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Case Report

Cholesterol granuloma of the breast: A case report [☆]Haley Letter, MD^{a,*}, Miglena Komforti, MD^b, Robert Maxwell, MD^a, Santo Maimone, MD^a^aDepartment of Radiology, Mayo Clinic Florida, 4500 San Pablo Rd, Jacksonville, FL 32224, USA^bDepartment of Pathology, Mayo Clinic Florida, Jacksonville, FL, USA

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ABSTRACT

Cholesterol granuloma of the breast is a rare entity that can be indistinguishable from cancer on physical exam and imaging. We present the case of a 58-year-old woman who developed a new enhancing mass on high-risk screening magnetic resonance imaging (MRI). Interestingly, this mass developed in the same area as a previously noted benign-appearing inflammatory cyst that had been decreasing in size on MRI and mammogram over many years. Ultrasound-guided biopsy was performed which revealed cholesterol granuloma. We will discuss the nonspecific imaging findings and the characteristic histopathological features that confirm diagnosis.

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Introduction

Cholesterol granuloma of the breast is a rare, benign condition that is often indistinguishable from breast cancer on imaging [1]. It most commonly presents as a painless, palpable mass or is discovered incidentally on screening mammography [2]. Most radiology literature regarding cholesterol granuloma is in the form of case reports discussing the mammographic and sonographic appearance [2]. Our case is unique in that the cholesterol granuloma was first discovered on screening MRI. The enhancement pattern prompted MRI directed ultrasound which ultimately led to biopsy. The characteristic appearance of cholesterol clefts and lipid laden macrophages confirmed the diagnosis of cholesterol granuloma, alleviating the need for surgical excision or follow up.

Case report

A 58-year-old woman presented for screening MRI which detected a new suspicious, enhancing mass in the right breast. She had no personal history of breast cancer, although previously underwent an excisional biopsy for atypical lobular hyperplasia of the left breast 3 years ago. She was taking raloxifene for risk reduction and was undergoing a high-risk imaging protocol which included annual breast MRI for supplemental screening. Her family history was significant for breast cancer in her mother and maternal aunt, both diagnosed in their 50s. Socially, she was an active smoker with many pack-year history. During the previous 7 years, the patient had undergone annual mammography and supplemental screening breast magnetic resonance imaging (MRI). On her most recent

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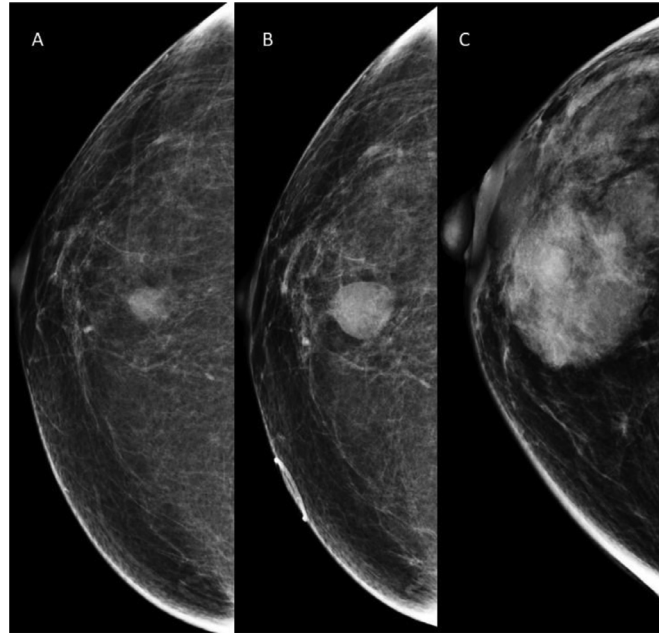


Fig. 1 – Current craniocaudal (CC) digital mammogram image of the right breast (A) demonstrated a solitary equal density mass with indistinct margins and no calcifications. CC mammogram image from 2 years prior (B) demonstrates the mass to be at least double in size. CC mammogram from 8 years prior (C) demonstrates a much larger equal density mass, with multiple smaller adjacent masses.

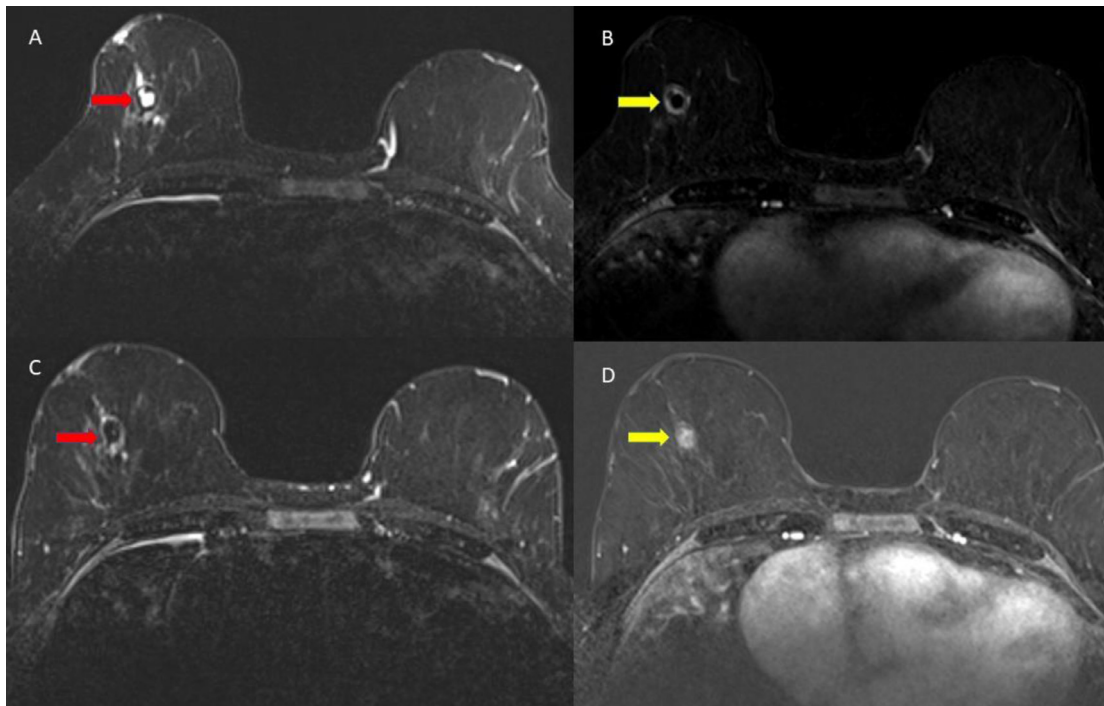


Fig. 2 – Magnetic resonance imaging (MRI) of the breasts from 6 months prior (A and B) and current exam (C and D). Axial T2 weighted fat saturated image (A) from 6 months ago demonstrated a T2 hyperintense cyst (red arrow) which demonstrates uniform rim enhancement (yellow arrow) on the axial postcontrast subtraction image (B). Axial T2 image from the current MRI exam (C) demonstrates loss of central T2 signal (red arrow), suggesting loss of prior cystic/fluid content. Heterogeneous enhancement of the mass (yellow arrow) in the axial post contrast subtraction image (D) suggests a solid mass rather than a benign cyst, considered a suspicious finding.

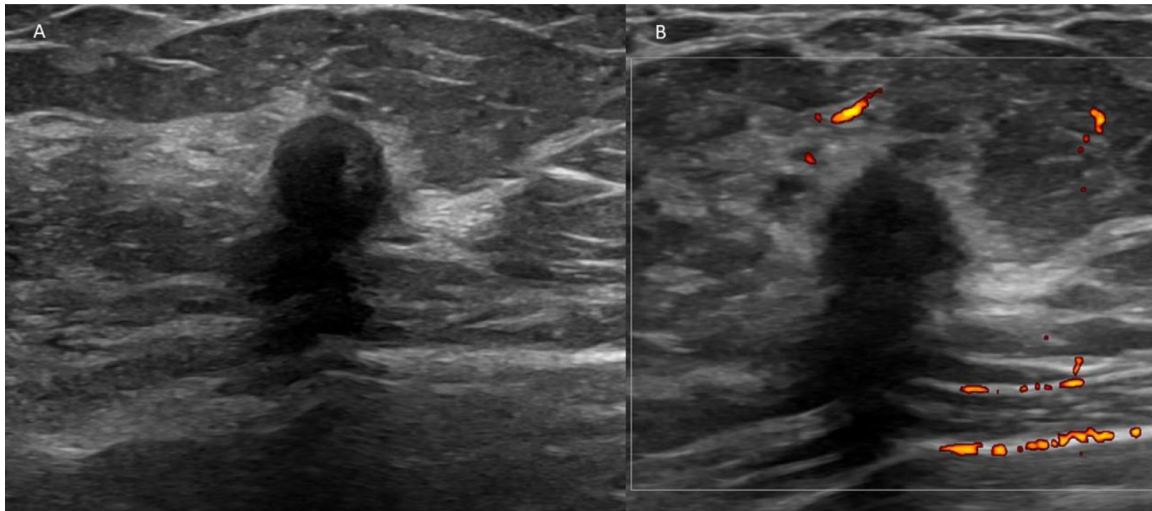


Fig. 3 – Grayscale (A) and power Doppler (B) images of the right breast mass from MRI-directed ultrasound demonstrate a suspicious round avascular mass with indistinct margins and posterior shadowing. Ultrasound biopsy was recommended and performed.

mammogram, the patient was noted to have multiple cysts in the right breast that decreased in quantity and size from prior mammograms (Fig. 1). Six months prior to presentation, the patient underwent MRI which revealed a solitary cyst in the lower central right breast, with a thin rim of enhancement suggesting a benign inflammatory cyst (Figs. 2A and B). On the current MRI, a heterogeneously enhancing, circumscribed 8 mm mass was noted in the right breast that seemed to replace the previously seen inflammatory cyst (Figs. 2C and D). Given the change in signal intensity and enhancement pattern, both now favoring a solid mass, MRI-directed ultrasound and biopsy were recommended.

Targeted ultrasound of the right breast demonstrated a round mass with indistinct margins and posterior acoustic shadowing, all characteristics that favor malignancy (Fig. 3). Ultrasound biopsy was performed, and postbiopsy mammogram (Fig. 4) demonstrated a marker clip well-positioned in the mass. Pathology revealed a diagnosis of benign cholesterol granuloma (Fig. 5). The patient was instructed to resume routine screening protocol.

Discussion

Cholesterol granuloma of the breast is rare, most commonly occurring in the ear or temporal bone [3]. Breast cholesterol granuloma has a nonspecific imaging appearance [4]. On mammography, it has been most commonly described as a round or oval, circumscribed mass with or without calcifications [4]. Ultrasound is the next step to further evaluate a mass seen on mammogram. Most case reports describe the ultrasound appearance as a solid mass that is indistinguishable from malignancy. A few case reports have described the ultrasound appearance to be a complex cystic and solid mass, which is still a suspicious lesion requiring biopsy [4].

Adding to the diagnostic uncertainty in our case was the sudden change in imaging characteristics on MRI of a mass that had otherwise resembled a benign cyst for multiple prior years. It is unusual for any breast mass, whether malignant or benign, to transform in such a way after many years of stability. MRI characteristics of breast cholesterol granuloma are not well described in the literature; however, MRI appearance of cholesterol granuloma in the temporal bone has been described as often hypoenhancing [1]. Interestingly, these lesions in the breast have been shown to be hyperenhancing on computed tomography (CT), which is more in line with our case presentation [5]. One case report of cholesterol granuloma on MRI described a persistent kinetic curve and restricted diffusion as means to successfully differentiate the cholesterol granuloma from an adjacent known tumor [1]. Newer research supports this hypothesis, specifically in using apparent diffusion coefficient (ADC) values for differentiating benign vs malignant lesions [6]. However, data on use of kinetic curve and diffusion weighted imaging to differentiate benign vs malignant breast tumors on MRI have not demonstrated reliability when studied on a large scale and more research is needed to change practice patterns. Biopsy is the standard of care of any new or enlarging enhancing mass on breast MRI, as was deemed necessary for our patient.

While the pathogenesis of cholesterol granuloma of the breast is controversial, most theories support the idea of duct ectasia leading to cholesterol crystal formation [3]. Lipid-rich material is commonly found in ectatic ducts, and it is presumed that cholesterol crystals leak through the walls of the duct inciting an inflammatory response [7]. There is usually a history of breast biopsy or trauma in the area that is thought to result in disruption of the ectatic duct [4]. Our patient had no history of biopsy or trauma to the right breast. Interestingly, our patient is a current smoker and there is a well-established link between smoking and duct ectasia. It is likely that the pre-

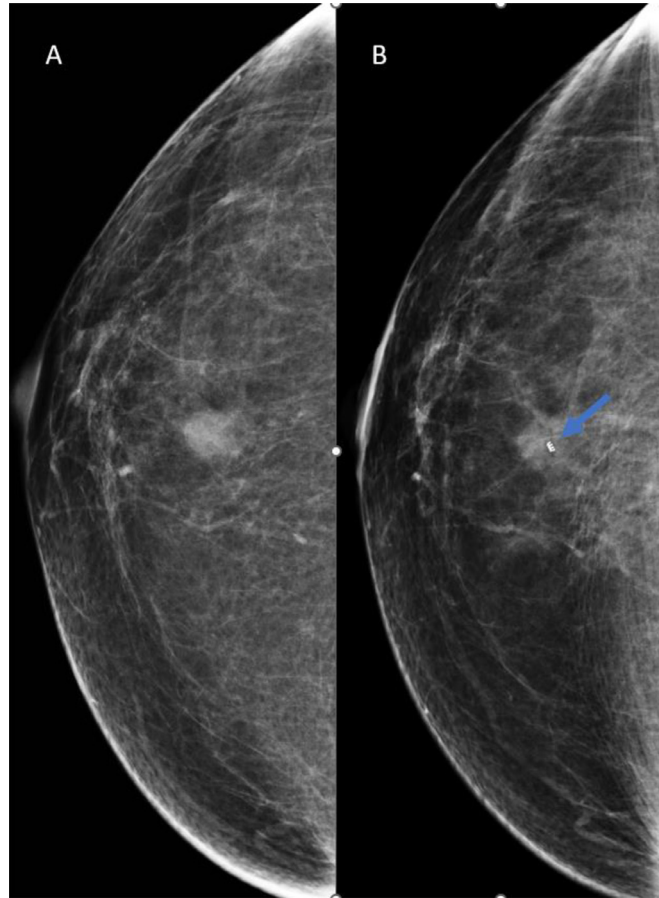


Fig. 4 – Prebiopsy 2D craniocaudal mammogram image of the right breast (A) demonstrating location of the mass in the central breast. Postbiopsy craniocaudal mammogram image of the right breast (B) demonstrates a coil shaped biopsy marker clip (blue arrow) well positioned in the mass.

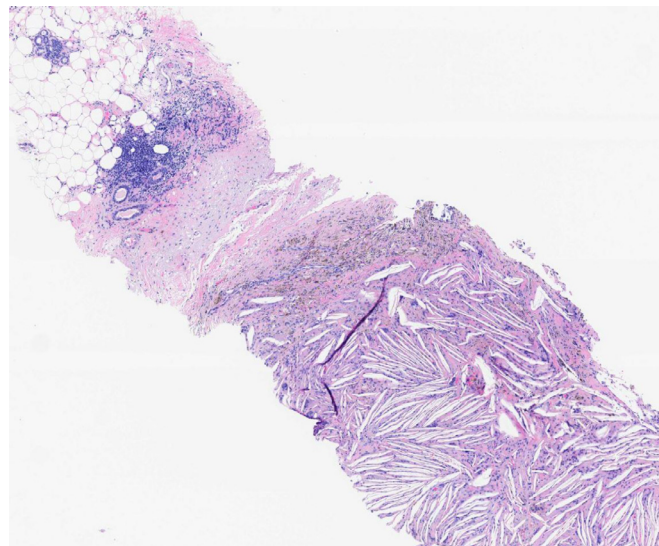


Fig. 5 – Low power view of the core needle biopsy demonstrates the edge of a well-circumscribed nodule, composed of foreign body giant cell reaction, cholesterol clefts and crystals, and hemosiderin laden macrophages. The histopathologic findings are consistent with cholesterol granuloma. Benign breast parenchyma with focal microcalcifications is also present at the outside periphery of the lesion [4x,H&E].

sumed benign inflammatory cyst seen on multiple prior imaging studies was a focal area of duct ectasia that eventually led to the development of a cholesterol granuloma.

Conclusion

Cholesterol granuloma is a rare benign lesion of the breast that can present as a palpable mass or be detected on imaging. Currently there are no specific imaging features on mammogram, ultrasound, or MRI that are reliable in distinguishing this entity from carcinoma. Therefore, biopsy is required and can reliably make the diagnosis, avoiding unnecessary imaging follow up and surgical intervention.

Patient consent

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

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