

Case Report

Congestive heart failure as a rare cause of unilateral breast edema: A case report & review of the literature

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ARTICLE INFO

Keywords:

Breast cancer
Inflammatory breast cancer
Case report
Unilateral breast edema
Congestive heart failure

ABSTRACT

Reported cases encountered difficulty in differentiating between inflammatory carcinoma and breast edema caused by congestive heart failure especially if the breast edema is unilateral. Our presented case is an elderly woman with unilateral breast edema due to congestive heart failure that was initially suspected to have breast cancer based on clinical findings. However imaging studies showed breast edema pattern with no definite underlying mass. This edema was resolved with standard treatment of heart failure. Congestive heart failure may be a possible cause of unilateral breast edema especially in a patient with background of congestive heart failure.

1. Introduction

Congestive heart failure is a common disease especially in elderly population. Its common presentations are well known such as dyspnea, fatigue, weakness, swelling in legs, increased need to urinate at night, and lack of appetite, but awareness of the rare symptoms and signs of this frequently encountered disease is important to prevent unnecessary investigation, unnecessary treatments, cost, and morbidity. Inflammatory carcinoma of the breast (IBC) is a rare type of invasive cancer. It accounts for average 5% of breast cancers, with average age of onset between 45 and 54 years [1]. To confirm breast cancer, biopsy & histopathology should be performed. Breast edema in unilateral location may co-occur with spectrum of etiologies including benign & malignant conditions. We diagnosed a case of unilateral breast enlargement in an elderly woman with multiple comorbid conditions including congestive heart failure that was clinically suspicious of inflammatory breast cancer.

2. Case presentation

In our institution we report a 69 years & 8 months old house woman presented to causality department in a secondary hospital with progressive shortage of breath & medical history including long term pulmonary hypertension & multiple previous hospitalizations of

shortness of breath, chronic pericardial effusion, bronchial asthma & edema of legs. On admission she presented with shortness of breath, paroxysmal dyspnea, orthopnea, cough & bilateral lower limbs pitting edema. Progressive enlargement of right mammary gland with peau d'orange appearance and pitting edema were detected. No associated arm edema noted. She did not have fever or dermal erythema. She did not give any history of breast trauma or any previous surgery. She had a past medical history of diastolic dysfunction, AF, LVF, anasarca, left basal pneumonia, right pleural effusion & pericardial effusion. On clinical examination, the patient was cooperative, showing dyspnea, orthopnea and tachypnea and she had pulse of 104b/min, and blood pressure of 130/80 mmHg. Bilateral crepitations noticed, more in the right side with decreased air entry. There were distended neck veins. There were bilateral legs pitting edema with level till mid shin. Abdominal examination shows shifting dullness & hepatomegaly. Clinical examination of breast revealed enlarged right mammary gland with diffuse thickened indurated skin showing peau d'orange pattern. The breast edema was pitting. There was no nipple discharge, nipple retraction, palpable breast mass or palpable axillary lymphadenopathy.

Full digital mammography revealed right breast skin thickening, Cooper ligaments thickening, and edema without any apparent mass. There are bilateral vascular calcifications & left breast lower central fibroadenoma with popcorn calcification (Figs. 1 and 2). Right breast digital tomosynthesis (DBT) was also obtained showing edema pattern

Peer review under responsibility of The Egyptian Society of Radiology and Nuclear Medicine.

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<https://doi.org/10.1016/j.ejnm.2018.01.010>

Received 26 September 2017; Accepted 15 January 2018

Available online 07 June 2018

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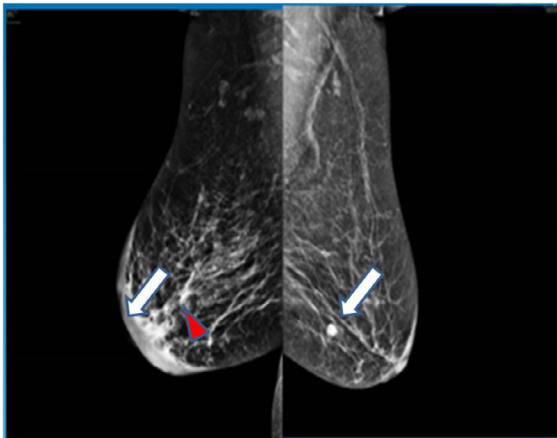


Fig. 1. Digital mammography: RMLO view show right breast edema in term of skin thickening (more than 3 mm), stromal trabecular coarsening and increased density. LMLO view shows benign looking calcified lesion.

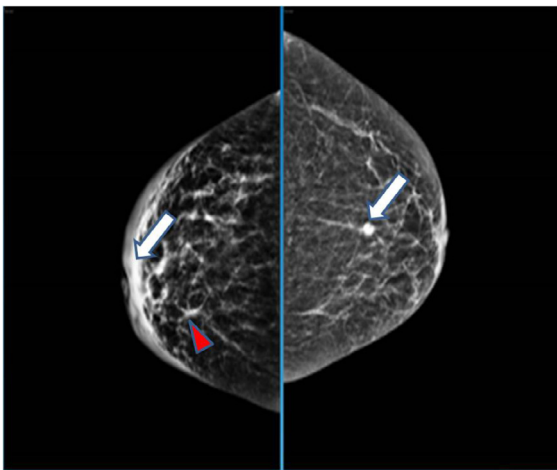


Fig. 2. Digital mammography: RCC view show right breast edema. LCC view shows benign looking calcified lesion.

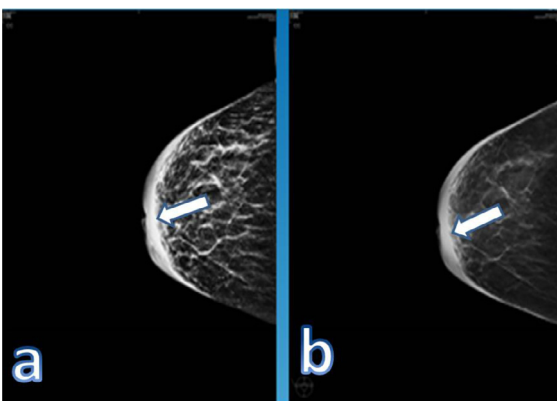


Fig. 3. Digital Breast Tomosynthesis Synthesized 2 D RCC view (a) show right breast edema. R CC slab view (b) shows edema & no masses.

& no underlying masses (Fig. 3). Ultrasound showed right breast skin thickening (5.8 mm), hyper echoic fat lobules & lymphatic engorgement without apparent mass (Fig. 4a). Ultrasound of the left breast shows solid hypo echoic calcified fibroadenoma at 6 o'clock zone A/B (Fig. 4b). Her initial chest X-ray showed radiological signs of heart failure (Fig. 5a) & follow up X-ray shows cardiac enlargement and bi-lateral pleural effusions more at right side & enlarged pulmonary artery

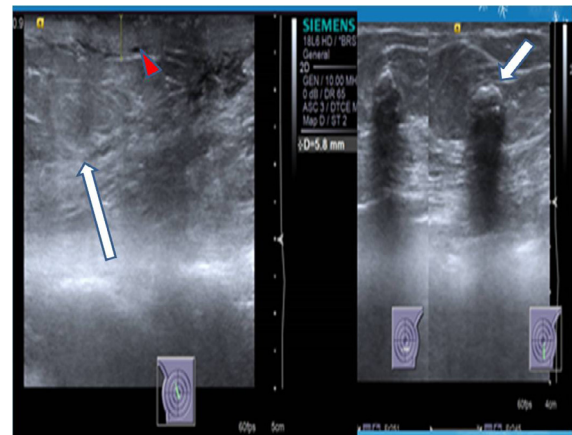


Fig. 4. (a) Right breast edema. (b) Left benign calcified mass.



Fig. 5. (a) Initial chest X-ray. (b) Follow up chest X-ray.

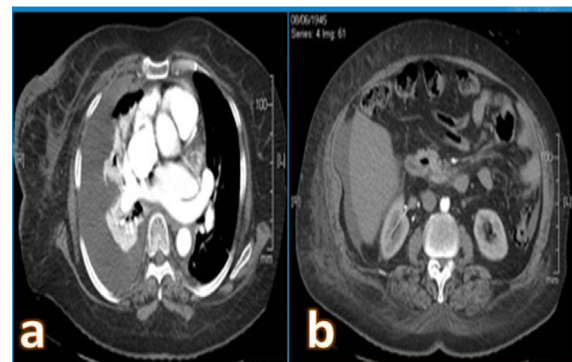


Fig. 6. (a) CT chest revealed significant right side pleural effusion with underlying lung collapse, right lateral chest wall edema & right breast edema. (b) CT abdomen revealed mild ascites & right lateral abdominal wall edema.

(Fig. 5b). The right pleural effusion was tapped showing transudate. Echocardiography shows tricuspid regurge & moderate mitral regurge with pulmonary hypertension. CT scan of the chest & abdomen was requested for assessment of lung, pleura & suspected liver cirrhosis. CT scan shows findings of decompensated cardiac failure. Heart failure was considered as a differential diagnosis rather than IBC since the edema seen on the CT chest (Fig. 6a) & abdomen (Fig. 6b) more at right side of the body. Yet, unilateral breast edema caused by heart failure is a rare entity, so we recommended tissue biopsy (skin punch biopsy) to rule out inflammatory breast cancer, while arranging for the biopsy the patient was on standardized anti failure measures. Eight days later, the patient shows significant improvement of the breast condition. Right breast ultrasound & right MLO view were repeated to assess the condition. The right MLO mammography view (Fig. 7) and ultrasound



Fig. 7. Follow up R MLO view shows complete regression of edema.



Fig. 8. Follow up right breast ultrasound shows complete regression of edema.

(Fig. 8) show amelioration of the right breast edema.

3. Discussion

Our provisional diagnosis of the unilateral breast edema in this case was an inflammatory breast carcinoma in back ground of congestive heart failure. This is a very uncommon, aggressive form of breast malignancy. Diagnosis of breast inflammatory carcinoma is accomplished by the clinical features and the peau d'orange sign. In IBC the peau d'orange is caused by tumor embolus and obstruction of the lymphatics. It is thought that the skin thickening is not due to skin invasion by tumor. The skin thickening and edema detected in cases of heart failure are commonly bilateral, yet in rare cases it can be unilateral with associated induration raising the suspicious of IBC. Unilateral breast edema in cases of heart failure may be explained by patient's preference to lie on one side, leading to unilateral edema at the dependent side. Pluchinotta et al. [2] suggested that the differential point of CHF in these patients is to detect "pitting" edema of the breast, which is not the case in malignant breast edema. While the case study of Oraedu et al. [3] doesn't show pitting breast skin edema & they explained this by the elevated lymphatic pressure in CHF, so it may be not pitting. It is

difficult to make the diagnosis in such similar cases and frequently biopsy is required. In spite of some improvements in treatment (i.e., chemotherapy, mastectomy, and radiation therapy), patients with inflammatory carcinoma generally have a poor prognosis. Pure inflammatory carcinoma appears to carry a worse prognosis compared with infiltrating ductal carcinoma with secondary local skin invasion [4]. Many other etiologies present signs of breast edema & inflammation. The differential diagnosis of these findings is wide and needs correlation with patient history, physical and radiologic evaluation for proper diagnosis [5]. The unilateral breast edema differential diagnosis list includes:

- **Malignant conditions:**

1. Inflammatory breast carcinoma.
2. Lymphoma.
3. Leukemia
4. Metastasis
5. Lymphatic permeation from contralateral breast cancer.

- **Benign**

1. Mastitis.
2. Granulomatous disease.
3. Post surgical changes.
4. Post radiation changes.
5. Lymphatic obstruction
6. Hemodialysis AV fistula complications.
7. Nephrotic syndrome.
8. Scleroderma.
9. Heart failure
10. Skin conditions e.g. pemphigus & psoriasis.
11. Milroy's disease (congenital absence of lymphatics).

IBC also manifests with erythema that may be associated with sensation of heat in the affected breast. Mastitis is accompanied with erythema, breast pain & fever that regress with antibiotic.

Breast lymphoma is rare & either primary or secondary with secondary lymphoma is slightly more common than primary lymphoma. Lymphoma of the breast is most commonly associated with bilateral axillary enlarged lymph nodes with lost fatty hilum. Primary lymphoma is rare cause of solitary oval or rounded mass with circumscribed or micro-lobulated margins without calcifications. Secondary lymphoma is usually presenting as multiple & smaller masses compared to primary lymphoma. Ultrasound of breast lymphoma (1ry or 2ry) shows solitary round or oval masses with circumscribed or ill-defined margins that have homogenous or mixed hypo to hyper internal echoes with posterior acoustic enhancement [18,19].

Breast leukemia commonly presents mammographically as a hyperdense mass with microlobulated margins. Microcalcifications are rare. Diffuse infiltration or architectural distortion may also be seen. Sonographically, breast leukemia may present as single or multiple heterogeneous hypoechoic masses with indistinct or micro-lobulated margins. In acute Leukemia, masses demonstrated irregular shape and non-circumscribed margins and heterogeneous echogenicity with a significant echogenic component [19].

Lymphangitic metastasis to contralateral breast shows imaging findings similar to IBC yet the microcalcifications & masses are more frequent in lymphangitic metastasis

than in IBC. Hematogenous metastasis are rare & can present radiologically as bilateral or unilateral, one or multiple well defined rounded mass with no microcalcifications or similar to IBC [6].

Disseminated tuberculosis can present with breast edema, yet the speculated masses, nodules, microcalcifications & dense axillary lymph nodes are more common in breast cancer. The affected breast by cancer is larger while in TB is smaller than contralateral side. Additionally TB may shows sinus tract or focal skin bulging [6].

Granulomatous mastitis appears as asymmetries, focal asymmetries or ill defined masses. Micro calcifications are not feature of the disease

Table 1

Previous reports of unilateral breast edema in congestive heart failure simulating IBC.

No.	Authors	No. of patients	Publication year
1	Lindhardt (9)	1	1981
2	Muller & Koehler (10)	2	1984
3	Doyle & Fracr (11)	1	1991
4	Pluchinotta et al. (2)	2	1994
5	Oraedu et al. (3)	1	2001
6	Jung et al. (12)	1	2004
7	Vasanwala & Li NG (13)	1	2013
8	Alikhassi et al. (14)	1	2014
Total No of patients		10	

yet can be seen up to 11% of cases. Ultrasound shows irregular masses, areas of inhomogeneous pattern with hypoechoic tubular/ nodular structures or decreased parenchymal echogenicity with acoustic shadowing.

Milroy's primary congenital lymphedema is due to autosomal dominant gene mutations. Edema is usually diagnosed at birth or shortly after & of progressive course. The condition clinically shows typical upslanting 'ski-jump' toenails. The clinical diagnosis of Milroy disease can be confirmed by molecular analysis.

Other entities can be suspected, based on clinical history (e. g. previous lumpectomy with axillary dissection or sentinel node biopsy, radiation to breast, hemodialysis with upper limb AV fistula, history of renal disease & renal laboratory tests, history of skin disease & manifestations of skin disease at other areas).

In view of the fact that systemic diseases (e.g. congestive heart failure) produce bilateral edema, there is difficulty in differentiating between inflammatory breast malignancy and congestive heart failure (CHF) [2]. However, inflammatory breast carcinoma has characteristic histopathology features for proper diagnosis [1,5]. Although congestive cardiac failure is a common condition and its frequent manifestation is well known, yet unilateral breast enlargement as a manifestation of cardiac failure is quite uncommon, and the condition is very rarely documented in the literature as it is usually bilateral, since systemic pathologic process usually lead to bilateral abnormalities [6,7]. In reviewing the previous literature, we found eight reports of heart failure simulating IBC with total number of 10 patients (Table 1).

MRI is superior to ultrasound & more superior to mammography in diagnosis of IBC regarding detection of primary breast cancer & its extent as well differentiating IBC from other inflammatory breast conditions [15–17].

The global skin thickening, breast edema with or without chest wall edema, and multiple small & confluent heterogeneously enhancing masses or non-mass like enhancement with or without pathological axillary lymph nodes are the key features of IBC that were reported by Le-Petross et al. [16].

MRI study can play important role in diagnosing IBC yet in such case with CHF, the patient cannot tolerate the examination due to prone position, dyspnea, orthopnea, closed machine & relatively long scanning time. So MRI scanning was not requested.

Unilateral breast edema secondary to heart failure is considered if there is edema with no underlying mass, patient tendency to lie at the side of unilateral edema & the edema should improve with standardized treatment of heart failure. It is mentioned that atrophic breast of elderly women is more susceptible to edema rather than young women in reproductive period [8].

References

- [1] Ha KY, Glass SB, Laurie L. Inflammatory breast carcinoma. *Proc (Bayl Univ Med Cent)* 2013;26(2):149–51.
- [2] Pluchinotta AM, De Min V, Presacco D, Reschiglian E, Tasinato R. Breast unilateral edema secondary to congestive heart failure: a two-case report. *Minerva Chir* 1994;49(11):1171–4.
- [3] Oraedu CO, Pinnapureddy P, Alrawi S, Acinapura AJ, Raju R. Congestive heart failure mimicking inflammatory breast carcinoma: a case report and review of the literature. *Breast J* 2001;7(2):117–9.
- [4] Kopans DB. *Breast imaging*, 2nd ed. Lippincott Williams & Wilkins; 2002.
- [5] Elías Mas A, Julià C, Collado A, Arcalis N, Fernandez JL, Goday Arno JA, et al. Inflammatory breast carcinoma; a diagnosis not to be missed. <http://dx.doi.org/10.1594/ECR2015/C-0093>.
- [6] Kwak JY, Kim E-K, Chung SY, et al. Unilateral breast edema: spectrum of etiologies and imaging appearances. *Yonsei Med J* 2005;46(1):1–7.
- [7] Braunwald E, Hoeffner W, Lanyi M, Muller JWT, Koehler PR. Cardiac failure simulating inflammatory cancer of the breast. *Br Med J* 1986;292(6518):446.
- [8] Muthusamy E. Unilateral breast enlargement as an unusual manifestation of cardiac failure: a case report. *Singapore Med J* 1988;29(6):604–5.
- [9] Lindhardt F. Unilateral oedema of the breast in chronic heart disease. *Ugeskr Laeger* 1981;143(24):1536–7.
- [10] Müller JWT, Koehler PR. Cardiac failure simulating inflammatory cancer of the breast. *Fortschr Röntgenstr* 1984;140(4):441–4.
- [11] Doyle AJ, Fracr C. Unilateral breast edema in congestive heart failure. A mimic of diffuse carcinoma. *Aust Radiol* 1991;35(3):274–5.
- [12] Jung JH, Min PK, Moon YW, Shim WH. Congestive heart failure and a swollen breast: case report. *Lancet* 2004;363:210.
- [13] Vasanwala FF, Yuen Li NG. A rare cause of reversible unilateral breast swelling: a case report. *J Med Cases*, 2013; 4(3):130–132.

- [14] Alikhassi A, Omranipour R, Alikhassy Z. Congestive heart failure versus inflammatory carcinoma in breast: case report. *Case Rep Radiol* 2014;4. <http://dx.doi.org/10.1155/2014/815896> [Article ID 815896].
- [15] Yeh Eren D, Jacene Heather A, Bellon Jennifer R, Nakhlis Faina, Birdwell Robyn L, Georgian-Smith Dianne, et al. What radiologists need to know about diagnosis and treatment of inflammatory breast cancer: a multidisciplinary approach. *RadioGraphics* 2013;33(7):2003–17.
- [16] Le-Petross HT, Cristofanilli Massimo, Carkaci Selin, Krishnamurthy Savitri, Jackson Edward F, Harrell Robyn K, et al. MRI features of inflammatory breast cancer. *AJR* 2011;197:W769–76.
- [17] Mansour Sahar M, Abolfotooh Ashraf. Does MRI help in the assessment of inflammatory breast disorders? *Egypt J Radiol Nuclear Med* 2012;43:487–97.
- [18] Ikeda DM, Miyake KK. The requisites: breast imaging, 3rd ed. Elsevier; 2017.
- [19] Glazebrook KN, Zingula S, Jones KN, Fazzio RT. Breast imaging findings in haematological malignancies. *Insights Imaging* 2014;5:715–22.