https://doi.org/10.31871/IJNTR.10.3.3
International Journal of New Technology and Research (IJNTR)
ISSN: 2454-4116, Volume-10, Issue-3, March 2024 Pages 01-05

The Procedural Role of The Mammography and Ultrasound in Breast Lesion Examination Among Libyan Women: (A Comparison Study)

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Abstract— **The detection of a breast mass is common in many women; however, most of found breast lesions are benign or non-cancerous in nature. The term high-risk breast lesion is given to a breast lesion that carries an increased risk for the future development of breast cancer or carries suspicion. Rapid and accurate diagnosis and characterization of breast cancer plays a vital role in treatment planning and improved prognosis.**

The most used medical diagnosis and screening techniques are breast magnetic resonance imaging MRI, X-ray mammography (MG), and ultrasound (US). However, there is no study found in Libya comparing the accuracy of X-ray mammography (MG) and ultrasound (US) in the early detection of breast cancer.

Therefore, the current study to compare the accuracy of (MG) and (US) screening methods in the early detection diagnosis of breast diseases among Libyan women.

The results of the present study indicated that the US was better than MG in the preoperative evaluation of breast diseases especially for women above the age of 40 years with dense breasts. Our Conclusion suggests that ultrasound (US) screening for breast lesions is important, and it has an important role in early detection of breast cancer and other breast lesions.

Index Terms— **Breast lesions, Breast cancer, Mammography, Ultrasound.**

I. Introduction

There are numerous common breast injuries that women commonly have at a few points in their lives. Increasing awareness of breast cancer being the most common cancer in ladies worldwide [1] with a high mortality rate is the reason for the expanding number of patients detailing to breast care clinics for any breast-related side effects. [1] Sometimes these different injuries deliver indications comparable to breast cancer. Protuberance, areola release, or sore -tenderness or torment within the breast are common displaying complaints.

These side effects can cause starting uneasiness approximately potential breast cancer. Ladies with age, hereditary components, and family history of breast cancer, thick breast cancer, past chest radiation, and expanded introduction to female hormones have a tall chance of cancer breast.

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Within the Joined together States, an evaluated 252,710 modern cases of obtrusive breast cancer will have been Analyzed in 2017 and 40,610 ladies will have passed on their infection. Breast cancer is the moment driving cause of cancer passing in ladies. [2] It is well built up that early discovery diminishes breast cancer passing. [3] Gauges show about 40% of breast cancer mortality lessening when screening ladies every year beginning at age 40. [4]

In arrange to decide the injuries of the breast; the quiet is inquired to require pictures with specialized gadgets to identify any variations from the norm and determine the sort.

The foremost imperative modalities utilized within the work of this strategy are the mammogram and sonography machine known as Sonography. The History of mammography started in 1913; when a Berliner specialist, A. Salomon realized a roentgen-histological ponder on 3,000 mastectomies. This work is the premise of mammography. From 1947 to 1970, the moment period brought the comes about of roentgen rationale and clinical relationship. Since 1951, many American and European radiologists brought their commitments. Ch. Gros is the finest known. He gave this procedure an affirmation all through the world for the determination of breast maladies. Since 1970, the third period has emphasized the esteem of mammography as a procedure for the location of breast cancer. It took the surgery community more than half a century to acknowledge mammography. From the '60s on, French, Swedish, and North American Radiologists made mammography a well-established method and the radiological industry created a devoted device with an uncommon anode expanding differentiate and bringing down radiation measurements to the breast. There's a ponder that appeared mammography for the discovery of breast cancer is 85%; in any case, in ladies with thick breast tissue, the affectability of mammography is decreased to 47.8–64.4%. [5]

The esteem of ultrasound for breast cancer determination has been a disputable theme for numerous a long times. Depending on hardware benchmarks, clinical destinations, and abilities of restorative experts with diverse specializations, the translation of its part is variable. A few considers have detailed that the primary test ultrasound examinations of the breast begun 60 a long time back, and it took around 30 a long time until innovative advancement and acknowledgment by clinicians made it valuable for clinical routine conclusion. [6] Within the early ponders, initially a military methodology utilized to distinguish metal blemishes, the innovation of high-frequency ultrasound was discharged for common utilize after World War II. In 1951, Wild and Neal portrayed the acoustic characteristics of 2

breast tumors, 1 generous and 1malignant, within the intaglio, in vivo breast.

Employing a exceptionally simple high-frequency (15-MHz) framework creating an A-mode sonogram, 3 diverse acoustic marks were portrayed on the premise of the measured acoustic impedance for typical breast tissue for generous tumors, and for dangerous tumors. In 1952, Wild and Reid distributed, the comes about of ultrasound examinations in 21 breast tumors, 9 generous and 12 harmful. Two of those cases got to be the exceptionally to begin with 2 dimensional echograms of breast tissue ever published. The taking after year, Howry et al distributed 2-dimensional pictures of in vitro breast tumors employing a lower-frequency beat reverberate scanner with focusing components inside it planned to diminish pillar width. Both of these alterations created pictures of superior symptomatic quality. The primary clinical application of breast ultrasound was detailed in 1954 by Wild and Reid. The early inquire about in sonographic breast imaging did not; consider that this methodology could be utilized as a screening apparatus. It was very the inverse. Wild and Reid expressed, " The examination was not arranged to identify tumors and was not fundamentally aiming to supplant existing strategies of conclusion of breast injuries. " The center was, be that as it may, clearly on the objective of recognizing between generous and harmful breast injuries, and the comes about were strikingly precise in this respect. [6]

For the purposes of this article, Review the principles of technical practices to assess and identify the appropriate performance of breast imaging and ultrasound, and compare the results for each examination.

II. MATERIALS AND METHODS

A. Participants

In this cross-sectional think about, 4 cases of female patients with breast injuries were selected. Their ages extended between 40 and 60 years. Each member experienced mammographic and ultrasonographic screening examinations. They consider was conducted in Tripoli city within the radiological department at Tripoli Medical Center, from 13th February – 13th March 2022.

B. Mammographic technique

The mammographic machine used in this study was the General Electric digital mammographic unit. The mammogram was done by digital image receptor, and both Cranio-Caudal (CC) and Mediolateral Oblique (MLO) projections with compression were obtained. The factors used were fixed: (standard) KV and (auto) mAs. The main Mammography views used in the results are (MLO) and (CC).

MLO "standard" the XR beam is directed from supero medial to infero lateral (usually at 30-60), compression is applied obliquely across the chest wall and perpendicular to the long axis pectoralis major, MLO the only view demonstrating the Entire breast tissue on single image, (well positioned) if the inframammary angle is demonstrated the nipple is positioned at the level of the lower border of the pectoralis muscle across the posterior border of the film at 25-30 to the vertical.

CC view "standard" the XR beam travels from superior to inferior. The breast is pulled forward and away from the chest wall with compression applied from above (well positioned) if the nipple is in profile; it demonstrates virtually all of the medial tissue and the majority of the lateral tissue.

(Paddle views)"supplementary" localized compression applied with a compression paddle and distinguishes a real lesion from the superimposition of normal tissues it defines the margin of the mass.

(Lateral view "supplementary") The mammography unit is turned through 90 and the mediolateral or Lateromedial XR beam is used, it distinguishes the superimposition of normal structures from real lesions.

Magnification views - performed in the (CC) and lateral projections – interrogate areas of macro calcification and can demonstrate "teacups "with benign calcification.

Eklund technique for use with sub pectoral breast implants (displacement of the implant posteriorly).

Axillary tail view (Cleopatra view) this view allows imaging of the Axillary tail of the breast. It resembles the mediolateral view but allows the evaluation of breast tissue more laterally oriented.

Cleavage valley view: modified CC view that improves visualization of the area between breasts. Both breasts are positioned on the detector.

Tangential view: performed to demonstrate the dermal location of the lesion

Rolled views: (roll breast laterally) superior lesion moves laterally.

C. Ultrasound examination

X-ray mammograms are habitually taken after up with ultrasound imaging to decide whether an injury that showed up on a mammogram may be a sore or a strong mass. The foremost common procedure is to at the first filter utilizing the framework filtering design, followed by a spiral (clock confront) procedure for difficult duplicate imaging. Breast ultrasound ought to be performed with a high-resolution, real-time, linear-array, broad-bandwidth transducer working at a center recurrence of 7.5 MHz at the slightest 12 MHz and ideally higher. Other transducers may be utilized in uncommon circumstances. Central zones ought to be electronically movable. In common, the most elevated recurrence competent of satisfactory infiltration to the profundity of intrigued ought to be utilized. For assessing shallow injuries, filtering through a lean standoff gadget or a thick layer of gel may be supportive in offsetting the transducer confront from the highest layer of skin to bring it into the central zone of the transducer.

III. RESULTS & DISCUSSION

This study is done to compare the technique role of mammography and ultrasound in the diagnosis of breast lesions and screening methods for early detection of breast cancer.

Case 1: A woman aged 44y with complaints (nipple discharge), the mammography and ultrasound technical were done in (Tripoli Medical Center), A is mammography imaging the position was (MLO), because of fatty breast the

result was no abnormality could be detected. B is ultrasound imaging position laterally and done of the patient diagnosed as fatty change (small lipoma) shown in Fig. 1. (A & B).

Fig1A. Breast Mammography imaging, (MLO) position.

Fig1B. Breast Ultrasound imaging laterally position.

Case:**2** A women 60y, follow up right breast after mastectomy left breast .**A&B** are mammography imaging done in MTC, (**A**. LMO &**B.**CC) position show lobulated mass in dense breast. **C is** Breast U/S is recommended shows lobulated large heterogenous mass suspicious breast cancer presents Fig, 2(A, B&C).

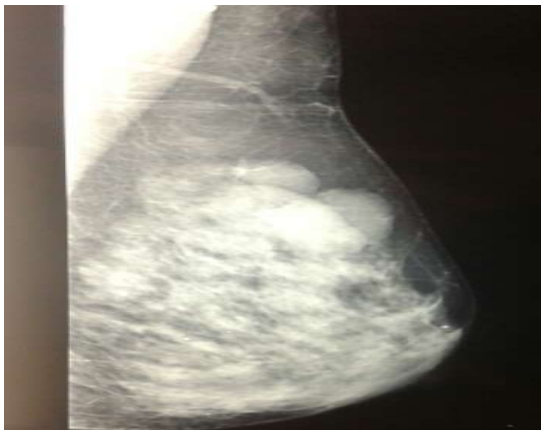

Fig 2A. Breast Mammography imaging, LMO position.

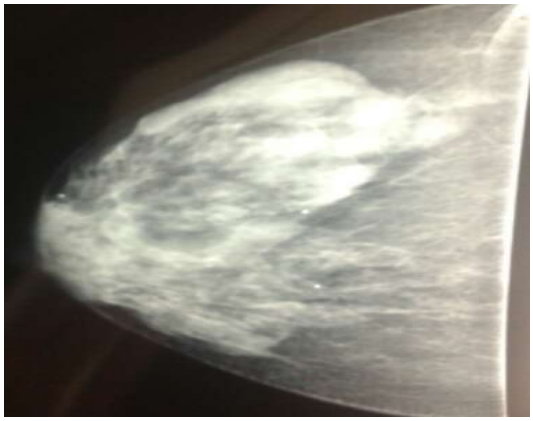

Fig 2B. Breast Mammography imaging CC position.

Fig 2C. Breast Ultrasound imaging

Case 3: A woman aged 60y, complained of breast pain, Imaging A. mammography showed a fatty breast with multiple well-defined small shape lesions, diagnosed as a case of fatty necrosis, and imaging B. ultrasound recommended as showing ill-defined right (distortion), Fig 3 (A&B).

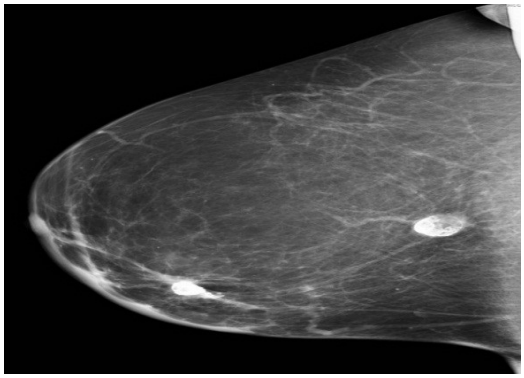

Fig 3 A. Breast Mammography imaging

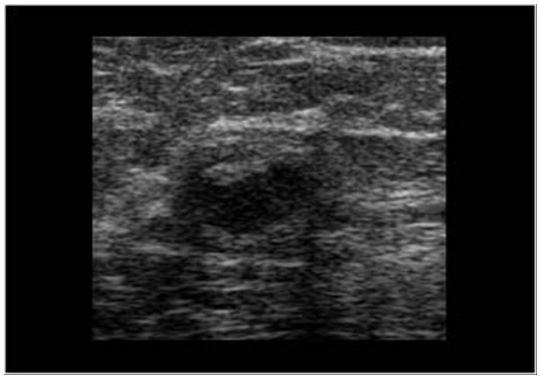

Fig 3B. Breast Ultrasound imaging

Case 4: A woman 48y diagnosed with Ca breast & mastectomy and she implanted the breast imaging A Breast Ultrasound was done and showed the normal appearance of a fold in an implant with a normal physiological amount of capsular free flui. B. mammogram below shows the typical appearance of the fold. Fig 4 (A&B).

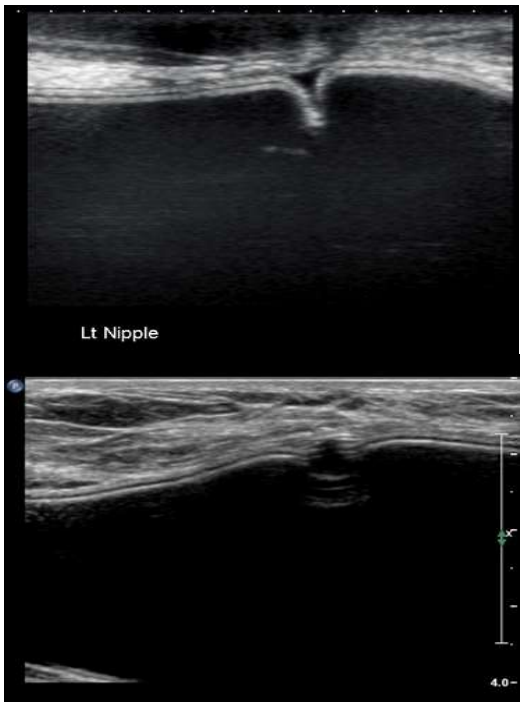

Fig 4A. Breast Ultrasound imaging

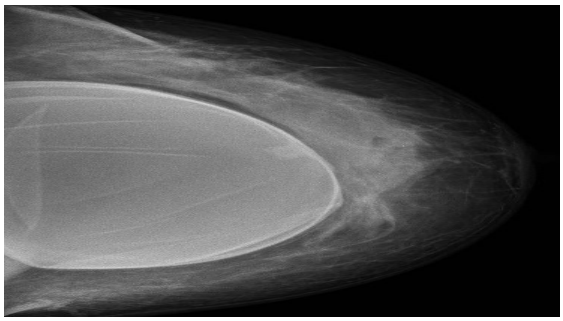

Fig 4B. Breast Mammography imaging

According to what we see in these cases, the sensitivity of mammography for detecting any abnormality will depend upon:

1. Nature of the breast lesion.
2. The radiographic density and overall nodularity of the breast tissue.
3. The location of the abnormality within the breast .
4. The technical quality of the mammograms.

The most common problem occurs when a potential lesion is seen in one projection and not seen in the other view. This often means that the observation is the result of a benign superimposition of typical structures that have formed a summation shadow.

The first question to be asked is, “Is it real?” and the following question is “Where is it?” Additional evaluation should begin by determining whether the finding is a true abnormality.

Numerous studies have proven lesions that are very high on the chest wall very deep within the breast or very far medial may be difficult to image on standard projections and may require special views for imaging. It is imperative therefore that the radiologist and radiographer know the location of the area of concern and are able to include it on the mammograms. [7]

Ultrasound is not advocated as a screening tool because the Ultrasound examination images only a small area of breast tissue at a time, Mass lesions are difficult to identify in fatty-replaced breasts, and Microcalcifications are not reliably imaged.

There may be a role for ultrasound in the screening evaluation of high-risk women with dense breast tissue, but this has not yet been proven. However, incidental and equivocal findings are detected at a high rate with ultrasound screening. This can increase the requirement for further investigations, including non-excision biopsies. [8]

The Combined use of mammography and ultrasound is given the limitations of both mammography and ultrasound; they are often used in conjunction to give complementary information in the evaluation of breast abnormalities. It is particularly important to note that false negative diagnoses can occur with both techniques. Mammography and /or ultrasound will assist in identifying whether there is more than one abnormality in the breast. Imaging will show the margins of the breast mass and whether any malignant or benign radiological features or other impalpable changes are confined to, or extend beyond the mass lesion. The imaging may also indicate other areas that investigation. As noted above, the patient is also referred to an ultrasound device because it is safe and does not cause the patient more fatigue. [8]

The data collected from many types of research show improved differential diagnosis of breast lesions by ultrasound in addition to mammography. The sensitivity for cancer diagnosis increases by 10–20% with ultrasound in comparison to mammography alone. On the other hand, the specificity is more variable. In several studies, data analysis was stratified by age and showed an inverse correlation between age and accuracy of ultrasound vs. mammography. [9]

Our study showed that the sensitivity of mammography for detecting the abnormality depended on the Nature of the

breast lesion, radiographic density and overall modularity of the breast tissue, location of the abnormality within the breast, and technical quality of the mammograms. Also, our study showed that ultrasound does better than mammography for node-negative invasive cancer based on the limited sensitivity of ultrasound relating to the detection of small and in-situ carcinoma.

Routine imaging of the chest wall after total mastectomy is not required, but both mammography and ultrasound may be appropriate if local recurrence is suspected clinically, mammography may not be feasible in the absence of adequate skin laxity on the chest wall.

The mammographic features of breast recurrence are often similar to the features identified on the original pre-treatment mammogram, and this can be a helpful clue to recurrence, progress mammograms with or without ultrasound should always be correlated with pre-treatment imaging studies.

IV. Conclusion

As with mammography, the ability to detect an abnormality with ultrasound depends on the quality of the equipment, the skill of the operator, the nature of the abnormality, the type of breast tissue, and the clinician's interpretive skill. High image contrast and spatial resolution are critical for optimal ultrasound diagnosis. The ultrasound equipment must have good near-field resolution with a high-megahertz transducer and pre- and post-processing that optimizes breast tissue image characteristics. Despite the differences in techniques, method of examination, and patient status during the examination, it may be possible to produce an equal image in terms of clarity in the identification of the lesion that appears for both the Mammo and ultrasound as an oil cyst lesion. But mammography can detect localization better than u/s.

V. Recommendation

Mammography is the primary breast imaging modality for the investigation of symptomatic women 35 years and over, for the follow-up of women with a previous diagnosis of breast cancer, and for the screening of symptomatic women aged 50 to 90 years. U/S is the most common complement to mammography and may be the primary and only imaging modality used for the investigation of breast symptoms in women less than 35 y and in women who are pregnant or lactating.

VI. Conclusion

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

Acknowledgment

All authors contributed to the manuscript

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