
  • Known diagnosis of breast cancer
  • Enrolled from 2013-2016
• Exclusion criteria
  • Pregnant women
  • Males
• Arm 1: MRI and ABUS
• Arm 2: ABUS alone (MRI either contraindicated or not tolerated)
• Occult lesions were evaluated by experienced breast radiologists and underwent additional biopsy or documented change in surgical plan
• We predicted ABUS would identify at least 75% of occult breast cancer detected by MRI

Results

<table>
<thead>
<tr>
<th>Occult Lesions</th>
<th>ABUS Detected/Positive</th>
<th>ABUS Not-detected/Negative</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detected/Positive</td>
<td>2</td>
<td>38</td>
<td>40</td>
</tr>
<tr>
<td>Not-detected/Negative</td>
<td>9</td>
<td>22</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>38</td>
<td>49</td>
</tr>
</tbody>
</table>

Conclusions

• MRI is far superior to ABUS in the detection of occult foci of breast cancer
• ABUS sensitivity for detection of occult breast cancer is only 18%
• ABUS should not replace MRI in women with a diagnosis of breast cancer, who can tolerate this exam