

AMSER Case of the Month

November 2025

63 year old female patient presenting for follow up s/p bilateral mastectomy with implant breast reconstruction

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AMSER

Patient Presentation

HPI: 63 year old women presents for implant integrity screening. She is s/p bilateral mastectomy with silicone breast implant reconstruction for DCIS diagnosed 9 years ago.

PMHx: stroke, aneurysm, Graves disease s/p thyroidectomy, history of tobacco use

Medications: aspirin, levothyroxine, ticagrelor

FHx: mother with breast cancer, father had prostate cancer, skin cancer in both brother and sister

PE: None

Pertinent Labs

- No pertinent labs

What Imaging Should We Order?

ACR Appropriateness Criteria

Scenario	Scenario ID	Procedure	Adult RRL	Peds RRL	Appropriateness Category
Breast implant evaluation, silicone, asymptomatic, negative imaging 5 to 6 yrs after implant placement, follow-up imaging every 2 to 3 yrs	3196614	● US breast	0 mSv 0	0 mSv [ped] 0	Usually appropriate
		● MRI breast without IV contrast	0 mSv 0	0 mSv [ped] 0	Usually appropriate
		● Digital breast tomosynthesis diagnostic	0.1-1mSv ☼☼		Usually not appropriate
		● Mammography diagnostic	0.1-1mSv ☼☼		Usually not appropriate
		● MRI breast without and with IV contrast	0 mSv 0	0 mSv [ped] 0	Usually not appropriate

US was used to initially evaluate implant integrity

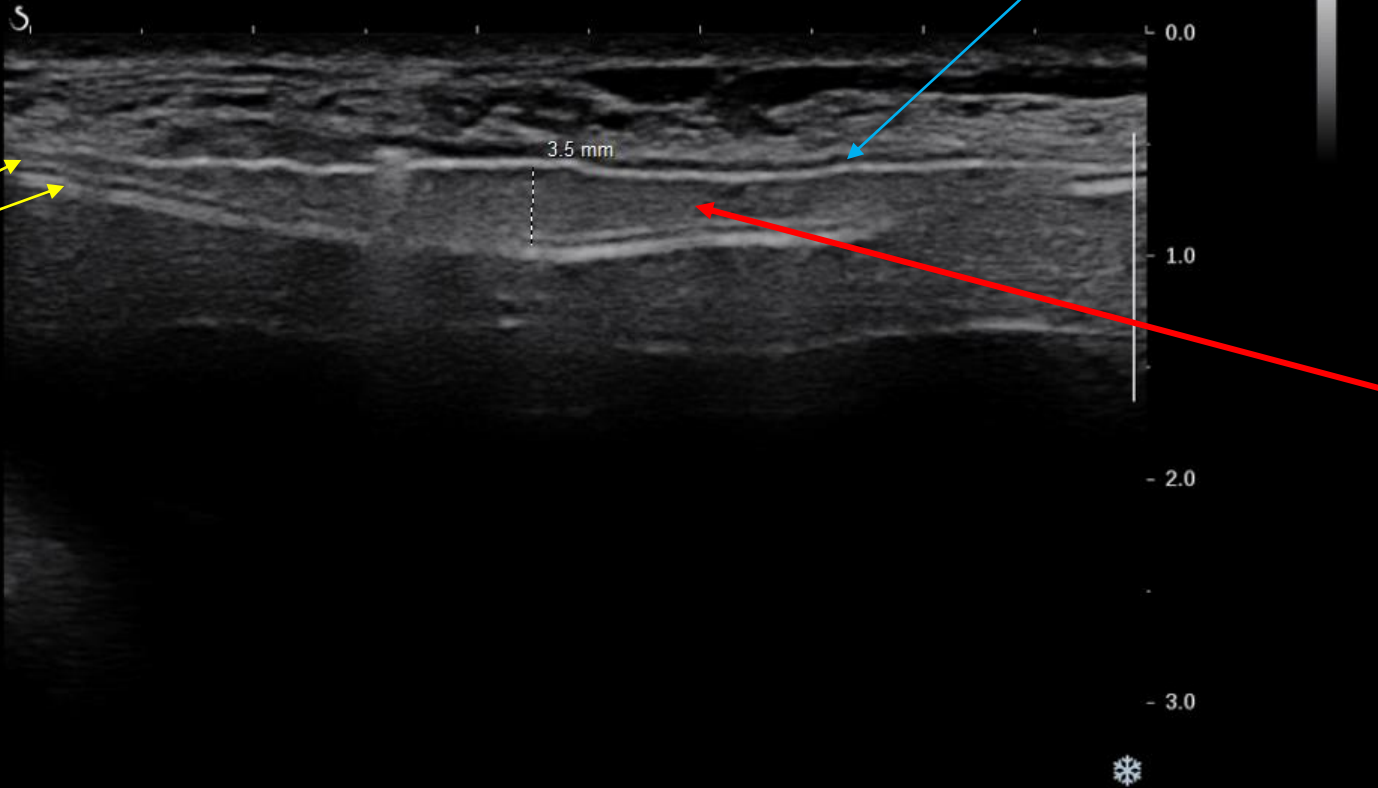
Findings (unlabeled)



Findings (labeled)

B
Pen/Med
M 3/67 dB/Med
T 1480 m/s
SC/SR 5
G 30 %
Fr. 42 Hz

Z 132 %



This thin echogenic line represents the implant capsule

These two echogenic lines represent the inner and out surfaces of the shell of the implant

Homogeneous echoes in-between the capsule (blue line) and the shell (yellow lines) represents silicone and is consistent with an intracapsular breast implant rupture.

Fr: 710/710

4/14/2025 10:13:29
MG00071
Key # 1/1

RT 2:00 RADIAL

4/14/2025
ORIGINAL/PRIMARY



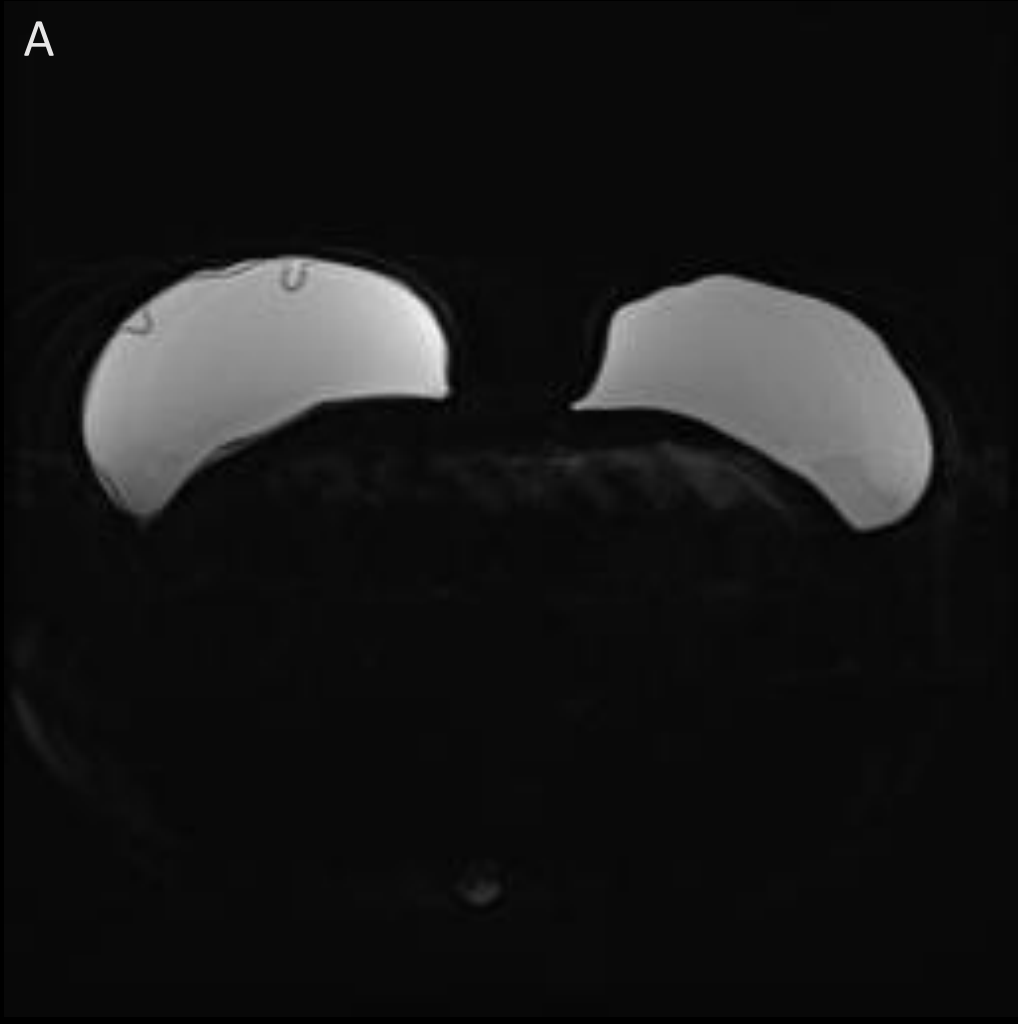
ACR Appropriateness Criteria

Scenario	Scenario ID	Procedure	Adult RRL	Peds RRL	Appropriateness Category
Breast implant evaluation, silicone, complication suspected, initial imaging	3196617	● MRI breast without IV contrast	0 mSv ○	0 mSv [ped] ○	Usually appropriate
		● US breast	0 mSv ○	0 mSv [ped] ○	May be appropriate (Disagreement)
		● Digital breast tomosynthesis diagnostic	0.1-1mSv ☼☼		May be appropriate (Disagreement)
		● Mammography diagnostic	0.1-1mSv ☼☼		May be appropriate (Disagreement)
		● MRI breast without IV contrast and with IV contrast	0 mSv ○	0 mSv [ped] ○	Usually not appropriate

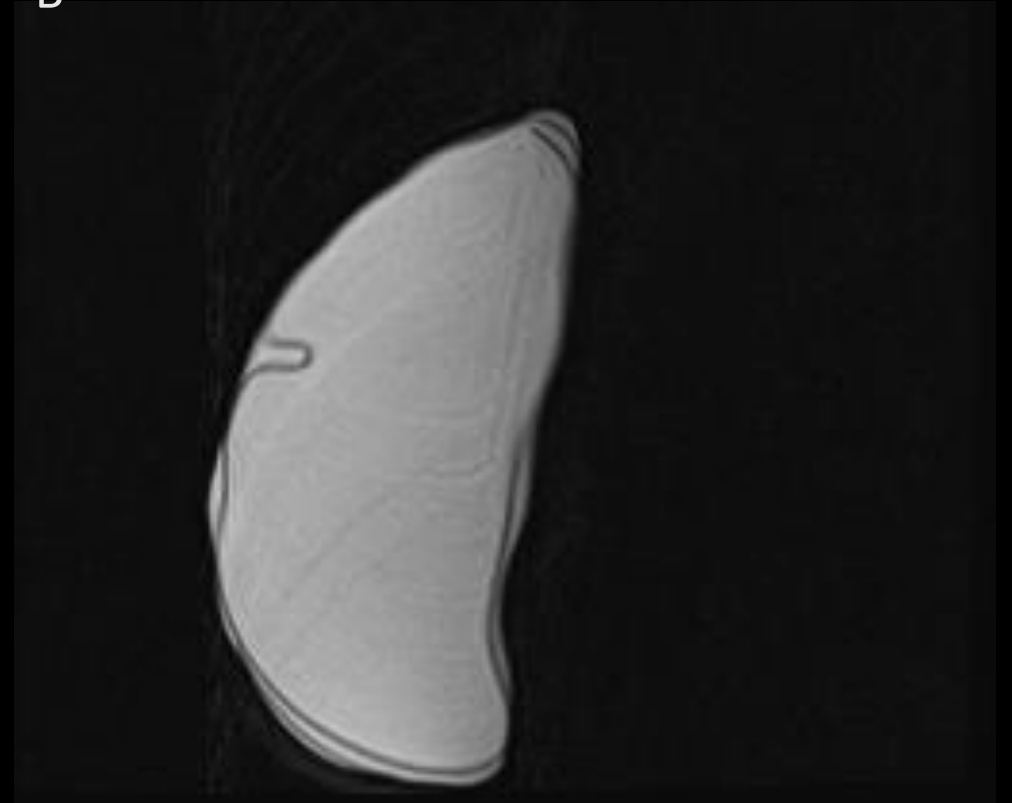
MRI following US findings to confirm suspected rupture

Findings (unlabeled)

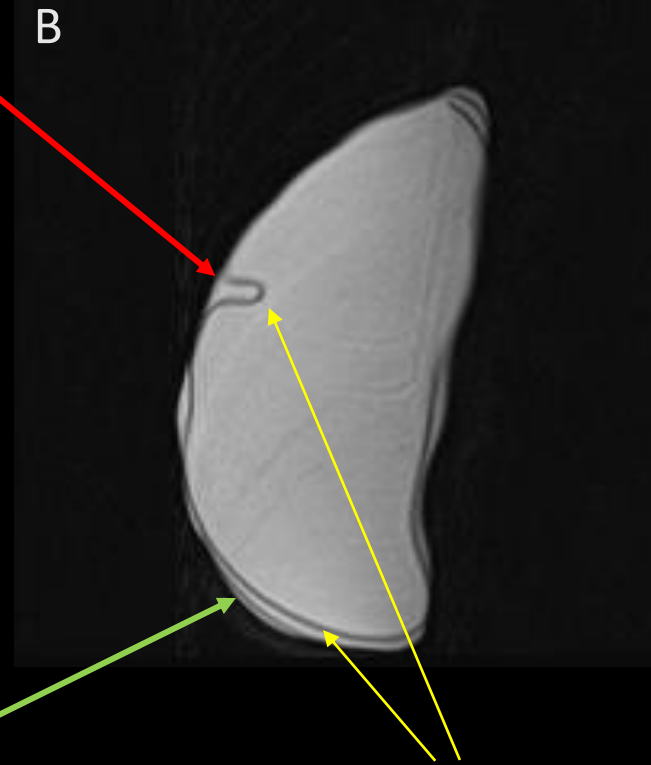
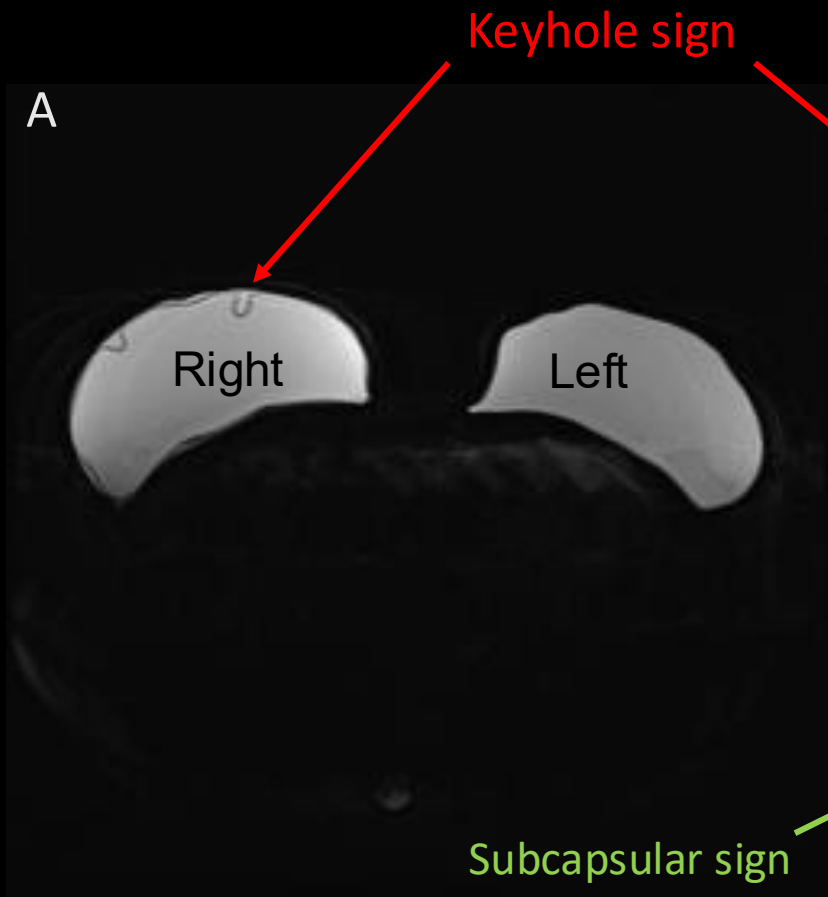
A



B



Findings (labeled)



A. Axial silicone sensitive MRI (silicone bright) sequence shows keyhole and subcapsular line signs on the right indicating intracapsular breast implant rupture. While silicone is seen outside the shell, the capsule remains intact (silicone is not seen outside the capsule).

B. Sagittal silicone sensitive MRI sequence again showing findings of keyhole and subcapsular line signs.

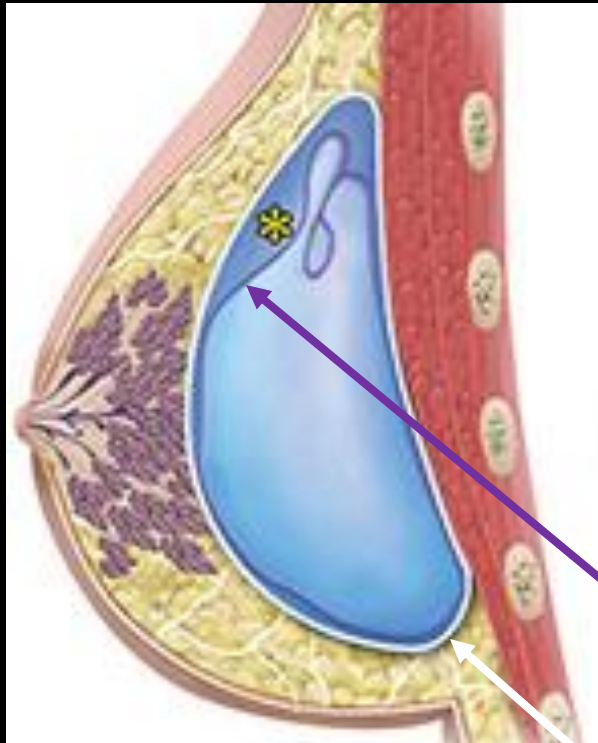
These curvilinear lines within the bright silicone represent the shell of the implant. On silicone sensitive MRI sequences, the implant capsule is black and blends in with the background.

Final Dx:

Right intracapsular breast implant rupture

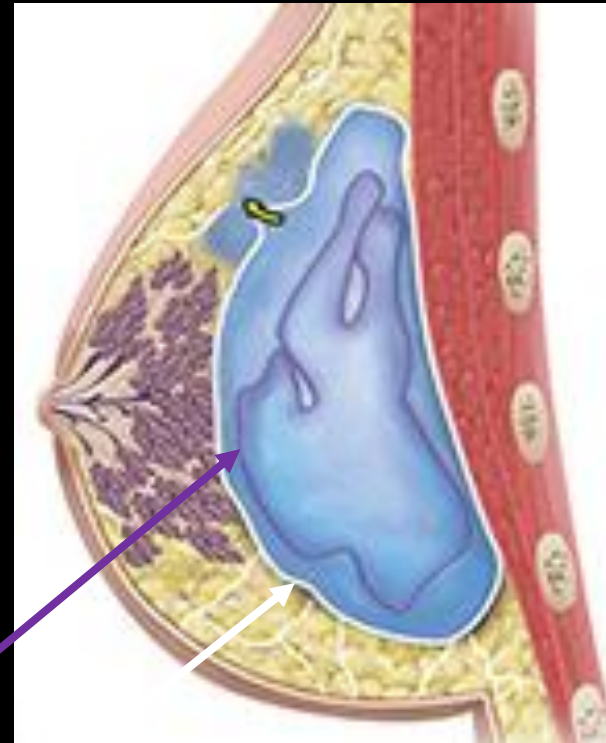
Intracapsular vs. Extracapsular Rupture

Intracapsular



- Intracapsular breast implant rupture occurs when a defect occurs in the implant shell (purple) but the fibrous capsule (white) remains intact.
- Silicone (yellow star) is outside the shell but contained within the capsule

Extracapsular



- Extracapsular rupture occurs when there is rupture of the shell (purple) and the fibrous capsule (white) leading to extravasation of silicone into the surrounding tissue (yellow arrow)

Implant shell

Fibrous capsule

Intracapsular Breast Implant Rupture Imaging Findings

- Mammogram
 - Least sensitive modality to detect intracapsular breast implant rupture
 - Due to the density of silicone, intracapsular rupture cannot be seen
 - Contour change of implant could indicate a problem

Intracapsular Breast Implant Rupture Imaging Findings

- Ultrasound

- A normal implant exhibits a smooth contour outlined by a trilaminar margin, which corresponds to the capsule-shell complex
- When a defect in the shell occurs (intracapsular rupture), silicone can escape into the space between the shell and the capsule distorting the tri-laminar margin.
 - Keyhole or noose signs – earliest signs of intracapsular rupture within a fold
 - Subcapsular line sign – separation of the capsule and shell by silicone
 - Stepladder sign – as an intracapsular rupture develops and silicone continues to extrude out of shell, the shell invaginates producing a series of echogenic lines

Intracapsular Breast Implant Rupture Imaging Findings

- MRI

- Most sensitive modality to detect intracapsular breast implant rupture
- Silicone sensitive sequences are used where only silicone is bright
- MRI signs of intracapsular implant rupture (see next slide)
 - Keyhole or noose sign – silicone within a radial fold (earliest sign with defect in shell only in the fold)
 - Subcapsular line sign – defect in shell along margin causing shell to separate from capsule with silicone in-between capsule and shell
 - Linguine sign – advanced intracapsular rupture with multiple infoldings of the shell

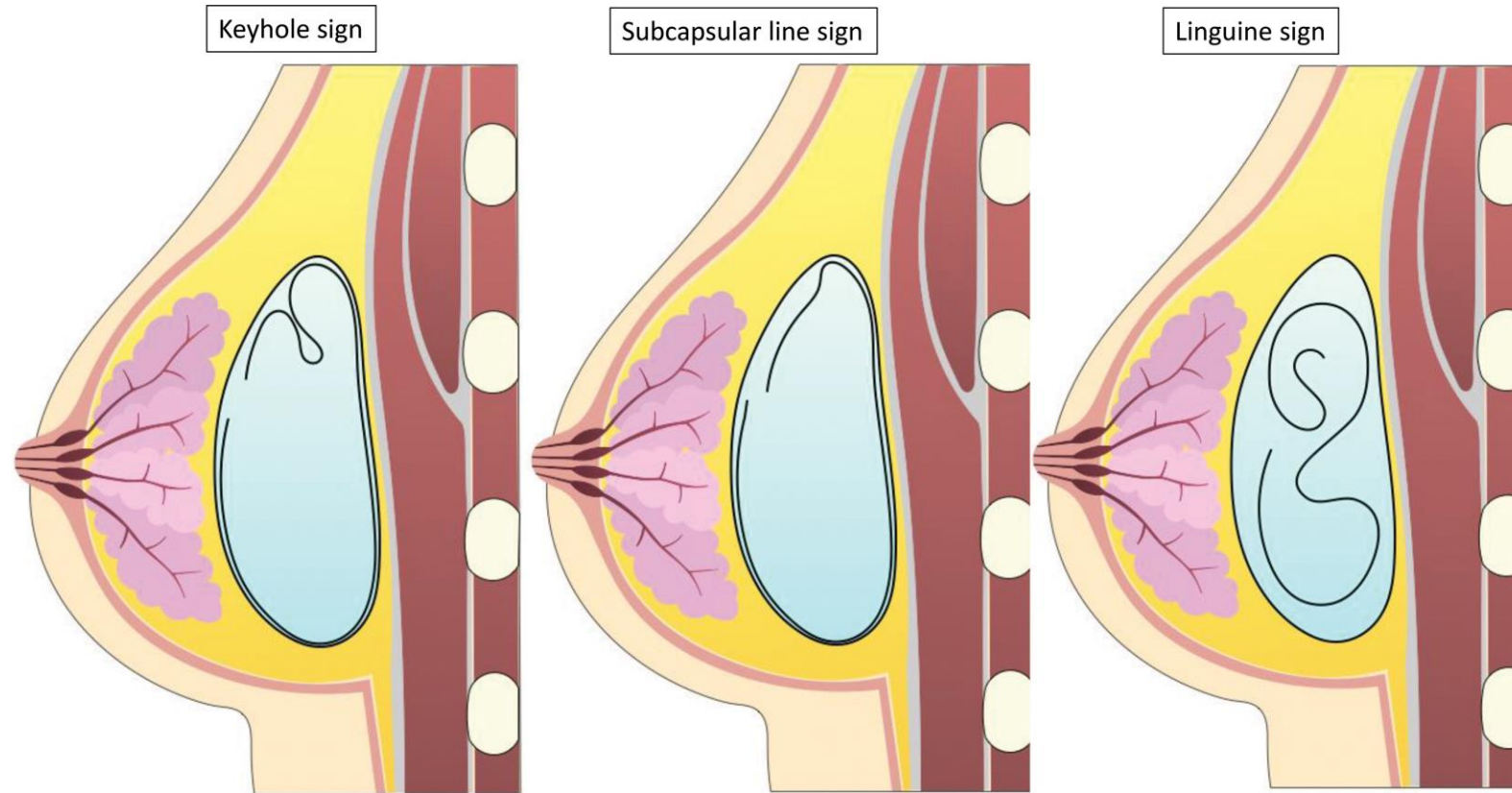


Figure 12. Findings of intracapsular rupture at MRI. Illustrations show the keyhole sign (left), with silicone expanding the vertex of the radial fold; a subcapsular line (middle), with lines running parallel to the fibrous capsule; and the linguine sign (right), with folded wavy multidirectional lines within the silicone gel, representing the collapsed implant shell.

ACR Implant Screening Guidelines

Variant 6. Adult of any age. Female or transfeminine. Evaluation of silicone breast implants. Asymptomatic. Initial imaging at 5 to 6 years after implant placement and follow-up imaging every 2 to 3 years after initial negative imaging.

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

- Current ACR guidelines recommend imaging with ultrasound or MRI every 2 to 3 years following initial imaging done 5 to 6 years following reconstruction (2)
- Many implant ruptures present with minimal to no clinical symptoms, making detection important for re-evaluation and possible surgical management
- Based on current guidelines, regular follow up with imaging studies every 2 to 3 years help to detect asymptomatic breast implant rupture and allow for timely management

Management of Breast Implant Rupture

- Breast implant failure can lead to many complications including silicone extravasation, silicone lymphadenopathy, capsular contractures, silicone granulomas, and infection
- Serious complications are more common in extracapsular implant ruptures
- Management of breast implant rupture usually includes removal of the implant depending on whether patient is symptomatic
- For patients with asymptomatic rupture, regular follow up with imaging is reasonable to assess stability
- Revision of the reconstruction maybe an option for patients with implant removal

References:

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2. Chetlen A, Niell B, Brown AL, Baskies AM, Battaglia TA, Chen A, et al. ACR Appropriateness Criteria® Breast Implant Evaluation: 2023 Update. *J Am Coll Radiol*. 2023;20(11 Suppl):S329-S350. doi:10.1016/j.jacr.2023.08.019
3. Ho IW, Schwarz GS, Chichura A, Pederson HJ. Current State of Evidence-Based Long-Term Monitoring Protocols for Breast Plastic Surgery Patients. *Ann Surg Oncol*. 2024;31:8372-8382.
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5. Seiler SJ, Sharma PB, Hayes JC, Ganti R, Mootz AR, Eads ED, Teotia SS, Evans WP. Multimodality Imaging-based Evaluation of Single-Lumen Silicone Breast Implants for Rupture. *Radiographics*. 2017 Mar-Apr;37(2):366-382. doi: 10.1148/rg.2017160086. Epub 2017 Feb 10. PMID: 28186859.