



Imaging and clinical features of breast cancer in young Mexican women: long delay between self-detection and seeking medical attention

Karen A. Rojas-Galeana^{1*}, Benjamin Conde-Castro², Nancy B. Guzman-Martinez¹,
Anallely Moctezuma-Oropeza³, and Beatriz Alvarez-Alonso³

¹Department of Mastography, ABC Medical Center; ²School of Medicine, Universidad Nacional Autonoma de Mexico; ³Department of Mastography, Hospital Juarez de Mexico. Mexico City, Mexico

ABSTRACT

Introduction: The interval between self-detection of clinical signs during breast self-examination and seeking medical attention in young women (< 40 years old) with breast cancer has not been evaluated in the Mexican population. There are also limited data on specific imaging findings. This study aimed (1) to determine the interval between self-detection of clinical signs and seeking medical attention in young Mexican women (< 40 years old) with breast cancer and (2) to describe the imaging ultrasound (US) and mammographic findings and clinical characteristics. **Materials and Methods:** A cross-sectional study included young women (< 40 years old) who self-detected clinical signs of histologically confirmed breast cancer and were examined with US grayscale and Doppler color, and mammography. Clinical signs such as a palpable lump, bloody discharge from the nipple or nipple retraction, and enlarged breast volume were recorded. The BI-RADS categories were used for evaluation. The interval between self-detection of clinical signs and seeking medical attention was also recorded. **Results:** A total of 43 patients aged 33.8 ± 4.5 years (range 21-39 years) were included. Most patients ($n = 30, 69.8\%$) had more than 90 days between self-detection of a breast sign and seeking medical attention, with a mean of 300 ± 7.8 days (range 30-1080 days). A palpable lump was the most common self-detected clinical sign in 37 (86.0%) patients. US and mammography showed BI-RADS 4 and 5 lesions suspicious of malignancy in all patients. Invasive ductal carcinoma was the most common ($n = 37, 86.0\%$). **Conclusion:** This is the first study in young Mexican women (< 40 years old) with breast cancer that showed a long delay between self-detection of clinical signs and seeking medical attention. US and mammography findings of breast cancer were comparable with other older populations.

Keywords: Breast cancer. Young women. Breast US. Mammography. Delayed diagnosis.

INTRODUCTION

A delayed breast cancer diagnosis in young women (< 40 years old) is associated with a more advanced clinical stage and a poor prognosis¹⁻³. A delay of more than 90 days between self-detection and seeking medical attention is associated with a more advanced

stage¹⁻³. Ultrasound (US) is the recommended imaging modality in women < 40 years of age when breast abnormalities are detected during breast self-examination. Other imaging modalities, such as mammography and magnetic resonance imaging (MRI), are used as complementary diagnostic evaluations for suspected malignancy⁴.

*Corresponding author:

Karen A. Rojas-Galeana
E-mail: dra.karenandrearg@gmail.com

Received for publication: 13-01-2024

Accepted for publication: 18-03-2024

DOI: 10.24875/JMEXFRI.M24000076

Available online: 10-07-2024

J Mex Fed Radiol Imaging. 2024;3(2):93-104

www.JMeXFRI.com

2696-8444 / © 2024 Federación Mexicana de Radiología e Imagen, A.C. Published by Permanyer. This is an open access article under the CC BY-NC-ND (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).

Table 1. Characteristics of 43 young Mexican women (< 40 years old) with breast cancer

Description	Parameters
Age, years, mean \pm SD (min, median, max)	33.8 \pm 4.5 (21, 34, 39)
School education	
Illiterate, n (%)	1 (2.3)
Basic education, n (%)	22 (51.1)
High education, n (%)	15 (35.0)
Bachelor's degree, n (%)	5 (11.6)
Lactation, yes, n (%)	27 (63.0)
Family history of breast cancer, yes, n (%)	12 (28.0)
Smoking, yes, n (%)	11 (26.2)
Alcoholism, yes, n (%)	10 (23.4)
The delay between self-detection of clinical signs and seeking medical attention ^a , mean \pm SD (min, median, max)	300 \pm 7.8 (30, 240, 1080)
More than 90 ^a days, n (%)	30 (69.8)
Less than 90 days, n (%)	13 (30.2)
Self-detected clinical signs ^a	
Lump and blood discharge from the nipple, n (%)	19 (44.2)
Lump, n (%)	18 (41.8)
Enlarged breast volume, n (%)	4 (9.4)
Blood discharge from the nipple, n (%)	1 (2.3)
Nipple retraction, n (%)	1 (2.3)
Clinical stage ^b , n (%)	
0	3 (6.9)
IIA	6 (14.0)
IIB	14 (32.5)
IIIA	12 (28.0)
IIIB	3 (6.9)
IIIC	1 (2.3)
IV	4 (9.4)

^aBreast abnormalities detected during breast self-examination; ^bAmerican Joint Committee of Cancer.

Villarreal et al.⁵ reported that the incidence and mortality rates for breast cancer in young Latin American women were higher than in developed countries (20.0% versus 12.0% and 14.0% versus 7.0%, respectively). The prognosis in young women (< 40 years old) with breast cancer is particularly unfavorable in developing countries such as Mexico, with limited access to medical care and early treatment. As the standard recommendation for breast cancer screening starts at the age

Table 2. US findings (n = 43) according to BI-RADS in young Mexican women (< 40 years old) with breast cancer

Descriptor	n (%)
Shape	
Oval	8 (18.6)
Round	0
Irregular	35 (81.4)
Orientation	
Parallel	24 (55.9)
Not parallel	19 (44.1)
Margin	
Circumscribed	8 (18.6)
Not circumscribed	
Spiculated	16 (37.2)
Angular	11 (25.6)
Microlobulated	7 (16.3)
Indistinct	1 (2.3)
Echo pattern	
Anechoic	0
Hyperechoic	0
Complex cystic and solid	7 (16.3)
Hypoechoic	33 (76.7)
Isoechoic	0
Heterogeneous	3 (7)
Posterior features	
No posterior features	13 (30.2)
Enhancement	7 (16.3)
Shadowing	23 (53.5)
Ductal changes	
Solitary dilated duct	7 (16.2)
Ductal extension	18 (41.9)
No ductal involvement	18 (41.9)

BI-RADS: Breast Imaging-Reporting and Data System, 5th Edition; US: ultrasound.

of 40 years, breast abnormalities are usually detected by breast self-examination in young women < 40 years old. However, there is evidence that a long interval occurs between self-detection of clinical signs during breast self-examination and seeking medical attention³. This study aimed (1) to determine the interval between self-detection of clinical signs and seeking medical

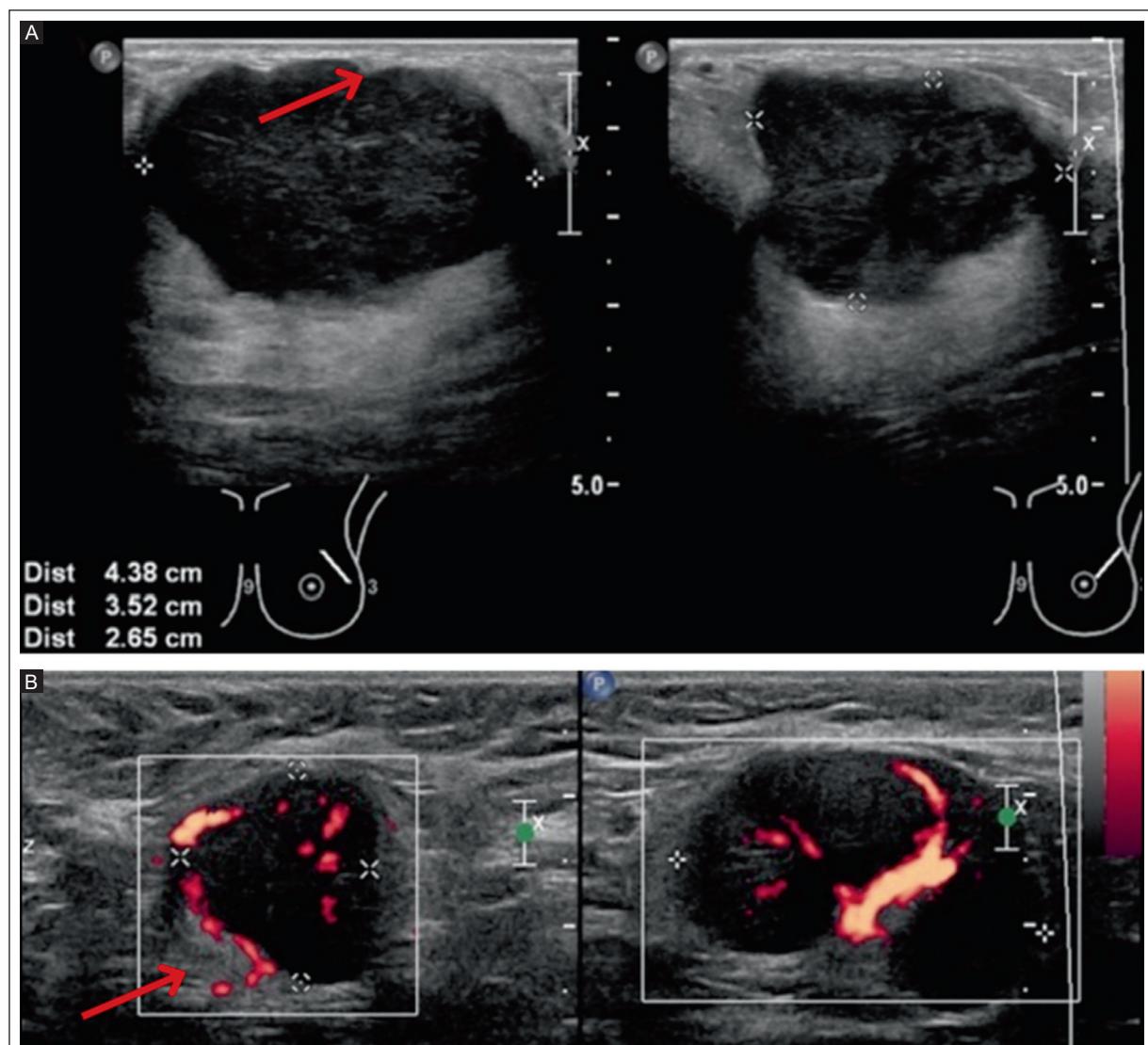


Figure 1. A 36-year-old woman with a palpable lump in the left breast and axilla for 3 months. **A:** US grayscale shows an irregular, parallel, microlobulated mass (arrow), radial and antiradial, hypoechoic with enhancement in the left breast at 2 o'clock. **B:** US Power Doppler shows an enlarged lymph node in the axillary region, with loss of morphology, cortical thickening displacing the fatty hilum, and transcapsular vascularity (arrow), BI-RADS 5. The histopathologic diagnosis was invasive ductal carcinoma with a triple-negative immunohistochemical profile. MRI with metastases in the central nervous system (not shown).

BI-RADS: Breast Imaging-Reporting and Data System; MRI: magnetic resonance imaging; US: ultrasound.

attention in young Mexican women aged < 40 years with breast cancer and (2) to describe the US and mammography findings and clinical characteristics.

MATERIALS AND METHODS

This cross-sectional study was conducted from January 2019 to December 2021 in the Department of Radiology and Imaging of the Hospital Juarez de Mexico in Mexico City. Young Mexican women aged < 40 years who self-detected any clinical signs on breast self-examination and with histologically confirmed breast

cancer were included. Patients without complete breast imaging examinations or who had undergone breast surgery were excluded. Informed consent was not required for this retrospective analysis of data obtained during routine medical care. The Institutional Research Ethics Committee and the Research Committee approved the study.

Study and variable development

Histologically confirmed breast cancer cases of patients who had undergone grayscale and Doppler

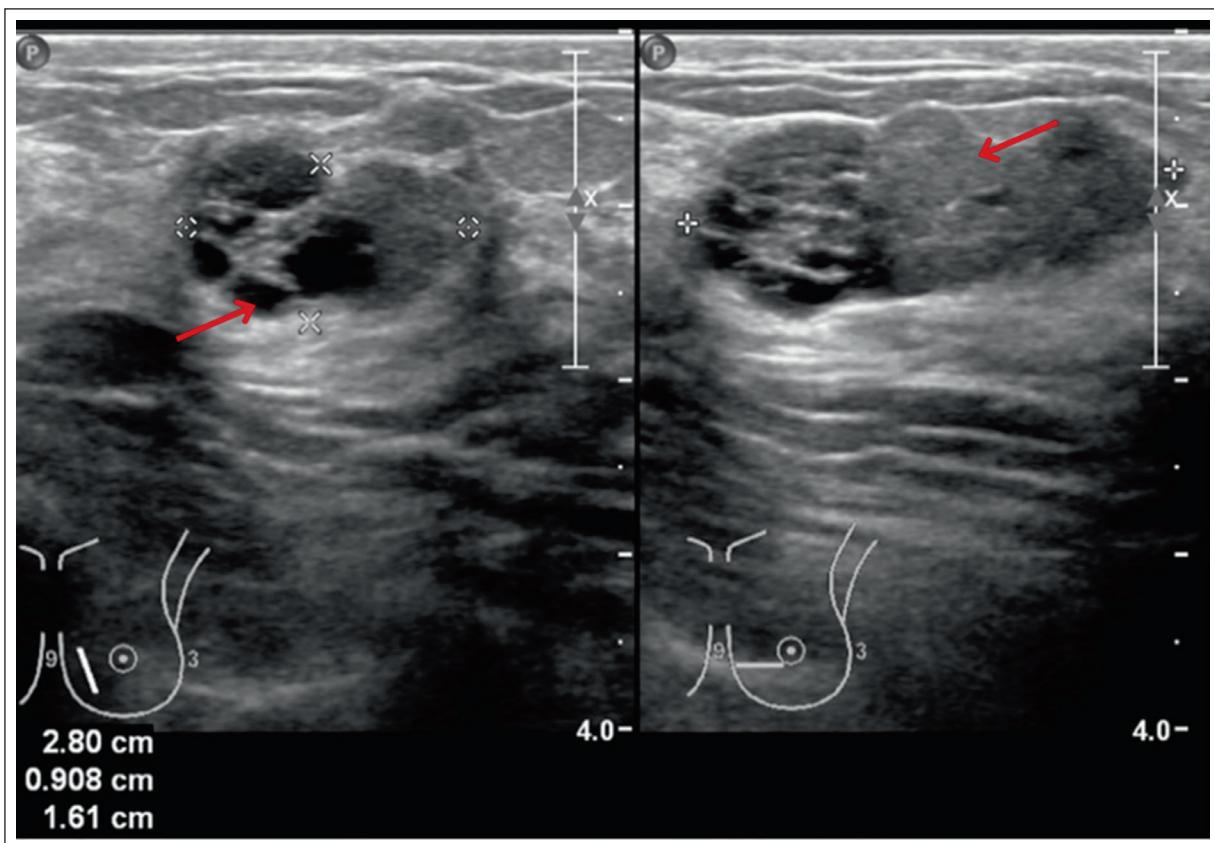


Figure 2. A 27-year-old woman with a palpable lump in the left breast that has been present for 1 month. US grayscale with a mass in the left breast at 8 o'clock, radial and antiradial, irregular, parallel, microlobulated, complex (arrows) with enhancement, BI-RADS 4B. The histopathologic diagnosis was an invasive ductal carcinoma with a luminal A immunohistochemical profile.

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

color US examination and mammography were selected from the institutional data. The variables were age, education, breastfeeding, family history of breast cancer, smoking, alcoholism, and clinical stage of the breast cancer diagnosis.

Clinical signs such as self-detection of a lump, a bloody discharge from the nipple or nipple retraction, and enlarged breast volume were recorded. The interval between self-detection of clinical signs and seeking medical attention was divided into more or less than 90 days. The US distribution patterns of breast masses were also recorded.

Protocol and image analysis

Ultrasound

US was performed with Phillips HD7XE equipment (Phillips Co, Amsterdam, The Netherlands) with a linear multifrequency transducer (7–14 MHz). Images were stored in the Picture Archiving and Communication

System (PACS) (Carestream, Rochester, NY, USA) and were analyzed with BI-RADS, 5th Edition⁶ by a breast radiologist (BAA) with 20 years of experience.

Mammography

A digital 2D and 3D full-field Selenia Dimensions Mammography System (Hologic Inc., Marlborough, MA, USA) was used, and medial-lateral oblique (MLO) and caudal-cranial (CC) projections were obtained. Images were stored in PACS and evaluated according to the BI-RADS, 5th Edition⁷ by a breast radiologist (BAA) with 20 years of experience.

Histologic evaluation

Percutaneous needle biopsies were performed in young women (< 40 years old) with a suspected breast malignancy with BI-RADS 4 or 5. Histologic features were classified using the Scarf-Bloom-Richardson system.

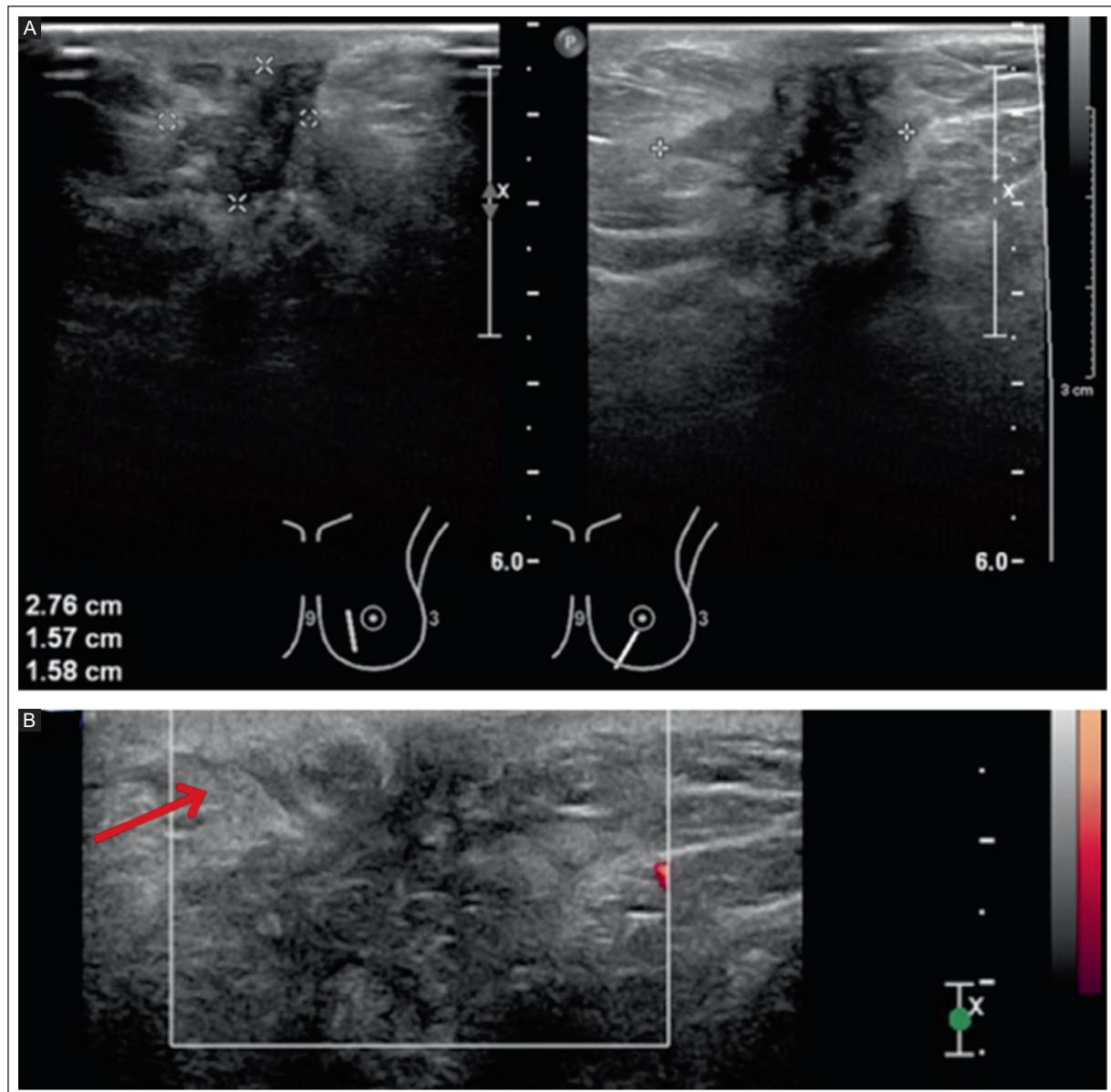


Figure 3. A 36-year-old woman with a palpable lump in the left breast and axillary region for 2 months. **A:** US grayscale with a mass in the left breast at 7 o'clock, radial and antiradial, irregular, not parallel, spiculated, hypoechoic, with shadowing. **B:** US Doppler power with absent vascularity (arrow), BI-RADS 5. The histopathologic diagnosis was an invasive ductal carcinoma with a triple-negative immunohistochemical profile. BI-RADS: Breast Imaging-Reporting and Data System; US: ultrasound.

Immunohistochemical profile

Estrogen receptor (ER) expression was determined with a primary monoclonal anti-ER antibody, and progesterone receptor (PR) expression was determined with a primary anti-progesterone receptor monoclonal antibody. The immunohistochemical classification was luminal A (ER-positive, PR-positive, and Ki-67 > 14%), luminal B (ER-positive, PR-positive, human epidermal

growth factor receptor-2, HER2), luminal B with HER2+ overexpression (ER-positive, PR-positive, HER2 positive), and triple-negative (ER-negative, PR-negative, and HER2-negative).

Statistical analysis

Frequencies and percentages were determined for qualitative variables, and means, standard deviations

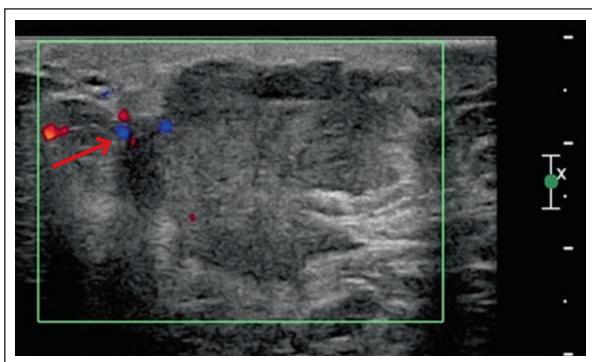


Figure 4. A 35-year-old woman with a palpable lump in the right breast for 4 months. US color Doppler with a mass in the right breast at 10 o'clock, irregular, not parallel, angular, hypoechoic, with enhancement and rim vascularity (arrow), BI-RADS 5. The histopathologic diagnosis was an invasive ductal carcinoma with a luminal B immunohistochemical profile.

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

(SD), medians, minimums, and maximums were determined for quantitative variables. The analysis was performed in Excel v.16 (Microsoft, Albuquerque, NM, USA).

RESULTS

A total of 43 young women (<40 years old) with a histopathologically confirmed diagnosis of breast cancer were included. The mean age was 33.8 ± 4.5 years (range 21–39 years) (Table 1). Basic education (n = 22, 51.1%) was more common. The majority of women had breastfed at least once (n = 27, 63.0%). Twelve (28.0%) women reported a family history of breast cancer. The mean between self-detection of clinical signs and seeking medical attention was 300 ± 7.8 days (range 30–1080 days). In most patients, more than 90 days (n = 30, 69.8%) elapsed between self-detection of breast signs and seeking medical attention. A palpable lump was the most common self-detected sign in 37 (86.0%), and a blood discharge from the nipple was detected in 19 of these cases. The most common clinical stage was IIB (n = 14, 32.5%), followed by IIIA (n = 12, 28.0%).

US findings

US breast examination showed masses in all women (n = 43, 100%) (Table 2). Irregularly shaped masses (n = 35, 81.4%) and a spiculated margin (n = 16, 37.2%) were the most common, followed by an angular margin (n = 11, 25.6%), while a microlobulated or indistinct margin was less common (n = 7, 16.3% and n = 1, 2.3%, respectively). Hypoechoic masses were the most

Table 3. Mammography findings (n = 31) according to BI-RADS in young Mexican women (< 40 years old) with breast cancer

Descriptor	Parameter
Mass	n = 26
Shape	
Oval, n (%)	4 (15.4)
Round, n (%)	0
Irregular, n (%)	22 (84.6)
Margin	
Circumscribed, n (%)	4 (15.4)
Not circumscribed	
Microlobulated, n (%)	4 (15.4)
Indistinct, n (%)	9 (34.6)
Spiculated, n (%)	9 (34.6)
Density	
High density, n (%)	18 (69.2)
Equal density, n (%)	8 (30.8)
Suspicious calcifications	n = 5
Morphology	
Amorphous, n (%)	2 (40.0)
Coarse heterogeneous, n (%)	2 (40.0)
Fine pleomorphic, n (%)	1 (20.0)
Architectural distortion	n = 31
Si, n (%)	25 (80.6)
No, n (%)	6 (19.4)

^aNo mammography was performed in 12 (27.9%) of 43 patients because the US findings were suspicious of malignancy. A biopsy was performed that confirmed breast cancer. BI-RADS: Breast Imaging-Reporting and Data System, 5th Edition.

common finding (n = 33, 76.7%), followed by a complex solid-cystic pattern (n = 7, 16.3%). Among posterior findings, an acoustic shadow was more common (n = 23, 53.5%). Ductal dilation was observed (n = 18, 41.9%) and associated with a dilated single duct (n = 7, 16.2%).

Figure 1 shows the breast US of a 36-year-old woman with a self-detected palpable lump. An irregular, microlobulated, hypoechoic mass with acoustic enhancement is seen. In the homolateral axilla, an enlarged lymph node with loss of its morphology, BI-RADS 5, was found. The histopathologic diagnosis was invasive breast carcinoma. Figure 2 shows the breast US of a 27-year-old woman with a palpable lump in the left breast that had been developing for 1 month. A microlobulated, solid-cystic, BI-RADS 4B mass is seen. The histopathologic diagnosis was invasive ductal carcinoma. Figure 3 shows

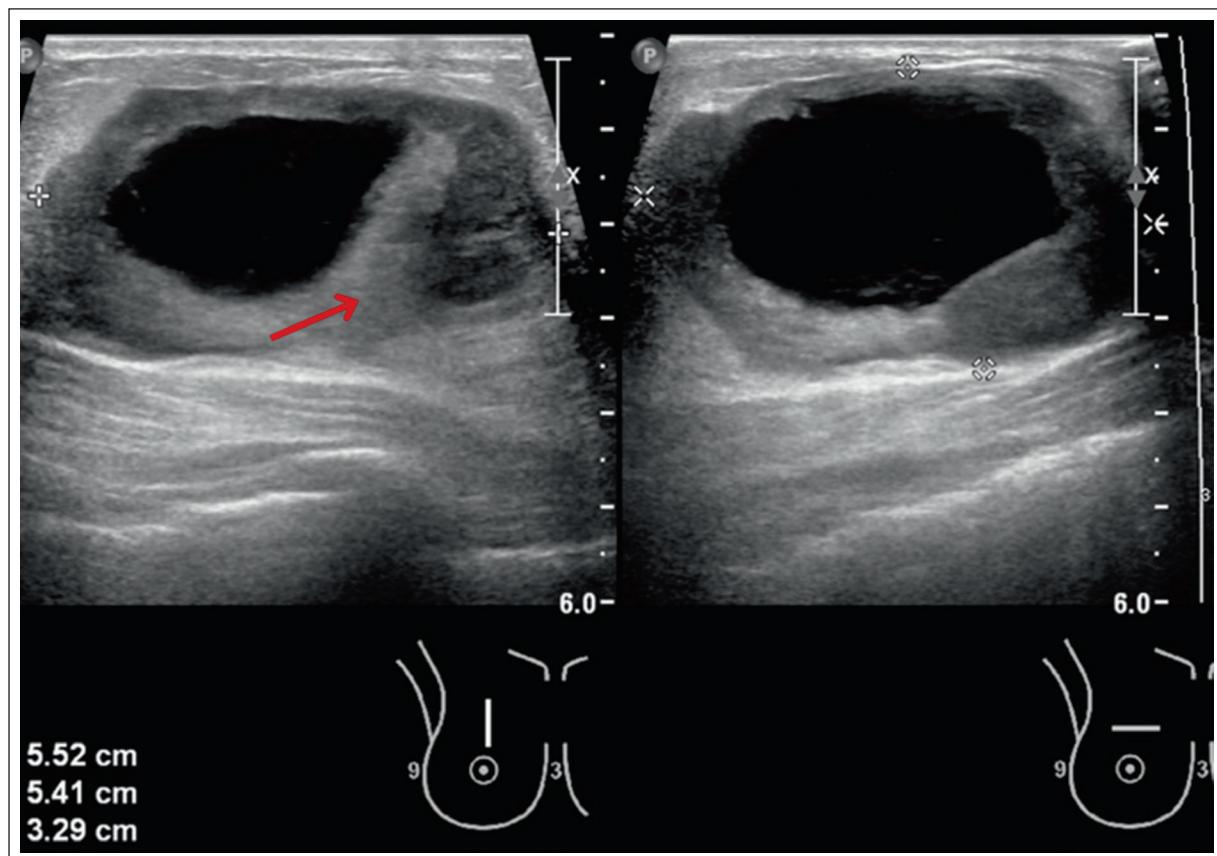


Figure 5. A 38-year-old woman with an enlarged right breast volume for 9 months. US grayscale with a mass in the right breast at 12 o'clock, radial and antiradial, parallel, oval, circumscribed, complex (arrow), with enhancement, BI-RADS 4A. The histopathologic diagnosis was an invasive ductal carcinoma with a triple-negative immunohistochemical profile. CT with metastases in the liver and chest (not shown). BI-RADS: Breast Imaging-Reporting and Data System; CT: computed tomography; US: ultrasound.

Table 4. US distribution patterns of breast masses ($n = 43$) in young Mexican women (< 40 years old) with breast cancer and suspected local extension

Description	n (%)
Unifocal pattern	32 (74.4)
Multifocal pattern	8 (18.7)
Multicentric pattern	2 (4.6)
Bilateral pattern	1 (2.3)
Suspicious axillary lymph nodes	
Si	26 (60.4)
No	17 (39.6)

US: ultrasound.

breast the US examination of a 36-year-old woman with a palpable lump in the left breast and axillary region that has been present for 2 months. An irregular, anti-parallel, hypoechoic, BI-RADS 5 mass with a spiculated

margin and an acoustic shadow without vascularity was found. The histopathologic diagnosis was infiltrating ductal breast carcinoma.

Figure 4 shows the US of a 35-year-old woman with a palpable lump in the right breast that has been present for 8 months. An irregular mass with an angular margin, hypoechoic, and peripheral saturation and acoustic enhancement on Doppler US, BI-RADS 5, was seen. The histopathologic diagnosis was invasive ductal carcinoma. Figure 5 shows the US of a 38-year-old woman with an enlarged right breast volume of 9 months. An oval, circumscribed, solid-cystic BI-RADS 4 mass with acoustic enhancement was seen. The histopathologic diagnosis was an infiltrating ductal carcinoma.

Mammography findings

Supplemental mammography was performed in 31 patients; 12 (27.9%) of 43 did not undergo mammography because the US examination showed suspicious

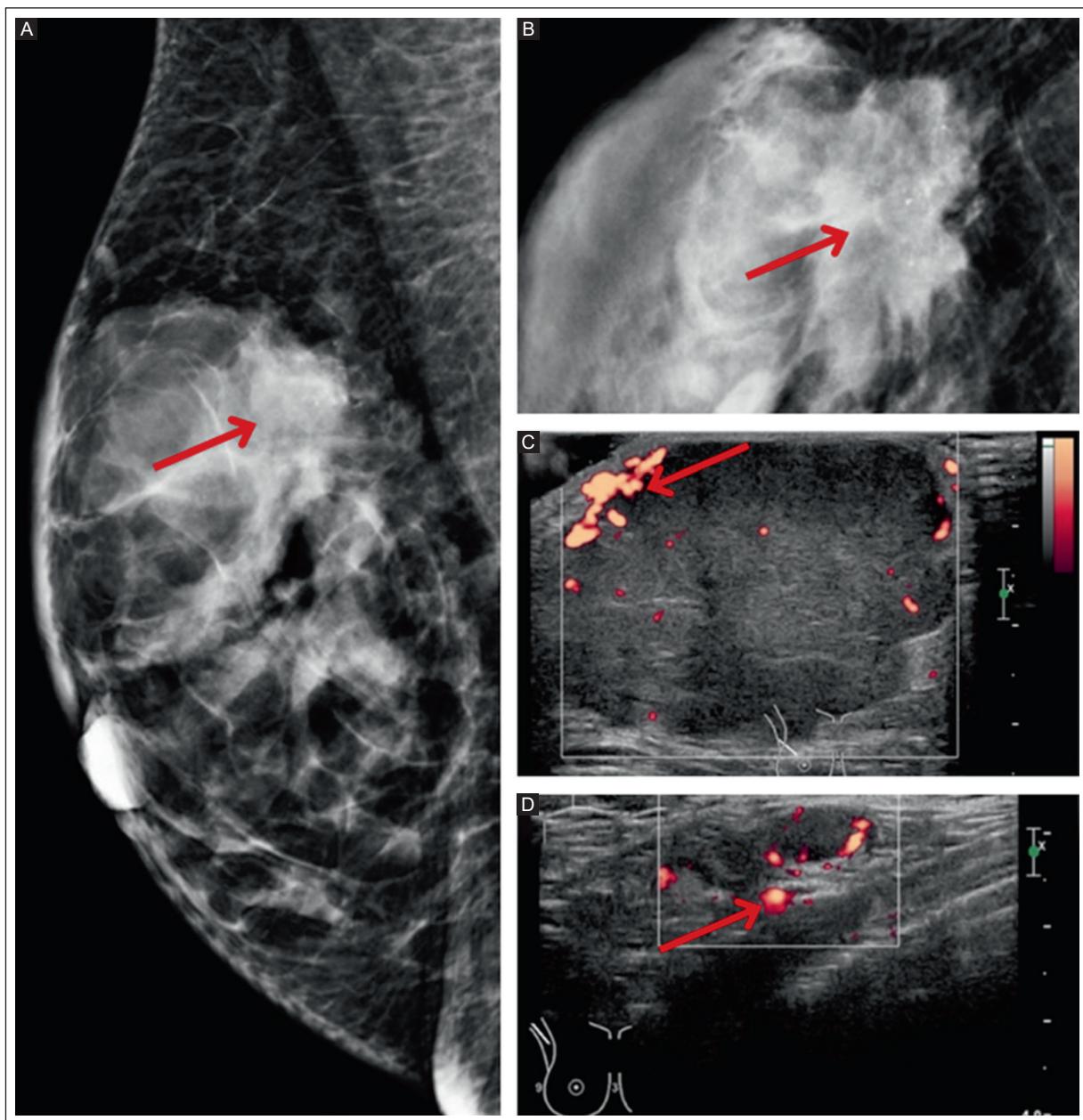


Figure 6. A 36-year-old woman with a palpable mass and an enlarged right breast volume for 36 months. **A:** mammography in projection MLO. **B:** CC view in the upper outer quadrant, with an obscured, irregular, high-density mass, with amorphous (arrows) calcifications and skin thickening. **C:** US Power Doppler of a mass in the right breast at 10 o'clock, irregular, parallel, microlobulated, hypoechoic, with rim vascularity (arrow). **D:** US Power Doppler of a right axillary, enlarged lymph node, with cortical thickening and transcapsular vascularity (arrow), BI-RADS 5. The histopathologic diagnosis was an invasive ductal carcinoma with a luminal B immunohistochemical profile. CT with metastases in the chest and bone (not shown).

BI-RADS: Breast Imaging-Reporting and Data System; CC: craniocaudal; CT: computed tomography; MLO: medial-lateral oblique; US: ultrasound.

findings of malignancy, and a biopsy confirmed the diagnosis. The most common finding was a mass ($n = 26$, 83.9%) and calcifications with suspicious morphology ($n = 5$, 16.0%) (Table 3). An irregular shape ($n = 22$, 84.6%) and a spiculated ($n = 9$, 34.6%), indistinct margin ($n = 9$, 34.6%), and hyperdense masses

($n = 18$, 69.2%) were the most common. Calcifications with suspicious morphology were present in 5 (16.0%) of 31 patients; of these, amorphous ($n = 2$, 40.0%), coarse heterogeneous ($n = 2$, 40.0%), and fine pleomorphic ($n = 1$, 20.0%) calcifications were identified. Architectural distortion was a common finding ($n = 25$, 80.6%).



Figure 7. A 31-year-old woman with an enlarged left breast for 3 months. Mammography in MLO projection of the left breast and lower quadrants shows fine pleomorphic grouped calcifications (arrow). The histopathologic diagnosis was an invasive ductal carcinoma with a HER2 immunohistochemical profile.

BI-RADS: Breast Imaging-Reporting and Data System; HER 2: human epidermal growth factor receptor 2; MLO: medial-lateral oblique.

Figure 6 shows the US and mammography of a 36-year-old woman with a palpable lump and volume increase in the right breast over 36 months. The US shows an irregular, microlobulated, hypoechoic BI-RADS 5 mass with peripheral vascularity. The MLO and CC mammogram projections showed an irregular hyperdense mass with a darkened margin associated with amorphous microcalcifications. Figure 7 shows the mammography of a 31-year-old woman with a volume increase in the left breast over 3 months. The MLO projection shows grouped, finely pleomorphic calcifications. The histopathologic diagnosis was an infiltrating ductal carcinoma with an *in situ* component.

Local spread of the disease

The US distribution patterns of breast masses are shown in Table 4. Unifocal masses were the most common ($n = 32$, 74.4%); multifocality was observed in 8 (18.7%) patients, multicentric masses in 2 (4.6%), and bilateral masses in 1 (2.3%). A total of 26 axillary lymph nodes (60.4%) had suspicious malignant morphology

on US. Figure 8 shows the US of a 39-year-old woman in the first trimester of pregnancy with a palpable lump in the right breast. She was evaluated at the end of her pregnancy because of an enlarged volume of the left breast. There was a mass in the right breast at 12 o'clock, irregular, parallel, angular, complex, with rim vascularity and a mass in the left breast at 3 o'clock, irregular, parallel, spiculated, hypoechoic with calcifications, and rim vascularity, BI-RADS 5. The histopathology diagnosis was a bilateral invasive ductal carcinoma with a triple-negative immunohistochemical profile.

Histopathology and molecular subtypes

Invasive ductal carcinoma was the most common subtype ($n = 37$, 86.0%), followed by ductal carcinoma *in situ* ($n = 3$, 7.0%) in young women aged < 40 years with breast cancer. The immunohistochemical profiles are shown in Table 5. Six (14.0%) cases were not evaluated by immunohistochemistry (three ductal carcinomas *in situ*, two malignant phyllodes tumors, and one sarcoma).

DISCUSSION

This is the first study in young Mexican women (< 40 years old) with breast cancer that showed the long delay between detection of clinical signs during breast self-examination and seeking medical attention. The main self-detected clinical sign was a palpable lump. US and mammographic findings of breast cancer were comparable with those of older populations. Awareness and education strategies must be improved in this age group for early medical care of any breast abnormality detected during breast self-examination, and a targeted US breast examination is recommended.

There have been concerns regarding delayed diagnosis in young women (< 40 years old) because it is associated with an advanced clinical stage and poor prognosis³. In a systematic review of 87 studies with 101,954 patients, Hanna et al.⁸ found that longer delays were associated with an advanced clinical stage of breast cancer and poor survival. The 5-year survival rate was 7% for delays of more than 90 days and 12% for shorter delays. Longer delays were also associated with a more advanced clinical stage. In a multicenter cohort study of 585 young women (< 40 years old) with breast cancer, Ruddy et al.² found a delay between self-detection of the first signs and seeking medical attention and defined 90 days as a critical point. The delay was more common in women with a lower economic level than women with a higher level ($n = 229$,

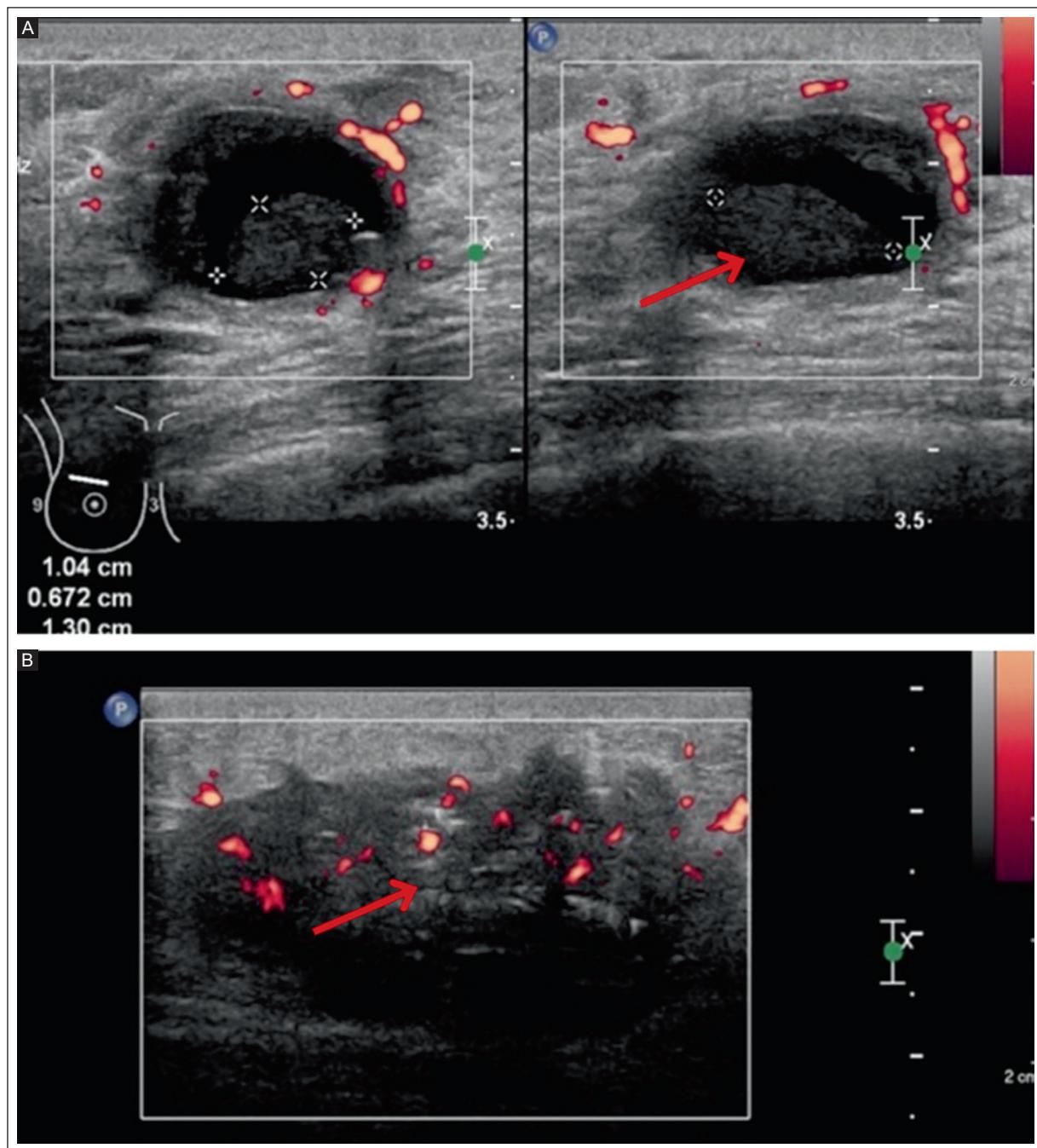


Figure 8. A 39-year-old woman with a palpable lump in the right breast since the first trimester of pregnancy. She was examined by a physician at the end of pregnancy because of an enlarged left breast volume. **A:** US Power Doppler shows a mass in the right breast at 12 o'clock, irregular, parallel, angular, complex (arrow), with rim vascularity. **B:** US Power Doppler shows a mass in the left breast at 3 o'clock, irregular, parallel, spiculated, hypoechoic with calcifications (arrow), and rim vascularity, BI-RADS 5. The histopathologic diagnosis was a bilateral invasive ductal carcinoma with a triple-negative immunohistochemical profile.

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

Table 5. Immunohistochemical profile (n = 37)^a of young Mexican women (< 40 years old) with breast cancer

Diagnosis	Total ^a	Luminal A	Luminal B ^b	HER 2+	Triple-negative
Invasive ductal carcinoma, n (%)	37	11 (29.7)	15 (40.5)	2 (5.5)	9 (24.3)

^a6 (14.0%) cases were not evaluated by immunohistochemistry: 3 with cancer *in situ*, 2 with phyllodes tumor, and 1 with sarcoma. ^b6 (40.0%) of the 15 patients with luminal B had HER+ receptors overexpression.

22.3% vs. $n = 217$, 11.9%, respectively). In our study, 30 (69.8%) of 43 women had more than 90 days between self-detection and seeking medical attention. On the other hand, the palpable lump was the most common clinical manifestation, comparable with a previous study of 142 young Mexican women (< 40 years old) with breast cancer who had a palpable lump as the most common clinical sign⁹. Despite self-detection of clinical abnormalities during breast self-examination, there was a long delay in seeking medical attention.

The breast cancer imaging in young women (< 40 years old) showed no special findings. These tumors are large and fast-growing, and US examination plays an important role in young women for several reasons, mainly because of breast density. We found an irregular mass on US and mammography. Calcifications with suspicious malignant morphology were also observed. Hu et al.³ reported the most common US, mammography, and MRI findings in a retrospective cohort study of 145 young women (< 40 years old) with breast cancer. Masses ($n = 127$, 87.6%) were the most common finding, followed by suspicious calcifications ($n = 32$, 22.1%) detected on mammography. Most masses were irregularly shaped ($n = 105$, 82.6%), although there were exceptions with radiologic and pathologic discrepancies with round or oval nodules with circumscribed margins ($n = 12$, 9.4%). These results are consistent with our study, in which all patients ($n = 43$) had irregular, non-circumscribed hypoechoic masses with spiculated or angular margins and calcifications ($n = 5$, 16.0%) on US that were suspicious on mammography. US is a valuable tool that can provide relevant information about the size and distribution pattern of masses as well as local disease extension. Unifocal masses were the most common in our study, while multifocality was found in a few patients. A bilateral mass was found in only one patient, related to the prolonged period of seeking medical attention (about 1080 days). The US and mammographic findings of breast cancer in young women (< 40 years old) are comparable with those in older populations.

A multimodality imaging examination may increase diagnostic accuracy in young women with breast abnormalities. A breast MRI can be performed from the age of 25 years⁴. In our study, complementary mammography was performed in three out of four patients. Suspicious calcifications were detected, resulting in carcinoma *in situ* and invasive carcinoma. Perez-Montemayor et al.¹⁰ conducted a study comparing automated breast US (ABUS) with manual US in 140 asymptomatic women aged ≤ 40 years. Abnormal

benign findings were found in 43 (3.7%). ABUS has several advantages in terms of standardization, facilitating on-site and remote interpretation with image storage and post-processing. Large population studies are needed to define the potential utility of ABUS as an imaging screening modality in asymptomatic young women (≤ 40 years old) and its impact on early detection of malignant lesions.

Breast cancer is a group of diseases with a heterogeneous behavior associated with a molecular profile that shows differences in the clinical course, response to treatment, overall survival, and prognosis of individual patients. Young women (< 40 years old) with breast cancer are more likely to have negative prognostic factors associated with their disease. The most common clinical stage in our study was IIB ($n = 14$, 32.5%). Villarreal et al.⁵ found that young Latin American women with clinical stages II and III had more aggressive tumors with a high histologic grade, associated with more aggressive molecular subtypes such as triple-negative and -positive HER2. Terrazas et al.¹¹ found that invasive intraductal was the most common and ductal *in situ* was the second most common carcinoma in 111 biopsies of young women aged < 40 years. This finding is consistent with what is known in the literature, namely, that cancers in young women (< 40 years old) are detected later and are more aggressive. Our study is similar to the results described as we found that the most common molecular profile was the hormone-sensitive subtypes. Luminal B was the most common. This subtype has a lower proportion of ERs, a high expression of cell proliferation genes, and a lower expression of genes or proteins, typical of the luminal epithelium. They are estrogen and progesterone receptor positive or negative with a high proliferation index¹². Based on the findings of previous studies and the consistent results of this study, young women aged < 40 years with breast cancer tend to have an unfavorable histologic grade and molecular profile, in addition to the complexity they face in self-detection and seeking medical care.

The strength of this study is that all young women (< 40 years old) had a confirmed histopathologic diagnosis. The limitations are related to the small sample size and the retrospective design. The study was conducted during the time of the global pandemic from 2020 to 2022, in which we became a center for patients with COVID-19, resulting in a reduction in radiology services in other areas, which may contribute to the longer delay between self-detection of clinical signs and seeking medical attention.

CONCLUSION

Our study showed that there is a long delay between self-detection of clinical signs and seeking medical attention in young Mexican women (< 40 years old) with breast cancer. Therefore, no specific US and mammography findings exist for this age group. The imaging behavior of breast masses in young women is a challenge for radiologists. However, in the presence of a clinical abnormality of the breast, a histopathologic examination is always warranted to avoid delaying the diagnosis of breast cancer with a negative impact on prognosis.

Acknowledgments

The authors thank Professor Ana M. Contreras-Navarro for her guidance in preparing and writing this scientific paper. This original research in the Radiology Specialty field was an awarded thesis at the Primera Convocatoria Nacional 2023, "Las Mejores Tesis de Radiología para Publicar en el JMeXFRI."

Funding

This research received no external funding.

Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of individuals. This study complied with the Declaration of Helsinki (1964) and its subsequent amendments.

Confidentiality of data. The authors declare that they followed their center's protocol for sharing patient data.

Right to privacy and informed consent. Informed consent was not required for this observational study of information collected during routine clinical care.

Artificial intelligence. The authors declare that they did not use generative artificial intelligence to prepare this manuscript and/or create tables, figures, or figure legends.

REFERENCES

1. Richards MA, Westcombe AM, Love SB, Littlejohns P, Ramirez AJ. Influence of delay on survival in patients with breast cancer: a systematic review. *Lancet.* 1999;353(9159):1119-1126. doi: 10.1016/s0140-6736(99)02143-1.
2. Ruddy KJ, Gelber S, Tamimi RM, Schapira L, Come SE, Meyer ME, et al. Breast cancer presentation and diagnostic delays in young women. *Cancer.* 2014;120(1):20-25. doi: 10.1002/cncr.28287.
3. Hu X, Myers KS, Oluyemi ET, Philip M, Azizi A, Ambinder EB. Presentation and characteristics of breast cancer in young women under age 40. *Breast Cancer Res Treat.* 2021;186(1):209-217. doi: 10.1007/s10549-020-06000-x.
4. Mainiero MB, Moy L, Baron P, Didwania AD, DiFlorio RM, Green ED, et al. ACR Appropriateness Criteria Breast Cancer Screening. *J Am Coll Radiol.* 2017;14(11S):S383-S390. doi: 10.1016/j.jacr.2017.08.044.
5. Villarreal-Garza C, Aguilera C, Magallanes-Hoyos MC, Mohar A, Bargalló E, Meneses A, et al. Breast cancer in young women in Latin America: an unmet, growing burden. *Oncologist.* 2013;18 Suppl:26-34. doi: 10.1634/theoncologist.18-S2-26.
6. Mendelson EB, Bühm-Vélez M, Berg W A. 2013 BI-RADS. ACR: Ultrasound: ACR BI-RADS Atlas, Standardized Breast Imaging Reporting System. Reston, VA: American College of Radiology.
7. Sickles EA, D'Orsi CJ, Bassett LW. 2013 BI-RADS. ACR: Mammography. In: ACR's BI-RADS Atlas, Standardized System for Reporting Breast Imaging Studies. Reston, VA: American College of Radiology.
8. Hanna TP, King WD, Thibodeau S, Jalink M, Paulin GA, Harvey-Jones E, et al. Mortality due to cancer treatment delay: systematic review and meta-analysis. *BMJ.* 2020; 371: 4087. doi: 10.1136/bmj.m4087.
9. Robles-Castillo J, Ruvalcaba-Limón E, Maffuz A, Rodríguez-Cuevas S. Breast cancer in Mexican women under 40. *Ginecol Obstet Mex.* 2011; 79(8):482-488. Spanish.
10. Perez-Montemayor DF, Orozco-Licona CA. Automated breast ultrasound (ABUS) in asymptomatic young women: an exploratory study. *J Mex Fed Radiol Imaging.* 2022;1(4):259-264. doi: 10.24875/JMEXFRI. M22000032.
11. Terrazas-Torres E, Magaña-Bou LA, Ferman- Corral HE. Prevalencia de Cáncer de Mama en mujeres menores de 40 años en el centro médico ABC. *An Radiol Mex.* 2020;19(2):96-106. doi:10.24875/ARM.20000018.
12. Łukasiewicz S, Czeczelewski M, Forma A, Baj J, Sitarz R, Stanisławek A. Breast Cancer-Epidemiology, Risk Factors, Classification, Prognostic Markers, and Current Treatment Strategies-An Updated Review. *Cancers (Basel).* 2021;13(17):4287. doi: 10.3390/cancers13174287.