

UNCOMMON MALIGNANT BREAST CONDITIONS MIMICKING BENIGN FINDINGS: CASE STUDIES AND REVIEW OF THE LITERATURE

RADIA BENYAHIA

Medical Imaging Department, Pierre and Marie Curie Center, University of Algiers 1, Algeria.

CHAHIRA MAZOUZI

University Hospital of Bejaia, Medical Oncology Department, University of Bejaia.

KAMEL HAIL

University Hospital of Mustapha, Surgery Department, University of Algiers 1.

NABIL BELLIK

University Hospital of Bejaia, Nephrology Department, University of Bejaia.

NAZIM LARABA

University Hospital of Bab El Oued, Internal Medicine Department, University of Algiers 1.

Abstract

Deceptive cancers mimic benign breast tumors and are primarily represented by the group of round-shaped cancers with well-circumscribed contours. These account for about 10 to 20% of breast cancers. They most often correspond to grade III invasive carcinomas without specific features, particularly triple-negative cancers. Other etiologies of round-shaped carcinomas correspond to specific histological types including colloid (or mucinous) carcinoma, and medullary carcinoma (especially frequent in patients mutated for BRCA1). It is crucial to recognize their presentation in conventional imaging, mammography, and ultrasound, and to consider them in the presence of morphological criteria of benign appearance (cystic component in ultrasound) combined with subtle non-typical benignity criteria such as the presence of microcalcifications in mammography, microlobulated contours, a complex cystic component in ultrasound, or intratumoral vascularization in Doppler mode. In case of doubt, it is imperative to indicate a micro-biopsy for histological analysis.

Keywords: Breast Cancers, Triple-Negative, Colloid Carcinoma, Medullary Carcinoma, BI-RADS, Mammography, Ultrasound, MRI, Benign Imaging.

INTRODUCTION

Rare malignant breast pathologies with benign imaging aspects present a diagnostic challenge for radiologists. Although these lesions may exhibit radiological characteristics suggesting a benign nature, they may in fact be malignant. In this article, we report three clinical cases of rare breast pathologies with benign imaging aspects and review the literature on these conditions to improve the recognition and management of these lesions.

Observation 1

This is a case of a 68-year-old patient with no personal or family history of breast or ovarian cancer, followed for hypertension and type 2 diabetes, who underwent a mammography following self-palpation of a right breast mass. Clinical examination found

a mobile mass of less than 2 cm, not adherent to deep planes, without axillary or supraclavicular lymphadenopathy. A mammography and breast ultrasound were requested. The mammography revealed a high-density right breast mass, oval in shape, with circumscribed, homogeneous contours, located in the upper outer quadrants, measuring 12mm without microcalcifications within (figures 1a,1b).

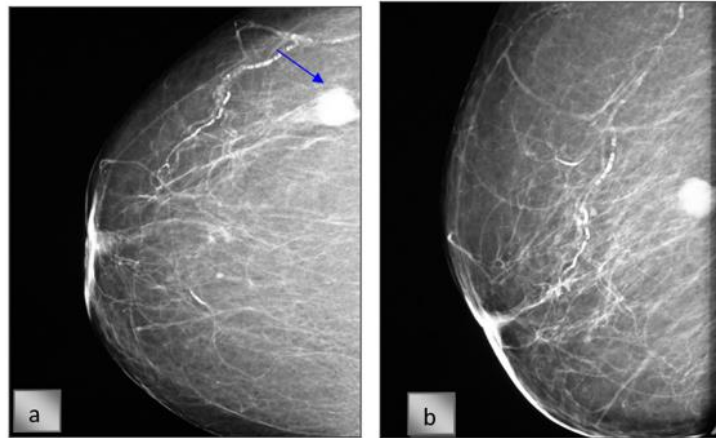


Figure 1: Mammographic views, frontal (a) and oblique (b), displaying a mass in the upper outer quadrants of the right breast with regular contours, oval shape, homogeneous without microcalcifications, classifying the lesion as BI-RADS 3 by ACR

Ultrasound complement revealed a rounded mass with micro-lobulated contours, hypoechoic, slightly heterogeneous, located in the upper outer quadrants of the right breast, classifying the lesion as BI-RADS 4a by ACR. A micro-biopsy was performed, favoring a diagnosis of pure colloid carcinoma (Figure 2).

The patient underwent a lumpectomy which confirmed the pure nature of the breast carcinoma.



Figure 2: Ultrasound image showing a lobulated mass at the level of the upper outer quadrant of the right breast with micro-lobulated contours, hypoechoic, heterogeneous

Observation 2

This concerns a 29-year-old patient with a family history of ovarian cancer, who consulted following self-palpation of a left breast mass. Clinical examination found a mass located in the upper outer left quadrant, mobile, 3 cm in size, not adherent to deep planes, with homolateral axillary lymphadenopathies. A breast ultrasound was requested, revealing a mass in the upper outer quadrant measuring 32 mm, lobulated shape, parallel to the skin planes, with circumscribed contours, homogeneous, very hypoechoic without posterior acoustic shadowing (Figure 3).

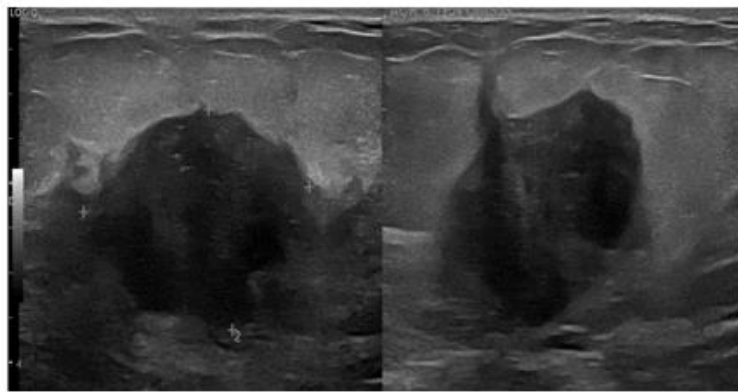


Figure 3: Ultrasound image showing a mass at the level of the upper outer quadrant of the left breast, oval in shape with regular contours, hypoechoic, heterogeneous classified as BI-RADS 4a lesion by ACR

A micro-biopsy was requested given the family history and radiological aspects, returning a diagnosis of infiltrating ductal carcinoma, hormone receptor-negative, Her2 negative, high KI67 (Figure 4).

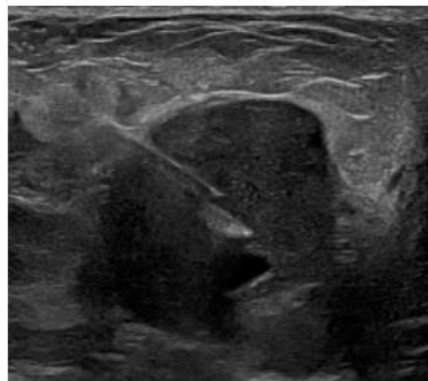


Figure 4: Ultrasound image of the micro-biopsy of the mass

Mammography requested as part of a diagnostic assessment for microcalcifications revealed a rounded mass, with circumscribed homogeneous contours without microcalcifications located in the upper outer quadrant of the left breast (Figure 5a), and

a focus of rounded, polymorphic heterogeneous microcalcifications classified as BI-RADS 4 by ACR (Figure 5b), with fine needle aspiration of the axillary lymphadenopathy being positive.

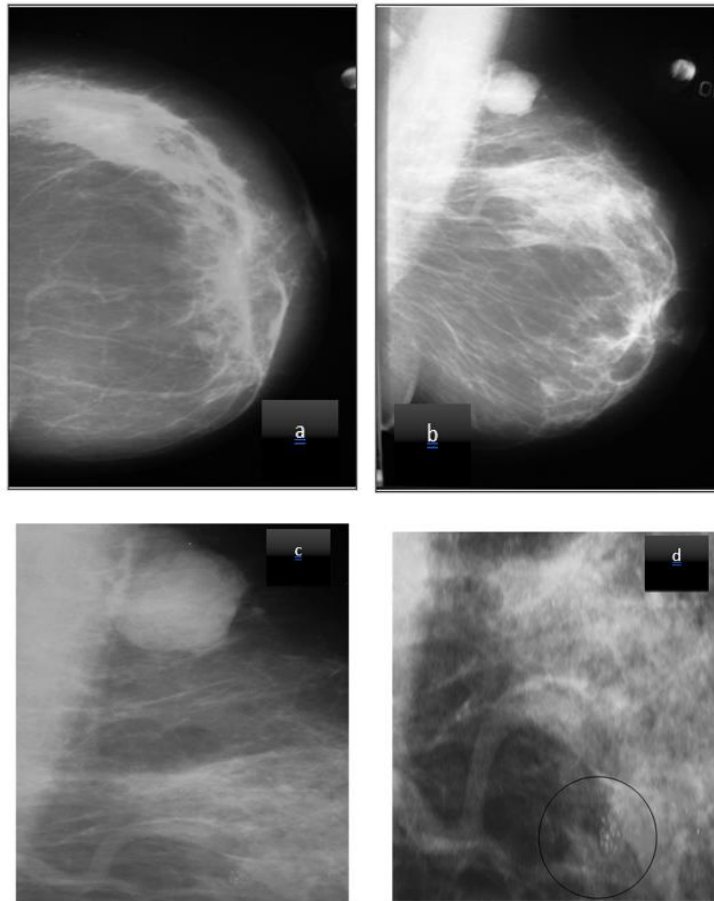


Figure 5: Mammographic views, frontal (a) and oblique (b) showing the presence in the upper quadrants of the left breast, of a mass, with regular contours, rounded shape, homogeneous without microcalcifications within (c) lesion classified as BI-RADS 6 by ACR; focus of polymorphic microcalcifications lesion classified as BI-RADS 4 by ACR

Breast MRI performed as part of a locoregional extension assessment to search for multifocality, multicentricity, bilaterality but also to investigate pectoral muscle involvement since the lesion was deep in intimate contact with the pectoral muscle. MRI revealed a mass with regular shape, circumscribed contours, in T1 hyposignal, with heterogeneous, intense contrast enhancement in arterial phase, persistent and washing out in delayed phase, producing a type 3 hemodynamic curve, located in the upper outer quadrant of the left breast. This mass did not show signs of tumoral extension (Figure 6).

A left axillary lymphadenopathy, Berg I, with intermediate signal in T1, high signal in T2, with intense and homogeneous contrast enhancement was also noted.

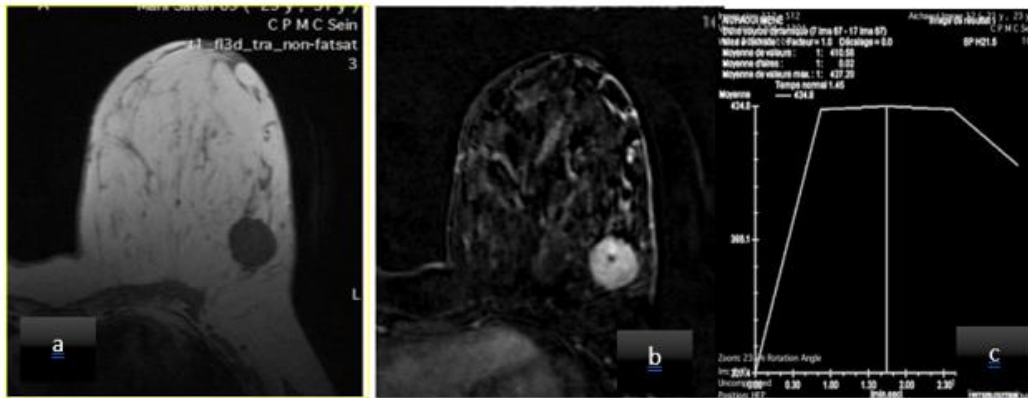


Figure 6: MRI aspect, T1 sequence (a), sequence with contrast injection (b), sequence in subtraction showing a unilocal mass at the level of the upper outer quadrant of the left breast, rounded shape, with regular contours, in T1 hyposignal, heterogeneously enhancing after contrast injection, producing a type 3 hemodynamic curve, classifying the lesion as BI-RADS 6 by ACR

The decision of the multidisciplinary consultation meeting was to perform a lumpectomy and lymph node dissection after neoadjuvant chemotherapy and clip placement (Figure 7).



Figure 7: Ultrasound image of clip placement

The patient was referred to an oncologist for neoadjuvant chemotherapy followed by conservative breast surgery and radiotherapy. Adjuvant hormone therapy is also considered.

Observation 3

This concerns a 36-year-old patient with a family history of breast cancer at the age of 42 in the mother, who consulted following self-palpation of a left breast mass. Clinical examination found a mass located in the upper inner left quadrant, mobile, over 2 cm in

size, not adherent to deep planes, without homolateral axillary lymphadenopathies. A breast ultrasound was requested, revealing a mass in the upper outer quadrant measuring 24 mm, oval in shape, parallel to skin planes, with circumscribed contours, homogeneous, with posterior attenuation (Figure 8) classified as BI-RADS 4a by ACR.

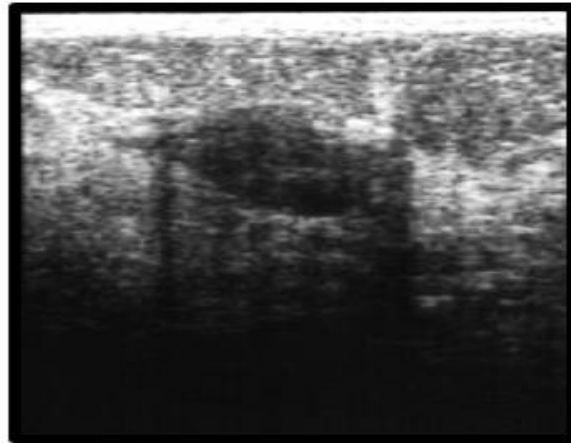


Figure 8: Breast ultrasound. Presence of an oval-shaped mass, with circumscribed contours, homogeneous, with posterior attenuation

A micro-biopsy was requested given the family history and radiological aspects, returning a diagnosis of pure medullary type carcinoma. Mammography requested as part of a diagnostic assessment for microcalcifications revealed a rounded mass, with circumscribed homogeneous contours without microcalcifications located in the upper inner quadrant of the left breast (Figure 9). The decision of the multidisciplinary consultation meeting was to perform a lumpectomy and lymph node dissection after neoadjuvant chemotherapy and clip placement (Figure 7).

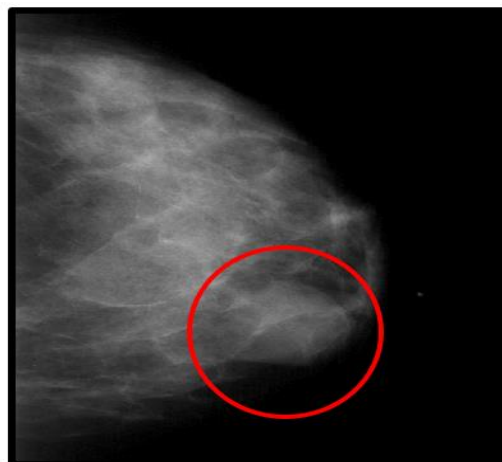


Figure 9: Frontal mammography. Presence of an oval-shaped mass, with circumscribed contours, homogeneous without microcalcifications,

DISCUSSION

In this discussion, we will address three distinct clinical cases: triple-negative breast cancer, mucinous cancer, and medullary carcinoma. Each of these breast cancer subtypes presents unique clinical and histological characteristics, as well as specific implications for patient management and prognosis.

1. Triple-Negative Breast Cancer:

Triple-negative breast cancer is characterized by the absence of hormone receptors (estrogen and progesterone receptors) and HER2 overexpression. It accounts for approximately 15 to 20% of breast cancer cases and is associated with a poorer prognosis due to the lack of specific therapeutic targets. In conventional imaging, mammography generally reveals a mass with a round, oval, or lobulated shape in 75% of cases, with a circumscribed border. Biopsy confirmed a triple-negative breast cancer. Similarly to mammography, the predominance of round-oval-lobulated shape, circumscribed contours, and marked hypoechogenicity in ultrasound are noted. Histological features include tumoral proliferation within ductal structures, with high mitosis and lymphocytic infiltration.

The management of triple-negative breast cancer typically involves surgery (mastectomy or lumpectomy) followed by adjuvant chemotherapy. Given the absence of hormone receptors and HER2 overexpression, targeted treatments such as hormone therapy and immunotherapy are not effective in this subtype of cancer. Radiotherapy may also be recommended after surgery to reduce the risk of local recurrence.

2. Mucinous Cancer:

Mucinous cancer, also known as colloid carcinoma, is a rare subtype of breast cancer, accounting for about 1 to 4% of cases. It is characterized by tumor cells floating in a mucinous matrix. Mammographic imaging appears as a rounded, oval, lobulated well-circumscribed mass. It may present variable density depending on the proportion of tumor cells and mucin. Microcalcifications are generally absent or infrequent, which can help differentiate mucinous carcinoma from other malignant lesions. In ultrasound, pure mucinous carcinoma often presents as a hypoechoic mass with circumscribed contours, difficult to differentiate from the surrounding fatty tissue, well-defined with posterior enhancement, the latter explained by the significant amount of water within the tumor and the transmission of ultrasound through the mucus. The presence of a mucinous matrix can give the lesion a "halo" appearance, surrounded by a hypoechoic zone. This feature is suggestive of mucin presence but can also be observed in other benign lesions. Ultrasound and mammography are very helpful for the differential diagnosis between pure and mixed colloid carcinoma. The mixed type appears as a hypoechoic, heterogeneous mass with posterior acoustic attenuation, reflecting the infiltrative nature of the tumor. Magnetic resonance imaging is of great interest in distinguishing pure colloid carcinoma from fibroadenoma.

The management of mucinous cancer generally involves surgery, with lumpectomy or mastectomy followed by adjuvant radiotherapy. As this subtype of breast cancer tends to be less aggressive, chemotherapy is often not necessary, except in cases of large tumors or affected lymph nodes.

3. Medullary Carcinoma:

Medullary carcinoma is a rare subtype of breast cancer, accounting for about 3 to 5% of cases. It affects young women under the age of 35. It is frequently diagnosed in women carrying the BRCA1 gene mutation (8 to 13% in this particular context).

Imaging shows a well-defined lesion, oval or rounded in shape, with circumscribed contours and in ultrasound, it is that of an oval mass, with circumscribed contours, hypoechoic, with posterior enhancement, homogeneous. Biopsy confirmed a medullary breast carcinoma.

The management of medullary carcinoma generally involves conservative surgery or mastectomy, followed by radiotherapy and/or adjuvant chemotherapy. Given the generally favorable prognosis of this breast cancer subtype, a more conservative approach may be considered, with a reduction in the extent of surgery and close monitoring.

CONCLUSION

Rare malignant breast pathologies with benign imaging aspects present a diagnostic challenge for radiologists. Through the presented clinical cases and literature review, we highlight the importance of vigilance in recognizing these lesions and the need for a multidisciplinary approach for optimal treatment. A better understanding of these rare entities will contribute to more accurate management and improve outcomes for patients with these pathologies.

Reference

- 1) Wang Y, Ikeda DM, Narasimhan B, Longace TA, Bleicher RJ, Pal S, et al. Estrogen receptor-negative invasive breast cancer: imaging features of tumors with and without human epidermal growth factor receptor type 2 overexpression. *Radiology* 2008;246(2):367—75.
- 2) Shin HJ, Kim HH, Huh MO, Kim MJ, Yi A, Kim H, et al. Correlation between mammographic and sonographic findings and prognostic factors in patients with node-negative invasive breast cancer. *Br J Radiol* 2011; 84:19—30.
- 3) Yang W-T, Dryden M, Broglio K, Gilcrease M, Dawwod S, Dempsey P, et al. Mammographic features of triple receptor-negative primary breast cancers in young premenopausal women. *Breast cancer Res Treat* 2008; 111:405—10.
- 4) Dogan B, Gonzalez-Angulo AM, Gilcrease M, Dryden MJ, Yang WT. Multimodality imaging of triple receptor negative tumors with mammography, ultrasound, and MRI. *AJR* 2010; 194:1160—6.
- 5) Kojima Y, Tsunoda H. Mammography and ultrasound features of triple-negative breast cancer. *Breast Cancer* 2011;18(3):146—51.

- 6) Ko ES, Lee BH, Kim HA, Noh WC, Kim MS, Lee SA. Triple-negative breast cancer: correlation between imaging and pathological findings. *Eur Radiol* 2010;20(5):1111—7.
- 7) Memis A, Ozdemir N, Parildar M, Ustun EE, Erhan Y. Mucinous (colloid) breast cancer: mammographic and US features with histologic correlation. *Eur J Radiol* 2000;35(1):39—43.
- 8) Boyer B. Mammographie : opacités subtiles ou trompeuses. Distorsion architecturale et asymétrie de densité. *Cancers vus sur une seule incidence, cancers ronds. J Radiol* 2005;86(10):1195
- 9) Calderaro J, Espié M, Duclos J, Giachetti S, Wehrer D, Sandid W, et al. Breast intracystic papillary carcinoma: an update. *Breast J* 2009;15(6):639—44.
- 10) Stita W, Trabelsi A, Jaidene L, Ben abdelkerim S, et al. Le carcinome mucineux pur du sein à propos de 18 cas. *Imagerie de la Femme*. 2008 Septembre;18(3):187—190. [Google Scholar]
- 11) Lam WW, Chu WC, Tse GM, Ma TK. Sonographic appearance of mucinous carcinoma of the breast. *AJR Am J Roentgenol*. 2004 Apr;182(4):1069—74.
- 12) Chtourou I, Krichen MS, Bahri I, Abbes K, et al. Carcinome colloide pur du sein: étude anatomoclinique de sept cas. *Cancer/Radiothérapie*. 2009 Jan;13(1):37—41.
- 13) Memis A, Ozdemir N, Parildar M, Ustun EE, Erhan Y. Mucinous (colloid) breast cancer: mammographic and US features with histologic correlation. *Eur J Radiol* 2000;35(1):39—43.
- 14) Monzawa S, Yokokawa M, Sakuma T, Takao S, Hirokaga K, Hanioka K, et al. Mucinous carcinoma of the breast: MRI features of pure and mixed forms with histopathologic correlation. *AJR Am J Roentgenol* 2009;192(3): W125—31.
- 15) Tardivon A. *Imagerie de la femme: sénologie*. Cachan: Lavoisier; 2016. p. 42—3.
- 16) Boisserie-Lacroix M, Mac Grogan G, Debled M, Ferron S, Asad-Syed M, Brouste V, et al. Radiological features of triplenegative breast cancers (73 cases). *Diagn Interv Imaging* 2012;93(3):183—90
- 17) Calderaro J, Espié M, Duclos J, Giachetti S, Wehrer D, Sandid W, et al. Breast intracystic papillary carcinoma: an update. *Breast J* 2009;15(6):639—44.