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Idiopathic Granulomatous Mastitis: How to identify by Imaging Features?

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Abstract

Background: Idiopathic granulomatous mastitis (IGM) is a chronic inflammatory disease of the breast with obscure etiology that mimics invasive carcinoma both clinically and radiologically. Since the disease can mimic both clinically and radiologically breast cancer and other inflammatory breast conditions and has a complete different management plan, there is an urge for proper and rapid diagnosis. A multimodality imaging approach and characterization of imaging features are essential in making this correct diagnosis.

Aim of Study: The aim of this study is to assess the different radiological findings and eliciting the typical appearance of idiopathic granulomatous mastitis. We highlighted the various findings by different imaging techniques.

Patient and Methods: This study included 41 patients examined by different imaging modalities and later pathologically all cases proved to have IGM. The initial modality was selected depending on the age of the patient and then complementary studies were tailored according to each patient condition and availability.

Results: In our study, IGM appears as a unilateral disease in (92.7%), and of bilateral distribution in (7.3%), manifested by conventional MG as breast asymmetrical density in (77.1 %), and mass densities in (22.9%) with about (17.1%) had associated architectural distortion.

On U/S it appeared as multiple hypoechoic lesions/pockets in (73.2%) with tubular extensionsin (65.9%) and abscess with sinus formation and skin opening in (70.7%) of the patients. Associated edema of the surrounding tissues was in (78%), Skin thickening in (53.7%) and reactive ipsilateral axillary lymph nodesin (80.5%). On Doppler application mean RI calculated was 0.51 in (34.1 %).

On Contrast studies (68.8%) of the patients showed combined mass and non-mass enhancement patterns and (25%) showed non-mass enhancement pattern. All patients were pathologically proven to have IGM.

Conclusion: The imaging findings of idiopathic granulomatous mastitis overlap with those of malignancy. The most common presentation is a focal asymmetric density on mammography and an irregular hypoechoic mass with tubular extensions on ultrasound, combined mass and non-mass enhancement. Core biopsy is typically diagnostic.

Key Words: *Granulomatous mastitis – IGM – Multimodality approach – Histopathology – Focal asymmetry – Hypoechoic pockets – Non-mass enhancement.*

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Introduction

IDIOPATHIC granulomatous mastitis (IGM) is a rare relapsing benign inflammatory breast disease with unknown etiology. Its clinical features and imaging signs may mimic inflammatory breast cancer or some other inflammatory breast disease [1].

The real incidence of IGM is unknown, with only a few hundred cases reported in the literature [2].

Before the 1980s, most patients with IGM were treated with wide surgical excision exclusively. However, conservative therapy with oral steroids or imaging surveillance is currently being endorsed as a first-line treatment option, before surgical consideration **[3]**.

Since the disease can mimic both clinically and Radiologically breast cancer, there may be delays in obtaining correct and timely diagnoses. This can impose additional burdens in terms of diagnostic and therapeutic costs, as well as cause anxiety

and concern for the patient. Therefore, correct and timely diagnosis of the disease is necessary [4].

Histopathology remains essential for a definitive diagnosis and appropriate management [5].

Aim of work:

The aim of this study is to assess the radiological findings in idiopathic granulomatous mastitis, describe and identify the most typical appearance by different medical imaging techniques to differentiate this entity from other pathologies.

Patients and Methods

This prospective study was performed in the female imaging unit of the National Cancer Institute (NCI), Cairo University and after receiving the approval of the Research and Ethical Committee as well as the Editorial Review Board of the radiology department of Kasr-Al-Aini Medical School, Cairo University Hospitals. This study examined 50 patients in years 2020-2021,sent from the breast clinicwith suspected clinical diagnosis of idiopathic granulomatous mastitis, only 41 cases were included in our study after exclusion of 9 cases after histopathological results. Their ages range from 25 to 53 years (mean age 34.5 years).

Inclusion criteria: Female patients with signs of mastitis resistant to medical treatment included redness, hotness, focal or diffuse swelling of the breast with or without generalized constitutional symptoms with or without palpable breast masses. Clinically, Idiopathic granulomatous mastitis was among the differential diagnosis.

Exclusion criteria: Pathologically results proved to be other than granulomatous mastitis.

Methods:

All patients were subjected to complete medical history and full clinical examination by their referring physicians. Then underwent.

Ultrasound was performed for all patients (41 patients) using 18-5 MHz linear probe on an EPIQ 7G Philips machine or 2.5-8 MHz linear probe using a LOGIQ E9 GE machine. Ultrasound reports confirm the location, shape, echopattern, margin, related vasculature, associated findings and axillary lymph-nodes examination.

Mammography Full Field Digital Mammography was performed for the patients above 30 years old (35 patients) with a fully digital Senographe Essential GE mammography device. Standard Cranio-Caudal and Medio-Lateral Oblique views; the axilla is included in the latter.

Contrast enhanced mammography (CESM) and Dynamic Contrast Enhanced MRI breasts were done collectively to 16 patients with unsatisfactory results based on previous imaging modalities.

Ultrasound guided core biopsies of the breast were performed using 14-gauge core biopsy needle for all cases to pathologically confirm the diagnosis with or without drainage under US guidance for cytological assessment to certain cases.

Statistical analysis:

Data management and analysis was performed using Statistical Package for Social Sciences (SPSS) vs. 28. The Chi square test was used to compare categorical data as needed.

Results

In our study, unilateral disease was found in 38 out of 41 cases (92.7%) with no side predilection. Only 3 cases (7.3%) had bilateral disease. The lesions were located in all quadrants and regions of the breasts, however UOQ lesions and diffuse form are commonly encountered in our study. The imaging findings were as follow.

Mammography findings:

35 of the 41 patients underwent mammography. 27 (77.1%) patients had asymmetric densities whether focal or global while 8 (22.9%) patients had mass densities. In addition to the previous mammographic findings 6 patients (17.1 %) had associated architectural distortion. No pathological microcalcifications were observed. Figs. (1,2) Table (1).

Ultrasound findings:

Ultrasonographic examination performed for all patients, revealed 31 (75.6%) participants with multiple lesions and the rest 10 (24.4%) patients with a single lesion. The lesions were confluent with intercommunication seen in 24 (58.5%) of the participants. 73.2% of the lesions were hypoechoic with about half of them with circumscribed borders and the other half without well demarcated borders. Tubular extension was seen among 27 (65.9%) of the lesions. 29 (70.7%) patients showed abscess formation with sinus formation and skin opening in 24 (58.5%) of the patients. Skin thickening was observed in about 22 (53.7%) patients slightly more than half of the cases. Edema pattern was depicted in 32 (78%) cases. 33 (80.5%) had axillary lymph nodes with thick cortex. Figs. (1,2) Table (2).

Color Doppler US findings showed increased arterial and venous vascularization (in comparison

to the same location in the contralateral breast) in only 14 cases (34.1%). The calculated RI ranges from 0.42 to 0.60 with the mean value measured 0.51. Figs. (1,2).

Enhancement pattern:

16 patients underwent contrast study; 11 (68.8%) of them showed both mass and non-mass enhancement patterns at the area of the lesions. 4 (25%) showed non-mass enhancement pattern alone and 1 showed mass enhancement alone Table (3) Figs. (2,3).

BIRADS:

37 (90.24%) patients were given a score of BIRADS III and 4 (9.76%) patients were under category BIRADS IV.

Pathology: Periductal granulomatous mastitis with abscess formation and fat necrosis.

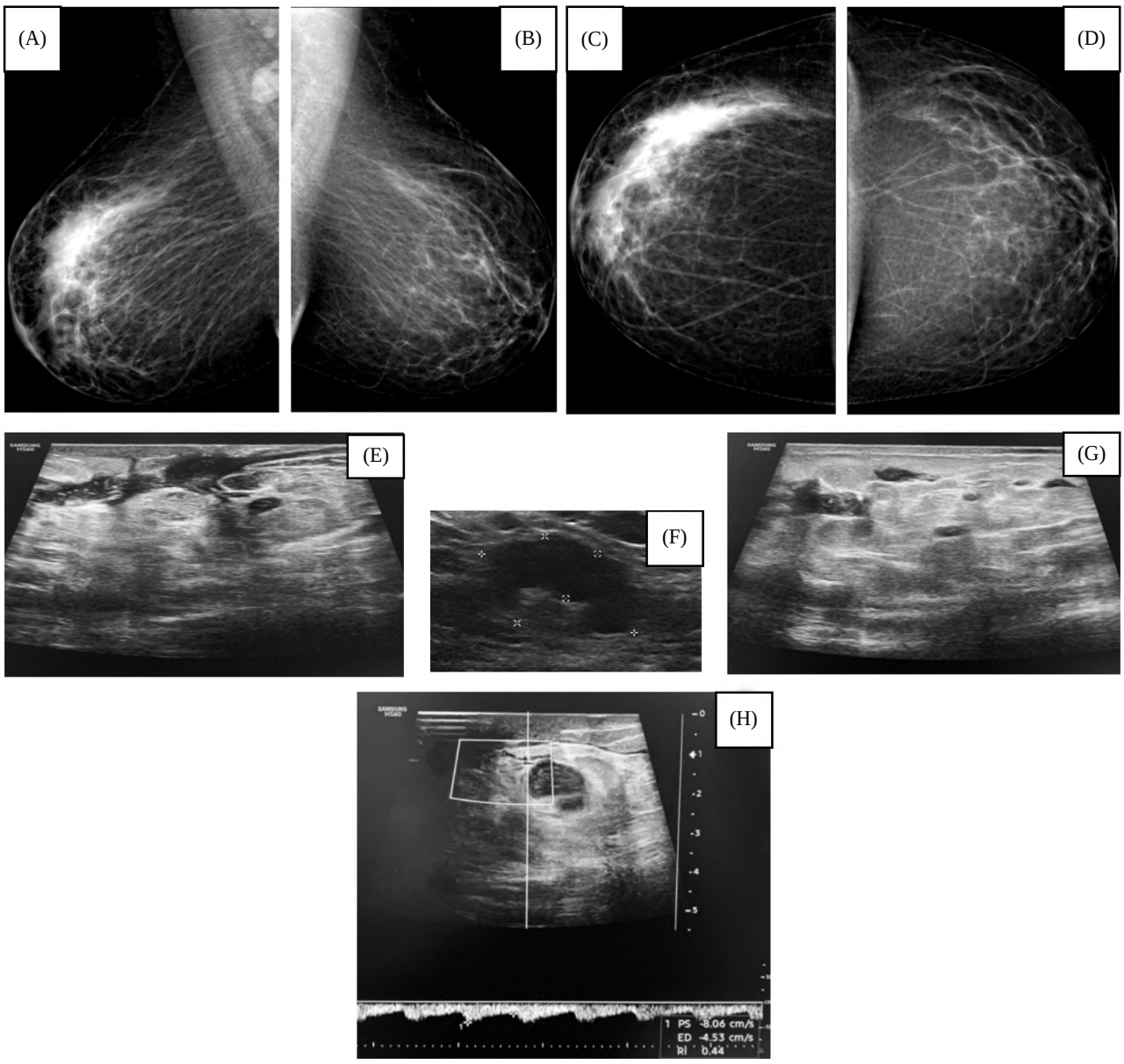

Fig. (1): 36 years old female with red dusky skin and history of recurrent draining sinuses. (A,B,C&D) conventional mammography of both breasts show, Right upper outer quadrant asymmetrical density. No overlying suspicious microcalcifications. Focal area of skin thickening and edema pattern. Axillary lymph nodes enlargement noted. Targeted Ultrasound B-mode (E, F & G) reveals multiple adjacent predominantly hypoechoic small pockets with tubular extension and tracts reaching the skin. Some of them are intercommunicating forming larger lesions. Associated focal skin thickening and edema of the surrounding tissues. Ipsilateral axillary lymph node showing diffuse increased cortical thickening reaching 8mm with still preserved oval shape and fatty hilum. On Doppler application (H): No evidence of increased vascularity on color Doppler application. Measured RI=0.44.

Pathology: Periductal granulomatous mastitis with abscess formation and fat necrosis.

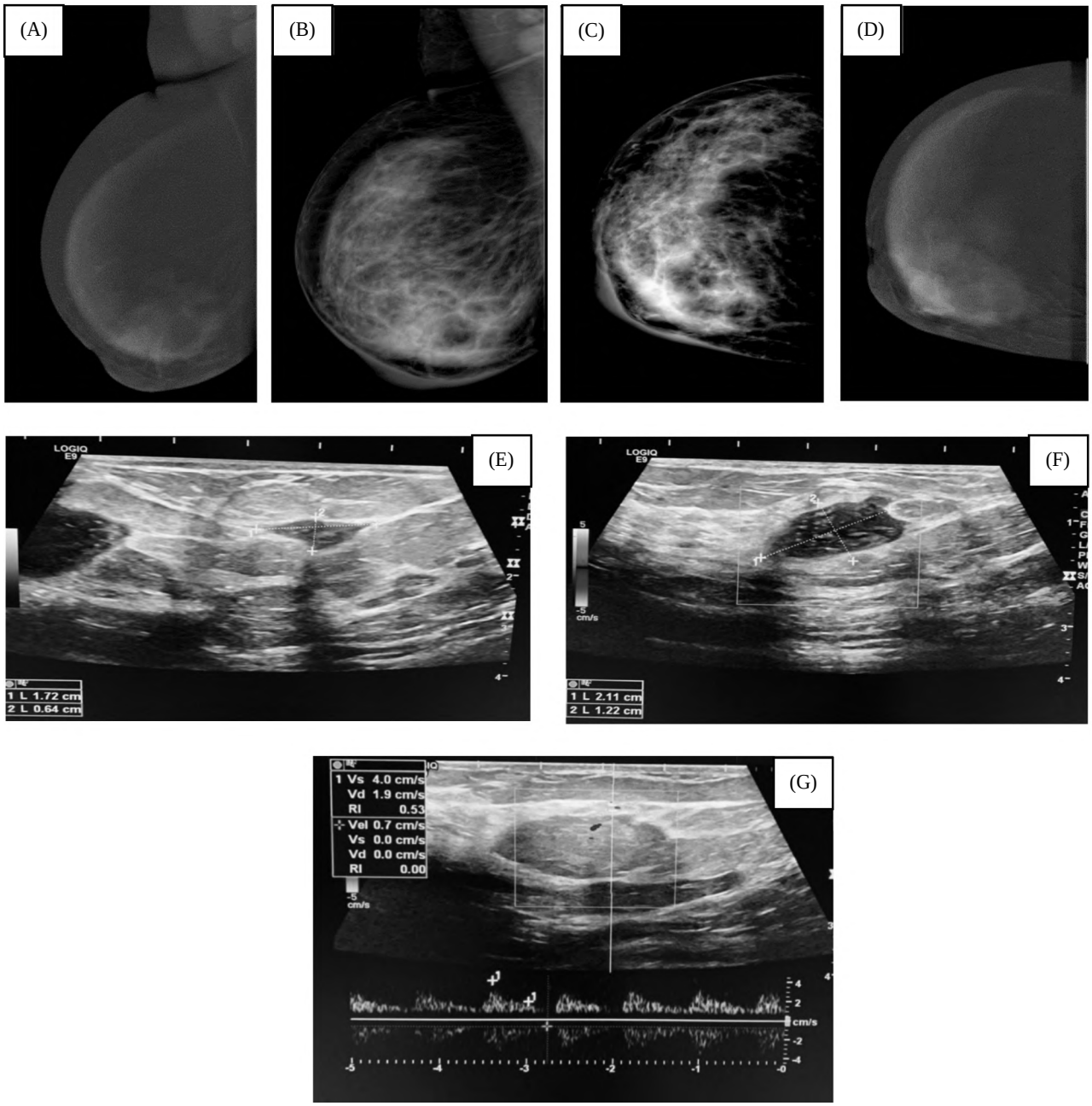

Fig. (2): 28 years old female with palpable lump and skin redness and induration. Conventional Mammography Right Breast (B & C): Right lower inner quadrant asymmetrical density and focal architectural distortion with few indistinct high-density lesions. No overlying suspicious microcalcifications. Focal area of skin thickening and edema pattern. CEDM (A & D): LIQ regional non-mass enhancement with internal clustered ring enhancement. Ultra Sound B-mode (E): Multiple adjacent predominantly hypoechoic pockets some of them show tubular extensions and internal floating debris. Associated with skin thickening and increased echogenicity of the surrounding tissues. Ultrasound Doppler (F & G): NO evidence of increased vascularity on color doppler application. Measured RI=0.53.

Pathology: Periductal granulomatous mastitis with abscess formation and fat necrosis.

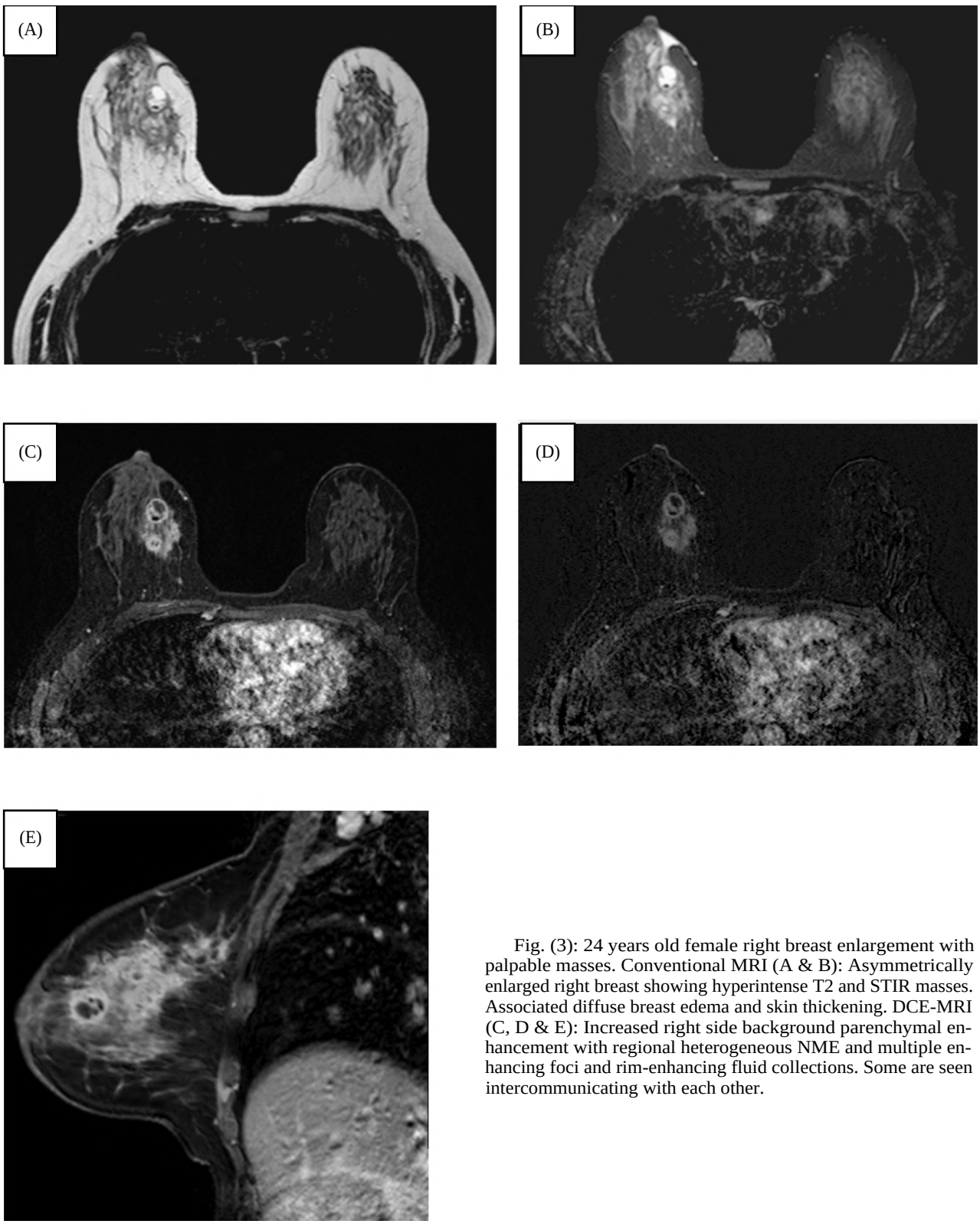

Fig. (3): 24 years old female right breast enlargement with palpable masses. Conventional MRI (A & B): Asymmetrically enlarged right breast showing hyperintense T2 and STIR masses. Associated diffuse breast edema and skin thickening. DCE-MRI (C, D & E): Increased right side background parenchymal enhancement with regional heterogeneous NME and multiple enhancing foci and rim-enhancing fluid collections. Some are seen intercommunicating with each other.

Table (1): Mammographic findings.

Radiological Findings	Count	%
Asymmetry:		
No	8	22.9
Focal	18	51.4
Global	9	25.7
Mass:		
Yes	8	22.9
No	27	77.1
Architectural distortion:		
Yes	6	17.1
No	29	82.9
Suspicious microcalcification:		
No	35	100.0
Mammography:		
Abnormal	35	100.0

Table (2): Ultrasonographic findings.

	Count	%
Number:		
Single	10	24.4
Multiple	31	75.6
Echo Pattern:		
Hypo	30	73.2
Mixed	11	26.8
Border:		
Circumscribed	21	51.2
Not Circumscribed	20	48.8
Tubular Extensions:		
Yes	27	65.9
No	14	34.1
Intercommunications:		
Yes	24	58.5
No	17	41.5
Abscess/Cystic Component:		
Yes	29	70.7
No	12	29.3
Sinus:		
Yes	17	41.5
No	24	58.5
Skin Thickening:		
Yes	22	53.7
No	19	46.3
Edema Pattern:		
Yes	32	78.0
No	9	22.0
Axillary Lymph Nodes Thickened Cortex:		
Yes	33	80.5
No	8	19.5

Table (3): Contrast patterns.

	Count	%
Enhancement:		
Non-Mass	4	25.0
Mass	1	6.3
Both	11	68.8
Non-Mass Enhancement:		
Focal	1	6.7
Diffuse	8	53.3
Regional	5	33.3
Segmental	1	6.7
Mass Enhancement:		
Rim	9	75.0
Heterogeneous	3	25.0

Discussion

Idiopathic granulomatous lobular mastitis (IGLM) is a rare chronic inflammatory disease of the breast with obscure etiology that mimics invasive carcinoma both clinically and radiologically **[6]**.

The aim of this study is to assess the different radiological findings and eliciting the typical appearance of idiopathic granulomatous mastitis.We highlighted the various findings by different imaging techniques.

Cedric W. Pluguez-Turull et al., reported that the mammographic findings of IGM are nonspecific and varied. The most frequently encountered mammographic appearance is focal asymmetry. Global asymmetry has been noted as a less common manifestation of granulomatous mastitis **[1]**.

In agreement with the different studies, we found in our study that the most common mammographic presentation is asymmetrical density whether focal or global found in 27 (77.1 %) patients. Focal asymmetry accounted for 18 (51.4%) of the cases alone while global asymmetry accounted for 9 (25.7%). Our result of global (diffuse) asymmetry is slightly higher compared to different studies and is may be due to the delay in seeking medical care or due to misdiagnosis before presentation to our institute. 8 (22.9%) patients of the patients had mass like density and (17.1%) had additional architectural distortion.

Various studies have as Afsaneh Alikhassi et al., reported that the most common manifestation is an irregular hypoechoic mass with tubular extension and interconnecting tracts **[7]**.

In our study (73.2%) of the lesions were hypoechoic with intercommunication seen in (58.5%) of the participants and tubular extension seen among 27 (65.9%) of the lesions. abscess formation was observed in 24 (58.5%) of the patients, skin thickening in about half of the cases and Edema pattern was depicted in 32 (78%).

An important finding elicited also by Afsaneh Alikhassi et al., was the increased flow noted at the area of the lesions in comparison to the nearby normal tissue. In our study we found an increase in the vascularity in only 14 cases (34.1%) patients [7].

We want to emphasis on a special imaging finding in our study which is the measurement of the resistive index (RI) of the vessel located at the periphery of the lesions. It ranges from 0.42 to 0.60 with the mean value measured 0.51 in our study. This is concordant with a study made by Hye-Young Choi et al., that concluded that a resistive index over 0.7 may suggest malignant lesions [8].

Many studies concluded that a heterogeneously enhancing mass (or masses) or rim-enhancing lesions are the most commonly described findings seen, which may also show associated segmental or regional non-mass enhancement (NME) as stated in the study of Cedric W. Pluguez-Turull et al. **[1]**.

This was also noted in our study with 68.8% of the participants showed both mass and non-mass enhancement patterns at the area of the lesions.

Histopathology remains essential for a definitive diagnosis and appropriate management as concluded by Oztekin PS et al. **[5]**.

In our study all patients were indicated for biopsy even if malignancy was ruled out by typical imaging features for definitive diagnosis and to start treatment.

Conclusion:

IGM has no specific features with conventional MG study however typical US appearance can exclude malignancy and favor inflammatory etiology.

Combined multimodality approach with proper clinical data helps in differentiation of IGM from malignant processes. Yet, histopathology remains essential for a definitive diagnosis and appropriate management.

Recommendation:

For patients with mastitis resistant to antibiotics, clinicians must suspect granulomatous mastitis among the differential diagnosis and recommend mammography and/or ultrasound examination according to the patient age and lactation status.

Combination of the clinical data and imaging findings helps in differentiation between IGM and malignant lesions, but US guided biopsy and histopathological examination is still the conclusive method for diagnosis and proper management.

References

1- PLUGUEZ-TURULL C.W., NANYES J.E., QUINTERO C.J., ALIZAI H., MAIS D.D., KIST K.A. and DORN-BLUTH N.C.: Idiopathic granulomatous mastitis: Manifestations at multimodality imaging and pitfalls. Radiographics, Mar. 38 (2): 330-56, 2018.

2- GAUTIER N., LALONDE L., TRAN-THANH D., EL KHOURY M., DAVID J., LABELLE M., PATOCSKAI E. and TROP I.: Chronic granulomatous mastitis: Imaging, pathology and management. European Journal of Radiology, Apr. 1; 82 (4): e165-75, 2013.

3- LARSEN L.J., PEYVANDI B., KLIPFEL N., GRANT E. and IYENGAR G.: Granulomatous lobular mastitis: Imaging, diagnosis, and treatment. American Journal of Roentgenology, Aug. 193 (2): 574-81, 2009.

4- ALIKHASSI A., AZIZI F. and ENSANI F.: Imaging features of granulomatous mastitis in 36 patients with new sonographic signs. Journal of Ultrasound, Mar. 23 (1): 61-8, 2020.

5- OZTEKIN P.S., DURHAN G., KOSAR P.N., EREL S. and HUCUMENOGLU S.: Imaging findings in patients with granulomatous mastitis. Iranian Journal of Radiology, Jul. 13 (3), 2016.

6- GÜRLEYIK G., AKTEKIN A., AKER F., KARAGÜLLE H. and SAĞLAM A: Medical and surgical treatment of diopathic granulomatous obular mastitis: A benign nflammatory disease mimicking nvasive carcinoma. J. J Breast Cancer, 15 (1): 119-23, 2012.

7- AFSANEH ALIKHASSI, et al.: "Imaging features of granulomatous mastitis in 36 patients with new sonographic signs." Journal of Ultrasound, Vol. 23,1: 61-68. doi: 10.1007/s40477-019-00392-3, 2020.

8- CHOI H.Y., KIM H.Y., BAEK S.Y., et al.: Significance of resistive index in color Doppler ultrasonogram: Differentiation between benign and malignant breast masses Clin. Imaging, 23: pp. 284-288, 1999.

الالتهاب المزمن الحبيبى فى الثدى : كيفية تشخيصه بالتصوير الطبى

الإلتهاب المزمن الحبيبى مرض نادر ليس له سبب معلوم. إختلاط ومشابهة أعراض هذا المرض بأمراض أخرى يحتم ضرورة التشخيص الدقيق والسريع لتجنب المضاعفات والعلاج الخاطئ. دور الأشعة التشخيصية والتصوير الطبى للمرأة بالإضافة إلى التقنيات المختلفة دور محورى فى تشخيص هذا المرض وإبراز السمات الفريدة لكل مرض على حدة.

هذا البحث تضمن فحص ٤١ حالة عن طريق مختلف وسائل التصوير الطبى وقد تم إثبات تشخيص الإلتهاب المزمن الحبيبى عن طريق تحليل الأنسجة فيما بعد. اعتمد اختيار الفحص المبدئى على سن المريضة، ثم اختيار الفحوصات المكملة بناءاً على جاهزيتها وعلى حالة المريضة. تم إجراء فحص سونار الثدى والماموجرام فى ٣٣ حالة، وفحص سونار الثدى فى ٧ حالات، وفحص حالة واحدة عن طريق الرنين المغناطيسى كفحوصات مبدئية داخل المعهد القومى للأورام.

هدفنا فى هذا البحث هو وصف وتحليل الأشكال والصفات المختلفة للأ لتهاب المزمن الحبيبى فى مختلف وسائل التصوير الطبى وتحديد القيمة التشخيصية لكل وسيلة على حدة لقد توصلنا من خلال هذا البحث إلى أن الصورة الأكثر شيوعاً لهذا المرض هو فى سيدة فى منتصف العمر (حوالى ٣٤ سنة)، مع إصابة لثدى واحد، فى أياً من أرباعه مع تفضيل للربع العلوى الخارجى. ومن الشائع أنه قد يشمل الثدى بالكامل.

عادة ما يظهر هذا المرض فى فحص الماموجرام على هيئة كثافة غير متطابقة فى الثدى مع عدم وجود تكلسات مرضية. أما عن فحص سونار الثدى فيظهر هذا المرض على هيئة إصابات متعددة ذات الحدود الواضحة أو المطموسة أو الأمتدادات الأمبوبية، والتى قد تتصل بعضها بالبعض أو تتحول إلى خراج بفتحات تمتد إلى الجلد. عادة ما يصاحب هذا المرض تورم فى أنسجة الثدى مع زيادة فى سمك الجلد وتضخم حميد فى العقد اللمفاوية للإبط قد يصاحبه زيادة فى التدفق الدموى ويظهر ذلك من خلال فحص الدوبلر الملون. مؤشر المقاومة المتوسط ٠.٥١. الفحص بالصبغة أظهر صبغة فى حواف الكتل مصاحب لها صبغة فى مناطق متفرقة.

الخلاصة :

- لا توجد خصائص محددة للأ لتهاب المزمن الحبيبى فى الما موجرام والسونار.
- الأستخدام الروتينى لفحص الدوبلر مع السونار يساهم فى فحص هذا المرض.
- استخدام الصبغة مع الما موجرام والرنين المغناطيسى للثدى وسيلة مكملة جيدة للفحص المبدئى.
- مزج مختلف الفحوصات المتاحة والتاريخ المرضى الجيد للمرضى، يساهم فى التفريق بين الإلتهاب المزمن الحبيبى والأورام السرطانية.
- يبقى تحليل الأنسجة ضرورى لتأكيد الإصابة بهذا المرض وبدء العلاج المناسب.