

# American College of Radiology: Criteria for Breast Implant MRI

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# 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.

Procedure	Appropriateness Category	Relative Radiation Level
MRI breast without IV contrast	Usually Appropriate	○
US breast	Usually Appropriate	○
Mammography diagnostic	Usually Not Appropriate	⊕⊕
Digital breast tomosynthesis diagnostic	Usually Not Appropriate	⊕⊕
MRI breast without and with IV contrast	Usually Not Appropriate	○



# ACR Appropriateness Criteria: Breast Implant Evaluation

**Variant 7:**

**Evaluation of silicone breast implants. Suspected implant complication. Age 30–39 years. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
MRI breast without IV contrast	Usually Appropriate	○
Mammography diagnostic	Usually Appropriate	⊕⊕
Digital breast tomosynthesis diagnostic	Usually Appropriate	⊕⊕
US breast	Usually Appropriate	○
MRI breast without and with IV contrast	Usually Not Appropriate	○

# ACR Appropriateness Criteria: Breast Implant Evaluation

**Variant 8:**

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

Procedure	Appropriateness Category	Relative Radiation Level
MRI breast without IV contrast	Usually Appropriate	○
Digital breast tomosynthesis diagnostic	Usually Appropriate	⊕⊕
Mammography diagnostic	Usually Appropriate	⊕⊕
US breast	May Be Appropriate (Disagreement)	○
MRI breast without and with IV contrast	Usually Not Appropriate	○

# MR Image Evaluation

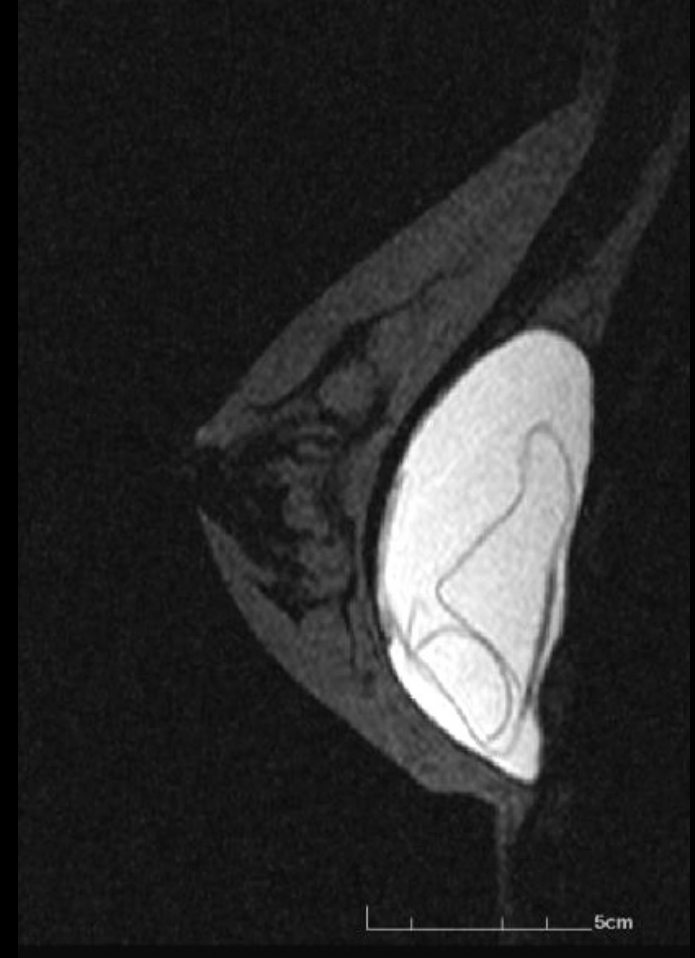
- To diagnose rupture, need to confirm in two planes
  - Axial and sagittal planes
  - Rupture on one plane may represent a fold
- Imaging should include both water and silicone-specific sequences



# 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

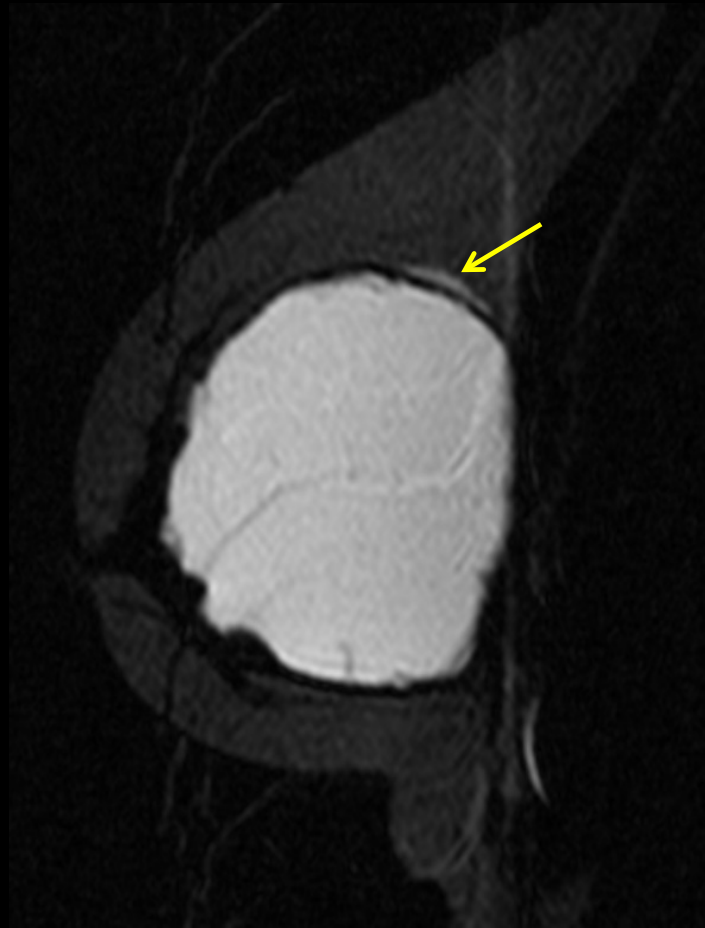


Linguine sign

# 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)

**Variant 12:**

**Suspected breast implant associated anaplastic large-cell lymphoma (BIA-ALCL) (delayed seroma, swelling, mass, pain but no erythema, warmth or skin changes that would raise concern for inflammatory breast cancer or mastitis). Any age. Breast implant of any type. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
US breast	Usually Appropriate	○
Digital breast tomosynthesis diagnostic	May Be Appropriate	⊕⊕
Mammography diagnostic	May Be Appropriate (Disagreement)	⊕⊕
MRI breast without and with IV contrast	May Be Appropriate (Disagreement)	○
MRI breast without IV contrast	Usually Not Appropriate	○

- MRI can be considered if US is equivocal or nondiagnostic

Thank You  
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