

Introduction

Breast cancer is one of the leading causes of death for women in many countries ⁽¹⁾.

The role of US in breast imaging has evolved over years, the operating characteristics of US including sensitivity and specificity are very helpful in: differentiating cystic from solid lesions, detection of occult lesions in dense breast, and also distinguishing breast cancer from benign breast lesions⁽²⁾. US should be considered the modality of choice to initiate the evaluation of palpable mass in women younger than 35 years ⁽³⁾.

Breast sonography is appropriate in the adjunctive evaluation of mammographic masses, persistent focal asymmetric densities, and palpable abnormalities not seen mammographically ⁽⁴⁾.

Most carcinomas smaller than 1 cm in diameter can be identified and analyzed with respect to sonographic features using modern high resolution linear array real time transducers, a further indication of breast US is the diagnostic workup of impalpable masses manifesting as intermediate densities on mammography ⁽⁵⁾.

Sonography is a diagnostic method that can help establish the differentiation between benign and malignant solid tumours: a lack of circumscribed margins, heterogenous echo patterns, thickened cooper's ligaments and increased A-P dimension can indicate a higher probability of malignancy in solid breast nodules ⁽⁶⁾.

Sonographically, masses were classified as likely benign based on: well circumscribed margins, gentle lobulations, wider than tall dimensions, and lack of any malignant features ⁽⁷⁾.

US also has an important interventional role in the following diagnostic and therapeutic procedures: simple cyst aspiration (therapeutic), complex cyst aspiration (diagnostic), abscess aspiration, fine needle aspiration cytology (FNAC), core biopsy / wide bore needle biopsy, preoperative localization of non – palpable lesions ⁽⁸⁾.

Sonographic image quality has been improved dramatically because of advances in technology such as use of all digital – high frequency transducers of up to 13 MHZ ⁽⁹⁾.

The 2000-2001 ACR (American College of Radiology) standard for the performance of breast US examination suggest transducer frequencies of 7 MHZ or higher, current transducers frequencies are typically 10 MHZ or higher ⁽¹⁰⁾.

Technical advances in the field have made breast sonography an essential component of the breast imaging evaluation. Technical advances such as compound imaging and harmonics have resulted in improved lesion characterization, other technical advances as Doppler imaging, extended field of view, fremitus imaging, I.V contrast, computer aided diagnosis and elastography have also expanded the clinical applications of breast US, while some of these technical advances are still in the research phase, many are available today for clinical use ⁽¹¹⁾.

In addition, three dimensional US has the capacity to demonstrate lesion margins and topography, thereby helping differentiate benign from malignant masses. 3 –D US can also help determine the need for biopsy and help facilitate needle localization and guidance during biopsy ⁽¹²⁾.

Combining mammography with US has produced higher diagnostic accuracy, now it is well accepted in many centers to combine the results of both mammography and ultrasound, and the report should include the findings revealed by both modalities ⁽¹³⁾.

Neovascularization, a characteristic of malignancies, can be detected with Doppler US and has been used in the diagnosis and management of breast carcinomas, furthermore, injection of micro bubble agent before color Doppler imaging enables accurate differentiation of benign masses from carcinomas ⁽¹⁴⁾.

While not highly specific, color Doppler has different patterns for benign and malignant solid masses. Malignant masses typically have feeding vessels and, most important, prominent internal vascularity.

High resolution color Doppler US frequently demonstrates these feeding vessels surrounding a malignancy ⁽¹⁰⁾.

The great value of color Doppler US appears in the following situations:

Galactoceles, fat necrosis, inflammation, sebaceous cyst, fibrocystic changes, adenomas & breast carcinomas ⁽¹⁵⁾.