Lactational breast changes/lobular hyperplasia mimicking masses: how can we differentiate from true pathological masses?

Amr Farouk Ibrahim Moustafa[a], Ola Magdy Mohammed Shetat[a], Mohammed Samy Said El-Azab[a], Mohammed Mohammed Mohammed Gomaa[a], Mona Alabrak[b], Hania M. Fadl[c]

Departments of [a]Diagnostic and Interventional Radiology, [b]Pathology, National Cancer Institute, Cairo University, Cairo, Egypt, [c]Department of Diagnostic Radiology, Khartoum Breast Care Center, Khartoum, Sudan

Correspondence to Amr F. Ibrahim Moustafa, MSc, 1 Fom El Khalig Square, Kasr El Ainy Street, Misr Al Qadimah, Cairo Governorate 11796, Egypt,
Tel: +20 114 074 8854; fax: +202-23644720;
e-mail: amrb31333@hotmail.com

Received 9 April 2016
Accepted 9 May 2016

Kasr Al Ainy Medical Journal
2016, 22:41–48

Objective
The aim of this study was to evaluate the role of sonomammography in the characterization of clinically palpable breast masses during pregnancy and lactation with differentiation of true and false (lobular hyperplasia/lactational changes) masses.
Materials and methods
One hundred patients with clinically palpable breast masses during pregnancy and lactation were evaluated by means of ultrasound (US). Mammography was performed only for 23 patients. Mammographic and sonographic findings were evaluated retrospectively. When US or mammography revealed a benign lesion, no further diagnostic evaluation was necessary. However, when US or mammography demonstrated a suspicious lesion, biopsy was performed.
Results
US showed lobular hyperplasia/lactational breast changes categorized as Breast Imaging-Reporting and Data System 2 (BI-RADS 2) in 13 cases, a lesion with the criteria of benignity categorized as BI-RADS 2 in four cases, BI-RADS 3 in 68 cases, BI-RADS 4 in three cases, and BI-RADS 5 in 12 cases. Mammography showed normal dense breast categorized as BI-RADS 1 in four cases, lesions with criteria of benignity categorized as BI-RADS 3 in six cases, BI-RADS 4 in two cases, and BI-RADS 5 in 11 cases. Trucut biopsy established the pathological diagnosis in 22 cases.
Conclusion
Most of the pregnancy-associated breast masses are benign. Nevertheless, a strict assessment of any lesion is required, to exclude malignancy and to rule out lactational breast changes/lobular hyperplasia that may present as lump. US is the most appropriate radiologic method for evaluating breast disorders in women during pregnancy and lactation.

Keywords:
breast, lactation, lobular hyperplasia, pregnancy-associated breast cancer, pregnancy-associated breast masses

Kasr Al Ainy Med J 22:41–48

1687-4625

Introduction

During pregnancy and lactation, the breasts undergo significant changes in the breast parenchyma, representing unique physiologic states. Considerable hypertrophy of the ductal–lobular–alveolar system occurs. These physiologic changes start at pregnancy, continue through lactation, and persist for ~3 months after cessation of breastfeeding [1].

Several physiologic changes during pregnancy and lactation show different sonographic appearances. During pregnancy, lobular growth is reflected by increased echogenicity of normal breast parenchyma. In the final days of pregnancy, tubular hypoechoic structures are seen, representing colostrum-filled ducts. Colostrum appears hypoechoic as it almost contains no fat. During lactation, most breast parenchymas appear echogenic, resulting from the combination of glandular enlargement and engorgement of breast tissue with milk rich in fat. In both pregnancy and lactation, increased vascularity of the breast tissue on Doppler application can be observed. After cessation of breastfeeding, the sonographic appearance of the breast returns to the prepregnancy state within 3 months. The primary mammographic appearance of the physiologic changes of pregnancy and lactation is increased

breast size and density reducing its sensitivity [1] (Fig. 1).

The physiologic changes that occur in the breast during pregnancy and lactation make the assessment of breast abnormalities difficult. Disorders affecting the breasts in pregnant or lactating women are divided into nonspecific disorders observed in nonpregnant women such as fibroadenoma and other specific disorders unique to pregnancy and lactation such as galactocele. Most breast tumors presenting during pregnancy and lactation existed before but manifest during this time due to response to hormonal changes [2].

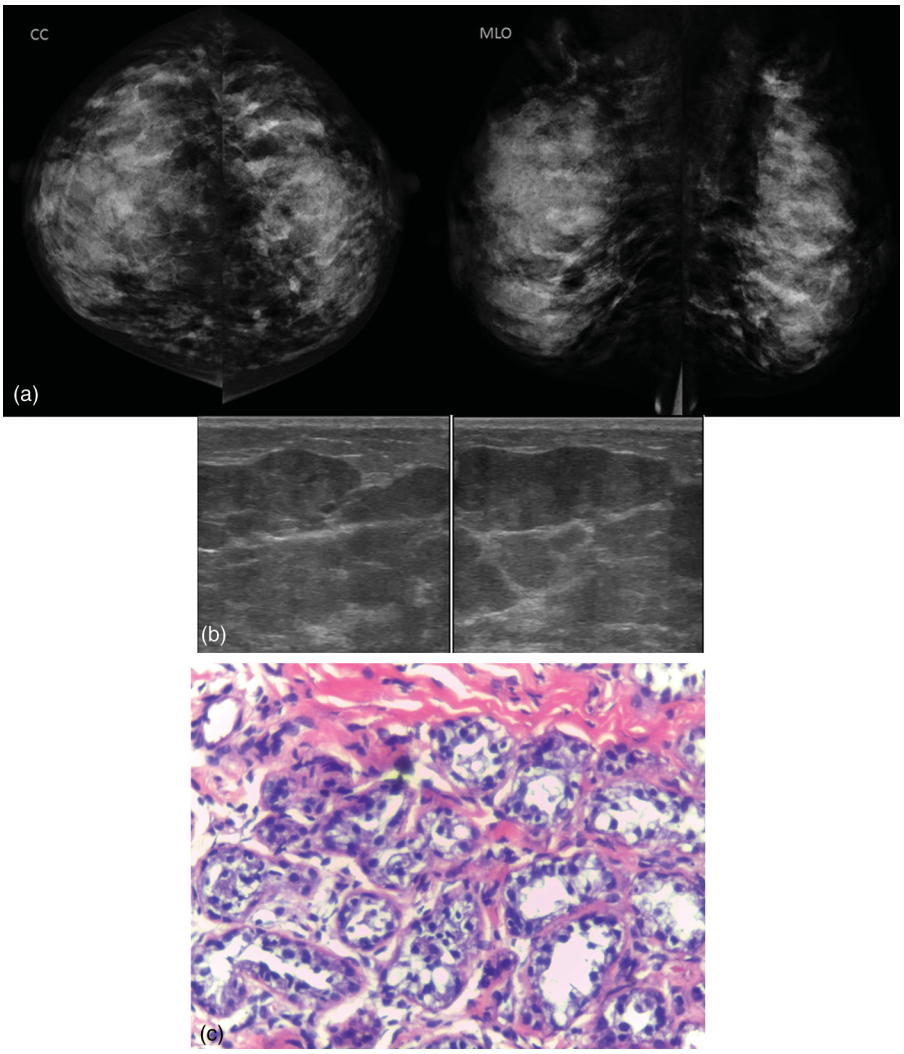
Most of the breast masses presenting during pregnancy and lactation are benign. However, any breast mass that occurs during this time requires thorough assessment to exclude the possibility of pregnancy-associated breast cancer (PABC) [3].

Physiologic changes also manifest clinically with increased breast size, firmness, and nodularity, which make the physical examination more difficult [1].

On ultrasound (US), lactational change occasionally is visible as a homogeneous to heterogeneous mass [4] (Fig. 2).

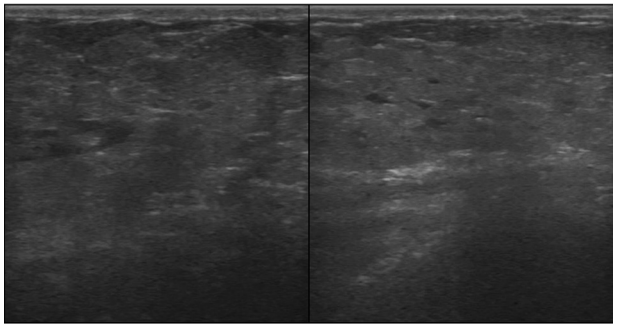
Most breast cancers in young women, including pregnant and lactating women, are detected as palpable and painless lumps. Cancers in pregnant and lactating women have a more aggressive growth pattern, caused by the biological effects of pregnancy, with a poor prognosis [5].

Figure 1



(a–c) A 28-year-old women lactating for 9 months presented with right breast lump. (a) Bilateral mammogram (craniocaudal and mediolateral oblique views) showing marked diffuse increase in parenchymal density, being more dense in right breast upper outer quadrant. (b) Ultrasound images of the clinically palpable lump at 9–11 O'clock position revealed diffuse enlargement of the glandular component with hyperechogenicity. However, there were no definite masses consistent with lactational changes/lobular hyperplasia confirmed by histopathology showing active breast tissue. (c) Microscopic picture (×40) magnification using Leica microscopy (Leica Microsystems, Wetzlar, Germany).

Figure 2



A 28-year-old lactating woman presented with right breast palpable nonpainful lump. Ultrasound showing marked echogenic breast tissue with no underlying masses consistent with lactational changes/lobular hyperplasia. These findings are normal in lactating patients and are due to engorged milk-filled breast.

The goal of this study was to evaluate the role of the sonomammography in the characterization of clinically palpable breast lumps during pregnancy and lactation to rule out PABC, which represents the most ominous entity and to highlight the radiologic features of lactational breast changes/lobular hyperplasia.

Materials and methods

This retrospective study was approved by the Institutional Review Board at our institutes. This study was retrospectively carried on 100 female patients with clinically palpable lumps during pregnancy and lactation. Patients were referred from the outpatient clinics. Patients' ages ranged from 18 to 41 years, with a mean age of 29 years.

Patients were subjected to the following.

Clinical history and examination.

Full history taking was carried out, including clinical presentation (complaint), age, family, and past medical history with dedicated examination.

Imaging procedures.

All 100 patients underwent B-mode US examination using an US device of GE Healthcare (LOGIQ_E5 with XDclear premium US) with a superficial linear 12 MHz probe. When US revealed a benign lesion, no further diagnostic evaluation was necessary. In patients older than 35 years when US demonstrated a suspicious lesion, a dedicated mammogram in the craniocaudal and mediolateral oblique views was performed using the digital mammography system (using GE Senographe 2000D full-field digital mammography system from GE Healthcare (Schenectady, New York, United States), Chalfont St Giles, UK). Only 23 patients underwent conventional digital mammography.

Table 1 Imaging modalities and techniques used in the evaluation of the 100 patients

Imaging modality/ technique	Ultrasound	Mammography	Ultrasound-guided core biopsy
Number of patients	100	23	22

Pathologic diagnosis.

Samples of breast lesions were obtained from 22 patients by means of core biopsy under US guidance using trucut needle biopsy (using 14 G needles). Specimens were evaluated and analyzed by well-trained expert pathologists.

Table 1 shows the different imaging modalities and techniques used for the evaluation of the 100 cases included in this study.

Imaging analysis and interpretation

Lesions were classified on B-mode sonography and mammography according to the Breast Imaging-Reporting and Data System (BI-RADS) criteria of the American College of Radiology.

Results

A total of 85 patients presented during lactation and 15 patients during pregnancy. The clinically palpable lumps were observed in the left breast in 51 cases and in the right breast in 49 cases.

US showed focal increased parenchymal echogenicity with no definite masses considered as lactational breast changes/lobular hyperplasia in 13 cases categorized as BI-RADS 2, well-defined lesion with the criteria of benignity as cyst categorized as BI-RADS 2 in three cases, a probably benign lesion such as fibroadenoma, lactating adenoma, focal lactational mastitis, breast abscess, galactoceles, and papilloma classified as BI-RADS 3 in 68 cases, lesions suspected of malignancy showing parenchymal distortion with hypoechoic texture classified as BI-RADS 4 in three cases, and 12 cases highly suspicious for malignancy classified as BI-RADS 5 (Table 2).

In 23 of 100 cases, mammography was performed: mammography showed four cases with diffuse increased parenchymal density with no masses

Table 2 US findings of the 100 cases

US category	BI-RADS 2	BI-RADS 3	BI-RADS 4	BI-RADS 5
Number of cases	17 (3 cysts, 13 lactational breast changes/lobular hyperplasia and 1 intramammary lymph node)	68 (35 fibroadenoma, 11 abscesses, 4 lactating adenoma, 1 papilloma, 16 galactocele, and 1 mastitis)	3 parenchymal distortion (2 proven to be invasive duct carcinoma and 1 granulomatous mastitis)	12 (invasive duct carcinoma)

BI-RADS, Breast Imaging-Reporting and Data System; US, ultrasound.

Table 3 Mammographic findings of the 23 cases

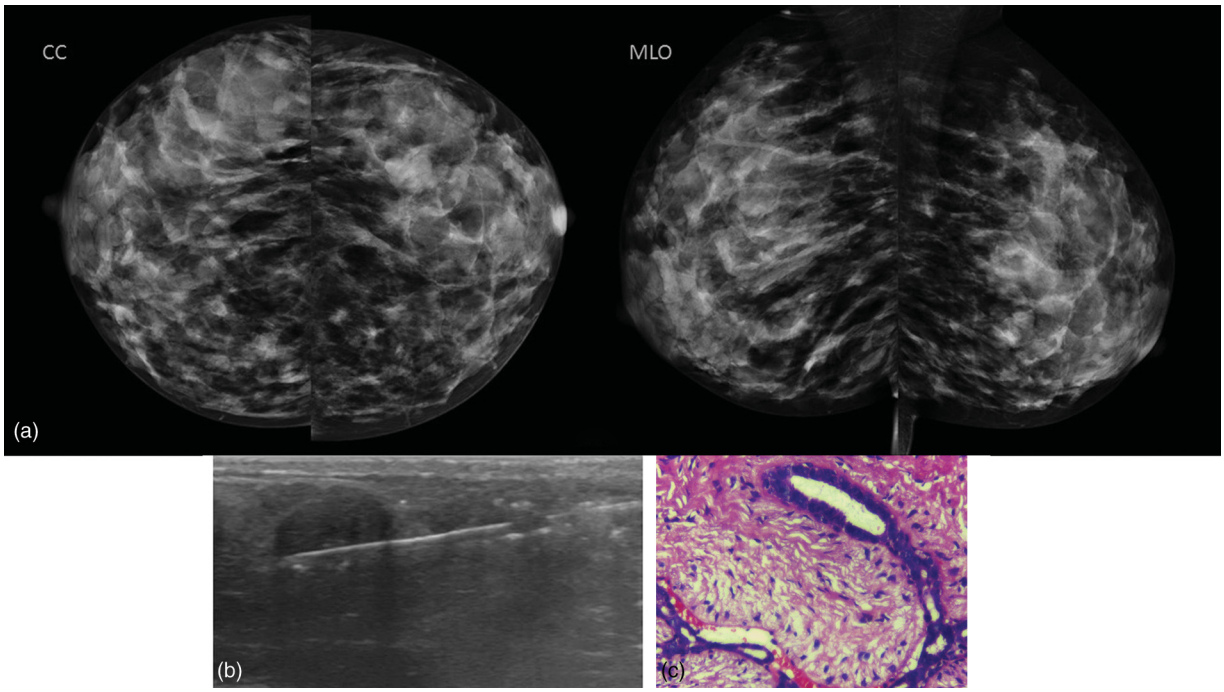
Mammography category	BI-RADS 1	BI-RADS 3	BI-RADS 4	BI-RADS 5
Number of cases	4	6 (3 fibroadenoma, 2 galactoceles, and 1 mastitis)	2 (parenchymal distortion proven to be invasive duct carcinoma)	12 (invasive duct carcinoma)

BI-RADS, Breast Imaging-Reporting and Data System.

Table 4 Trucut biopsy pathological results of 22 cases

Pathology	Active breast tissue	Papilloma	Granulomatous mastitis	Ductal carcinoma	Fibroadenoma
Number of cases	5	1	1	14	1

Figure 3



(a–c) A 21-year-old lactating woman presented with left UOQ breast lump. (a) Bilateral mammogram (craniocaudal and mediolateral oblique views) showing bilateral extremely dense breast parenchyma with well-defined lobulated isodense mass lesion in the left UOQ. (b) Images of ultrasound-guided biopsy showing at 10 O'clock a well-defined homogenously isoechoic mass lesion consistent with fibroadenoma confirmed by histopathology. (c) Microscopic picture (×40) magnification using Leica microscopy. UOQ, upper outer quadrant.

or features suggestive of malignancy classified as BI-RADS 1, six cases were classified as BI-RADS 3, two cases classified as BI-RADS 4, and 11 cases classified as BI-RADS 5 (Table 3). Trucut biopsies were performed in 22 cases (Table 4).

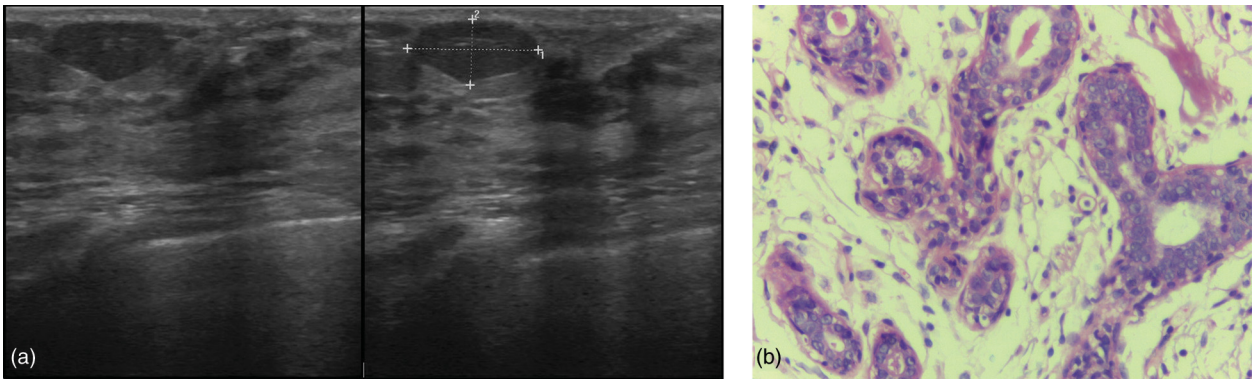
Discussion

During pregnancy and lactation, physiologic changes cause dramatic changes in breast parenchyma. Radiologically, in ultrasonography, most breast

parenchymas appear echogenic, resulting from the combination of glandular enlargement and engorgement of breast tissue with milk rich in fat, in addition to increased vascularity of the breast tissue, whereas in mammography these changes manifest as increased parenchymal density with overall increased breast size [4].

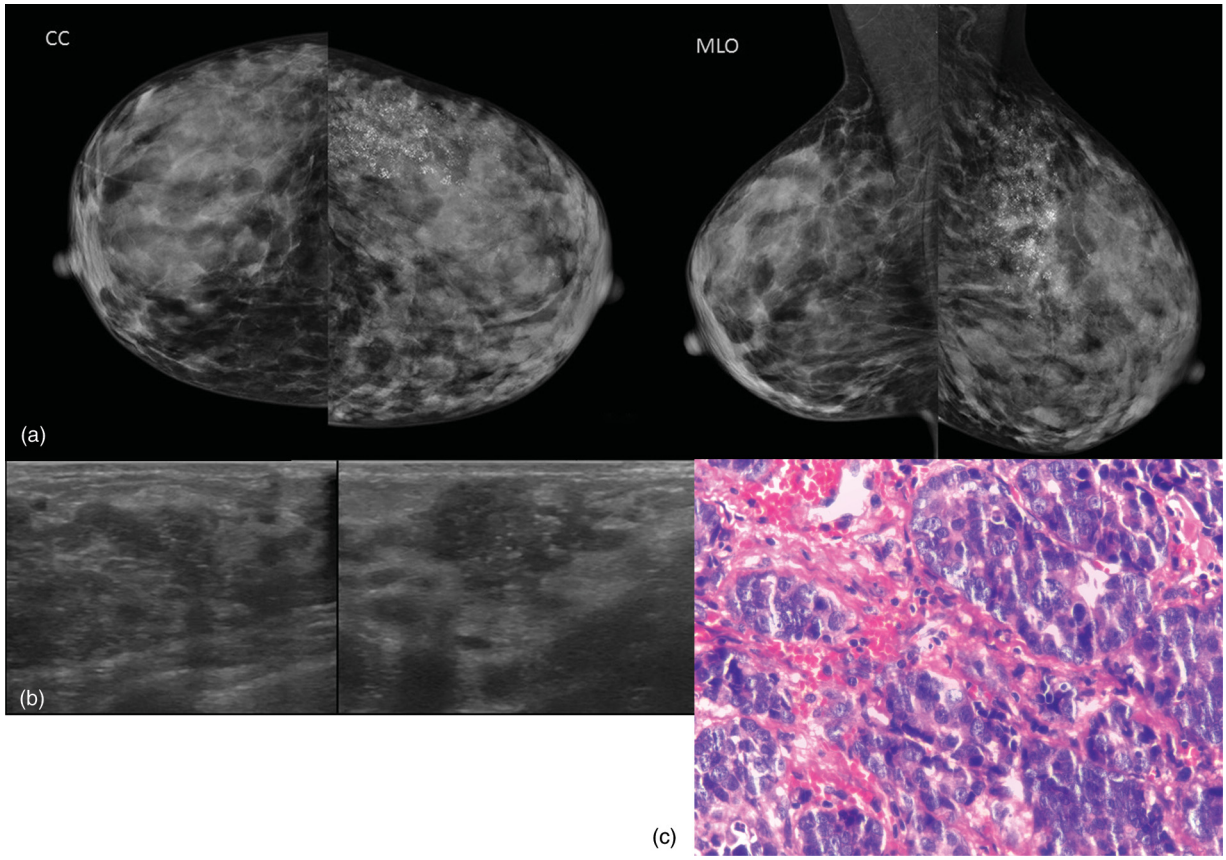
On US, lactational change occasionally is visible as a homogeneous to heterogeneous mass [4].

Figure 4



(a) A 26-year-old pregnant woman in her last trimester presented with right upper outer quadrant palpable nonpainful lump. Ultrasound showing well-defined homogenous iso-to-hypoechoic mass lesion consistent with fibroadenoma. (b) Microscopic picture (×40) magnification using Leica microscopy.

Figure 5



(a, b) A 35-year-old lactating woman presented with left UOQ breast lump. (a) Bilateral mammogram (craniocaudal and mediolateral oblique views) showing bilateral extremely dense breast parenchyma with left UOQ scattered microcalcific foci with ductal extension pointing toward the nipple. (b) US images showing at 12–3 O'clock position diffuse hypoechoic parenchymal infiltration (BI-RADS 5). US-guided core biopsy was performed and histopathology revealed invasive duct carcinoma of grade III. (c) Microscopic picture (×40) magnification using Leica microscopy. BI-RADS 5, Breast Imaging-Reporting and Data System 5; UOQ, upper outer quadrant; US, ultrasound.

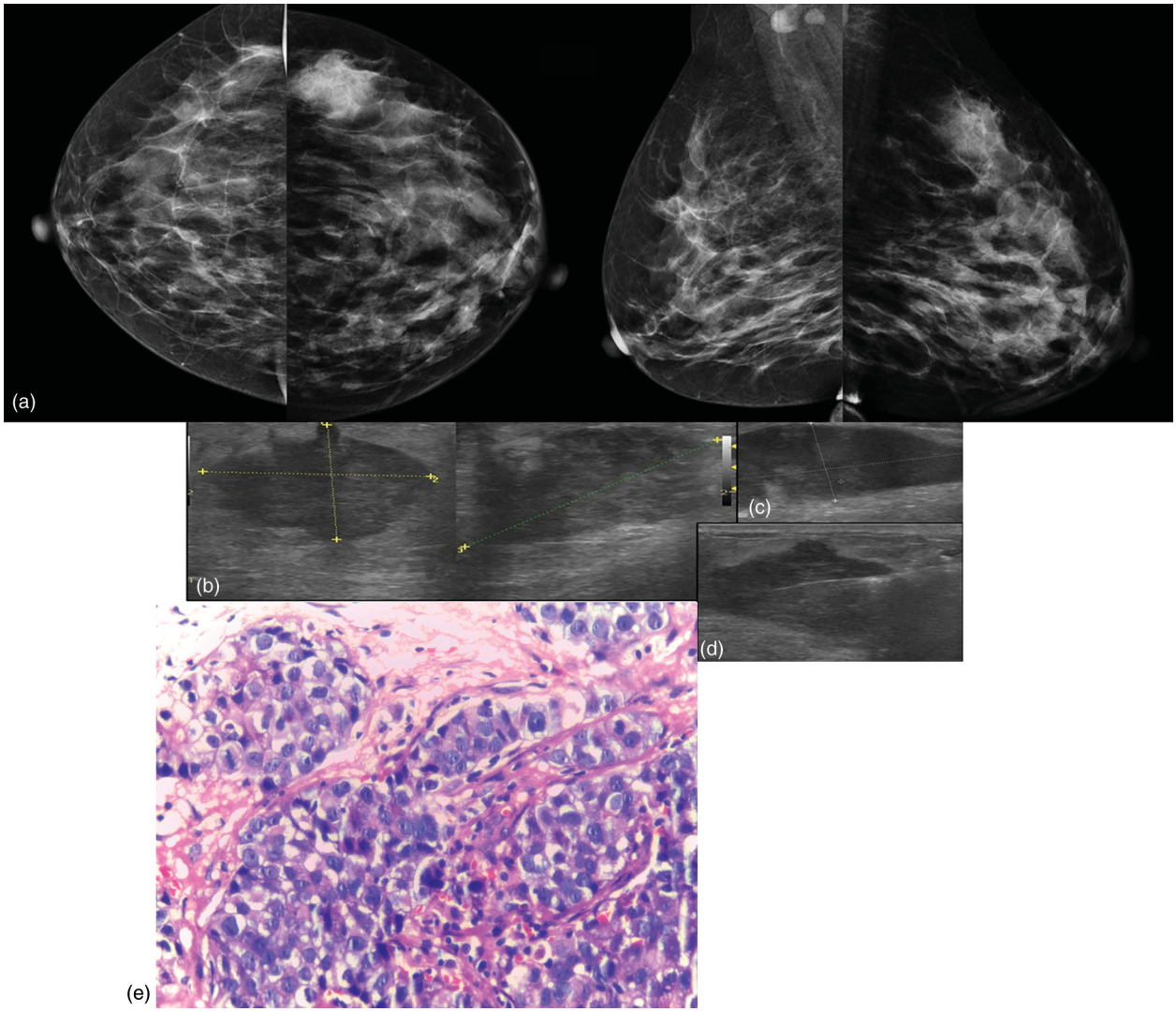
In our study, 13 of the 100 patients presenting with clinically palpable lumps showed markedly echogenic breast tissue with no underlying masses, consistent with lactational changes/lobular hyperplasia; five of the 13 patients underwent US-guided core biopsy, revealing active breast tissue, thus confirming the diagnosis. (Core biopsies were performed upon patients' request because of anxiety.)

Breast disorders detected during pregnancy and lactation are benign in most cases [6].

Pregnancy-related clinically palpable benign disorders include cysts, galactocele, fibroadenoma, lactating adenoma, papilloma, and intramammary lymph node as well as focal lactational mastitis and abscess (Fig. 3).

Galactoceles can present in the third trimester, during lactation or after delivery, or even after cessation of breastfeeding. Galactoceles occur as a result of an obstructed duct, leading to distension of proximal lobular segments. Patients most often present with a tender mass. The imaging appearance of galactocele is variable, depending on the amount of fat, protein, and water content. On mammography, a mass of mixed lucent and dense areas, or a mass with a fat-fluid level on the lateral projection, is a diagnostic sign in the proper clinical setting [4].

Figure 6



(a–e) A 40-year-old lactating woman presented with palpable, hard, nonpainful lump of the upper outer quadrant of the left breast. (a) Bilateral mammogram (craniocaudal and mediolateral oblique views) showing bilateral heterogeneously dense breast parenchyma with partly obscured ill-defined highly suspicious mass lesion in the left upper outer quadrant. (b) US images showing at 2 O'clock position an ill-defined hypoechoic suspicious mass lesion measuring 2.6×3×4.2 cm along its maximal dimensions (BI-RADS 5). (c) US images showing left axillary pathological lymph nodes with cortical thickening and effaced hilum. (d) US images of US-guided core biopsy from the suspicious mass. Histopathology revealed invasive duct carcinoma of grade III. (e) Microscopic picture (×40) magnification using Leica microscopy. BI-RADS 5, Breast Imaging-Reporting and Data System 5; US, ultrasound.

In our study, galactoceles represented 16 of 100 cases of pregnancy and lactational associated breast masses. They showed cystic appearance with internal echoes and variable posterior enhancement. In our study, two cases that underwent mammography showed a mixed lucent and dense mass lesion.

Fibroadenomas are common benign lesions of the breast that usually present as a single mass in young women. Fibroadenoma may show increase in size or texture during pregnancy or lactation, stimulated by estrogen, progesterone, and prolactin. US appearance is round or oval solid mass with horizontal orientation, smooth contour, and gentle lobulations, showing uniform internal echo pattern and intermediate acoustic attenuation [7] (Fig. 4).

Lactating adenoma is a lesion specific to pregnancy and lactation. Lactating adenomas typically appear as oval masses with a wider-than-tall orientation, posterior acoustic enhancement, and a circumscribed margin. A lactating adenoma may be indistinguishable from a fibroadenoma on sonography [1].

In our study, fibroadenomas were found in 35 patients and lactating adenomas in four patients, representing together the most common benign mass lesion.

Focal lactational mastitis and breast abscess can present as tender palpable mass. In early mastitis, sonographic changes may be limited to regional edema and skin thickening. As tissue necrosis begins in focal mastitis, skin thickening may be accompanied by a focal hypoechoic mass with surrounding hyperemia. Further progression to a mature abscess appear as thick-walled mass with or without internal gas and debris and posterior acoustic enhancement [1].

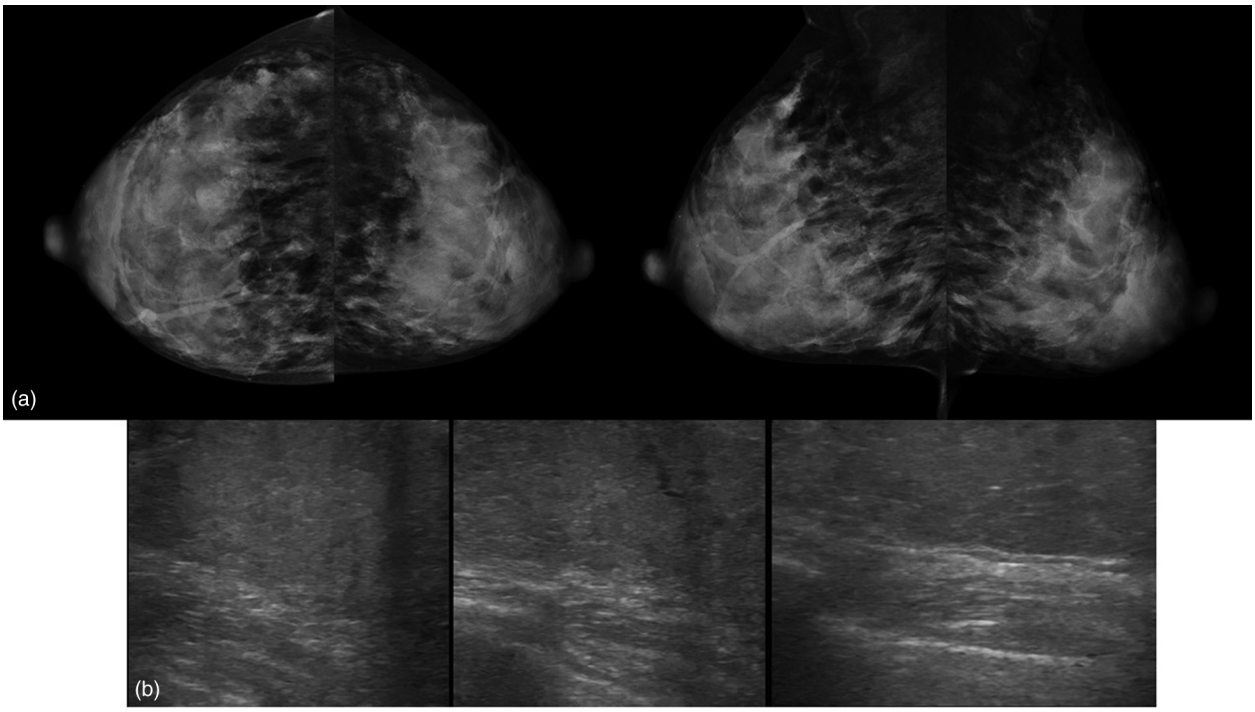
In our study, focal lactational mastitis and breast abscess were seen in 12 of 100 patients.

Other less common benign entities were encountered in our study: cysts in three cases, an intramammary lymph node in one case, parenchymal distortion pathologically proven later as granulomatous mastitis in one case, and a papilloma appeared as a subareolar well-defined solid, lobulated mass within a dilated duct in one case.

PABC is defined as breast cancer diagnosed during pregnancy and within 1 year of delivery [8] (Fig. 5).

PABC is relatively an uncommon event; the frequency is ~1 in 3000 pregnancies, and 7–14% of newly

Figure 7



(a, b) A 31-year-old lactating woman presented with palpable, nonpainful lump of the upper outer quadrant of the left breast. (a) Bilateral mammogram (craniocaudal and mediolateral oblique views) showing bilateral marked diffuse increase in parenchymal density, no definite masses. (b) US images of the clinically palpable lump at 1–3 O'clock position revealed diffuse area of parenchymal hyperechogenicity, yet no definite masses consistent with lactational changes/lobular hyperplasia.

diagnosed breast cancers in women younger than 40 years are associated with pregnancy [9] (Fig. 6).

In our study, 14 cases of the 100 patients presenting with clinically palpable breast masses showed PABC pathologically proven as invasive duct carcinoma.

Conclusion

The majority of pregnancy-associated breast masses are benign. Nevertheless, a thorough and prompt evaluation of any lesion during this time is required, to rule out malignancy and to avoid misdiagnosis of lactational breast changes/lobular hyperplasia as a pathology (Fig. 7). US is very useful in differentiating between cystic and solid masses as well as characterization of different lesions. US constitutes the most appropriate radiologic method for evaluating breast disorders in women during pregnancy and lactation [10]. In older patients and when the imaging results are suspicious, mammography is to be performed with further biopsy performed to obtain a pathologic diagnosis.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 Vashi R, Hooley R, Butler R, Geisel J, Philpotts L. Breast imaging of the pregnant and lactating patient: physiologic changes and common benign entities. Am J Roentgenol 2013; 200:329–336.

2 Sabate JM, Clotet M, Torrubia S, Gomez A, Guerrero R, de Las Heras P, *et al.* Radiologic evaluation of breast disorders related to pregnancy and lactation 1. Radiographics 2007; 27:S101–S124.

3 Hogge JP, de Paredes ES, Magnant CM, Lage J. Imaging and management of breast masses during pregnancy and lactation. Breast J 1999; 5:272–283.

4 Joshi S, Dialani V, Marotti J, Mehta TS, Slanetz PJ. Breast disease in the pregnant and lactating patient: radiological-pathological correlation. Insights Imaging 2013; 4:527–538.

5 Ahn BY, Kim HH, Moon WK, Pisano ED, Kim HS, Cha ES, *et al.* Pregnancy- and lactation-associated breast cancer: mammographic and sonographic findings. J Ultrasound Med 2003; 22:491–497 quiz 498–499.

6 Robbins J, Jeffries D, Roubidoux M, Helvie M. Accuracy of diagnostic mammography and breast ultrasound during pregnancy and lactation. Am J Roentgenol 2011; 196:716–722.

7 Greenberg R, Skornick Y, Kaplan O. Management of breast fibroadenomas. J Gen Intern Med 1998; 13:640–645.

8 Loibl S. New therapeutic options for breast cancer during pregnancy. Breast Care (Basel) 2008; 3:171–176.

9 Ring AE, Smith IE, Ellis PA Breast cancer and pregnancy. Ann Oncol 2005; 16:1855–1860.

10 Hosny IA, Eldin LAS, Elghawabi HS. Radiological evaluation of palpable breast masses during pregnancy and lactation. Egypt J Radiol Nucl Med 2011; 42:267–273.