American College of Radiology: Criteria for Breast Implant MRI

Stamatia V. Destounis, MD, FACR
American College of Radiology
Elizabeth Wende Breast Care, LLC.
Background: ACR Appropriateness Criteria

• In the 1990s, the American College of Radiology (ACR) saw a need for national guidance for appropriate use of imaging technologies

• Created ACR Task Force on Appropriateness Criteria
  • Panels made of multidisciplinary experts, including those representing other specialty medical societies (OB/GYN, Oncology, Internal Med, Surgery etc.)

• Guideline development and revisions made by extensive literature review and application of established methodologies
  • When evidence is lacking or equivocal, expert opinion and consensus may supplement
Background: ACR Appropriateness Criteria

• After extensive research and deliberation, the panel gives an appropriateness rating for imaging and treatment procedures for specific clinical scenarios

• Currently, ACR AC includes 186 diagnostic imaging and interventional radiology topics with 914 clinical variants and over 1,600 clinical scenarios

• As medicine is a dynamic field, yearly reviews and revisions are made; new topics introduced frequently
  • Breast Implant Evaluation Criteria – New for 2018
Background: ACR Appropriateness Criteria

• Intended to guide radiologists, radiation oncologists and referring physicians in making decision regarding radiologic imaging and treatment

• Ultimate decision regarding appropriateness must be made by referring physician and radiologist in light of all circumstances presented in an individual exam
MR Imaging Evaluation of Breast Implants

• Breast MRI – high spatial, tissue resolution; no radiation; ability to suppress or emphasize signal from water, fat, silicone = ideal for evaluation of implants
  • Variable sensitivity, specificity and accuracy reported

• Rietjens M et al. – accuracy of 94%
• Scaranelo AM et al. – sensitivity of 64%, specificity of 77%
• Holmich LR et al. – accuracy of 92%, sensitivity of 89%, specificity of 97%, PPV of 99%, NPV or 79%
2018 ACR Appropriateness Criteria: Breast Implant Evaluation

- MRI Usually Not Appropriate
  - Evaluation of saline implants
    - No imaging indicated for asymptomatic patient
    - Symptomatic - no role for MRI – recommend mammography or US
  - Evaluation of silicone implants in asymptomatic patient
    - Benefits of screening for rupture controversial – limited data – no clear role at this time
      - Shared decision making with a patient-centered decision vs. generalized recommendations
ACR Appropriateness Criteria: Breast Implant Evaluation

• Rupture one of main complications of implants
  • Risk increases with age of implant, most ruptures occur 10-15 years post-placement

• Evaluation of symptomatic patient with silicone implant – MRI indicated
### ACR Appropriateness Criteria: Breast Implant Evaluation

**Variant 6:** Evaluation of silicone breast implants. Suspected implant complication. Age younger than 30 years. Initial imaging.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI breast without IV contrast</td>
<td>Usually Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>US breast</td>
<td>Usually Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>Mammography diagnostic</td>
<td>Usually Not Appropriate</td>
<td>⚫⚫⚫</td>
</tr>
<tr>
<td>Digital breast tomosynthesis diagnostic</td>
<td>Usually Not Appropriate</td>
<td>⚫⚫⚫</td>
</tr>
<tr>
<td>MRI breast without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>O</td>
</tr>
</tbody>
</table>
ACR Appropriateness Criteria: Breast Implant Evaluation

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI breast without IV contrast</td>
<td>Usually Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>Mammography diagnostic</td>
<td>Usually Appropriate</td>
<td>☀️</td>
</tr>
<tr>
<td>Digital breast tomosynthesis diagnostic</td>
<td>Usually Appropriate</td>
<td>☀️</td>
</tr>
<tr>
<td>US breast</td>
<td>Usually Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>MRI breast without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>O</td>
</tr>
</tbody>
</table>
# ACR Appropriateness Criteria: Breast Implant Evaluation

**Variant 8:**
*Evaluation of silicone breast implants. Suspected implant complication. Age 40 years or older. Initial imaging.*

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI breast without IV contrast</td>
<td>Usually Appropriate</td>
<td>0</td>
</tr>
<tr>
<td>Digital breast tomosynthesis diagnostic</td>
<td>Usually Appropriate</td>
<td>🌟🌟</td>
</tr>
<tr>
<td>Mammography diagnostic</td>
<td>Usually Appropriate</td>
<td>🌟🌟</td>
</tr>
<tr>
<td>US breast</td>
<td>May Be Appropriate (Disagreement)</td>
<td>O</td>
</tr>
<tr>
<td>MRI breast without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td>O</td>
</tr>
</tbody>
</table>
MR Image Evaluation

- To diagnose rupture, need to confirm in two planes
  - Axial and sagittal planes
  - Rupture on one plane may represent a fold

- Imaging should include both water and silicone-specific sequences
Evaluation of Rupture with MRI – Intracapsular Rupture

- Requires breast MRI evaluation (very challenging to diagnose with US (“step-ladder”), and mammography not routinely used to diagnose)

- On MRI, presence of multiple curvilinear low signal intensity lines within the T2 bright silicone (linguine sign) = complete rupture
  - Curvilinear lines = collapsed implant membrane
  - Signs of minimally collapsed intracapsular rupture – “tear drop”, “keyhole”, “subcapsular line sign”
Intracapsular Rupture

Linguine sign
Evaluation of Rupture with MRI – Extracapsular Rupture

• Patient may present with palpable masses or changes in breast contour
  • Diagnosis can often be made by mammography and/or US as high-density silicone is identified outside the implant shell (“snowstorm pattern”)

• On MRI, visualized as discrete foci of isointense to low signal intensity on T1 fat-suppressed images; high signal intensity on water-suppressed T2 images
Extracapsular Rupture

Sag T2 water sat
Suspected breast implant associated anaplastic large-cell lymphoma (BIA-ALCL)

• 2016 WHO classified BIA ALCL as a newly recognized entity – data limited and still evolving – most reported cases associated with textured implants

• Entity is rare T-cell lymphoma, most often presents with delayed peri-implant effusion (>1 year post surgery)

• Early recognition critical - diagnosis can be made from cytological analysis of fluid, patients with disease limited to implant capsule have better prognosis
ACR Appropriateness Criteria: Breast Implant Evaluation

- Suspected breast implant associated anaplastic large-cell lymphoma (BIA-ALCL)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>US breast</td>
<td>Usually Appropriate</td>
<td>O</td>
</tr>
<tr>
<td>Digital breast tomosynthesis diagnostic</td>
<td>May Be Appropriate</td>
<td>🌟🌟</td>
</tr>
<tr>
<td>Mammography diagnostic</td>
<td>May Be Appropriate (Disagreement)</td>
<td>🌟🌟</td>
</tr>
<tr>
<td>MRI breast without and with IV contrast</td>
<td>May Be Appropriate (Disagreement)</td>
<td>O</td>
</tr>
<tr>
<td>MRI breast without IV contrast</td>
<td>Usually Not Appropriate</td>
<td>O</td>
</tr>
</tbody>
</table>

- MRI can be considered if US is equivocal or nondiagnostic
Thank You
research@ewbc.com