Benign rare inflammatory breast diseases - a pictorial essay

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Authors: M. Szep, A. R. Chiorean, M. A. Chiorean, B. Fetica, L. Rogojan, M. M. Duma; Cluj-Napoca/RO
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Learning objectives

• To analyze mammography, ultrasound and strain sonoelastography appearances of rare breast non-neoplastic inflammatory diseases.
• To discuss differential diagnosis.
Background

Benign breast inflammatory diseases consume less than 1% of the activity in a breast unit. They are usually classified as infectious, non-infectious or indeterminate. Atypical clinical presentations or/and suspicious appearances on imaging may complicate patient management raising the possibility of breast carcinoma [1].

**Granulomatous mastitis (GM)** is a rare, benign, inflammatory chronic disease seen more frequently in females at a reproductive age. It is characterized by the presence of aseptic inflammatory lesions within the breast lobules [2]. It was first described in 1972 by Kessler and Wolloch [3]. Approximately, 200 cases of IGM have been reported in the literature during the past 3 decades, with most of them being reported in developing countries [4].

The etiology of GM is currently unclear. Contraceptives, breast feeding, breast trauma, hyperprolactinemia with nipple discharge, alpha-1-antitrypsin deficiency, autoimmunity, unknown microbiological agents, smoking have been proposed as etiologic factors [5].

Clinically, it presents as a painful, firm, ill-defined mass in the breast, with dimensions varying between 0.5 to 15 cm [2,6]. The lesions are usually unilateral and may be located in every quadrant of the breast [6]. The subareolar region is commonly not affected. Associated lymphadenopathy is found in 15% of cases [1].

Mammography and ultrasound (US) often show non-specific aspects that can suggest a malignant disease.

Focal, poorly-defined asymmetrical density or homogeneous opacity with sharp margins are among mammography findings associated with granulomatous mastitis [2,5,7].

Ultrasound appearances which might rise the GM suspicious are quite heterogeneous, non-specific and often suspicious. According to literature data, GM may present as multiple, irregular, clustered, often contiguous, tubular hypoechoic lesions, which may be associated with large, irregular hypoechoic masses; ovoid well circumscribed mass is another possibility followed by a series of abnormalities generated by edema and hyperemia, such as: hypoechoic linear tracks to skin; typically without acoustic shadowing; increased parenchymal echogenicity and hypervascularity on Doppler examination [7,8].

**Kimura disease** or **eosinophilic hyperplastic lymphogranuloma** is an uncommon benign chronic inflammatory entity with unknown etiology and pathogenesis. Allergic reaction, infection or autoimmune reaction may be involved. Clinically is characterized by painless, slowly enlarging soft tissue mass, lymphadenopathy and peripheral blood eosinophilia. Soft tissue and lymph nodes of head and neck are typically affected. It may mimic a malignancy or a lymphoproliferative disease [9]. Commonly occurs in young
middle age Asian men, but there are reports in non-Asian patients too [9, 10]. To the best of our knowledge there are no breast lesions yet reported in the literature.

**Chronic lymphocytic mastitis** or **Diabetic mastopathy** is also a rare and benign condition. It is associated with long-standing type 1 insulin-dependent diabetes mellitus or type 2 diabetes mellitus and is characterized by a perilobar and perivascular lymphocytic infiltrate, stromal fibrosis, lobular atrophy and characteristic myofibroblastic epithelioid cells. The common clinical presentation consists of large, palpable, rigid mass. It is oftenly multicentric and bilateral [7,11,12]. On mammography commonly appears as homogeneous dense parenchyma, ill-defined mass or asymmetrical density. Hypoechoic area or mass with indistinct margins and marked acoustic shadowing is the characteristic appearance on ultrasound [7,12].

**Eosinophilic mastitis** is a very rare, benign condition, characterized by tissue eosinophilia limited to the breast. Tissue eosinophilia is usually accompanied by peripheral eosinophilia, which is caused by inflammatory allergic diseases, parasitic infestations, collagen diseases and haematological malignancies [13]. Radiological appearances are also non-specific, the final diagnosis is established on histopathological criteria [14].

**Tuberculous mastitis** is caused by infection with Mycobacterium tuberculosis. It represents less than 0,1% of cases of tuberculosis. Commonly occurs in young women and favored factors are pregnancy, lactation and multiparity. Breast tuberculosis was also described in elderly women and rarely in men [1,11].

Breast tuberculosis may be primary, which is very rare, or secondary. The infection pathways may be retrograde spread through lymphatics or hematogenous dissemination or even direct inoculation of the nipple [15]. It manifests clinically as a stiff, painless lump. TB should always be considered when dealing with persistent breast abscess despite well-managed treatment, or in cases with recurring breast fistula [1,12].

Mammography findings of breast TB can be classified as nodular, diffuse or fibrous pattern. Nodular pattern shows an ill-defined or irregular mass, diffuse pattern as focal asymmetrical densities and fibrous pattern manifests as dense breast parenchyma associated with architectural distorsion and retraction of the nipple [1]. Ultrasound may depict a poorly defined, hypoechoic mass, with discrete posterior enhancement, collections or duct ectasia [1].

Up to 50% of patients present axillary lymphnodes enlargement, they appear large, dense and often calcified on mammography [12]. On ultrasound tuberculous lymph nodes appear round, hypoechoic with no visible hilum, indistinct margins. Perinodal edema, thickened capsule, prominent vascularity and cystic necrosis with internal echoes may also be noted [16].

Breast TB is often misdiagnosed as a pyogenic abscess or carcinoma of breast from clinical and imaging point of view [15].
**Breast sarcoidosis** is a rare, chronic inflammatory condition of unknown cause and usually occurs in patients who already have a known sarcoid diagnosis. Primarily affects the lungs, lymph nodes, spleen, liver, skin, eyes, muscles, myocardium, bones, central nervous system, and salivary glands [7, 17]. Breast sarcoidosis generally manifests in women between 20 and 50 years of age. The clinical presentation consists of palpable firm masses [12].

On mammography breast sarcoidosis may appear as an irregular, spiculated opacity or as a circumscribed, round mass, without calcifications. Ultrasound shows irregular hypoechoic mass or cluster of small masses. Intramammary or axillary lymph nodes are involved [7,12].

**Mondor’s disease** is an uncommon entity characterized by thrombophlebitis of the superficial veins of the breast and the chest wall. It is a benign and self-limiting disorder. Mondor’s disease has been associated with trauma, core or surgical biopsy, exercise, injections, pregnancy, malignant breast disease [7,12]. Patients present with a painful, palpable cord structure. The diagnosis is usually clinically established [7]. Imaging finding may be negative or on mammography it may appear as a tubular opacity. In chronic stages vein calcification may be noted. On US, the vein appears as hypo- or anechoic superficial, tubular structure with internal echoes, often non-compressible. Absent flow on Doppler examination may also be found. [7,12]. There are no indication for antibiotics or anticoagulants, however analgesics can be administered for pain. Most cases are cured in 2 up to 12 week period [7].

**Differential diagnosis of rare inflammatory breast diseases** includes a wide spectrum of entities: bacterial mastitis, diffuse or inflammatory carcinoma, Wegener granulomatosis, foreign body granuloma, silicon oil granuloma, fibrosis [7].
Findings and procedure details

We present images collected during a period of nine years (2006-2014). Twenty-two patients diagnosed with uncommon inflammatory breast disease were analyzed retrospectively. The imaging aspects were assessed according to BI-RADS and Tsukuba elasticity score [18,19].

Imaging modalities used for examination (according to case peculiarities and ACR recommendations):

- Mammography - Siemens 3000 NOVA;
- Ultrasound (US): Hitachi 8500 EUB, 6500 EUB, Vision Avius machines; Ultrasonix Sonix Touch machine; Medison Sonoace Pico Portable Ultrasound Machine; Philips HD-11 Digital Ultrasound Machine;
- Sonoelastography (USE): Hitachi 8500 EUB, 6500 EUB, Vision Avius machines, Ultrasonix Sonix Touch machine.

Examinations were performed and interpreted by two Consultant Radiologists with several years experience in breast imaging including ultrasound elastography.

Final diagnosis was established after percutaneous or excision biopsy.

Findings:

Granulomatous mastitis: 11 cases were analyzed and the current study showed similar findings with those already published in literature regarding the age of the patients, size, location of the lesions, mammography and 2D ultrasound aspects:

- the mean age was 36.45 (27-74) years old;
- the maximum diameter of the lesions varied from 5 mm to 90 mm;
- they were located in every quadrant of the breast and no case in the subareolar region.

Imaging findings were the following:

Mammography findings - only 4 patients were mammographic assessed due to the age of patients:

- ill defined opacity: 2 cases (Fig.1)
- asymmetrical density: 2 cases (Fig.2)

Ultrasound findings:

- irregular hypoechoic mass associated with irregular, tubular hypoechoic lesions: 8 cases (Fig.3), (Fig.4);
• irregular, lobulated hypoechoic mass: 2 cases
• oval, poorly-circumscribed nodule: 1 case (Fig.5)
• increased parenchymal echogenicity due to edema: 2 cases
• associated axillary lymphadenopaty: 3 cases
• in contrast with literature data 10 of 11 cases presented intrinsic hypervascularity on Doppler examination (Fig.4)

**Sonoelasography findings** - the novelty of the present study

• Elastographic score 1: 1 lesion (Fig.5)
• Elastographic score 2: 3 lesions (Fig.7), one of them can be interpreted as invers elastographic score 3 reported by Chiorean et al [20] (Fig.4)
• Elastographic score 4: 1 lesion (Fig.8)
• Elastographic score 5: 4 lesions (Fig.3)
• Elastographic score BGR: 2 lesions (Fig.9)

**Kimura disease** of the breast (Fig.10),(Fig.11) - peculiarities of the case are location of the disease, and the fact that it was detected in a non-asian, Caucasian elderly woman.

**Diabetic mastopathy, eosinophilic mastitis, breast tuberculosis, breast sarcoidosis, Mondor’s disease** showed mammography and ultrasound appearances similar with those already described in literature data

**Chronic lymphocytic mastitis** or **Diabetic mastopathy** (Fig.12)

**Eosinophilic mastitis** (Fig.13)

**Tuberculosis**: 1 breast tuberculosis (Fig.14), 1 cold absess (Fig.15), 2 cases of tuberculous lymph nodes (Fig.16), (Fig.17), (Fig.18)

**Sarcoidosis**: 1 mammary sarcoidosis (Fig.19), 2 cases of sarcoidotic axillary lymph nodes (Fig.20), (Fig.21), (Fig.22)

**Mondor’s disease** (Fig.23).

The elasticity Tsukuba scores of mastitis included in our analysis are presented in Table I.

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<td>Granulomatous mastitis</td>
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Table I. The elasticity score of rare, benign mastitis
8 cases of benign mastitis showed non-suspicious, soft appearances on elastography (score 1, 2, BGR) and 7 cases displayed a stiff, suspicious aspect (score 4 and 5).

Tuberculous and sarcoidotic lymph nodes included in this presentation appeared with a BGR pattern on strain sonoelastography.

**Differential diagnosis:**

- Differential diagnosis of these rare benign forms of mastitis included in our presentation are to be made with acute non-specific bacterial mastitis (Fig.24), non-specified chronic mastitis (Fig.25), foreign body granuloma (Fig.26), (Fig.27), primary breast leukemia (Fig.28), breast lymphoma (Fig.29), diffuse neoplasia - DCIS (Fig.30), IDC (Fig.31), ILC (Fig.32), fat necrosis (Fig.33), stromal fibrosis (Fig.34);

- Differential diagnosis of TB or sarcoidotic lymph nodes are to be made with adenopathies found in toxoplasmosis (Fig.35), leukemia (Fig.36), cat scratch disease (Fig.37).
Fig. 1: 33 year old woman with right inner palpable lump. Craniocaudal (CC) and mediolateral oblique (MLO) mammography views of right breast show oval, lobulated opacity with ill-defined margins located medially (red circle). The pathological result was granulomatous mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 2: 33 year old woman with palpable left mass and nipple discharge. Bilateral CC and MLO mammograms: Focal asymmetrical density -inner quadrants of the left breast (red circle). Pathology: granulomatous mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 3: 33 year old woman - Same patient as in Fig. 1 (mammography: ill-defined opacity) Ultrasound, Doppler examination and strain sonoelastography showing an irregular, hypoechoic mass, associated with irregular, tubular hypoechoic lesions; moderate vascularity on Doppler examination. Elastography shows rigid lesions with Tsukuba score 5. BI-RADS 5. Percutaneous biopsy: granulomatous mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 4: Same patient as in Fig. 2 (mammography: assymetrical density) Ultrasound, Doppler examination and strain sonoelastography: heterogeneous mass with elongated shape and parallel orientation. Lesion appears hypervascularized on Doppler examination. On elastography there is to be noted a mosaicated appearance concordant with a Tsukuba score 2. BI-RADS 4B. Histopathology obtained post core biopsy: granulomatous mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 5: 37 year old woman, asymptomatic. Ultrasound, Doppler examination and strain sonoelastography: oval, heterogeneous, poorly-circumscribed nodule, with central Doppler signal, soft on elastography (Tsukuba score 1). BI-RADS 4A. Pathology: granulomatous mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 6: Haematoxylin and Eosin (original magnifications X2 (a.), X4(b.)) stainings: Idiopathic lobular granulomatous mastitis - breast lobules centered by granulomatous inflammation: lymphocytes, plasma cells, epithelioid histiocytes, neutrophils. References: Dr. L. Rogojan, Department of Pathology, Emergency County Hospital of Cluj Napoca, Romania

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Fig. 7: Ultrasound, Doppler examination and strain elastography show a irregular, heterogenous lesion, with indistinct margins, parallel orientation, without acustic shadowing, moderate vascularity at Doppler examination and soft aspect at elastography (Tsukuba score 2). BI-RADS 4b. The percutaneous biopsy was performed and the result was granulomatous mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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**Fig. 8:** 32 year old patient with painful left breast mass. Ultrasound, Doppler examination and strain sonoelastography: Irregular, heterogenous parenchimal areas associated with hypervascularity on Doppler examination. Lesion appears stiff on elastography (Tsukuba score 4). BI-RADS Pathology: granulomatous mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj-Napoca, Romania

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Fig. 9: 34 year old patient. Clinically presentation: painful external left mass. Craniocaudal (CC) and mediolateral oblique (MLO) mammography views of left breast show a focal asymmetric density associated with small radiolucent areas located externaly within the left breast. Ultrasound, Doppler examination and strain sonoelastography shows multiple hypoechoic, heterogeneous, ill-circumscribed masses, with intrinsic vascularity and BGR pattern on elastography. BI-RADS 5. A percutaneous biopsy was performed and the result was granulomatous mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj-Napoca, Romania

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Fig. 10: 61 year old caucasian woman. Palpable lump in the left breast. Ultrasound, Doppler examination and strain sonoelastography showing a non-specific hypoechoic mass, with indistinct margins, hyperechoic rim and discreet posterior shadowing. Lesion appears hypovascularized on Doppler examination and stiff on elastography (Tsukuba score 4). BI-RADS 4b. The histopathological result: eosinophilic hyperplastic lymphogranuloma (Kimura disease) References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 11: Haematoxylin and Eosin (original magnifications X40 (a.) and X400 (b., c.)) stainings suggesting a Kimura disease: infiltration of adipose tissue with lymphocytes and eosinophils (a.), lymphocyte predominant area (b.), eosinophils predominant area and numerous small vessels (c.) References: Dr. B Fetcă, Pathology Department, Oncologic Institute of Cluj Napoca, Romania

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Fig. 12: 55 year old woman, known with insulin-dependent diabetes mellitus for 40 years. Ultrasound, Doppler examination and strain sonoelastography: two focal echogenicity alterations with marked acoustic shadowing, minimal Doppler signal, stiff on elastography examination (Tsukuba score 4) within the upper quadrant of the left breast. BI-RADS 4b. The percutaneous biopsy was performed and the result was: Chronic lymphocytic mastitis or Diabetic mastopathy

References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 13: 32 year old postpartum woman with palpable external left lump, recently detected. Ultrasound, Doppler examination and strain sonoelastography: heterogeneous, partially circumscribed large mass, with indistinct medial margins, moderate vascularity, displaying a score 2 on elastography. BI-RADS 4A. The core biopsy was performed and the result was eosinophilic mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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**Fig. 14:** 71 year old patient. History: multiple TB pulmonary sequelae, inferior right-submammary nodule known from 20 years. Clinically guided, blind biopsy: non-contributive result. Bilateral CC and MLO mammograms show a right breast, peripheral, submammary located, ill-defined opacity with skin retraction. Ultrasound, Doppler examination and strain sonoeelastography reveal at six o'clock heterogeneous, irregular mass, without Doppler signal and Tsukuba score 2 on elastography. BI-RADS 5. Excision biopsy - Tuberculous granuloma

References: Dr. M.M. Duma, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 15: 54 year old patient. Ovoid, homogeneous opacity overimposed on the pectoral muscle on the mediolateral oblique (MLO) mammography view of the right breast. Ultrasound and Doppler examination show a heterogeneous, non-vascularized, circumscribed lesion within the pectoralis muscle. BI-RADS 4a. Tuberculosis - cold abscess. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj-Napoca, Romania

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Fig. 16: 35 year old woman with painful left lymphadenopathy. Ultrasound, Doppler examination and strain sonoelastography show multiple enlarged lymph nodes in the left axilla. The lymph nodes presents modified architecture with thickened cortex, distorted hilum and moderate vascularity; BGR pattern on elastography. A core biopsy was performed and the result was tuberculosis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj-Napoca, Romania

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Fig. 17: Haematoxylin and Eosin (original magnifications X2 (a.), X4 (b.)) staining: Tuberculous lymphadenitis - epithelioid granulomas (b.) with epithelioid histiocytes, multinucleated giant cells and large areas of necrosis (a.) References: Dr. L. Rogojan, Department of Pathology, Emergency County Hospital of Cluj Napoca, Romania

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Fig. 18: Ultrasound and Doppler examination showing voluminous right supraclavicular lymph node in a patient with ipsilar mastectomy performed 15 years prior to current presentation. Lesion appears with hypoechoic, impure fluid aspect on gray-scale US. There are to be noted intrinsic solid areas vascularized on Doppler examination. Ultrasound guided evacuation was performed and the collected material was sent to histopathological and bacteriological examination. The result was tuberculous lymph node. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj-Napoca, Romania

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**Fig. 19:** Ultrasound and Doppler examination showing a suspicious focal echogenicity alteration with posterior shadowing and Doppler signal. The biopsy result: breast sarcoidosis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj-Napoca, Romania

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**Fig. 20:** 62 year old man. Ultrasound, Doppler examination and strain sonoelastography showing a large right axillary lymph node with irregular thickened cortex, hypervascularized, displaying a BGR elastography pattern. Histopathology on core biopsy: sarcoidosis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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**Fig. 21:** 59 year old woman. Ultrasound, Doppler examination and strain sonoelastography: Oval, heterogeneous left axillary lymph node, with thickened cortex, without vascularity on Doppler examination and BGR pattern on elastography. The histopathology: sarcoidosis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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**Fig. 22:** Haematoxylin and Eosin (original magnifications X400 (a.), X100 (b.)) stainings: Lymph node sarcoidosis: Schaumann bodies (upper left) and granuloma (lower right) (a.); confluent granulomas without central necrosis (b.) References: References: Dr. B Fetica, Pathology Department, Oncologic Institute of Cluj Napoca, Romania

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**Fig. 23:** 49 year old woman - Right breast, externally located painful, palpable cord. Ultrasound and Doppler examination showing anechoic, superficial, tubular structure with absent flow on Doppler examination. The diagnosis is usually clinically established: Mondor's disease. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 24: 39 year old patient. Ultrasound, Doppler examination and strain sonoelastography showing a lower left retroareolar, hypoechoic, heterogeneous, irregular mass, with angular margins, parallel orientation, hypervascularity on Doppler examination and score 2 on elastography. BI-RADS 5. The pathology: acute bacterial mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj-Napoca, Romania

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Fig. 25: 50 year old patient with recurrent episodes of acute mastitis. Ultrasound, Doppler examination and strain sonoelastography: multiple irregular hypoechoic masses and Doppler hypersignal. Lesions appear soft on elastography (Tsukuba score 2). BI-RADS 4a. Final diagnosis after percutaneous biopsy: chronic mastitis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 26: 69 year old patient. Ultrasound, Doppler examination and strain sonoelastography show at the level of the left breast, inferior outer quadrant a heterogenous, irregular, mass, with discrete vascularity on Doppler examination. On elastography the cranial part of the lesion appears rather stiff -Tsukuba score 3-whereas the caudal part is soft-Tsukuba score 1. BI-RADS 3. The histopathological result: Foreign body granuloma. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 27: Haematoxylin and Eosin (original magnifications X4 (a.), X10 (b.)) stainings: Foreign body granuloma - necrosis, lymphocytes, plasma cells, histiocytes and multinucleated foreign body giant cells. References: Dr. L. Rogojan, Department of Pathology, Emergency County Hospital of Cluj Napoca, Romania

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Fig. 28: 46 year old patient. Bilateral CC and MLO mammography views show an opacity with imprecise delineation located within the upper outer quadrant of the right breast (red circle). Ultrasound and Doppler examination: hypoechoic, ill defined, heterogeneous, hypovascularized lesion. BI-RADS 5. Histopathology: Primary breast acute myeloid leukemia - HE mononuclear cell infiltrate, + myeloperoxidase, + CD 117, + blastic cell nuclei (TdT), + Ki67 antibody staining References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania; Dr. L. Rogojan, Department of Pathology, Emergency County Hospital of Cluj Napoca, Romania

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**Fig. 29:** 61 y.o woman Ultrasound, Doppler examination and strain sonoelastography: irregular, hypoechoic mass with moderate signal al Doppler examination and Tsumuka score 2 on elastography. BIRADS 5. Pathology: Non-Hodgkin lymphoma. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 30: 61 year old woman. Ultrasound, Doppler examination and strain sonoelastography show a left breast irregular, heterogenous mass, with angular margins, moderate vascularity, stiff on elastography (Tsukuba ascore 5). Histopathology: DCIS References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania; Dr. L. Rogojan, Department of Pathology, Emergency County Hospital of Cluj Napoca, Romania

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**Fig. 31:** 35 year old patient. Ultrasound, Doppler examination and strain sonoelastography: hypoechoic, irregular, hypervascularized lesion, stiff on elastography (Tsukba score 5). BI-RADS 5. The histopathology (Haematoxylin and Eosin - original magnifications X4): IDC grade II with neuroendocrine component + DCIS References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca; Dr. L. Rogojan, Department of Pathology, Emergency County Hospital of Cluj Napoca; Dr. L. Rogojan, Department of Pathology, Emergency County Hospital of Cluj Napoca, Romania

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Fig. 32: 56 year old patient. Ultrasound, Doppler examination and strain sonoelastography: irregular, heterogenous, hypervascularized mass, Tsukuba score 3. BI-RADS 4A. The histopathology (Haematoxylin and Eosin - original magnifications X 10): ILC References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca; Dr. L. Rogojan, Department of Pathology, Emergency County Hospital of Cluj Napoca, Romania

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Fig. 33: 32 year old patient with a discrete left breast edema. Ultrasound, Doppler examination and strain sonoelastography: hypoechoic, ill-circumscribed, heterogeneous, hypervascularized and stiff lesion (Tsukuba score 5). BI-RADS 4C. The histopathology: Fat necrosis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj-Napoca, Romania

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**Fig. 34:** 60 year old woman. Ultrasound, Doppler examination and strain sonoelastography showing a focal parenchymal alteration with posterior shadowing, minimal marginal Doppler signal, stiff on elastography (Tsukuba score 5). BI-RADS 4B. Lesion was clinically and mammographically occult. The percutaneous biopsy was performed and the result was stromal fibrosis. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 35: 61 year old patient. Ultrasound, Doppler examination and Strain elastography: left axillary lymph node with normal hilum, but irregular and thickened cortex and hypervascularity. Lymph node cortex shows a BGR pattern on elastography. The core biopsy revealed: toxoplasmosis References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Fig. 36: 59 year old patient with normal mammography and breast ultrasound. Ultrasound, Doppler examination and strain sonoelastography showing bilateral axillary enlarged, atypical lymph nodes with thickened cortex, moderate vascularity. Elastographic image cannot be properly interpreted. Pathology: leukemia. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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**Fig. 37:** 37 year old patient. Ultrasound and Doppler examination show large left axillary lymph node with excentric hilum, thickened cortex and hypervascularity at Doppler examination. The pathology: cat-scratch disease. References: Dr. A.R. Chiorean, University of Medicine and Pharmacy Cluj- Napoca, Romania

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Conclusion

- The great majority of these rare forms of mastitis display suspicious imaging aspects and thus require pathology control through biopsies.
- Elastography offers non-specific, either benign (score 1, 2) or suspicious information (score 4, 5) regarding these types of mastitis. However it may confirm the fluid nature of a pseudo-solid looking lesion through its BGR artifact.
**Personal information**

Contact e-mail:

chiorean_angi@yahoo.com
magdaduma@gmail.com
madalinaszep@gmail.com
References


