Case Report

Imaging Features of Rare Breast Lesions in Young Women

RALUCA-ELENA NICA[1,2], MIRCEA-SEBASTIAN ȘERBĂNESCU[3], LUCIAN-MIHAI FLORESCU[2,4], GEORGIANA-CRISTIANA CAMEN[2,4], IOANA-ANDREEA GHEONEA[2,4]

[1]PhD Student, Doctoral School, University of Medicine and Pharmacy of Craiova, Romania

[2]Department of Radiology and Medical Imaging, Emergency Clinical County Hospital of Craiova, Romania

[3]Department of Medical Informatics and Biostatistics, University of Medicine and Pharmacy of Craiova, Romania

[4]Department of Radiology and Medical Imaging, University of Medicine and Pharmacy of Craiova, Romania

ABSTRACT: Rare breast tumors, such as, pseudoangiomatous stromal hyperplasia, granulomatous mastitis, tubular adenoma, myofibroblastoma and xanthogranulomatous mastitis, sarcomas, neuroendocrine tumors can sometimes be misdiagnosed because of the similarities in their imagistic characteristics. The main objective of our report is to emphasize the importance of performing ultrasound-guided breast biopsies of suspect lesions in young patients. We performed an US-guided breast biopsy instead of an excisional biopsy because breast surgery has a huge psychological impact. We selected 3 atypical breast tumors in young women, with different clinical signs and symptoms, some of which similar to other breast lesions, but with rapid growth, which needed a different and multiple imaging approach.

KEYWORDS: *US-guided breast biopsy, rare breast tumors, young patients.*

Introduction

In the past 50 years, imaging techniques has greatly improved early breast tumor diagnosis and has significantly accelerated access to therapy [1].

Breast pathology may include symptoms like nipple discharges, changing color or temperature of the breast or breast masses which may lead patients to seek medical assistance [2].

The most frequent benign lesions are represented by cysts, fibroadenomas, sclerosing adenosis, ductal ectasia, lipomas.

Not all breast lesions have typical clinical signs, some of them may be accidentally discovered in routine controls, but there are cases in which the patient may identify nodular masses or changes in the breast tissue (color of the skin, pain, temperature) [3].

Rare benign breast lesions, like pseudoangiomatous stromal hyperplasia, granulomatous mastitis, diabetic mastopathy, tubular adenoma, myofibroblastoma, schwannoma and xanthogranulomatous mastitis, can be encountered [4,5].

The most common cause of death from cancer in women worldwide is represented by breast cancer [6].

It is determined by an uncontrolled growth and development of abnormal cells in the normal breast tissue.

Ductal carcinoma is the most frequent type of breast cancer and can be divided in DCIS (ductal carcinoma in situ) or invasive (when being spread outside the duct).

Other types of breast cancer can be represented by metastatic breast cancer, inflammatory breast cancer, triple negative breast cancer [6,7].

Rare breast malignant tumors may include neuroendocrine tumors [8] or breast sarcomas, a heterogenous group of non-epithelial tumors with mesenchymal origin [9].

The imaging techniques used to breast screening or diagnose are represented by breast ultrasound (US), mammography (MM) and magnetic resonance imaging (MRI).

Breast US is a non-irradiating imaging technique which can identify the tissue composition and blood flow in any breast area or axilla. MRI is also a radiation-free imaging technique which can provide 3D images of the breast and axillary adenopathy. MM is the imaging technique used in breast screening by using X-rays [10].

Every type of breast lesion involves different medical approaches, therapeutic plans, and prognosis, according to the morphological phenotypes and specific histopathological types.

The diagnosis of benign or malignant breast tumors and the histopathological type is determined through a breast biopsy or excisional surgery.

10.12865/CHSJ.47.02.25

US-guided breast biopsy is a fast and non-invasive well-accepted procedure (contrasted to excisional surgical biopsy), with a more rapidly healing and no scarring.

The US-guided breast biopsy does not produce any changes in the breast tissue or shape, it is safe and with a lower cost, and it not involves hospital stay [11].

Subjects

The main objective of our study is to emphasize the importance of performing US-guided breast biopsies for suspect breast lesions.

The breast biopsy is also especially important for situations where there are lesions with similar imaging characteristics, but with a completely different histopathological results which conduct to different therapeutic approaches.

The current study received approval from the local Ethics Committee.

The patients included in the study freely expressed their written consent regarding the use of medical data for research purposes.

A total of three rare, atypical breast lesions in young patients, which were identified through US±MM or MRI, were selected for our case report, from a total of 352 patients investigated between January 2018 and December 2019.

The patients were investigated in the Clinical Emergency County Hospital of Craiova and in the Imaging Centre of University of Medicine and Pharmacy of Craiova.

To obtain the histopathological (HP) and immunohistochemical (IHC) reports for the certainty diagnosis (benign/malignant lesions), we performed an US-guided breast biopsy.

In young patients, the HP results confirmed uncommon breast tumors like xanthogranulomatous mastitis, primary breast sarcoma and tubular fibroadenoma.

The cases presented different clinical signs and symptoms, some of which similar to other breast lesions, but with rapid growth, which needed a different and multiple imaging approach.

One of the rare pathologies was identified in a 19-year-old patient with an enlarged right breast, describing tension, pain, and a modified areola, which developed progressively over a period of few months (Figure 1).

Figure 1. Patient in sitting position with arms on the side; enlarged right breast and areola (indicated by arrow).

Because of the young age, the patient was examined through breast ultrasound (Figure 2) and MRI Figure 3, 4), and no MM.

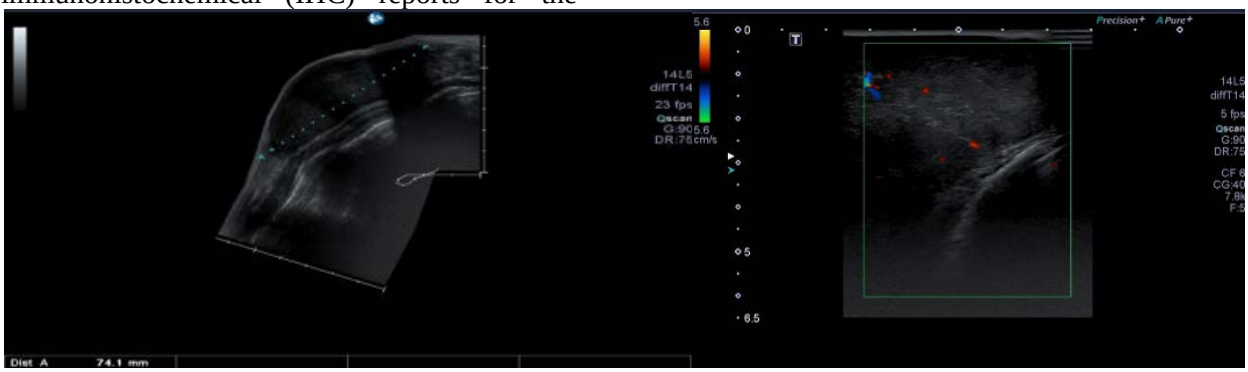

Figure 2. US aspects suggesting large, nodular breast tumor.

The breast-ultrasound identified in the right breast a well-circumscribed, hypoechoic, nodular mass, with weak vascularization and overlarge dimensions difficult to be measured by US.

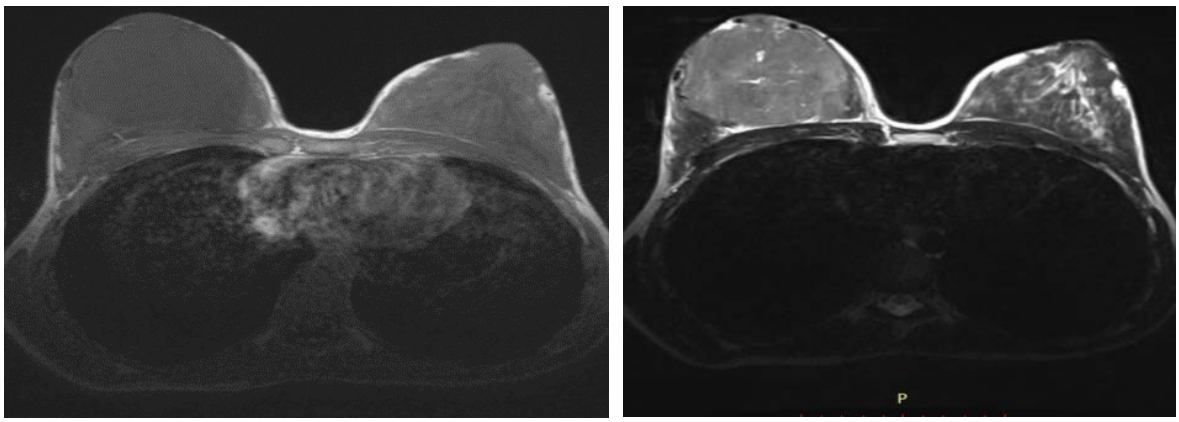

Figure 3. MRI T1 and T2 axial sequences suggesting tumor aspects without contrast agent.

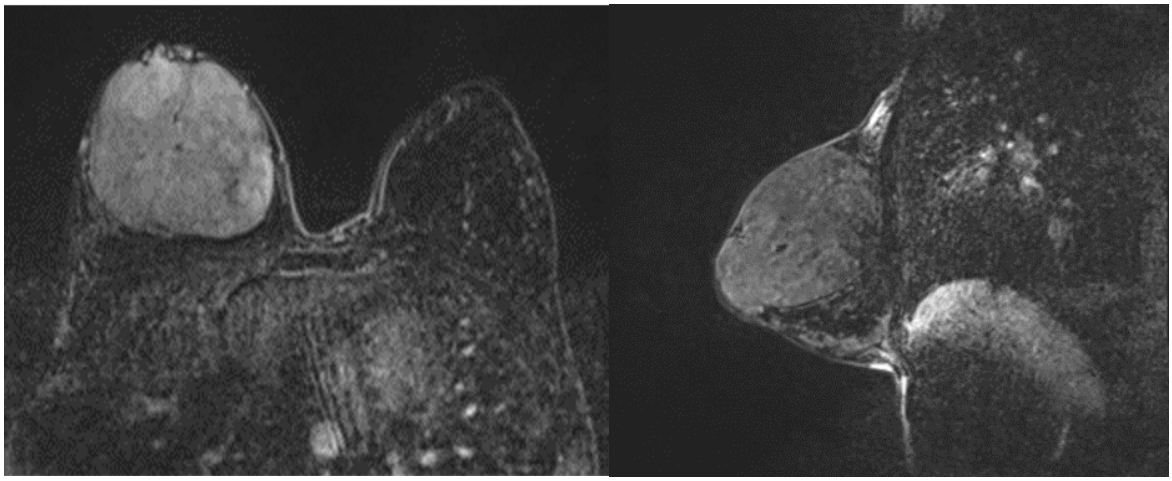

Figure 4. MRI postcontrast sequence axial and sagittal view suggesting inhomogeneous breast tumor compressing normal breast tissue.

The MRI with gadolinium depicted a large, inhomogeneous tumor, occupying both upper quadrants and a mass effect on the parenchyma inferiorly, with no-restricted diffusion and a type I enhancement curve, with a progressive enhancement pattern.

An US-guided breast biopsy established the histopathological report of tubular fibroadenoma.

The US-guided breast biopsy we performed offered multiple fragments which permitted proper identification of proliferated packed tubular structures.

The patient underwent surgery and was submitted to breast ultrasound follow-up.

The breast surgery is indicated in this case due to the rapid continuing growth of the tumor.

Another rare pathology was identified in a 46-year-old patient who, after self-examination identified in the right inframammary fold a subcutaneous mass, which developed for 6 months (Figure 5).

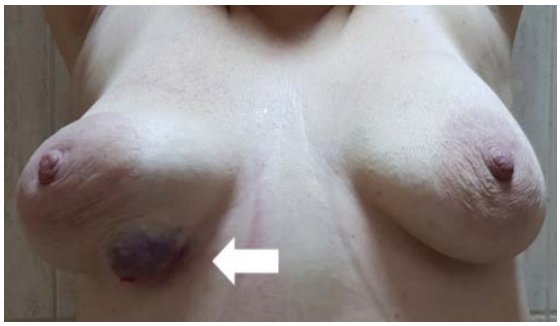

Figure 5. Patient in standing position, with arms behind the neck; subcutaneous breast mass in the right inframammary fold (indicated by arrow).

As the patient was over 40 years old, we examined the breasts through MM (Figure6) and US.

10.12865/CHSJ.47.02.25

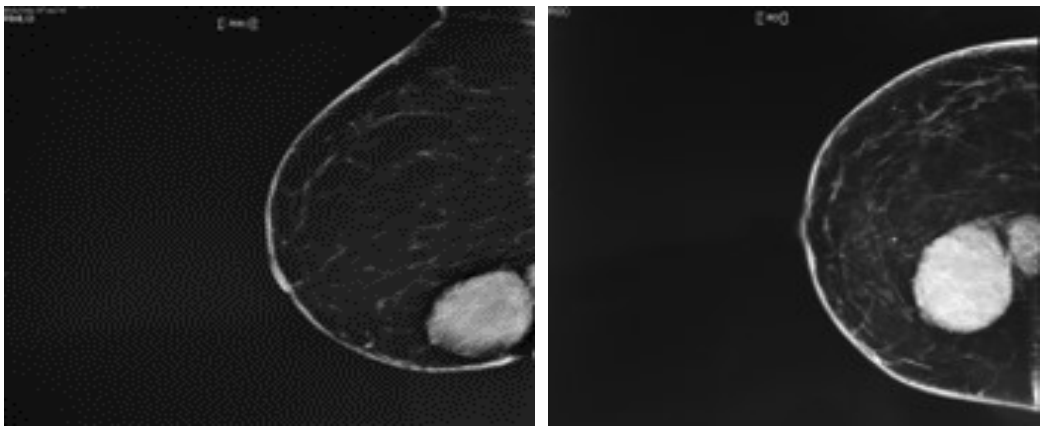

Figure 6. Mediolateral oblique and craniocaudal MM view presenting two adjacent oval breast masses.

MM identified two hyperdense breast masses with circumscribed margins. No calcifications were identified. The patient was additionally investigated through MRI (Figure 7, 8, 9).

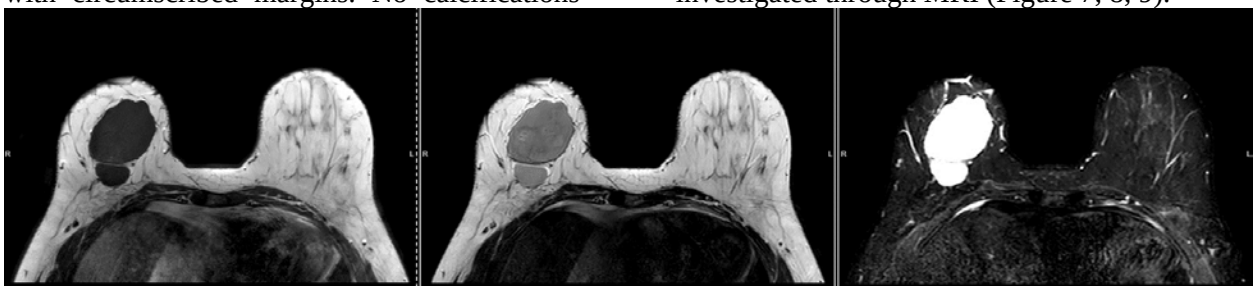

Figure 7. 3T MRI - T1, T2 and STIR image suggesting the two adjacent breast masses.

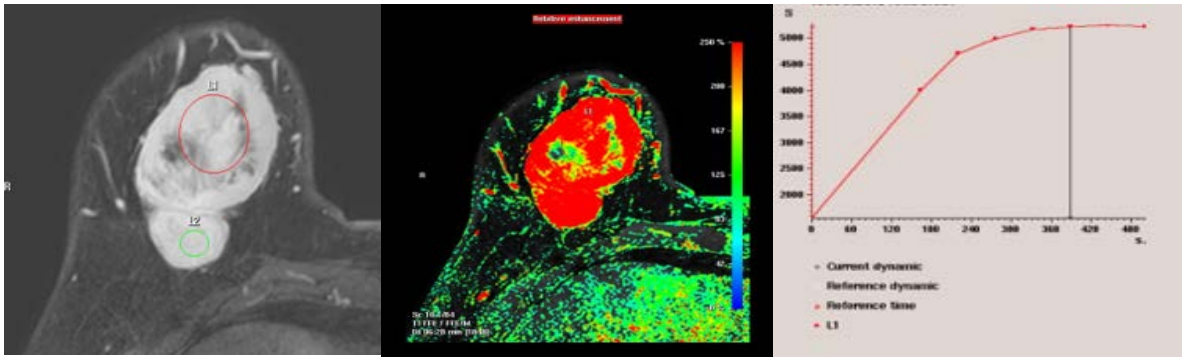

Figure 8. 3T MRI image-hyper enhancing lesions strongly perfused and type II curve.

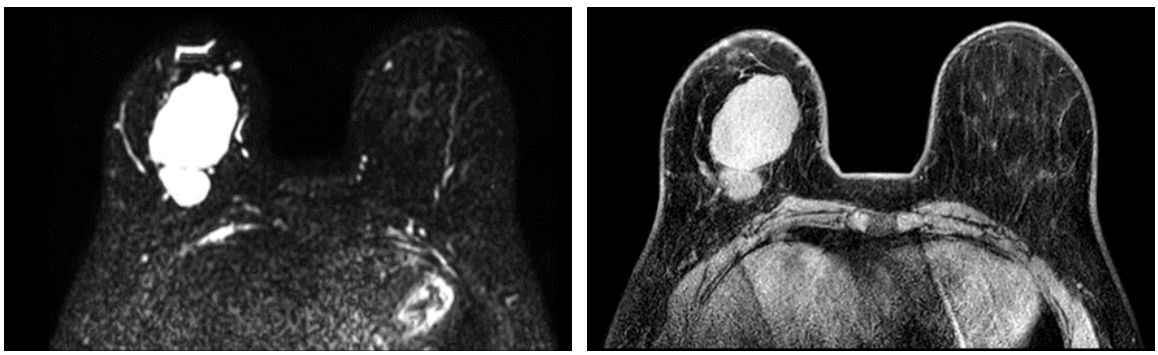

Figure 9. 3T MRI image of breast sarcoma (DWI and postcontrast image) suggesting hyper enhancing lesions, with restricted diffusion.

The 3T MRI with contrast agent (Gadolinium) distinguished in the right breast two near-by breast masses, well demarcated, along with heterogenous structure, necrosis, hyperintense enhancing areas and restricted diffusion.

Regarding the MRI enhancement curve (time intensity), we obtained a type II curve, with initial uptake followed by the plateau phase towards the latter part of the study-considered concerning for malignancy.

An US-guided breast biopsy was performed and the histological and immunohistochemical findings established the diagnosis of primary breast sarcoma.

The patient underwent oncological treatment, surgery and was submitted to computer tomography general follow-up and contralateral usual breast examination.

An additional rare breast pathology was identified in a 34-year-old patient who was submitted in our out-patient clinic with right breast pain and palpatory anomalies, tension and an increased volume.

The patient was firstly examined through US (Figure 10) because of the young age.

Figure 10. US suggesting a mass-like aspect with acoustic shadowing.

On US we identified ductal ectasia filled with hyperechoic material and mass-like appearance with acoustic shadowing.

Due to the severe clinical symptoms and family history, we continued the breast investigation through MM (Figure 11).

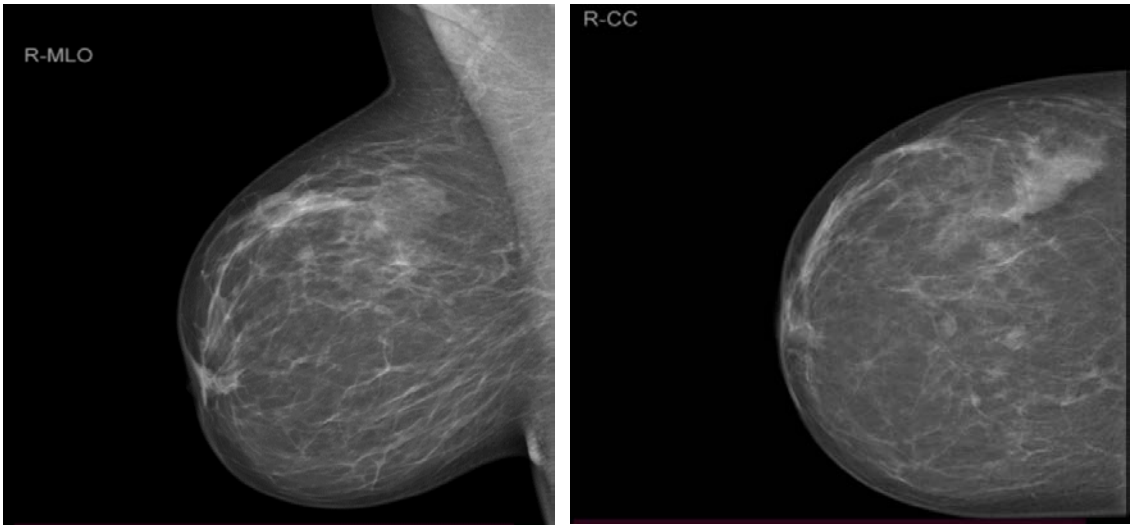

Figure 11. Mediolateral oblique and craniocaudal MM view suggesting focal asymmetric densities.

The MM identified fatty heterogenous breast with focal asymmetric densities in the upper-outer quadrant.

The profile of the investigations raised malignant suspicion which enabled us to perform an US-guided breast biopsy.

The HP diagnosis established the presence of a chronic inflammatory reaction represented by a gigantic mastitis xanthogranulomatous.

Discussion

The present study consisted in the examination of the breasts through US, MM, and MRI in some selected cases.

An US-guided breast biopsy was performed on all three patients included in this case report to establish the HP type of the lesions, because of the clinical aggressive signs and various imaging aspects.

10.12865/CHSJ.47.02.25

The results of this research emphasize the importance of this minimal invasive technique because of potential misdiagnosis which might be caused by the imaging similarities of the lesions.

Breast US is the first imaging technique used in breast evaluation, involving lower costs. It can be used both for diagnosis and follow-up because is a non-invasive and non-irradiating imaging method.

It can be performed on patients of any age, multiple times. It can assess the structure and margins of the lesions, or morphology [12-14].

MM was not used as an imaging technique in the youngest patient (19 years old) because of the exposure to X-rays, so the patient performed an MRI examination.

For the other two patients the benefits provided by the mammography outweighed the risks induced by this amount of radiation [15].

MRI is used as an addition to breast US and MM, being also an especially important diagnostic tool, by identifying exceedingly small breast lesions.

Some notable advances in MRI technology, such as diffusion weighted MRI (DWI-MRI), apparent diffusion coefficient (ADC) and dynamic contrast-enhanced MRI have proved their efficacy in being an adjunct to MM or breast US in case of a not truly clear diagnosis, in patients with dense breast or breast implants.

Breast MRI can also be used in highly invasive breast cancers or in monitoring the response to neoadjuvant therapy.

An important role in differentiating benign from malignant lesions is played by using DWI and ADC values, even without using contrast administration (in patients with known allergies or renal dysfunction) [16].

DWI offers biological information about the physical properties of tissues, composition and about the architectural organization.

Breast MRI can identify both masses and non-masses lesions with full criteria such as shape, dimensions, enhancement, and the kinetic curve assessment because it generates images based on the normal molecular motion of water which is altered by mostly malignant pathology (a more compact architecture which will affect the movement of water molecules, represented by lower ADC values) [16,17].

The gold standard for the pathologic evaluation of breast cancer is represented by the US-guided needle-core breast biopsy, which has become the preferred technique in sampling breast tumors [12].

Nevertheless, challenging areas have remained in the differentiation between certain subtypes of breast cancer, such as fibroadenomas and Phyllodes tumors [18].

In our case, we performed an US guided-breast biopsy using an automatic 14G biopsy gun which obtained the biological material necessary for a histopathological examination.

We performed an US-guided breast biopsy as an alternative to excisional biopsy since breast surgery has a huge psychological impact at any age.

Another important advantage of this technique is represented by the fact that in young patients whose breasts are not fully developed, surgery may affect the breast shape.

Representing only 0.13-1.7% of all breast benign tumors, the tubular adenoma is one of the rarest benign breast masses identified in young premenopausal women [19].

The tubular fibroadenoma should be differentiated both with benign lesions (classic fibroadenoma, lactating adenoma) and malignant tumors (tubular carcinoma), so both with benign and malignant lesions, which empathize once more the importance of a breast biopsy [20].

They usually appear as non-calcified fibroadenomas on mammograms and well-circumscribed hypoechoic masses on ultrasounds [21-24].

Breast sarcoma is a rare type of breast cancer (accounting for fewer than 1% of all breast cancers) [25].

Their development takes place in the connective tissue that supports the lobules and the breast ducts, unlike the more common types of breast cancer which start to develop in the milk ducts, and therefore they act differently than the more common breast cancer types.

They are undifferentiated high-grade tumors, with rapidly dividing cells.

Breast sarcoma may be de novo (primary) or secondary to chemotherapy, immune system disorders, chronic lymphedema.

The primary breast sarcoma may involve the presence of inherited genetic disorders. Because of its rarity, literature is limited to case reports and reviews [25,26].

The differential diagnosis of breast sarcoma should be made with Phyllodes tumors, metaplastic carcinoma, invasive ductal carcinoma not otherwise specified, triple-negative carcinomas, lymphoma, juvenile fibroadenoma (giant fibroadenoma) [27].

Xanthogranulomatous inflammation is a rare form of chronic inflammation which is characterized by its mass forming capacity and locally destructive nature.

It may involve many different organs but is an extremely uncommon occurrence in the breast and has a variable clinical presentation.

This type of inflammation may produce firm lesions which can mimic malignant tumors [28,29].

The etiology of granulomatous mastitis is not very clear, being considered a heterogeneous chronic pathology with multiple clinical signs and symptoms [30].

Most frequently it is associated with severe inflammation and/or fistulae.

The main priority is to exclude a malignant pathology being taken into consideration that the granulomatous changes may obscure carcinomas -a supplemental reason to perform an ultrasound-guided breast biopsy [28,30].

The differential diagnosis of gigantic mastitis xanthogranulomatous should be made with Zuska's disease, squamous metaplasia of lactiferous ducts, recurrent subareolar abscess. Often patients present fistulae tracts [31].

The most common reasons for missed diagnosis are dense parenchyma that conceals the tumor, particularly in noncalcified lesions, inadequate positioning or poor technique, lack of perception of an abnormality, erroneous interpretation of a suspect lesion, subtle characteristics of malignancy or slow developing, non-distorting tumors.

In the three selected instances the clinical evolution was quite rapid, which determined the patients to immediately seek medical assistance.

The imaging aspects of the lesions were ambiguous, which prompted us to perform the US-guided biopsies in order to avoid misdiagnosing the suspect tumors.

The goal is to gather all the patient information in one place in order to increase the proficiency and also the efficiency.

Breast imaging is no longer considered to be a single modality field because every breast imaging technique has its advantages but also its limitations.

There are some imaging aspects regarding every imaging technique which may orientate breast lesions directly to high-risk pathology like irregular tightly clustered calcifications on MM, hypoechoic ill-defined lesions on breast US or restricted-diffusion areas on MRI.

All these identified changes associated with an ultrasound-guided breast biopsy will allow obtaining an eloquent diagnosis and staging for the best therapeutic plan and follow-up.

A breast screening program should be implemented for the early detection of lesions, given the heterogeneity of imaging features.

A high degree of suspicion must be especially raised for breast tumors, developed in young patients.

Close collaboration between radiologists and pathologists is crucial for a fast and concise diagnosis, in order to ensure that suspect lesions are not overlooked and do not delay the diagnosis of malignancy.

Conflict of interests

None to declare.

References

1. Solanki M, Visscher D. Pathology of breast cancer in the last half century. Hum Pathol, 2020, 95:137-148.
2. Bodine AM, Holahan B, Mixon A. Benign breast conditions. J Am Osteopath Assoc, 2017, 117(12):755-760.
3. Masciadri N, Ferranti C. Benign breast lesions: Ultrasound. J Ultrasound, 2011, 14(2):55-65.
4. Adrada BE, Krishnamurthy S, Carkaci S, Posleman-Monetto FE, Ewere A, Whitman GJ. Unusual Benign Tumors of the Breast. J Clin Imaging Sci, 2015, 5:27.
5. Leong PW, Chotai NC, Kulkarni S. Imaging features of inflammatory breast disorders: A pictorial essay. Korean J Radiol, 2018, 19(1):5-14.
6. Acevedo C, Amaya C, López-Guerra JL. Rare breast tumors: Review of the literature. Rep Pract Oncol Radiother, 2014, 19(4):267-274.
7. Breast Cancer Classification Based on Type, Grade and Stage [online]. Available at: https://breastcancer-news.com/breast-cancer-classification/ [Accessed 08.06.2020].
8. Rosen LE, Gattuso P. Neuroendocrine tumors of the breast. Arch Pathol Lab Med, 2017, 141(11):1577-1581.
9. Lim SZ, Ong KW, Tan BK, Selvarajan S, Tan PH. Sarcoma of the breast: An update on a rare entity. J Clin Pathol, 2016, 69(5):373-381.
10. Types of Breast Imaging | Stanford Health Care [online]. Available at: https://stanfordhealthcare.org/medical-tests/b/breast-imaging/types.html. [Accessed 16.07.2020].
11. Bick U, Trimboli RM, Athanasiou A, Balleyguier C, Baltzer PAT, Bernathova M, Borbély K, Brkljacic B, Carbonaro LA, Clauser P, Cassano E, Colin C, Esen G, Evans A, Fallenberg EM, Fuchsjaeger MH, Gilbert FJ, Helbich TH, Heywang-Köbrunner SH, Herranz M, Kinkel K, Kilburn-Toppin F, Kuhl CK, Lesaru M, Lobbes MBI, Mann RM, Martincich L, Panizza P, Pediconi F, Pijnappel RM, Pinker K, Schiaffino S, Sella T, Thomassin-Naggara I, Tardivon A, Ongeval CV, Wallis MG, Zackrisson S, Forrai G, Herrero JC, Sardanelli F. Image-guided breast biopsy and localisation: recommendations for information to women and referring physicians by the European Society of Breast Imaging. Insights Imaging, 2020, 11(1):12.

 10.12865/CHSJ.47.02.25

12. Guo R, Lu G, Qin B, Fei B. Ultrasound Imaging Technologies for Breast Cancer Detection and Management: A Review. Ultrasound Med Biol, 2018, 44(1):37-70.
13. Gheonea IA, Donoiu L, Camen D, Popescu FC, Bondari S. Sonoelastography of breast lesions: a prospective study of 215 cases with histopathological correlation. Rom J Morphol Embryol, 2011, 52(4):1209-1214.
14. Gheonea I, Stoica Z, Bondari S. Differential diagnosis of breast lesions using ultrasound elastography. Indian J Radiol Imaging, 2011, 21(4):301-305.
15. Mammography [online]. Available at: https://www.nibib.nih.gov/science-education/science-topics/mammography [Accessed 07.03.2021].
16. Youssef MA, Elahwal HMS, Alwageeh MM, Attya SE. Role of MRI in differentiating benign from malignant breast lesions using dynamic contrast enhanced MRI and diffusion weighted MRI. Alexandria J Med, 2018, 54(1):1-9.
17. Palle L, Reddy B. Role of diffusion MRI in characterizing benign and malignant breast lesions. Indian J Radiol Imaging, 2009, 19(4):287-290.
18. Yohe S, Yeh IT. "Missed" diagnoses of phyllodes tumor on breast biopsy: Pathologic clues to its recognition. Int J Surg Pathol, 2008, 16(2):137-142.
19. Mazingi D, Mbanje C, Jakanani G, Muguti GI, Mandizvidza V, Bopoto S. Maffucci's syndrome in association with giant tubular adenoma of the breast: Case report and literature review. Int J Surg Case Rep, 2019, 63:147-152.
20. Efared B, Sidibé IS, Abdoulaziz S, Hammas N, Chbani L, El Fatemi H. Tubular Adenoma of the Breast: A Clinicopathologic Study of a Series of 9 Cases. Clin Med Insights Pathol, 2018, 11:1179555718757499.
21. Sengupta S, Pal S, Biswas BK, Phukan JP, Sinha A, Sinha R. Preoperative diagnosis of tubular adenoma of breast-10 years of experience. N Am J Med Sci, 2014, 6(5):219-223.
22. Salemis SS, Gemenetzis G, Karagkiouzis G, Seretis C, Sapounas K, Tsantilas B, Sambaziotis D, Lagoudianakis E.. Tubular Adenoma of the Breast: A Rare Presentation and Review of the Literature. J Clin Med Res, 2012,4(1):64-67.
23. Tavassoli FA, Devilee P. Pathology and Genetics: Tumours of the Breast and Female Genital Organs. In: Hanby AM, Walker C (Eds): WHO Classification of Tumours series-volume IV, IARC Press, 2004, Lyon, 133.
24. Sengupta S, Pal S, Biswas BK, Bose K, Phukan JP, Sinha A. Evaluation of Clinico-Radio-Pathological Features of Tubular Adenoma of Breast: a Study of Ten Cases with Histopathological Differential Diagnosis. Iran J Pathol, 2015, 10(1):17-22.
25. Breast Sarcomas-Johns Hopkins Kimmel Cancer Center [online]. Available at: https://www.hopkinsmedicine.org/kimmel_cancer_center/cancers_we_treat/breast_cancer_program/treatment_and_services/rare_breast_tumors/breast_sarcomas.html. [Accessed 07.03.2021].
26. Yin M, MacKley HB, Drabick JJ, Harvey HA. Primary female breast sarcoma: Clinicopathological features, treatment and prognosis. Sci Rep, 2016, 6:31497.
27. Matsumoto RAEK, Hsieh SJK, Chala LF, de Mello GGN, de Barros N. Sarcomas of the breast: Findings on mammography, ultrasoundand magnetic resonance imaging. Radiol Bras, 2018, 51(6):401-406.
28. Koo JS, Jung W. Xanthogranulomatous mastitis: Clinicopathology and pathological implications. Pathol Int, 2009, 59(4):234-240.
29. Bamanikar SA, Chandanwale SS, Pathak P, Gambhir A, Sheth J. A rare case of xanthogranulomatous mastitis with intraductal papilloma. Med J Dr DY Patil Vidyapeeth, 2018, 11(4):348.
30. Yukawa M, Watatani M, Isono S, Fujiwara Y, Tsujie M, Kitani K, Hara J, Kato H, Takeyama H, Kanaizumi H, Kogata S, Ohta Y, Inoue M. Management of granulomatous mastitis: A series of 13 patients who were evaluated for treatment without corticosteroids. Int Surg, 2015, 100(5):774-782.
31. Lester SC. Differential Diagnosis of Granulomatous Mastitis. Breast J, 2005, 11(6):534-535.

Corresponding Author: Mircea-Sebastian Şerbănescu, Department of Medical Informatics and Biostatistics, University of Medicine and Pharmacy of Craiova, Romania, 2-4 Petru Rareș Street, 200349 Craiova, Romania, e-mail: mircea_serbanescu@yahoo.com