

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Breast Mucocele-like lesions (MLL): A case report and review of the literature [☆]

Assim Saad Eddin, MD*, Su Kim Hsieh, MD, PhD, Fabiana Policeni, MD

Department of Radiology, University of Iowa Hospitals and Clinics, 200 Hawkins Drive, Iowa City, IA 52242, USA

ARTICLE INFO

Article history:

Received 6 November 2023

Accepted 9 December 2023

Keywords:

Mucocele-like lesions

Breast biopsies

High-risk

ABSTRACT

Mucocele-like lesions of the breast are rare, usually presenting themselves as suspicious findings on imaging, warranting biopsies. It can be associated with several degrees of hyperplasia, including atypical ductal hyperplasia and ductal carcinoma in situ, historically being considered a high-risk lesion. It also can be an underestimated invasive carcinoma in a percutaneous biopsy. When facing a histologic diagnosis of a mucocele-lesion in a percutaneous biopsy, it is important to be aware of these lesions' significance to make the most appropriate interpretation, recommendation, and management. The purpose of this work is to present some cases of breast mucocele-like lesions from our Institution and perform a review of the literature.

© 2023 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Mucocele-like lesions (MLL) of the breast are rare and asymptomatic. They are usually detected on screening mammograms as calcifications and when facing a diagnosis like this on a percutaneous biopsy, comprehension of this entity will allow correct management and recommendation.

We present 2 cases of imaging detected MLL of the breast with 2 different management scenarios. One case presents a new group of calcifications with a good sampling and a pathology result of MLL without atypia associated, allowing conservative management. The second case is also an imaging-detected group of calcifications, but the biopsy report yields MLL associated with atypical ductal hyperplasia (ADH) prompting an excisional biopsy, that confirms this diagnosis.

When facing a MLL in a breast biopsy what should be the most appropriate recommendation? What are the parameters that should be evaluated that will help us decide what's the best step in action? We reviewed the current data on the literature regarding MLL of the breast to help us guide through these cases.

Case report

Case 1

A 56-year-old female patient was seen for diagnostic evaluation of new calcifications in the left breast. The patient had no personal history of breast or ovarian cancer. The

[☆] Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

* Corresponding author.

E-mail address: assim-saadeddin@uiowa.edu (A.S. Eddin).

<https://doi.org/10.1016/j.radcr.2023.12.017>

1930-0433/© 2023 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

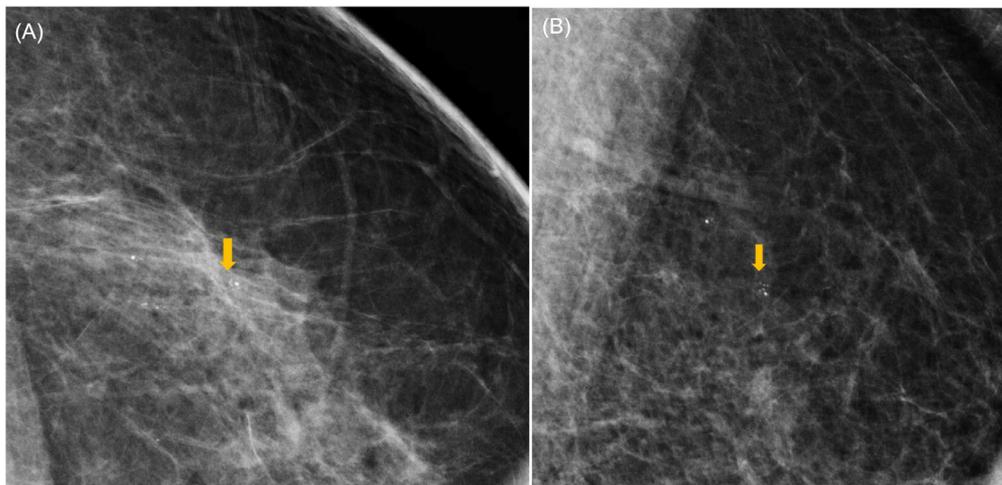


Fig. 1 – (A) Left upper outer cranial caudal (CC) magnification view demonstrating the new group of round calcifications (arrow). (B) Left upper outer quadrant lateral magnification view demonstrating the new group of round calcifications (arrow).

present mammography examination has been compared to prior imaging studies performed at our hospital. There were scattered areas of fibro glandular tissue and a new group of round calcifications in the upper outer quadrant of the left breast (Figs. 1A and B). A biopsy was performed (Fig. 2), and the pathology report revealed a focal MLL with mucin extravasation, fibrocystic changes, and microcalcifications. No atypia or malignant findings were reported in the left breast. A Mammographic follow-up in 6 months was performed with no significant changes (Fig. 3).

Case 2

A 59-year-old female with a family history of breast cancer (maternal cousin, paternal aunt, cousin, and grandmother), gastrointestinal and pancreatic cancer. The posterior genetic test was negative for mutations. During screening 2 new groups of amorphous calcifications were detected in the upper outer quadrant of the right breast (Fig. 4). These 2 groups were biopsied under stereotactic guidance. Pathology results yielded mucocele-like lesions with associated ADH, columnar cell hyperplasia and calcifications for the most anterior group (Fig. 5), and columnar cell change (mild, focal), sclerosing adenosis (mild, focal), microcysts (with apocrine change), microcalcifications (associated with benign ducts) for the most posterior group of calcifications. There was no evidence of malignancy.

Radioactive seed localized excisional biopsy was then performed for the most anterior group of calcifications that yielded MLL associated with ADH (Fig. 6). Final pathology confirmed the biopsy results: ADH and columnar cell hyperplasia with adjacent biopsy site changes, and fibrocystic changes with associated microcalcifications. Margins were negative for atypia (ADH was found 4 mm from the lateral margin). Additional anterior cranial margin, excision demonstrated benign breast tissue.

Due to her elevated risk of breast cancer due to her ADH, her Tyrer-Cuzick lifetime risk was calculated as 26.6% and the patient will undergo high-risk screening.

Discussion

Histology

MLL is a descriptive term, and it was first described in the breast by Rosen et al in 1986 [1]. It was named after what looked like a mucocele – a mucin containing cystic lesion of a minor salivary glands in the oral cavity. It falls into a broader spectrum of mucin containing lesions that includes incidental mucus-filled benign cysts to mucin-producing ductal carcinoma in situ and invasive mucinous carcinoma, mucinous micropapillary carcinoma, solid papillary carcinoma, mucinous cystadenocarcinoma, mucoepidermoid carcinoma, invasive lobular carcinoma with extracellular mucin and metastasis [2]. It is frequently associated with a spectrum of hyperplasia and atypia, mostly ADH, and less frequently with atypical lobular hyperplasia (ALH) and flat epithelial atypia (FEA) [2–4]. It consists of a ruptured duct with extravasation of mucin in periductal stroma [3,4]. The lining epithelial cells can show flat or cuboid epithelium or varied levels of hyperplasia. There are cysts and ducts filled with mucin and myoepithelial cells that adhere to strips of cells floating in lakes of mucin, calcifications, and epithelial cells with typical and atypical proliferative changes. The etiology is unclear but can be related to excess secretion of mucin or obliteration of the duct. MLL of the breast are rare. The frequency is less than 2% of the breast benign lesions [5] and affects women between 25 and 82 years old, with a mean age of 54 years old [1,6]. They are usually asymptomatic, but occasionally can be detected as palpable masses. The diagnosis is made mainly by imaging studies, and it is found in about 1% of the biopsies [7]. Most of the cases present calcifications, ranging from 48% to 90%, [8,9] as mucin

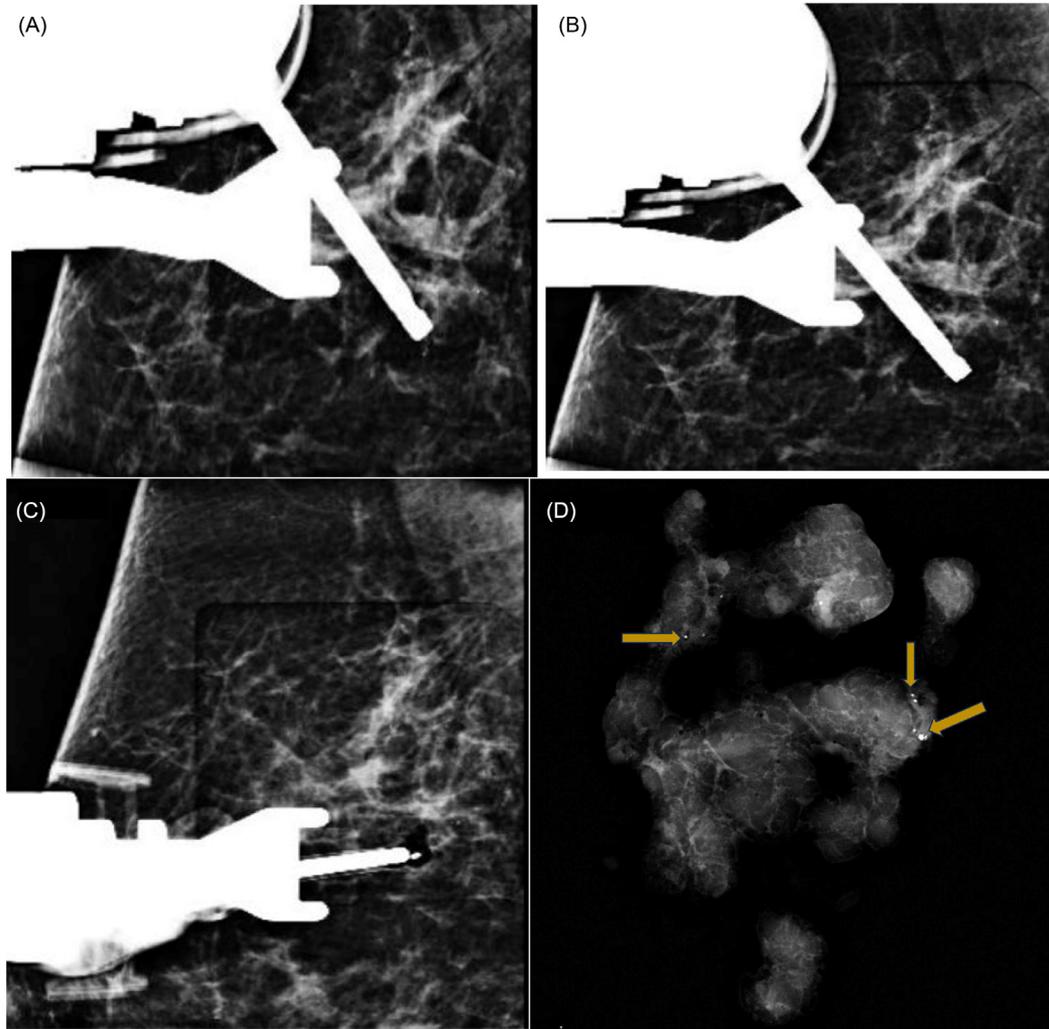


Fig. 2 – Stereotactic biopsy of the upper outer quadrant calcifications. Prefire images (A) Postfire images (B). Postbiopsy clip (C). Specimen radiograph demonstrating the calcifications (arrows) (D). Pathology results yielded focal mucocele-like lesion with mucin extravasation and fibrocystic changes with associated microcalcifications. No atypia or malignancy associated.

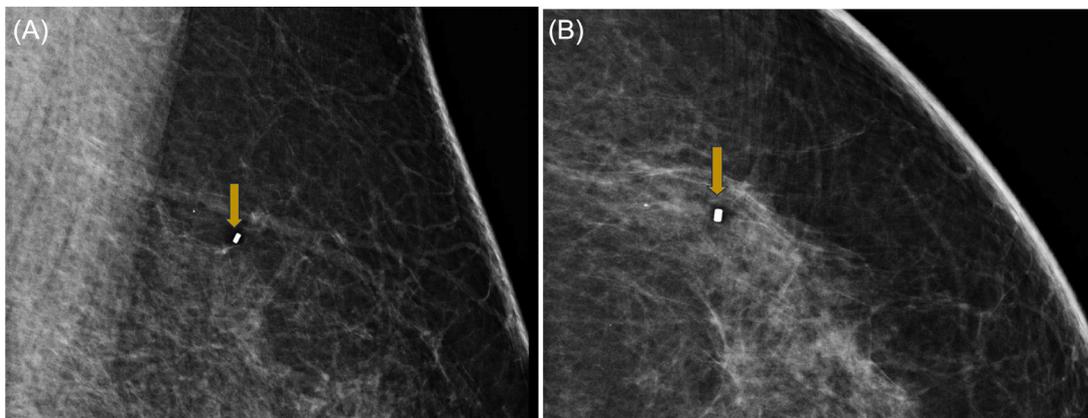


Fig. 3 – Six-month follow-up after the biopsy demonstrating the clip (arrow) with no significant residual calcifications. Lateral magnification view (A) and CC magnification view (B).

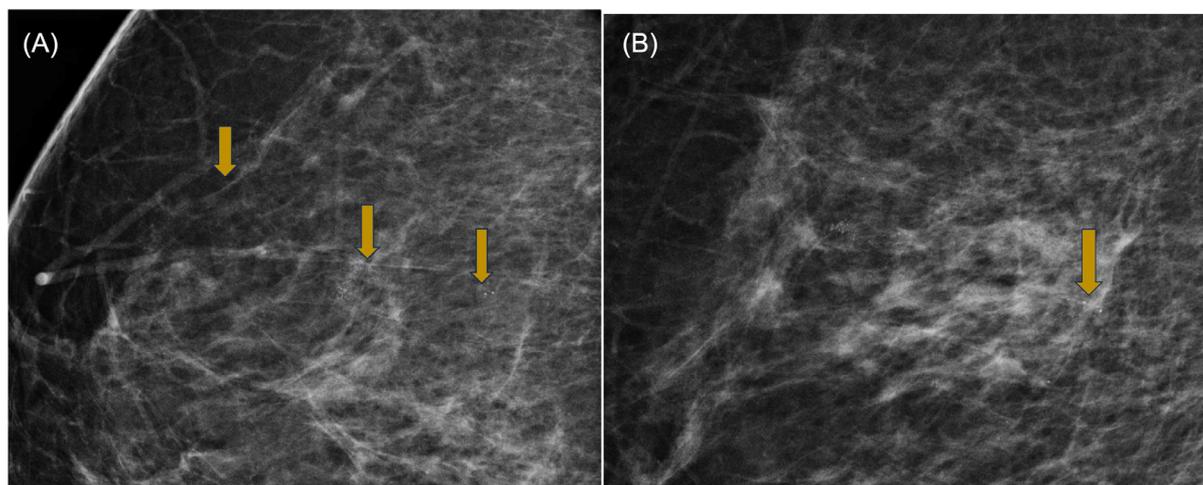


Fig. 4 – Magnified CC view (A) and magnified lateral view (B) of the upper outer quadrant of the right breast, measuring 13 mm distant 7 cm from the nipple and the other group measuring 5mm distant 10 cm from the nipple (arrows).

Table 1 – Shows the percentage upgrades for both MLL with atypia and MLL without atypia.

Author	MLL with atypia	MLL without atypia	Percentage upgrade for patients with atypia to DCIS or invasive carcinoma	Percentage upgrade for patients without atypia to DCIS or invasive carcinoma
Carder et al. [15]	4	7	3 (75%)	0
Sutton et al. [16]	16	22	5 (31%)	0
Rakha et al. [9]	0	54	0	2 (4%)
Ha et al. [5]	12	23	1 (8.3%)	0
Meares et al. [4]	27	75	4 (14.8%)	9 (12%)
Gibreel et al. [17]	14	15	0	2 (13%)
Griffiths et al. [8]	11	36	3 (27.3%)	1 (2.8%)
Towne et al. [11]	23	25	4 (17.4%)	2 (8%)

has the tendency to calcify. Occasionally masses can be also found [7,8]. Most of the lesions are small, less than 2 cm in size [2], but the reported range is 0.5-10 cm in size [10].

The morphology of the calcifications can be round, coarse, fine linear, or fine pleomorphic and the distribution is usually grouped. When MLL presents as masses, they are described as round or lobular with or without circumscribed margins, single or multiple with a rosary-like appearance [10]. Ultrasound can demonstrate hypoechoic oval masses, complex cysts with or without associated calcifications, clustered cysts, cysts with thick septations, complex masses (solid-cystic), or tubular masses with low-level internal echoes [10]. There are few reports of mucocele-like cases with magnetic resonance imaging (MRI), being reported as irregular masses with heterogeneous enhancement or nonmass enhancements [7,11,12]. There are no specific imaging criteria to predict atypia or malignancy [10]. The preferred method of sampling would be vacuum-assisted. Fine needle aspirations (FNA) and core needle biopsies (CNB) are usually not recommended, because of the extensive considerations in the literature about underestimation rates mainly for calcifications and complex masses. The smaller sampling of CNB and the low cellularity associated with MLL lesions make them often misdiagnosed as

other pathologies. Moreover, the presence of mucin and very similar cytological appearance made it difficult to distinguish MLL from mucinous carcinoma on more than 1 occasion [13]. The increased use of vacuum-assisted excision (VAE) in Europe suggests that more invasive surgical procedures such as diagnostic surgical excision could be avoided [9,14]. In fact, UK guidelines currently recommend VAE as the first-line procedure for all MLL lesions [14].

Management after a diagnosis of MLL on a percutaneous biopsy

MLLs are considered benign, and the management depends on the associated findings, especially if there are atypical proliferative changes. A good radiology-pathology correlation is needed. About 11%-57% of the MLLs are associated with ADH [3,7] and 2%-30% are associated with DCIS [3]. The upgrade rate to DCIS for MLL with atypia is 8%-75% and for MLL without atypia is 2.8%-13% (Table 1) [5,8,9,11,15–17]. The atypical hyperplasia can be found outside the area of MLL in 26% of the ADH and 88% of the ALH [4], reflecting the heterogeneous

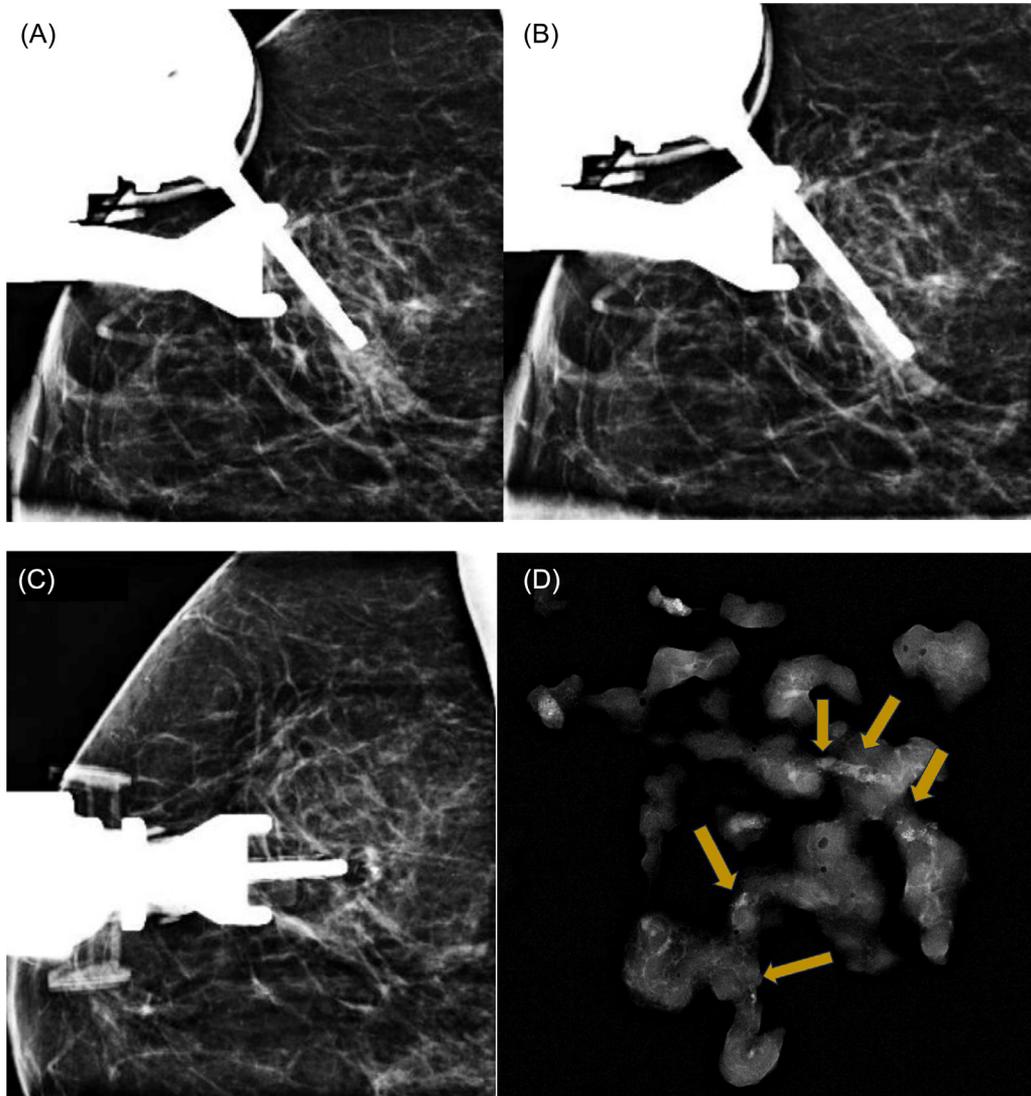


Fig. 5 – Stereotactic biopsy of the most anterior group, 7 cm distant from the nipple group of calcifications. Prefire images (A), Postfire images (B). Postbiopsy clip (C). Fragments radiograph demonstrating calcifications (D) (arrows). The pathological result was mucocele-like lesion associated with atypical ductal hyperplasia (ADH), columnar cell hyperplasia and calcifications.

background of these lesions and reaffirming the importance of a good sampling, not only the visible target. If there is a good sampling, no atypical proliferative changes, and no suspicious radiologic features, a follow-up is preferred to a surgical excision [9]. If there are atypical proliferative changes, a surgical excision is recommended. If the MLL is associated with DCIS or mucinous carcinoma, treatment is warranted. A

long follow-up of a 102 MLL in a single institution revealed breast cancer in 13 patients, with a median time to cancer of 11.8 years, 46% being diagnosed in the contralateral breast [4]. Nevertheless, the final decision of management of MLLs should be made by a multidisciplinary team taking into consideration the radiological, clinical, and pathological findings [15].

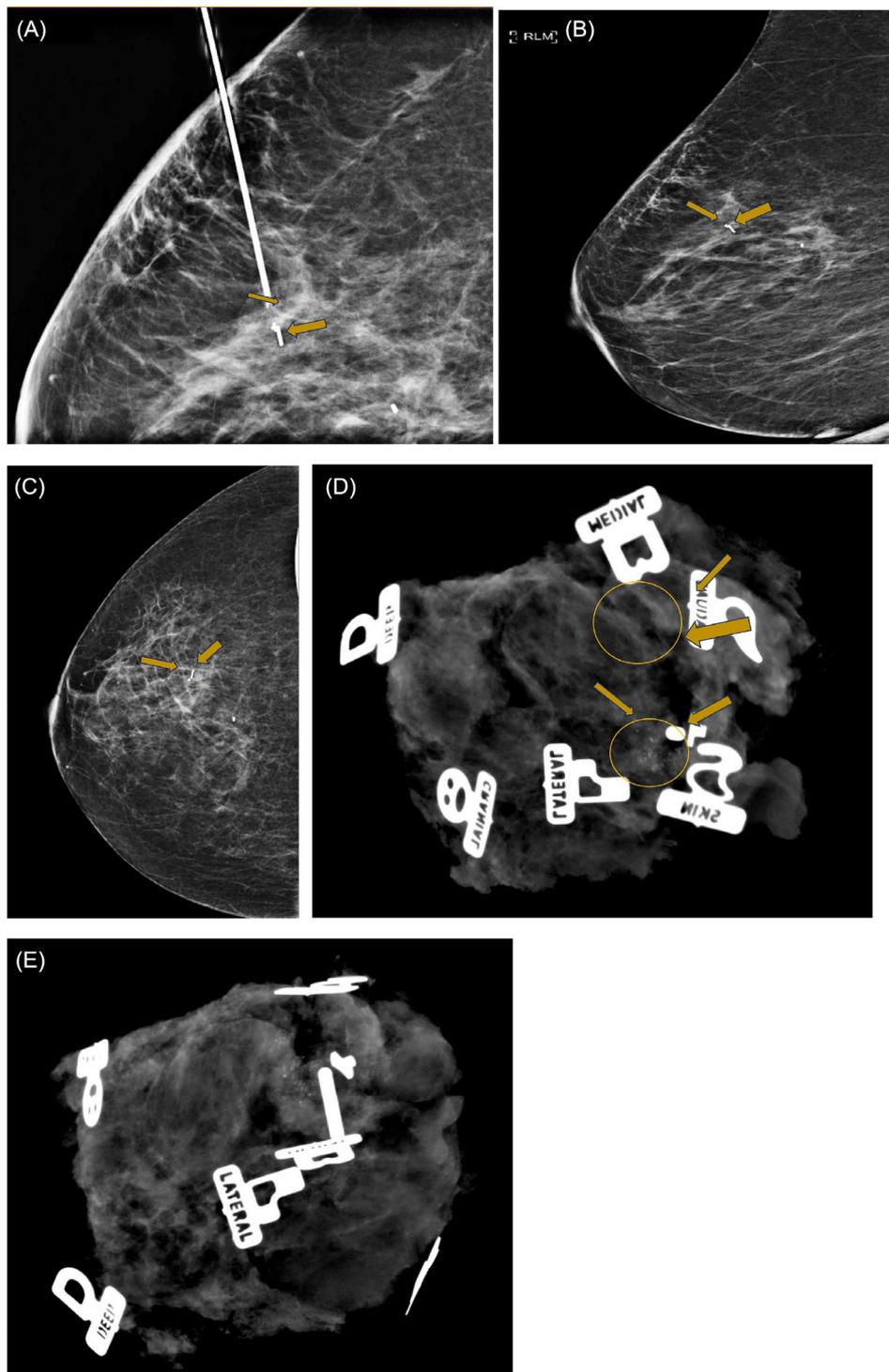


Fig. 6 – Preoperative localization with Iodine 125 seed was performed under mammographic guidance for the previously biopsied group of amorphous calcifications distant 7 cm from the nipple (A). Final lateral and CC (B) and lateral (C) views after the seed placement in accurate position (thick arrow in the seed and thin arrow in the clip). Excisional biopsy specimen radiograph showing the post biopsy clip (thin arrow), seed (thick arrow) and some calcifications (circle) close to skin margin (D and E). Pathological results yielded atypical ductal hyperplasia and columnar cell hyperplasia with adjacent biopsy site changes. Margins negative for atypia (ADH is 4 mm from the closest margin - lateral). Fibrocystic changes associated with microcalcifications. Additional anterior cranial margin, excision: Benign breast tissue.

Conclusion

MLL lesions without atypia appear to have a benign outcome in most of the cases mentioned in literature. Therefore, such lesions can be managed in a more conservative manner with less invasive interventions and greater radiological follow-up.

Patient consent

Written informed consent for the publication of this case report was obtained from the patients.

REFERENCES

- [1] Rosen PP. Mucocele-like tumors of the breast. *Am J Surg Pathol* 1986;10(7):464–9. doi:[10.1097/0000478-198607000-00003](https://doi.org/10.1097/0000478-198607000-00003).
- [2] Joneja U, Palazzo J. The spectrum of mucinous lesions of the breast. *Arch Pathol Lab Med* 2023;147(1):19–29. doi:[10.5858/arpa.2022-0054-RA](https://doi.org/10.5858/arpa.2022-0054-RA).
- [3] Jaffer S, Bleiweiss IJ, Nagi CS. Benign mucocele-like lesions of the breast: revisited. *Mod Pathol* 2011;24(5):683–7. doi:[10.1038/modpathol.2010.235](https://doi.org/10.1038/modpathol.2010.235).
- [4] Meares AL, Frank RD, Degnim AC, Vierkant RA, Frost MH, Hartmann LC, et al. Mucocele-like lesions of the breast: a clinical outcome and histologic analysis of 102 cases. *Hum Pathol* 2016;49:33–8. doi:[10.1016/j.humpath.2015.10.004](https://doi.org/10.1016/j.humpath.2015.10.004).
- [5] Dang BQ, Miles B, Young P, He J, Nguyen QD. Mucocele-like lesion of the breast. *Cureus* 2023;15(4):e37829. doi:[10.7759/cureus.37829](https://doi.org/10.7759/cureus.37829).
- [6] Thai JN, Lerwill MF, Chou SS. Spectrum of mucin-containing lesions of the breast: multimodality imaging review with pathologic correlation. *Radiographics* 2023;43(10):e230015. doi:[10.1148/rg.230015](https://doi.org/10.1148/rg.230015).
- [7] Ha SM, Cha JH, Shin HJ, Chae EY, Choi WJ, Kim HH. Mucocelelike lesions in the breast: radiologic and clinicopathologic correlations with upgrade rate. *AJR Am J Roentgenol* 2018;210(6):1386–94. doi:[10.2214/AJR.17.18515](https://doi.org/10.2214/AJR.17.18515).
- [8] Griffiths R, Alarcon L, Bonello V, Scott V, Szollosi Z. Mucocele-like lesions of the breast - a radiological and clinicopathological analysis. *Curr Probl Cancer* 2021;45(6):100762. doi:[10.1016/j.crrproblcancer.2021.100762](https://doi.org/10.1016/j.crrproblcancer.2021.100762).
- [9] Park YJ, Kim EK. A pure mucocele-like lesion of the breast diagnosed on ultrasonography-guided core-needle biopsy: is imaging follow-up sufficient? *Ultrasonography* 2015;34(2):133–8. doi:[10.14366/usg.14036](https://doi.org/10.14366/usg.14036).
- [10] Leibman AJ, Staeger CN, Charney DA. Mucocelelike lesions of the breast: mammographic findings with pathologic correlation. *AJR Am J Roentgenol* 2006;186(5):1356–60. doi:[10.2214/AJR.04.1949](https://doi.org/10.2214/AJR.04.1949).
- [11] Towne WS, Michaels AY, Ginter PS. Mucocele-like lesion of the breast diagnosed on core biopsy. *Arch Pathol Lab Med* 2022;146(2):213–19. doi:[10.5858/arpa.2020-0497-OA](https://doi.org/10.5858/arpa.2020-0497-OA).
- [12] Edelweiss M, Corben AD, Liberman L, Kaplan J, Nehhozina T, Catalano JP, et al. Focal extravasated mucin in breast core needle biopsies: is surgical excision always necessary? *Breast J* 2013;19(3):302–9. doi:[10.1111/tbj.12104](https://doi.org/10.1111/tbj.12104).
- [13] K Reynolds C. Original report. Mucocele-like tumors of the breast: mammographic and sonographic appearances. *AJR Am J Roentgenol* 2003;180(4):949–54. doi:[10.2214/ajr.180.4.1800949](https://doi.org/10.2214/ajr.180.4.1800949).
- [14] Farshid G, Pieterse S, King JM, Robinson J. Mucocele-like lesions of the breast: a benign cause for indeterminate or suspicious mammographic microcalcifications. *Breast J* 2005;11(1):15–22. doi:[10.1111/j.1075-122X.2005.21437.x](https://doi.org/10.1111/j.1075-122X.2005.21437.x).
- [15] Ohi Y, Umekita Y, Rai Y, Sagara Y, Baba S, Tamada S, et al. Mucocele-like lesions of the breast: a long-term follow-up study. *Diagn Pathol* 2011;6:29. doi:[10.1186/1746-1596-6-29](https://doi.org/10.1186/1746-1596-6-29).
- [16] Sutton B, Davion S, Feldman M, Siziopikou K, Mendelson E, Sullivan M. Mucocele-like lesions diagnosed on breast core biopsy: assessment of upgrade rate and need for surgical excision. *Am J Clin Pathol* 2012;138(6):783–8. doi:[10.1309/AJCP1D8YLCFFFTLOW](https://doi.org/10.1309/AJCP1D8YLCFFFTLOW).
- [17] Gibreel WO, Boughhey JC. Mucocele-like lesions of the breast: rate of upstaging and cancer development. *Ann Surg Oncol* 2016;23(12):3838–42. doi:[10.1245/s10434-016-5352-7](https://doi.org/10.1245/s10434-016-5352-7).