CME

Approach to the patient with a palpable breast mass

Toni Jackson, MMS, PA-C; Caroline Carmichael, MMS, PA; Katie Lovett, MMS, PA; Morgan Scott, MMS, PA; Sabrina Shakya, MMS, PA; Megan Sotak, MMS, PA

ABSTRACT

Breast mass is a common finding in patients presenting to primary care, women's health, or urgent care clinics. There are multiple etiologies that can cause a palpable breast mass both benign and malignant. PAs must know how to approach a patient with a palpable breast mass as well as what appropriate diagnostic evaluation is needed.

Keywords: breast mass, breast lump, palpable breast mass, breast imaging, breast examination

Learning objectives

- List the differential diagnoses of a palpable breast mass, including historical and physical examination features.
- Describe the diagnostic evaluation of a patient with a palpable breast mass as well as breast imaging screening recommendations.

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Palpable breast mass is a common abnormality of the breasts. Causes vary; some are physiologically harmless and others are life-altering. Women of reproductive age most commonly have benign breast masses, with incidence peaking between ages 40 and 50 years.[1] In contrast, postmenopausal women more often experience malignancy, with a peak incidence at age 70 years.[1] Breast cancer is the most common cancer among women of all ages, with one out of eight affected in their lifetime.[2] Thus, the possibility of a malignancy should greatly influence evaluation. Adolescents and men, although less likely, also may present with palpable breast masses. Given the range of differential diagnoses, clinicians must approach breast masses using a systematic, evidence-based method.

This article describes differential diagnoses to consider when encountering a patient with a palpable breast mass, and highlights risk factors, clinical features, and prevalence. The article also summarizes an algorithmic diagnostic approach to a patient with breast mass and screening recommendations for breast imaging.

The differential diagnosis for a new breast mass includes benign, malignant, infectious, and traumatic conditions. Primary care providers (PCPs) must understand the various pathologies and differentiating factors as a first step toward evaluating the patient with a breast mass.

BENIGN CONSIDERATIONS

The discovery of a breast mass may create significant anxiety for patients. Clinicians with knowledge of benign breast conditions can provide reassurance to patients and arrange further evaluation as needed.

Fibroadenomas represent 25% of benign breast masses, with peak incidence between ages 15 and 35 years.[1] They develop from fibrotic glandular breast tissue, presenting as smooth, rubbery, and mobile lesions in a unilateral distribution. Fibroadenomas become more prominent just before or during menstruation because of fluctuating hormone levels.[3]

Fibrocystic breast changes affect about 50% of women over age 30 years, with premenopausal women most commonly affected. The fibrotic tissue creates firm, tender, rope-like areas in one or both breasts, which may intensify with menstruation.[3]

Toni Jackson is an assistant professor in the PA program at Wake Forest School of Medicine in Winston-Salem, N.C. At the time this article was written, **Caroline Carmichael, Katie Lovett, Morgan Scott, Sabrina Shakya,** and **Megan Sotak** were students in the PA program at Wake Forest School of Medicine. The authors have disclosed no potential conflicts of interest, financial or otherwise.

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Key points

- Benign breast masses are more common in patients of reproductive age and can be soft, rubbery, mobile, or well circumscribed on palpation.
- Malignant breast masses are more common in older adults, and can be hard, fixed, or irregular on palpation.
- Triple assessment including history and physical examination, radiological imaging, and pathological analysis, if indicated, is the best approach in the management of patients with a palpable breast mass.
- The first-line diagnostic test in the evaluation of breast mass is determined by the patient's age.
- BI-RADS categories should guide further evaluation and follow-up.

Cysts of the breast develop in response to fluid buildup in the terminal duct lobular units. The affected area is smooth, elastic, mobile, and tender to the touch. Cysts may be solitary or multifocal, with palpability and sensitivity fluctuating throughout the menstrual cycle.[3]

Lipomas are benign, mesenchymal soft tissue tumors composed of mature adipose tissue. A patient presents with a palpable, painless, soft, and mobile lump that does not change with menstruation. Breast lipomas usually are asymptomatic and often are discovered incidentally on routine screening mammography.[1]

Galactocele is a collection of fluid resulting from an obstructed milk duct in the lactating breast. A galactocele presents as a soft, nontender mass without associated systemic symptoms. Galactoceles occur most commonly after cessation of breastfeeding.

Gynecomastia is an enlargement of male glandular breast and adipose tissue. Causes include liver failure, chromosomal disorders, paraneoplastic syndrome, and medications, including spironolactone and calcium channel blockers. Both breasts have firm, palpable masses deep to the areola.[4]

MALIGNANT CONSIDERATIONS

Although 95% of abnormal findings on mammography are benign, the consideration of malignancy begs a thorough investigation.[5] Malignant findings are discussed in order of most to least frequent. Differentiating between types of malignant masses through history and physical examination can be challenging. Although any breast mass may merit further workup, important features and patterns may lead a clinician to have a higher suspicion for a malignant cause. History or examination findings of a new mass in a patient of older age; a mass that is firm, nonmobile, or has irregular borders; or a mass associated with skin changes, nipple discharge, or lymph node findings can all be associated with malignancy.[6,7]

Invasive ductal carcinoma, also known as infiltrating ductal carcinoma, is the most common type of breast cancer and accounts for up to 75% of all invasive breast cancers.[8] It begins as atypical cell progression from ductal to surrounding tissue. The cells may spread to lymph nodes and further metastasize to common sites such as bone, brain, and lungs.

Invasive lobular carcinoma begins in the lobules of the breast and extends to the surrounding areas. It accounts for about 15% of all invasive breast cancers.[8] Similar to invasive ductal carcinoma, it can spread to the lymph nodes and metastasize.[7] Invasive lobular carcinoma rarely presents as a distinct mass, making detection by physical examination or mammography difficult.[9]

Ductal carcinoma in situ (DCIS), a noninvasive finding of malignant cells arising from and isolated to the breast ducts, accounts for 20% to 25% of all newly diagnosed breast cancer in the United States.[10] DCIS often is found incidentally on routine mammography. If left untreated, it can evolve into invasive cancer, though appropriate therapeutic intervention is associated with a good prognosis. Long-term survival rate after 10 years with routine follow-up is about 98%.[11]

Lobular carcinoma in situ (LCIS) is localized to the lobules of the breast without spreading into surrounding tissues. LCIS commonly is found incidentally in 2% of all breast biopsies.[12] A diagnosis of LCIS increases a patient's risk for development of invasive breast carcinoma by 9 to 10 times.[12]

Paget disease accounts for 1% to 4% of all breast cancers.[13] This rare form of breast cancer affects the ducts deep to the areola, with potential for spread to the surface affecting the nipple. Most commonly, the skin changes related to Paget disease resemble eczema or psoriasis with a red, itchy, scaly rash. However, it can be distinguished from those two skin conditions because it typically presents unilaterally and on the nipple, rather than bilaterally and affecting the areola. Paget disease frequently coincides with another underlying breast malignancy, most commonly DCIS or invasive carcinoma, and presence of these negatively affect the patient's prognosis.[14]

Inflammatory breast cancer is a rare, aggressive form of malignancy that accounts for 1% to 5% of breast cancers in the United States.[15] Presenting manifestations often include erythema, pruritus, warmth, and swelling of superficial breast tissue rather than a palpable mass. These skin changes may cause an appearance reminiscent of an orange peel (*peau d'orange*). It demonstrates rapid metastatic behavior and on first clinical presentation, nearly 100% of patients have axillary node involvement and one-third of patients present with metastases to lung, liver, or bone. The average 5-year survival rate is 40.5%.[16]

Malignancy in men most often affects the nipple and subareolar area. Of all breast cancer cases, only 0.5% to 1% occur in men.[4] Invasive ductal carcinoma accounts for 90%, with the remaining 10% of malignancies in men being carcinoma in situ.[17] Once found, breast cancer in

men is associated with an advanced stage of disease that could account for the lower survival rates seen in men of all races and ethnicities.[17,18] However, a disparity is noted in Black men, who are more likely to be diagnosed at a later stage than Hispanic or non-Hispanic White men.[18] Clinicians must be diligent to consider a patient's risk for this malignancy, particularly in patients with a family history of BRCA mutations.[18]

INFECTIOUS CONSIDERATIONS

Mastitis is a painful infection of breast tissue most commonly caused by *Staphylococcus aureus*, *Streptococcus* species, *Pseudomonas aeruginosa*, or *Escherichia coli*.[3] Mastitis usually presents as a single lesion on one breast with associated erythema, tenderness, and induration. The features of mastitis can also be seen in inflammatory breast cancer, making differentiating factors important to know during evaluation. Patients with mastitis often are lactating and present with a rapid progression of associated symptoms such as fever and malaise; symptoms frequently are absent in inflammatory breast cancer.[3,7] Presence of adenopathy and progression of symptoms over a few weeks is more often associated with inflammatory breast cancer. Mastitis may develop into a breast abscess, which is characterized by fluctuance and worsening pain.

TRAUMATIC CONSIDERATIONS

Fat necrosis occurs when scar tissue replaces oxygen-depleted adipose tissue, forming a round, possibly tender mass that has associated darkening or bruising of the affected area. Patients may experience fat necrosis after surgery, trauma, biopsy, or radiation of the breast.[19]

EVALUATION

Evidence shows that a triple assessment technique when evaluating a breast mass may yield up to a 100% positive predictive value in the diagnosis of benign versus malignant findings.[20] The triple assessment technique consists of the clinical assessment, radiologic imaging, and pathologic analysis if indicated. Using all three elements yields a cost-effective, yet least-invasive assurance for clinicians working up a suspicious but inevitably benign mass, with a clear path to move forward for malignant masses.

A breast mass may be found by a clinician or a patient while performing a clinical breast examination (CBE) or self-breast examination (SBE). A proper evaluation of a patient with a breast mass includes eliciting key historical features and performing specific physical examination maneuvers to aid the clinician in narrowing the differentials.

History A thorough history of the patient presenting with a breast mass is an important factor in early detection and proper workup. Obtain the following information:

- **Character—**presence or absence of pain, location and laterality, texture (hard, rubbery)
- **Timing and progression—**acute, chronic, fluctuating (independent of or dependent on menses)
- **Associated symptoms—**nipple discharge, nipple or breast skin changes, systemic symptoms (fever, chills, weight loss), lymph node enlargement.

Because certain phases of menstruation may affect the presentation of a breast mass, ask patients for their last menstrual period date. Other important history to obtain includes reproductive history, breastfeeding, and previous history of similar symptoms.

Risk factors When obtaining a patient history, assess for risk factors that identify patients at higher risk of cancer development and can help in determining appropriate surveillance. One important risk factor to investigate is a history of prolonged estrogen exposure, which can occur with early age at menarche, nulliparity, late menopause, or a high body mass index. Hormone replacement therapy, which may be used by women in menopause or by transgender women, also prolongs estrogen exposure. Other risk factors include older age, smoking and alcohol use, past exposure to ionizing chest radiation, Ashkenazi Jewish ethnicity, personal history of malignancy or dense breast tissue, and familial history of breast, ovarian, prostatic, or pancreatic cancer.[2] Black patients have lower survival rates than Hispanic and non-Hispanic White patients and are at a higher risk for some more aggressive subtypes of breast malignancies.[6,21,22]

The Breast Cancer Risk Assessment Tool (BCRAT) is a simple and useful tool for clinicians based on the Gail Model that calculates a patient's 5-year and lifetime risk of developing breast cancer.[23] BCRAT is based on several factors, including age, menarche, race and ethnicity, family history, age at first live birth, and previous breast biopsies.[23] This tool does not take into consideration breast density, previous history of breast cancer, or BRCA mutation status, and thus its accuracy is limited in these populations.[24] Regular physical activity, a diet high in fruits and vegetables and low in alcohol, and breastfeeding are all lifestyle modifications that can reduce breast cancer risk.[25]

CBE The guidelines for offering and performing a CBE differ among the governing bodies. The National Comprehensive Cancer Network and the American College of Obstetricians and Gynecologists both recommend offering a CBE every 1 to 3 years for average-risk women ages 25 to 39 years and annually for those age 40 years and older.[2,26] This differs from US Preventive Services Task Force guidelines, which make no recommendation for or against CBE, and the American Cancer Society, which does not recommend performing a CBE at all because of evidence that CBE does not improve identification of breast cancer and can increase the rate of false-positive evaluations.[27,28]

When approaching a CBE, clinicians should be sensitive to gender identity and/or sexual trauma that may affect patient comfort. Other considerations include introducing chaperones before the examination and being aware of

sensitive language used during the examination. Next, a clinician may ensure patient privacy with a gown and/or drape, exposing areas only as necessary when moving through the physical examination. Provide a clear explanation of the planned examination and ask for patient oral consent. Patients may or may not want the clinician to explain techniques as they are performed.[29]

The physical examination itself is a vital part of the workup of a breast mass and should include inspection and palpation. Begin the examination with a thorough visual inspection of each breast with the patient in various positions, ensuring that all aspects of the breasts are viewed. Start with the patient sitting and breasts in a neutral, relaxed position, followed by inspection with the patient's hands above the head, then hands at the hips with flexion of the pectoral muscles. Finally, the patient should be assisted by the clinician to safely lean forward for observation of symmetrical and appropriate fall of the breasts.

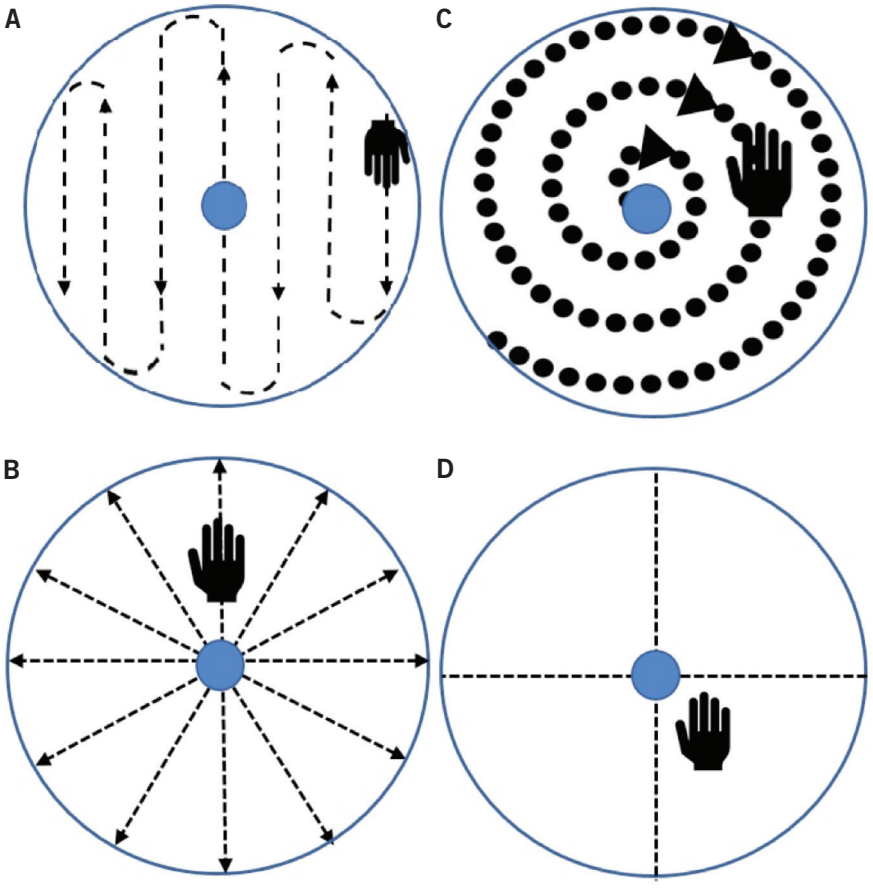

FIGURE 1. Patterns of palpation for clinical breast examination: vertical strip (A), clock dial (B), concentric circles (C), and quadrant method (D)

If a breast mass was noted before the visit, ask the patient to identify its location and begin the examination on the contralateral, unaffected breast first. Following a thorough inspection, place the patient supine and palpate the breasts using the pads of the second, third, and fourth digits, and palpating in a circular manner to apply light, moderate, and deep pressure. For palpation of the medial aspect of the breast, ask the patient to rest the ipsilateral hand at the level of the shoulder. To flatten the lateral aspect of the breast tissue for enhanced palpation, ask patients to shift their weight onto the contralateral hip, keeping the shoulders flat against the examination table and the hand resting on the forehead.

Multiple patterns can be used to thoroughly palpate the entirety of the breast tissue including vertical strip, dial of a clock, concentric circles, and quadrant methods (**Figure 1**). To ensure that no breast tissue is missed during palpation, follow a systematic search pattern, use sweeping motions, and avoid removing the fingerpads from the breast.[30] Although no gold standard exists for the pattern of palpation, one recent cross-sectional study identified the dial of a clock pattern of palpation as the pattern with the highest sensitivity in the detection of a palpable breast mass.[31] Patients with large or pendulous breasts may require a manual mammogram, in which the clinician flattens the breast between their own hands to palpate for abnormalities.

Once a palpable breast mass is identified, documentation should include location with respect to the nipple in a clockwise fashion, size, shape, texture, and mobility of the mass. Perform nipple palpation to assess for the presence of discharge. Clavicular and axillary lymph node palpation also is indicated in a patient with a breast mass, because enlargement in these nodal groups in a patient with breast mass is highly suspicious of infectious or neoplastic causes.

DIAGNOSTIC STUDIES

If a breast mass is found on physical examination, further diagnostics are warranted to better identify the nature of the mass. National guidelines specify which imaging modality is most appropriate for evaluation of a newly identified breast mass, based on patient age. Techniques include breast ultrasound, mammography, and digital breast tomosynthesis (DBT). Breast MRI is not recommended in the initial diagnostic evaluation of a patient with a palpable breast mass.[32,33]

Ultrasonography For patients under age 30 years, diagnostic ultrasonography is the first-line testing.[32,33] Breast ultrasound has no contraindications and has high sensitivity for patients with a palpable lump, aiding in differenti-

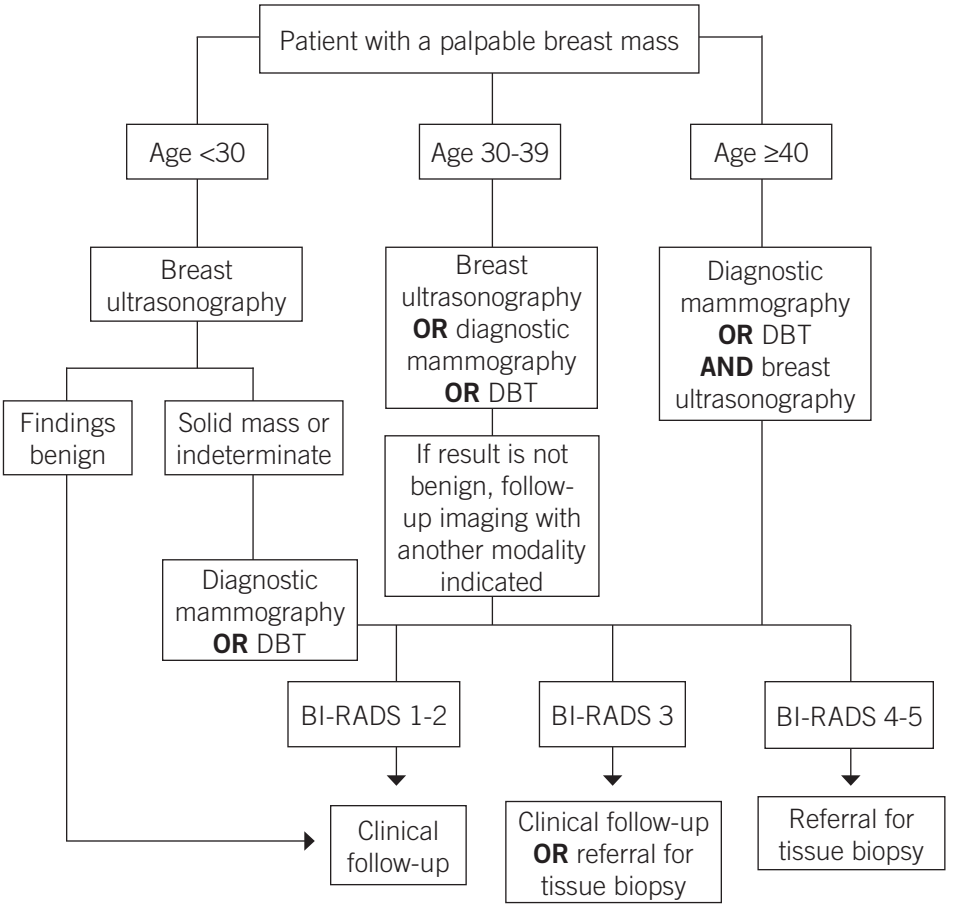

FIGURE 2. Diagnostic approach of palpable breast mass[32,33]

ating cysts from solid masses. A breast ultrasound that does not yield clear benign findings warrants further evaluation with diagnostic mammography or DBT.[33]

Diagnostic mammography and DBT Diagnostic mammography or DBT can be used as the first-line diagnostic modality for patients over age 40 years with a palpable breast mass and are considered equally efficacious in these patients. In patients with a palpable breast mass, breast ultrasonography typically is used in conjunction with either of these modalities due to the higher incidence of malignancy in this age group. Women ages 30 to 39 years can be evaluated first with breast ultrasonography, diagnostic mammography, or DBT.[32,33] Depending on the initial diagnostic evaluation chosen for patients in this age group, if the result is not clearly benign, obtain a follow-up imaging of another modality.[33] For example, if mammography or DBT is performed and the findings are not benign, an ultrasound is indicated.

BI-RADS Diagnostic breast imaging findings are classified by a standardized reporting system known as the Breast Imaging-Reporting and Data System (BI-RADS). BI-RADS categorizes radiologic findings into universally understood descriptions that guide further evaluation or surveillance. The categories were created after the American College of Radiology performed analytical research and determined that certain descriptions correlated with high predictive values of malignant or benign disease.[32] BI-RADS enables clinicians to understand radiology interpretations and subsequently assess patient risk. There are seven categories, from 0 (incomplete study, inconclusive) to 6 (biopsy-proven malignancy).[32]

Tissue biopsy In the event that the diagnostic result of a palpable breast mass is concerning or indeterminate, tissue biopsy is recommended. Consider biopsy in patients with new masses or those increasing in size even with benign features (BI-RADS 3), depending on the clinical situation.[33] Tissue biopsy is required if suspicious for malignancy (BI-RADS 4 and 5).[32] Core biopsy with image guidance is the recommended method for tissue biopsy and most commonly is performed by an interventional radiologist.[34] A diagnostic approach to a patient with a palpable breast mass is summarized in **Figure 2**.

CLINICAL FOLLOW-UP AND REFERRAL

Clinical follow-up is indicated for patients with benign breast conditions to ensure symptom resolution or to monitor for changes of the mass on CBE. Mastitis and breast abscess may require ultrasonography if they do not respond to treatment.[3] For masses classified as BI-RADS 1 and 2 on diagnostic imaging, routine breast cancer screening should be resumed.[32]

Some patients with a palpable breast mass may require referral. For example, those whose masses are benign based on diagnostic evaluation, but painful or cosmetically displeasing, should be referred for surgical excision. Patients with malignant breast masses require referral to surgery for removal, oncology for chemotherapy and/or radiation, and possibly genetic counseling to assist in determining targeted therapy. Following referral, PCPs must remain involved in ensuring that patients receive routine health maintenance and resources for emotional support as needed.

TABLE 1. Summary of recommendations for breast cancer screening in average-risk women[2, 26-28]

	ACOG	USPSTF	ACS	NCCN
When to perform a clinical breast examination	• Offer every 1-3 years for ages 25-39 years • Perform annually for ages 40 years and above	No recommendation to perform or not perform	Do not perform	• Offer every 1-3 years for ages 25-39 years • Perform annually for ages 40 years and above
When to offer and/or initiate mammography	• Offer for ages 40-49 years • Initiate by age 50 years at the latest	• Offer for ages 40-49 • Initiate at age 50 years	• Offer for ages 40-45 years • Initiate at age 45 years	• Initiate at age 40 years
Frequency of screening mammography	Annual or biennial	Biennial	• Annual for ages 40-54 years • Biennial or annual for ages 55 years and older	Annual
When to end mammography	• Age 75 years • May use shared decision-making based on health status to continue beyond age 75 years	No sufficient evidence for ages 75 years and older	Time at which life expectancy is less than 10 years	Time at which life expectancy is less than 10 years

PREVENTION AND SCREENING

The major guideline groups differ in their recommendations for breast cancer screening (**Table 1**). The American College of Obstetricians and Gynecologists emphasizes the importance of shared decision-making between clinicians and patients when choosing which screening approach to follow, ensuring patient preference is taken into consideration.[2] Although the guidelines vary, the concept of breast self-awareness is emphasized universally. Unlike BSE, breast self-awareness does not involve systematic and routine self-examination. Instead, it promotes the awareness of one's personal normal breast anatomy to increase the likelihood of noticing changes. About 50% of cases of breast cancer in women age 50 years or older and 71% of cases in women age 50 years or younger are detected by patients themselves.[2] Therefore, PCPs should educate patients to alert their healthcare providers of changes in their breast tissue to ensure timely diagnosis and treatment.

CONCLUSION

Breast masses, although often benign, can be concerning to both patients and clinicians. Knowledge of differential diagnoses and a thorough physical examination with diagnostic evaluation are imperative for ensuring better patient outcomes. PCPs should be empowered to assess a palpable breast mass, partake in shared decision-making, and provide ongoing support to patients. **JAAPA**

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