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Case Report

Silicone granuloma with intact breast implants: A case report[☆]Ryan Lei^a, Miglena Komforti, DO^b, Mira Lotfalla, MD^b, Haley Letter, MD^{c,*}^aDes Moines University, College of Osteopathic Medicine, 8025 Grand Ave, West Des Moines, IA 50266, USA^bDepartment of Pathology and Laboratory Medicine, Mayo Clinic, 4500 San Pablo Rd, Jacksonville, 32224 FL, USA^cDepartment of Radiology, Mayo Clinic, 4500 San Pablo Rd, Jacksonville, FL 32224, USA

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ABSTRACT

Silicone granuloma formation is a potential complication of silicone implant rupture. Breast magnetic resonance imaging (MRI) is a useful diagnostic tool to assess implant integrity and complications; however, there can be overlap in the enhancement pattern of silicone granuloma and malignancy. We present the case of an 85 year old with suspicious axillary masses on clinical exam for which MRI was recommended. MRI demonstrated enhancing masses in the right axilla that were suspicious for malignancy and biopsy was ultimately performed. This case discusses the use of inversion recovery sequences on MRI, as well as ultrasound, to differentiate malignancy from silicone granuloma formation to prevent unnecessary biopsies.

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Introduction

Silicone granuloma is a rare complication of rupture of a silicone breast implant, often detected on magnetic resonance imaging (MRI), that mimics the findings of breast malignancy. This particular case of silicone granuloma presented as an enlarging mass in the axilla, with suspicious features on MR that prompted biopsy. This article reviews the common imaging appearance of silicone granuloma and provides recommendations regarding diagnosis to ensure appropriate work-up and diagnosis.

Case presentation

An 85-year-old female presents to the plastic surgeon with chief complaint of an enlarging mass in the right axilla. Eight years ago, she had revision of her cosmetic bilateral breast augmentation, with exchange of her implants to textured implants and an open periprosthetic capsulectomy. Four weeks prior to presenting to clinic, she noticed enlargement in the right axillary region with change in the shape of her right breast. There had always been a small palpable lump in the right axillary region, but this has increased in size significantly

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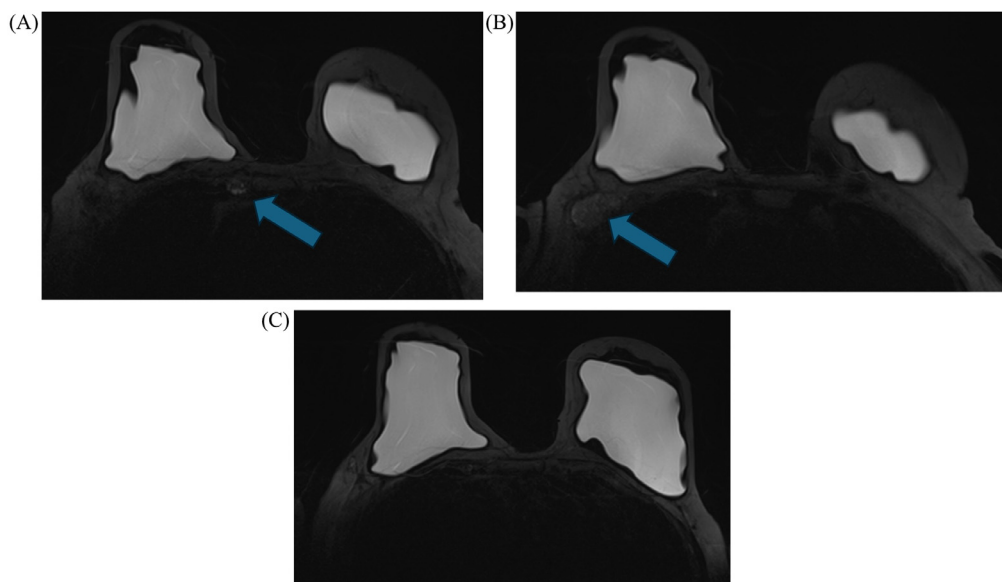


Fig. 1 – Axial water suppressed subtraction T2-weighted image of both breasts demonstrates an enlarged internal mammary chain lymph node with hyperintensity suggestive of silicone (A), as well as a large, T2-hyperintense mass in the right axilla (B). Additional axial water suppressed T2 image indicates that both breast implants remain intact (C).

since the revision surgery. Of note, the patient had undergone recent negative screening mammogram and had no history of breast biopsies or surgeries other than augmentation. In our institution, plastic surgeons typically select MRI as their first-line imaging tool for suspected silicone implant complications, given its superior sensitivity compared to ultrasound. Therefore, MRI of the breasts with and without contrast was ordered.

The MRI protocol for suspected implant complication at our institution includes T2 weighted imaging with and without water suppression (silicone sensitive sequences) and dynamic T1 fat post contrast sequences. MRI demonstrated an enlarged internal mammary chain lymph node and axillary lymph nodes containing silicone (Figs. 1 and 2). MRI also demonstrated intact bilateral silicone breast implants, which increased the suspicion of adenopathy secondary to malignancy. There was no suspicious enhancement in either breast

or peri-implant effusion to suggest implant-associated lymphoma. The case was assigned a BI-RADS category 4 “suspicious” assessment, and MRI directed ultrasound with biopsy was recommended.

MRI-directed ultrasound demonstrated several areas in the right axilla with snowstorm artifact, suggestive of silicone. No normal or abnormal axillary lymph nodes were identified (Fig. 3). The constellation of ultrasound findings suggested multiple silicone granulomas. The surgery team was highly concerned for lymphoma, specifically breast implant-associated anaplastic large cell lymphoma, while also considering other differentials such as metastatic disease, granulomatous infections, and SCC of the head/neck. Given the high clinical suspicion for malignancy and MRI appearance, the surgeon requested tissue confirmation and ultrasound-guided biopsy was performed. This confirmed the diagnosis of a silicone granuloma (Fig. 4). In this scenario,

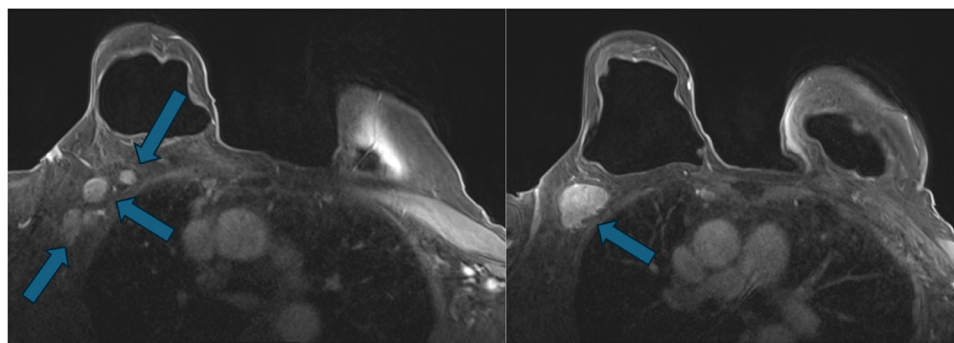


Fig. 2 – Axial T1 weighted imaging following gadolinium administration of both breasts demonstrates several enhancing right axillary lymph nodes (left, arrows), as well as an enlarged lymph node vs mass more inferiorly in the right axilla (right, arrow).

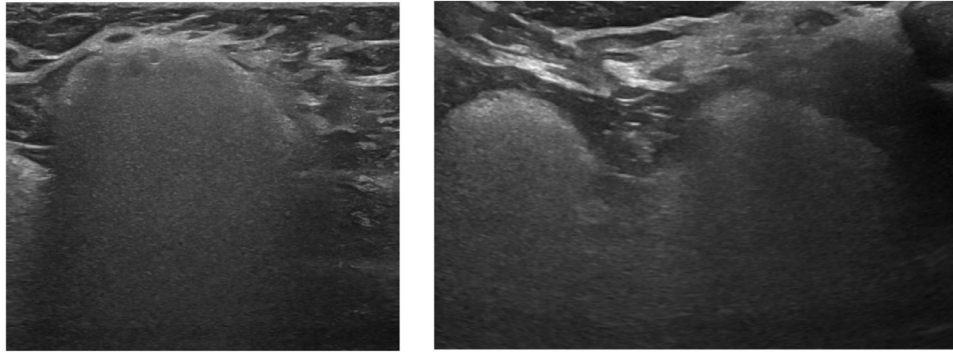


Fig. 3 – MRI-directed ultrasound of the axillary masses was performed, which indicate the characteristic “snowstorm” artifact, with no visualized adenopathy.

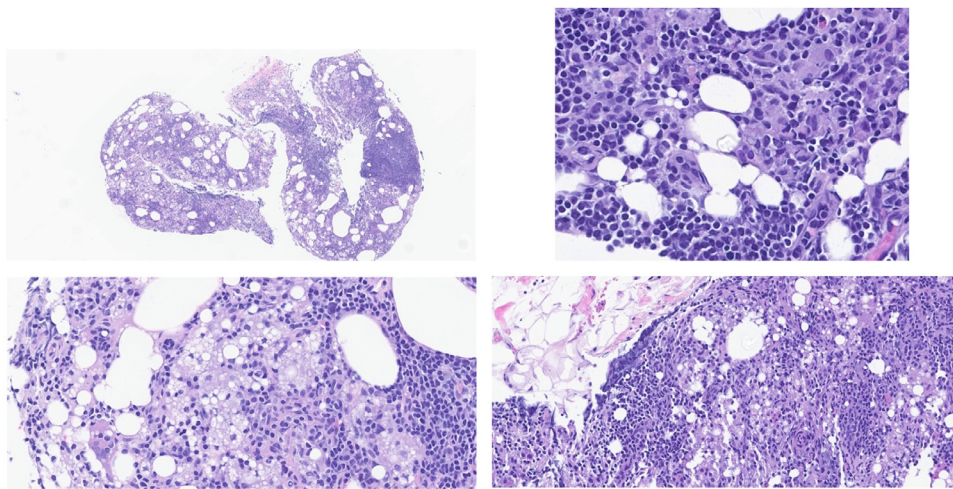


Fig. 4 – Sections show core needle fragments of lymph node parenchyma as evidenced by the association of lymphoid aggregates with a fibrous capsule at the edge, and large vessels; histiocytic and focal granulomatous formations are noted (Hematoxylin & Eosin, 6.3x). A suggestion of variably sized “empty” spaces within the lymph node parenchyma can be appreciated on low power. Upon closer inspection at high power, clear, refractile and nonpolarizable material within those spaces is seen (Hematoxylin & Eosin, 50x). While not entirely specific, in the setting of implants, this foreign material is compatible with silicone and suggests implant leak and/or rupture.

due to the patient's age, risk of complications from surgery, and the high probability of benign findings, the surgeons and patient desired a conservative, nonsurgical approach. The implants were not removed. The case was discussed at multi-disciplinary conference and the patient will be followed with close physical exam and imaging as necessary.

Discussion

Silicone implant rupture is a relatively common complication that is most often easily diagnosed on breast imaging. Some studies estimate that rupture can be identified in up to 77% of patients, with 22% of those ruptured implants showing extracapsular spread [1]. Silicone can spread to regional lymph nodes, specifically the internal mammary chain and the axilla. Silicone has also been noted to migrate into the brachial plexus, resulting in neuropathy [2]. Extracapsular silicone has

been shown to rarely migrate into more distal regions, such as the subcutaneous tissues of the abdominal wall and groin [3,4].

According to a study performed by the Food and Drug Administration's Breast Implant Study, the findings of extracapsular silicone can sometimes be missed by radiologists. In this study, 82% of breasts were consistently described as having extracapsular silicone, but only 18% of breasts noted discrete isolated masses of silicone gel [1]. In 5% of breasts reviewed in this study that had disagreement over the presence of extracapsular silicone, these disagreements were attributed to the readers' failure to review inversion-recovery images of the breasts [1]. This highlights the importance of reviewing the silicone specific sequences, noting that observers became aware of overlooking extracapsular silicone and were more likely to review these images when the extracapsular silicone findings were more subtle [1]. The unilaterality of the findings did increase the suspicion for disease; however, this is not uncommon with benign silicone granulomas.

MRI is the most sensitive modality for assessing silicone implant integrity and is currently recommended by the FDA as a screening modality for asymptomatic women with silicone implants [1]. However, on review of postcontrast sequences, silicone granulomas can enhance and be mistaken for malignancy [5]. In our case, the current implants were intact on MRI, implying that the silicone granuloma formation in this patient must have resulted from rupture of her previous breast implants. In the cases of suspected silicone granuloma showing enhancement on MRI, attention should be made to the silicone specific sequences (T2 water suppression sequences) [6]. There was faint hyperintensity in the silicone granulomas on silicone sequences on this case, suggesting the diagnosis. The unilaterality of the findings did increase the interpreting radiologist's suspicion for malignancy; however, unilaterality is not uncommon with benign silicone granulomas.

In cases such as this where the MRI findings are equivocal or even suspicious, ultrasound can be performed for further characterization. Ultrasound is more specific than MRI in its ability to demonstrate the characteristic snow-storm appearance of free silicone, as seen in our patient. Based on imaging alone, the prebiopsy diagnosis was consistent with silicone granulomata formation in the axilla and biopsy was only requested due to the high clinical suspicion. In the case of a suspected mass involving the implant capsule, it is important to avoid percutaneous diagnostic biopsies to prevent breaking the fibrous capsule barrier and exposing the rest of the body to silicone [3,7].

Silicone granulomata can often mimic malignancy, due to their indolent growth pattern. This patient presented with a slow growing axillary mass with recent enlargement, with a large palpable mass on physical exam. Differential diagnoses may include seroma, capsular contracture, late hematoma, late inflammatory/infectious processes, as well as primary breast lymphomas. Anaplastic large B-cell lymphoma is a rare lymphoma that may present with breast implants, dubbed Breast Implant-Associated Anaplastic Large Cell Lymphoma (BIA-ALCL). While BIA-ALCL is rare, with fewer than 400 reported cases in the literature, it has an estimated 0.3% incidence per 100,000 women per year [8]. The FDA has noted 1264 reported cases of BIA-ALCL, most presenting as a seroma, with the MDR noting that 918 of these cases having textured surfaces, and 37 having smooth surfaces [9]. 309 of these cases did not have any specified implant surface [10]. The FDA has noted concern regarding the increase in cases of BIA-ALCL, and in 2019 requested a voluntary recall of several textured breast implants due to the elevated risk of developing BIA-ALCL [10]. Current guidelines do not recommend removal of textured implants if already in place, as removing them does not eliminate or significantly decrease the risk of lymphoma [11].

This case also emphasizes the need for a standardized protocol to evaluate suspected silicone implant complications. While MRI is the most-sensitive modality for evaluating silicone implants, ultrasound is more specific. The American College of Radiology Appropriateness Criteria recommends diagnostic mammogram and ultrasound be performed first in a patient with silicone implants and new adenopathy [12]. MRI is only indicated in these patients if diagnostic imaging and biopsy reveals axillary metastatic disease. The nonspe-

cific findings on MRI in this case perpetuated additional work-up and biopsies that would likely have not been necessary if ultrasound had been used as an initial imaging tool.

Conclusion

This case highlights the potential complications of silicone implants and the potential pitfalls in MRI for diagnosing free silicone. Confirmatory biopsy was performed in this case due to the combination of clinical suspicion and MRI findings, but could have been avoided due to the classic appearance on T2 weighted water suppression sequences as well as ultrasound. Utilizing the proper algorithm per ACR guidelines is important to help avoid unnecessary imaging and procedures. While this lesion may look intimidating at first glance, examination of MRI with classic sonographic findings can help exclude malignancy.

Patient consent

Written, informed consent was obtained from the patient for publication of this case.

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