

Research Article

Comparison of Clinical Findings with Ultrasonography of Various Breast Disorders in a Tertiary Care Hospital

Asma Bibi¹, Iftikhar Ahmed², Bashir Ur Rahman³, Saira Mahmood⁴, Ahsan Nayyar⁵, Syed Hasham Ahmad⁶

¹Associate Professor General Surgery, HBS Medical and Dental College and Islamabad, Pakistan

²Professor of Surgery, Rawal Institute of Health Sciences, Islamabad, Pakistan

³Assistant Professor Pediatric Surgery, Rawal Institute of Health Sciences, Islamabad, Pakistan

⁴Assistant Professor, Rawal Institute of Health Sciences, Islamabad, Pakistan

⁵Senior Registrar Surgery, HBS Medical and Dental College, HBS General Hospital, Islamabad, Pakistan

⁶Senior Registrar General Surgery, HBS Medical and Dental College, Islamabad, Pakistan

Corresponding Author: Iftikhar Ahmed, Professor of Surgery, Rawal Institute of Health Sciences, Islamabad, Pakistan, Email: driftikhar29@gmail.com

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ABSTRACT

Background: Breast Ultrasound has improved over a period of time and there are more detailed ultrasound features with advanced technology. This is helping in detecting and differentiating various malignant from benign disorders. Both mammogram and ultrasound have their own benefits and limitations.

Objective: To compare clinical diagnosis of various breast disorders presenting in our hospital with the diagnosis of ultrasound.

Method: This Cross Sectional study is conducted in department of General Surgery HBS Hospital from 1st May 2022 to 31st May 2024. All female patients presenting to surgical OPD and indoor for different breast diseases with no age limitation were included in the study. After history and clinical examination ultrasound of breast was done. Patients without ultrasound report were excluded. Clinical data of the patients with ultrasound findings and specimen reports were recorded and submitted for analysis. A total of 225 patients were studied.

Conclusion: Ultrasound can pick the lesions with accuracy and it can be easily available diagnostic modality whereas mammogram is expansive investigation and is found in a few setups not accessible to all patients. Mammogram use should be limited to those 40 and above as a screening tool and in high risk groups at 35 above or where doubtful ultrasound findings.

Keywords: Breast Lump, Ultrasound breast, Carcinoma Breast, Fibroadenoma Breast

INTRODUCTION

Breast has varied changes during reproductive years of female. Cancer of breast is one in nine patients in Asian countries among female population. The lumps in breast are mostly painless and ignored by the patients. Other patients present with pain in breast, nipple discharge, fever and pus ooze. Ultrasound breast is one of easily available and accessible facility to diagnose various lumps in breast and other pathologies. It has a high sensitivity for picking up lumps in younger women of 35-40 and below [1].

On ultrasound the lumps appear to be irregular shaped having speculated margins seen more frequently associated with invasive duct carcinoma than DCIS [4]. Breast Cysts are divided into simple, complicated and complex cysts. However abscesses may arise from infection of the sub areolar ducts. When there is a focal chemical mastitis caused by rupture of ducts or cysts it is known as ductal ectasia,

which affects peri-menopausal women. Fibroadenomas are benign solid tumors [5].

Mammogram is a facility to screen patients above 35 and is available in a few setups in our suburbs [7]. The lesions on mammograms appear to be hypoechoic and irregular with speculated margins for malignant lumps and ultrasound has increased vascularity [9].

Breast ultrasonography is widely accepted as an adjunct to mammography in the diagnosis and management of breast masses, but its role as a primary diagnostic tool is not fully established [10]. When evaluating non-palpable breast lesions, Breast Imaging-Reporting and Data System (BI-RADS) is an approved method to identify probably benign masses, which can be managed with short interval follow-up.

The patients want an early diagnosis for breast lesions and treatment after presentation in OPDs. In our setup we do ultrasound for all breast patients presenting with different symptoms. The abscess in breast and cancer

has some radiological features coinciding with each other. However the findings of ultrasound are reliable in younger age patients and can be confirmed on biopsy.

The ultrasound & mammogram both are part of triple assessment in cancer diagnosing. The objective of this study is to see how useful is ultrasound in picking different lesions of breast clinically diagnosed and its accuracy in differentiating abscesses from malignant disorders.

METHODOLOGY

This retrospective descriptive study was conducted in HBS Hospital Islamabad. HBS Hospital is a tertiary care setup catering all patients from peripheral area of Lehtrar road and suburbs. This study was conducted from 1st May 2022 to 31 May 2024 for breast diseases after approval by Hospital Ethical Committee Ref no (Appl#EC19/202, 13 Oct 23). All female patients, irrespective of their age operated for breast diseases and presenting in OPD were included in the study.

Patients without ultrasound breast report were excluded. The symptoms of patients as lump, pain, nipple discharge, redness, pus ooze, and nipple with skin changes and palpable axillary lump were recorded on proforma along with relevant detailed history points taken. Examination was performed by single Assistant Professor and findings were recorded.

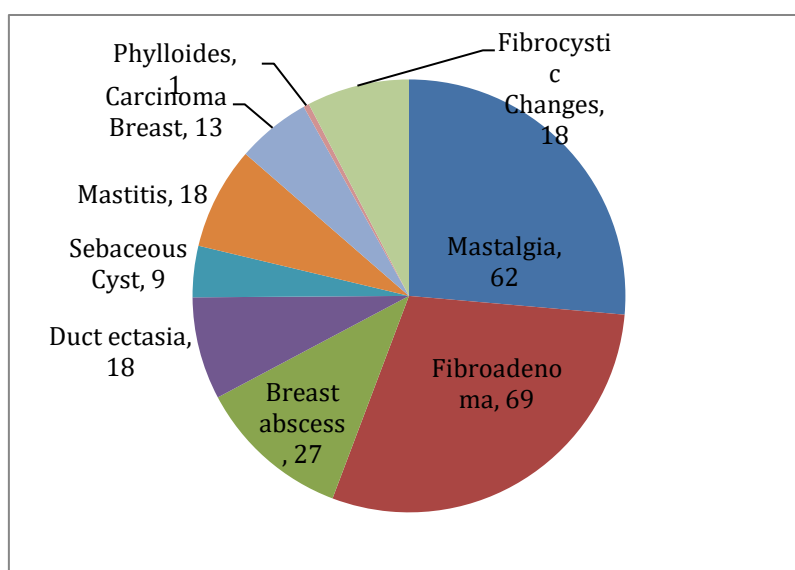
Patients were sent for breast ultrasound performed by a consultant radiologist in radiology department and features on

ultrasound with BIRADS (Breast Imaging Reporting and Data System) grade noted. If there was any suspicious finding clinically or sonological evidence of suspicion, biopsies were performed for suspicious lumps. Counseling of patients was done for follow up and breast self-examination was taught to each patient having benign breast disorder.

Data of all patients operated or managed conservatively for breast diseases was collected from the clinical files and outpatient register. Age at presentation symptoms, clinical features of patients, results of investigations, operative findings and specimen reports from histopathology and cultures were recorded on designed forms and tabulated. All the data was collected and results were interpreted and submitted for analysis. Mean, frequency and percentage, sensitivity were analyzed through standard statistical methods of SPSS 22.

RESULTS

Total 225 patients were studied. The mean age of patients was 42yrs (range 9yr-62yr). Out of these patients, 62 were having mastalgia which was cyclical and a cyclical, being the most common disease with normal ultrasound findings. Fibroadenoma was found in 69 patients. Duct ectasia was in 18 patients. Out of 27 patients 4 patients of breast abscess mimicked the features of malignancy. Sebaceous cyst on breast was found in 9 and Carcinoma breast was found in 13 as shown in (Pie Chart 1).

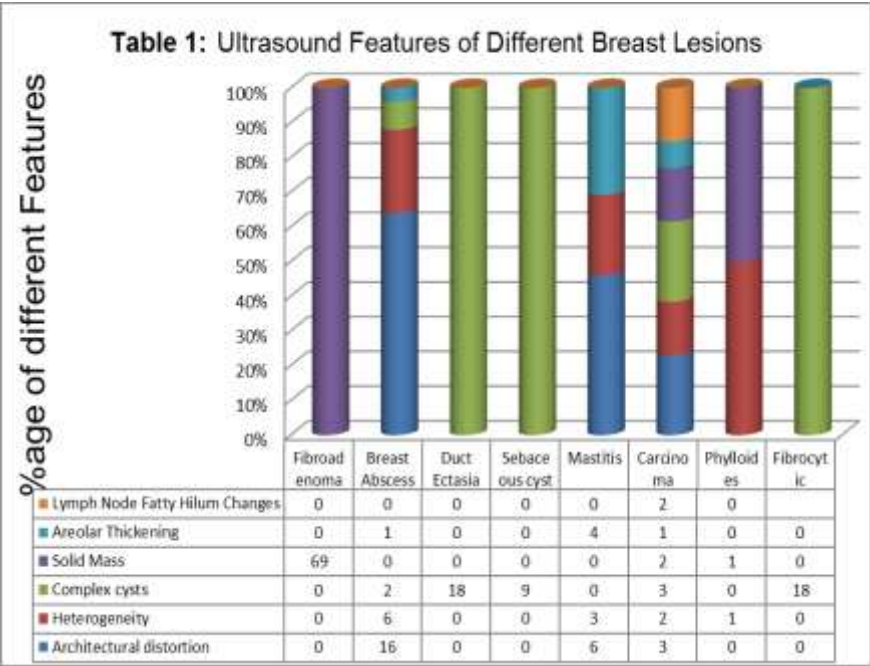


Pie Chart 1: Various Breast disorders presented in our Setup

The Table 1 below shows the Ultrasonological features picked for different breast lesions in details. The lump features like echogenicity may be homogenous or heterogeneous.

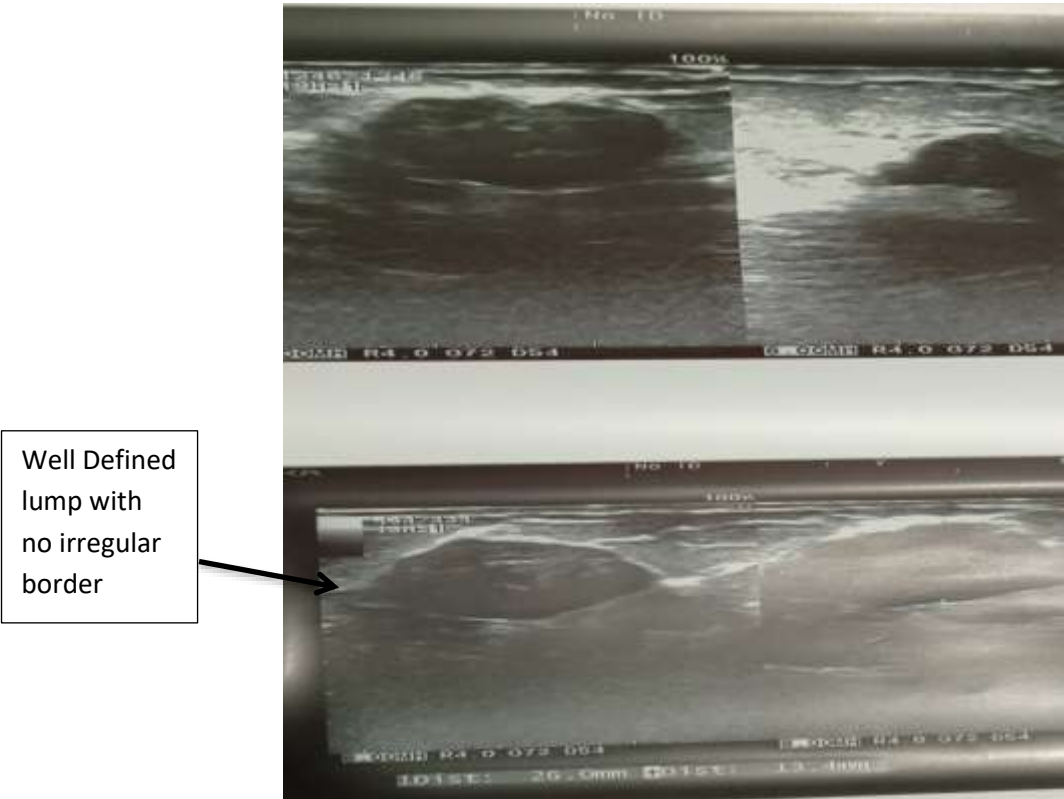
Thickened sub areolar tissue and complex cysts is feature of abscess with architectural distortion and heterogeneity. Same features are seen in cancers with destroyed fatty hilum

of lymph nodes that is one point separating it from abscess.

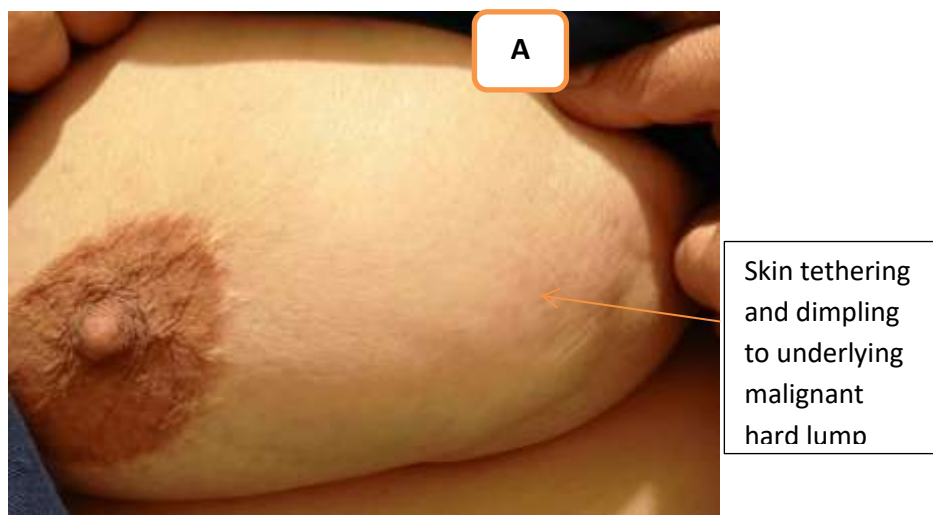


Picture 1 below is taken from patients presented with benign lump (fibroadenoma) picked on ultrasound showing well defined

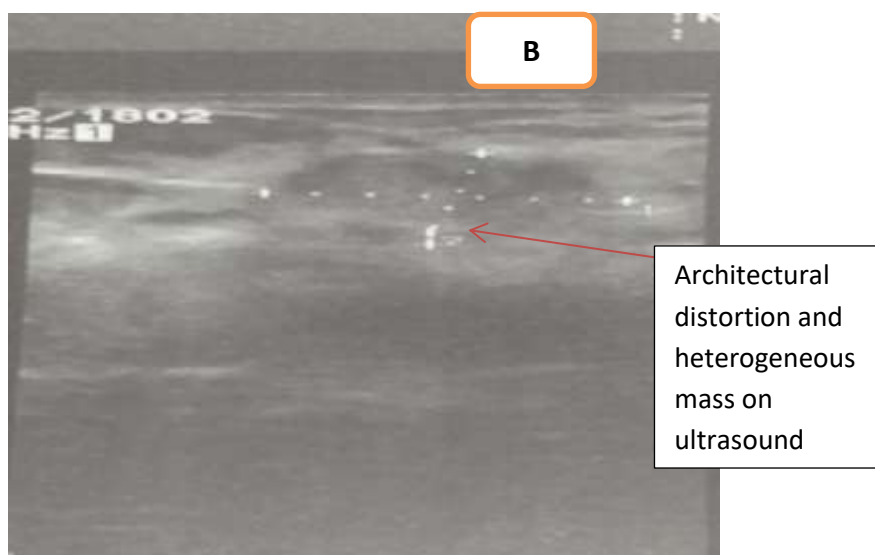
lump with homogeneous echogenicity and no architectural destruction or irregularity.



Picture 1: Ultrasound Features of Benign breast Fibroadenoma with well-defined margins



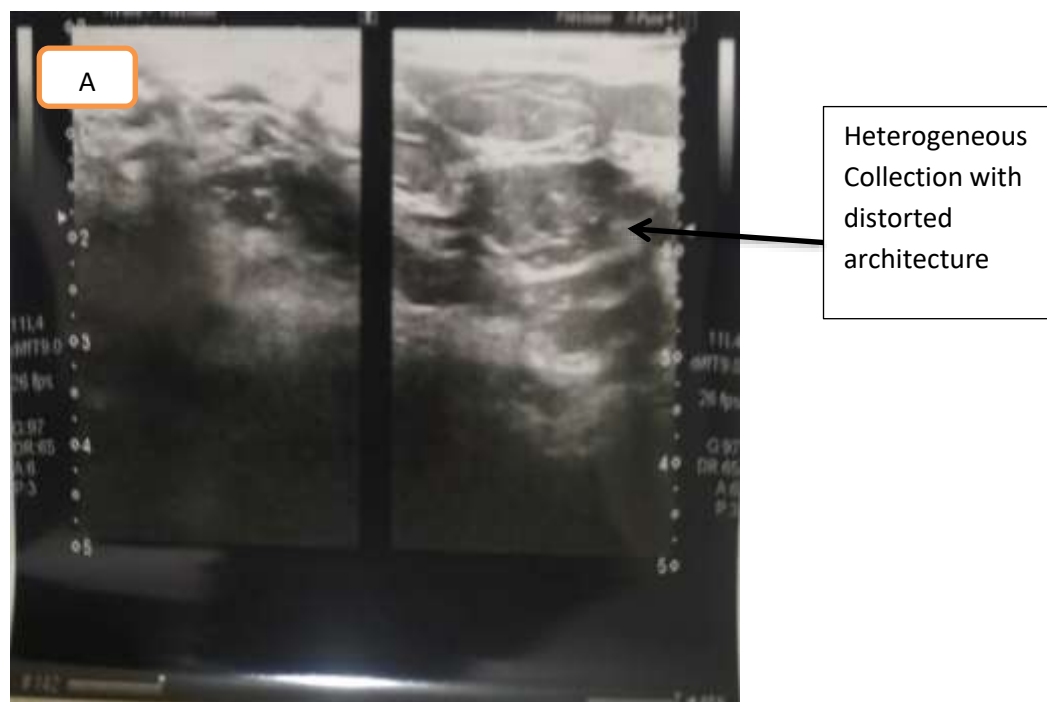
Picture 2: Clinical Features of skin dimpling with malignant 6cm mass left breast outer quadrants & Normal nipple left breast (picture is taken with permission of patient)



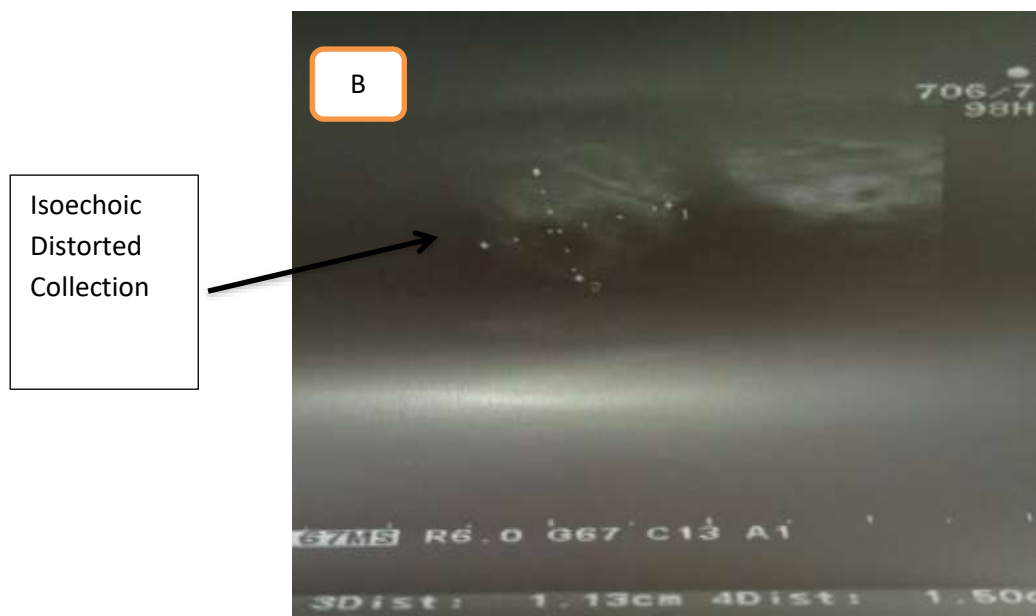
Picture 2 A & B: Ultrasound features of same malignant breast lesion with architectural distortion as in Picture 2



Picture 3: Clinical Features of Right Breast Abscess with skin redness & Retraction of nipple (picture is taken with permission of patient)



Picture 3 A: Ultrasound features of multifocal distorted thick walled collection with internal echoes mimicking tumor



Picture 3 B: Ultrasound features of isoechoic distorted collection (abscess) with internal echoes

Table 2 shows sensitivity & specificity of ultrasound with positive & negative predictive values for abscess and CA Breast.

Table 2: Frequency of Breast Abscess & Carcinoma Breast missed on Ultrasound				
(n=225)		Breast Lump Hard with skin Changes & Architectural Distortion		p-value
CA Breast (n=13)		Positive	Negative	P=<0.000001
	Positive	8	3	
	Negative	2	212	
Breast Abscess & Mastitis (n=45)	Positive	37	4	P=<0.000001
	Negative	4	194	
Values	CA Breast		Breast Abscess	
Sensitivity	80%		90.24%	
Specificity	98.60%		97.98%	
Positive Predictive Value	72.73%		90.24%	
Negative Predictive Value	99.07%		97.98%	
Accuracy	97.78%		96.65%	

DISCUSSION

Breast is a gland which changes in size and its function throughout reproductive years of a female. Due to reproductive hormones there is lumpiness, pain and other symptoms in the breast. Lumps and disorders of breast are diagnosed and picked not only clinically but also by certain investigations.

Ultrasound is first test to see status of breast and pick any pathology in it. Majority of benign breast lesions are observed in women of childbearing age, and most of those with malignant breast masses are menopausal. Our study shows that the various benign breast disorders presented in OPD are more (n=222) than CA breast (n=13). Some of the breast abscesses that distort shape of breast are picked as malignant on ultrasound and few carcinoma (CA) breast lesions mimic as infections for which sensitivity & specificity is calculated to be around 90.24% and 80% respectively that is significant.

Our study results are comparable with a study of Iran that shows the sensitivity and specificity of ultrasound for the diagnosis of benign and malignant lesions around 93.9% and 86.5%, respectively [1].

Second study is from USA in which solid masses are identified in 68 patients. All 76 solid masses yield benign pathology on core biopsy and are interpreted to be concordant with the imaging findings. Out of 19 fibroepithelial lesions, 11 go for surgical excision yielding three benign phylloides tumors and 8 fibroadenomas. Shape, margin, echogenicity pattern and posterior acoustic features are noted in the study as in our study [2].

Another USA study shows cancer detection only by ultrasound and finds it comparable with no difference in two modalities in detecting cancer as regards both ultrasound and mammography

at 58 of 111 (52.3%) against 59 of 111 (53.2%), P = 0.90 [3].

The study by Fatima & colleagues focuses on dense breasts in women where mammogram may not be sufficient as the only screening or diagnostic tool. Therefore, additional imaging tests such as ultrasound or MRI may be required for further evaluation [6]. Rehman determines that the sensitivity, specificity, PPV, NPV, and accuracy of sonographic classification of satellite masses into benign and malignant were 88.2%, 73.6%, 77%, 86.1%, and 80.9% respectively almost comparable to our study [7].

Khan & colleagues calculate overall sensitivity of ultrasound alone around 89.87%, specificity 66.67%, diagnostic accuracy 71.50%, positive predictive value 76.34%, negative predictive value 63.64% lower than study being discussed [9].

The calculated sensitivity, specificity, positive and negative predictive values of sonography by Masroor & colleagues as a complement to mammography is 100%, 85%, 14% and 86% respectively [10].

A study from China notes that the overall positivity rate of ultrasound screening is high [11]. Indian authors have shown ultrasound can be used as an adjunct to mammogram in benign disorders [14].

Kanumuri from India shows mammography has a sensitivity of 68.0% and ultrasound 70.2% when used alone in detecting benign & malignant lesions of the breast compared to a sensitivity of 95.7% obtained by their combined approach[15].

A meta-analysis by Sood R et al on ultrasound has found an overall pooled sensitivity and specificity of 80.1% (95% CI, 72.2% to 86.3%) and 88.4% (95% CI, 79.8% to 93.6%), respectively. When only low- and middle-

income country data are considered, ultrasound maintains a diagnostic sensitivity of 89.2% and specificity of 99.1% [16, 17].

Study from Uganda has seen ultrasound scan detects 27% more malignant lesions than mammography did in dense breasts [20]. Wang [23] found in his study of comparison of ultrasound breast with mammogram that the sensitivity of ultrasound for breast cancer diagnosis was significantly higher than that of mammography (95.7% vs. 78.9%, $p < 0.001$). Whereas the specificity was significantly lower than that of mammography (42.9% vs. 62.3%, $p < 0.001$).

Chen [24] found that sensitivity of mammography was more in patients above 50 years (81.3% vs 62.7%, $P < .001$). Overall ultrasound had higher sensitivity than mammography ($P < .001$) in dense breasts. Xing has added artificial intelligence software in ultrasound to detect sensitivity and specificity. He found that the sensitivity, specificity, and accuracy of the S-Detect classification group (artificial Intelligence) were improved 87.36%, 88.28%, and 88.04%, respectively [25].

Prediction model based on patients' clinical information and ultrasonic features is established and is now widely used to predict the risk of breast cancer [26].

Alshoabi studied CA breast and his study cross-tabulation test showed a significant association between the malignancy tumor and the irregular shape of the lesion ($p < 0.001$, OR=7.162, CI 2.726-18.814), non-circumscribed margins ($p < 0.001$, OR = 9.031, CI 3.200-25.489), tissue distortion ($p < 0.001$, OR = 18.095, CI 5.944-55.091) [27].

On HR-USG, 33.4% of patients with dense breast were shown to have suspicious (BIRADS 5) lesions. 21.7% had simple cysts. Fibro adenomas and abscess were seen in 18% and in 15% of patients, respectively. So Mukhtar R concluded that HR-USG as a modality of choice that supersedes the diagnostic efficiency of mammography in patients with dense breasts thus enhances early detection and better treatment of breast cancer, decreasing mortality owing to delay in diagnosis.[29].

Study by Iacob R in 2024 reviewed various database for ultrasound breast and found that recent research showed the increased sensitivity of breast ultrasound, especially in women who have dense breasts and mammography has reduced effectiveness because they might produce false negative results in the presence of dense breast tissue. [30]

Bai D combined MRI with breast ultrasound to see accuracy in detecting breast CA. He found

that the ultrasound when combined with MR images based on the Logistic Regression classifier has the best diagnostic efficiency, with AUC of 0.92 and 0.91, sensitivity of 0.80 and 0.67, specificity of 0.90 and 0.94, accuracy of 0.84 and 0.79, respectively.[31]

All these studies show that ultrasound can also detect with accuracy different benign & malignant breast lesions with further evaluation by a biopsy in patients. So it can be used as an adjunct to other investigations in diagnosing lesions earlier.

CONCLUSION

Breast lump clinical diagnosis and its features picked on complementary ultrasound are showing high sensitivity of ultrasound in detecting different lesions. Ultrasound breast is a safe imaging technique that when used can be a useful parameter as proved in above discussion to detect suspicious lumps in breast with few limitations.

It may assist in screening many patients where mammogram is not available. Biopsy remains main stay in every lump to reach final diagnosis.

Major Limitations of This Study

In our study sample includes all breast disorders. However number of abscesses and CA breast cases are very limited and they are not adequate as compared to studies having big samples. So results cannot be applied on general population until a big sample of CA breast cases is studied in future that is necessary to exactly find out ultrasound accuracy in picking them.

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