

LOCALIZED AMYLOIDOSIS OF THE BREAST MIMICKING BREAST CANCER: RADIOLOGIC- PATHOLOGIC CORRELATION

Monette C. Coletti,

*M.D., West County Radiological Group, Mercy Hospital Saint Louis, Saint Louis, MO, 63141,
Email: monette.castillocoletti@mercy.net*

Annette I. Joe, M.D.,

*University of Michigan Health System, Department of Radiology, Division of Breast Imaging,
Ann Arbor, MI, 48109, Email: ajoe@med.umich.edu*

Deborah O. Jeffries, M.D.,

*University of Michigan Health System, Department of Radiology, Division of Breast Imaging, Ann
Arbor, MI, 48109, Email: debjeffr@med.umich.edu*

Elizabeth Wey, M.D.,

*Oakland University William Beaumont School of Medicine, Department of Pathology, Troy,
MI, 48085, Email: elizabeth.vey@beaumont.edu*

Corresponding author: Annette I. Joe, M.D.

Assistant Professor of Radiology

University of Michigan Health System

2902 Taubman Center, SPC 5326

1500 E. Medical Center Drive

Ann Arbor, Michigan 48109-5326

Phone: (734) 232-2919, Fax: (734) 936-9723

Email: ajoe@med.umich.edu

Abstract:

Amyloidosis localized to the breast is uncommon. It may present with nonspecific imaging characteristics including a suspicious mass with or without calcifications, calcifications alone, or even with features mimicking inflammatory carcinoma of the breast. Amyloidosis has also been described coexistent with primary carcinoma of the breast, further confounding the imaging spectrum. We describe a case of amyloidosis localized to the breast presenting as a new mass with imaging features highly suggestive of malignancy.

Keywords: *Localized Amyloidosis; Breast; Breast ultrasound; Mammography*

1. CASE REPORT

A 54-year-old asymptomatic postmenopausal woman presented to the radiology department for a digital screening mammogram. The patient’s medical history was noncontributory and a recent physical exam was within normal limits. The mammogram demonstrated a mass in the upper outer quadrant of the right breast, which was not present 2 years prior (Figure 1A, B). The left breast was negative. Incremental diagnostic images of the right breast confirmed a 1.7 cm irregular mass with indistinct margins and no associated calcifications (Figure 2). A focused ultrasound of the upper outer right breast performed by the radiologist demonstrated a 1.0 x 0.7 x 0.7 cm nonparallel, irregular, hypoechoic solid mass with spiculated margins, corresponding to the mammographic mass (Figure 3A, B). This mass also demonstrated an echogenic halo and posterior acoustic shadowing (Figure 3A, B). The imaging characteristics were classified as highly suggestive of malignancy (Breast Imaging Reporting and Data System [BI-RADS®] Category 5) (1). Biopsy was recommended to the patient.

Figure 1B.

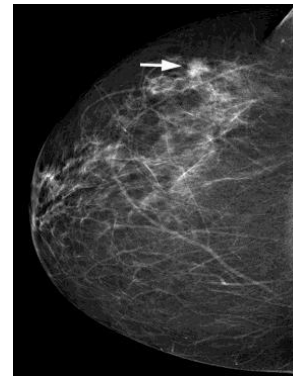


Figure 1(A, B): Right breast, craniocaudal (A) and mediolateral oblique (B) views, demonstrates a 1.7 cm irregular mass in the upper outer quadrant (arrow).

Figure 2.

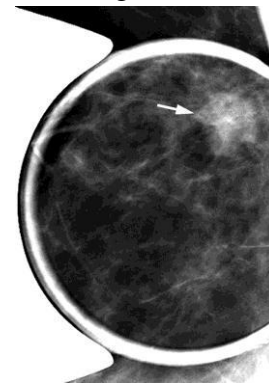


Figure 2: Spot compression view of the right breast mass demonstrates indistinct margins and no associated calcifications (arrow).

Figure 1A.



Figure 3A.



Figure 3B.

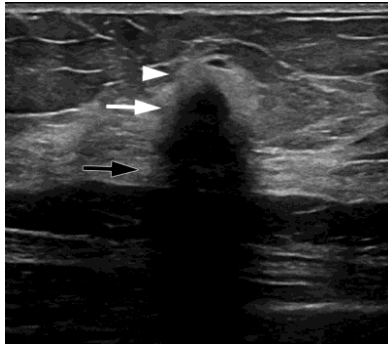


Figure 3(A, B): Right breast focused ultrasound orthogonal images demonstrate a 1.0 x 0.7 x 0.7 cm irregular, nonparallel, hypoechoic mass with spiculated margins (white arrow), an echogenic halo (arrowhead) and posterior acoustic shadowing (black arrow) corresponding to the mammographic mass.

An ultrasound guided core biopsy was performed using a 14-gauge automatic core biopsy needle. Four independent core biopsy samples were obtained and the position of the needle within the mass was confirmed with orthogonal views after each pass (Figure 4A, B). The samples were sent to pathology in formalin. A metallic tissue marker was placed at the biopsy site under direct ultrasound guidance and a two-view digital post procedure mammogram demonstrated the metallic marker in the mass in the right upper outer quadrant.

Figure 4A.



Figure 4B.

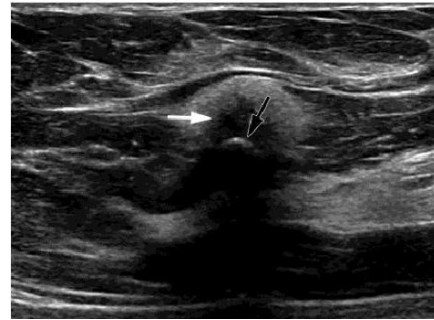


Figure 4(A, B): Orthogonal images confirm needle position (black arrow) during ultrasound guided core needle biopsy of the right breast mass (white arrow).

Histologic examination demonstrated breast tissue with scattered aggregates of eosinophilic amorphous material consistent with amyloid (Figure 5). The presence of amyloid was confirmed by Congo red special stain, which revealed apple-green birefringence with polarized light (Figure 6). In addition, there were a few small clusters of lymphocytes and plasma cells, largely associated with the lobules. Immunohistochemistry was performed to further evaluate these inflammatory foci. CD3 highlighted scattered single and small clusters of T-cells. CD20 marked tiny aggregates of B-cells. CD38 highlighted scattered plasma cells that were polytypic by kappa and lambda immunostains. The immunomorphology of these lymphoplasmacytic foci was consistent with a reactive process and not a neoplastic process. Amyloid typing detected a peptide profile consistent with AL (lambda)-type amyloid deposition. A surgical biopsy with wire localization was subsequently performed, which again demonstrated amyloidosis and was negative for carcinoma.

Figure 5.

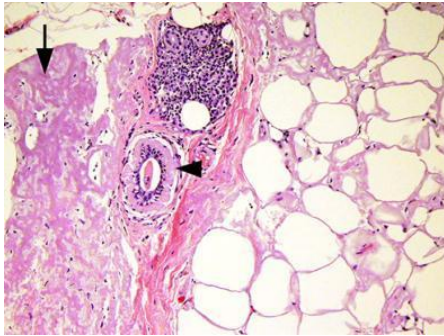


Figure 5: Amyloid tumor. Amorphous homogeneous deposits of amyloid are seen in adipose tissue, fibrocollagenous stroma (arrow) and around a duct (arrowhead). In addition, there is an associated small, perilobular collection of lymphocytes and plasma cells. (H&E stain, 200x.)

Figure 6.

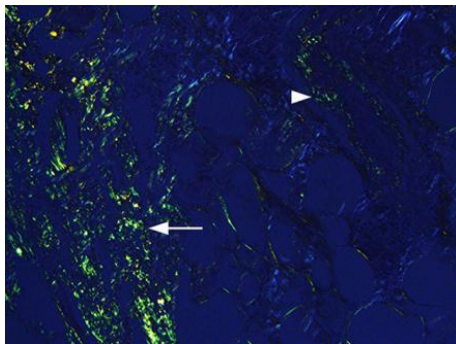


Figure 6: Amyloid tumor. Apple-green birefringence of amyloid in periductal tissue. (Congo red stain with polarized light, 400x.)

2. DISCUSSION

Amyloidosis is extracellular deposition of amorphous congophilic protein within tissues (2). The kidneys are the most commonly affected organs, but other organs such as the liver, spleen, skin, heart and gastrointestinal tract may be involved (3, 4). Historically, amyloidosis was classified based on organ distribution and clinical presentation, as either primary (i.e., idiopathic) or secondary (i.e., associated

with a chronic inflammatory condition or neoplastic process) and localized (organ-specific) or systemic (involving multiple organs). The current classification system is based on the numerous different amyloid protein types, with over 25 different proteins currently known (3). Most cases of primary amyloidosis are associated with amyloid derived from immunoglobulin light chain (AL) caused by an underlying plasma cell proliferative disorder (2, 3). Most cases of secondary amyloidosis are associated with the deposition of fibrils derived from serum amyloid A protein (AA), an acute-phase reactant protein (3). However, from a practical clinical standpoint, amyloidosis can still be viewed as either systemic or localized. The systemic form is clinically more important since multiple vital organs can be affected.

Amyloidosis involving the breast is a rare entity which has been reported more often in the setting of the systemic form of the disease. It is usually a late presentation of previously diagnosed disease in patients with known wide spread visceral amyloid involvement (5). Amyloid deposition isolated to the breast is extremely rare, and is often benign and self-limited. However, amyloidosis localized to the breast should be a diagnosis of exclusion since the systemic form of the disease may be clinically silent.

Our patient did not have a personal or family history of primary or secondary amyloidosis. Clinical and laboratory work up was negative except her serum protein electrophoresis initially revealed a very small (0.1 gram per deciliter) IgA kappa monoclonal gammopathy. This was no longer seen on one and two year follow-up serum protein electrophoresis and was felt to be unrelated and of uncertain clinical significance. The patient has been followed for four years with no evidence of systemic amyloidosis.

Within the breast, amyloid fibrils can deposit around ducts, blood vessels, lymphatic ducts, within lobules and within the interstitium (4, 5). The proteins can be found as a conglomerate, in the masslike or tumoral form, or diffusely throughout the breast (4). Amyloid deposition in the breast can present clinically as a palpable mass or as a non-palpable abnormality on mammography (6). Amyloidosis has also presented clinically as diffuse breast heaviness, engorgement and skin thickening, mimicking inflammatory carcinoma (7). There are no imaging characteristics specific to amyloidosis. Rather, amyloid deposition in the breast is often described as mimicking breast carcinoma and warranting biopsy. Mammographically, amyloidosis in the breast has presented as a suspicious mass with or without microcalcifications, as well as microcalcifications alone (6, 8-10). In a case series of 7 patients with localized amyloidosis of the breast, all patients presented with calcifications on screening mammography (9). Calcifications associated with amyloid deposition in the breast have been described as smooth branching rodlike, elongated, curvilinear, and radiolucent centered, with distribution patterns of grouped, segmental and even scattered (4, 6).

A few case reports have described primary carcinoma of the breast coexistent with amyloid deposition with or without systemic amyloidosis. Amyloidosis has been described coexistent with ductal carcinoma in situ, invasive ductal carcinoma, invasive lobular carcinoma, and invasive tubulo-lobular carcinoma (4, 5, 11). When accompanying carcinoma, amyloid can be intermingled with the carcinoma, a discrete lesion in the same or opposite breast, or extensive throughout the breast (5, 11).

Our patient presented with a new,

nonpalpable mass without associated calcifications on screening mammography. Sonography demonstrated features most compatible with carcinoma (i.e., irregular nonparallel, hypoechoic solid mass with spiculated margins, echogenic halo and posterior acoustic shadowing). The findings were considered highly suggestive of malignancy, with greater than a 95% probability of malignancy. To our knowledge there have been no other case reports describing the sonographic features of amyloid tumor in the breast without an associated breast cancer. A case report of an invasive lobular carcinoma intermingled with amyloidosis, describes the sonographic features as an ill-defined mass with diffuse hyperechogenicity (5).

It is clear that the imaging characteristics of amyloid deposition in the breast are nonspecific and often mimic malignancy. Histologic sampling of suspicious imaging findings is always warranted to rule out carcinoma even in patients with known amyloidosis.

REFERENCES

1. American College of Radiology (ACR). ACR BI-RADS[®] Mammography. In: Sickles EA, D'Orsi CJ, Bassett LW, et al., eds. ACR BI-RADS[®] Atlas, Breast Imaging Reporting and Data System. 5th ed. Reston, VA: American College of Radiology; 2013.
2. Deolekar MV, Larsen J, Morris JA. Primary amyloid tumour of the breast: a case report. *J Clin Pathol.* 2002; 55(8):634-5.
3. Picken MM. Amyloidosis-where are we now and where are we heading? *Arch Pathol Lab Med.* 2010; 134(4):545-51.
4. Munson-Bernardi BD, DePersia LA. Amyloidosis of the breast coexisting with ductal carcinoma in situ. *AJR Am J Roentgenol.* 2006; 186(1):54-5.
5. Sabate JM, Clotet M, Torrubia S, et al. Localized amyloidosis of the breast associated with invasive lobular carcinoma. *Br J Radiol.* 2008; 81(970):e252-4.
6. Gluck BS, Cabrera J, Strauss B, et al. Amyloid deposition of the breast. *AJR Am J Roentgenol.* 2000; 175(6):1590.
7. Fu K, Bassett LW. Mammographic findings of diffuse amyloidosis and carcinoma of the breast. *AJR Am J Roentgenol.* 2001; 177(4):901-2.
8. Diaz-Bustamante T, Iribar M, Vilarrasa A, et al. Primary amyloidosis of the breast presenting solely as microcalcifications. *AJR Am J Roentgenol.* 2001; 177(4):903-4.
9. Charlot M, Seldin DC, O'Hara C, et al. Localized amyloidosis of the breast: a case series. *Amyloid.* 2011; 18(2):72-5.
10. Huerter ME, Hammadeh R, Zhou Q, et al. Primary amyloidosis of the breast presenting as a solitary nodule: case report and review of the literature. *Ochsner J.* 2014; 14(2):282-6.
11. Rocken C, Kronsbein H, Sletten K, et al. Amyloidosis of the breast. *Virchows Arch.* 2002; 440(5):527-35.