



E-ISSN: 2616-3470

P-ISSN: 2616-3462

© Surgery Science

www.surgeryscience.com

2021; 5(2): 28-30

Received: 18-02-2021

Accepted: 20-03-2021

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The accuracy of ultrasound in diagnosis of palpable breast lumps

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DOI: <https://doi.org/10.33545/surgery.2021.v5.i2a.657>

Abstract

Objective: To find the sensitivity, specificity and positive predictive value of ultrasound in detection of palpable breast lumps and to correlate the findings of ultrasound with the findings of fine needle aspiration cytology (FNAC), or histopathology.

Materials and Methods: Ultrasonographic evaluation of 100 palpable breast lumps was done in Alkhansaa hospital in the department of breast clinic. Diagnosis was made considering four features of the lumps i.e. shape, margins, width: AP ratio and echogenicity. Diagnosis was confirmed by fine needle aspiration cytology or histopathology.

Results: The sensitivity of ultrasound in detection of palpable breast lumps was 95%. The incidence of breast lumps was highest in the age group of 20-29 years. Lump alone was the presentation in 75% of the cases. 60% of the lumps were present in outer upper quadrant of the breast. The sensitivity, specificity and positive predictive value of ultrasound in fibroadenoma of the breast was 82%, 94% and 90% respectively. The sensitivity for carcinoma of the breast was 67% and for cystic masses it was 92%. The ultrasound features that most reliably characterized breast masses as benign were round or oval shape (97% were benign), circumscribed margins (81% were benign) and width: AP ratio > 1.4 (90% were benign). Features that characterised masses as malignant were irregular shape (48% were malignant), non-circumscribed margins (36% were malignant) and width: AP ratio 1.4 (31% were malignant).

Conclusion: Ultrasound is a useful tool in differentiation of cystic from solid masses of the breast. It is useful in young females and pregnant women where mammography is not advisable. However its role in diagnosis of carcinoma of the breast needs further evaluation before it can be used for screening of carcinoma breast.

Keywords: Breast, lump, ultrasound

Introduction

Ultrasound is a simple, non invasive, time saving tool for evaluation of breast masses and it is the ideal imaging modality and can be useful in identifying and characterising breast masses by certain criteria and then guiding further investigation^[1]. It should be the first investigation to be done in young females or pregnant women where mammography is not advisable^[2]. Ultrasound is the primary imaging modality for identification of an abscess in patients with mastitis^[3]. It is a useful modality in the work up of breast abnormalities. Although its exact role is determined by the age of the patient and the nature of the lesion, its main role has been differentiation of cystic from solid abnormalities of the breast^[4]. While breast sonography is frequently a useful modality for breast mass detection particularly as an adjunct to x-ray mammography, the common overlap in characteristics of benign and malignant masses makes histological evaluation of all solid masses essential^[5]. It is more accurate in assessment of breast cancer size than both clinical and mammographic assessments^[6]. In palpable breast lumps, it is the scare of breast cancer which most of the times makes women consult a doctor^[7]. The early diagnosis and management of breast lumps is important because of the fact that the breast is the commonest site for development of cancer in the females and accounts for around 20 percent of all malignancies in this sex^[8]. Large number of biopsies for benign breast abnormalities has long been recognized as a serious problem^[9]. Excessive biopsies have adverse effect on the society and on the women who undergo them. So the accurate diagnosis of breast lumps without resorting to formal biopsy is highly desirable both for the patient who can be quickly reassured and counseled, and the clinician who can reduced unnecessary surgery^[10]. The availability of ultrasound and sonologist even at the level of sub-district hospital in our state along with

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increased incidence and prevalence of breast masses prompted us to take this study which deals with hundred cases of palpable breast masses evaluated by ultrasound at our institute and confirmed by fine needle aspiration cytology or histopathology.

Material & Methods

Ultrasonographic evaluation of 100 cases of palpable female breast masses was done in Alkansaa hospital-breast clinic between January 2013 to Feb. 2015. Ultrasound examination of the breast masses was done by an expert Sonologist in the department of radio diagnosis. The area under evaluation was immobilized and skin adequately lubricated to facilitate ultrasound transmission. The transducer was gently applied and both longitudinal and transverse scans were taken. The scans included information regarding the four features of the breast:-(i) Shape-----Round/Oval or irregular. (ii) Margins-----Circumscribed or noncircumscribed (iii) Width: AP ratio >1.4 or =1.4 (iv) Echogenicity-----hyperechoic, Isoechoic or hypoechoic.

On the basis of these four features an impression about diagnosis was made. The confirmation of the ultrasound diagnosis was made by fine needle aspiration cytology or histopathology which

was done by an expert pathologist in the department of pathology.

Results

Out of hundred palpable breast lumps ultrasound diagnosed the lump in 95 cases' thus the overall sensitivity of ultrasound was 95%. The maximum number of patients in our study were in the age group of 20-29 years (45%) followed by 40-49 years (20%). 60 % of the patients were married. Lump alone was the presenting symptom in 75% of the patients followed by lump with pain (20%) and lump with discharge from the nipple (9%). The average duration of the symptoms was 6.52 months. 60% of the masses were present in the outer upper quadrant of the breast. Both breasts were involved in 10% of the cases. The accuracy of ultrasound in the detection of carcinoma of the breast was 67%. The cystic masses of the breast had the highest diagnostic accuracy of 93% followed by fibroadenoma (82%). Ultrasound features that most reliably characterized breast masses as benign were round or oval shape (68 of 70 [97%] were benign), circumscribed margins (62 of 67 [87%] were benign), width: AP ratio > 1.4 (62 of 69 [90%] were benign), 87% of isoechoic and 78% of hyperechoic masses were benign. Features that characterized masses as malignant were irregular.

Table 1: Accuracy of ultrasound in the diagnosis of solid and cystic breast masses

Lesion	No. diagnosed by ultrasound	No. of diagnosis	final	%age of correct diagnosis by ultrasound
Carcinoma	10	15		67
Fibroadenoma	33	40		82
Fibro-adenosis	14	20		70
Cysts	15	15		100
Cystosarcoma phylloids	4	4		100
Breast abscess	4	7		57

Table 2: Association of ultrasonic features with benign and malignant lesions

Ultrasound features		Tissue Diagnosis	
		Malignant	Benign
Shape	Round/oval	2 (3)	68 (97)
	Irregular	13 (52)	12 (48)
Margins	Circumscribed	5 (9)	62 (81)
	Non- Circumscribed	10 (36)	18 (64)
Width: AP ratio	> 1.4	7 (10)	62 (90)
	? 1.4	8 (31)	18 (69)
Echogenicity	Hyperechoic	0 (0)	10 (100)
	Isoechoic	5 (13)	34 (87)
	Hypoechoic	10 (22)	36 (78)

shape (13 of 25 [48%] were malignant), Non-circumscribed margins (10 of 28 [36%] were malignant), width: AP ratio = 1.4 (8 of 28 [31%] were malignant), 13% of isoechoic and 22% of hypoechoic masses were malignant. No hyperechoic mass was malignant.

Discussion

Breast diseases range from mild changes in the tissue to full-fledged malignant change. These cause considerable physical and psychological morbidity. A palpable mass in a woman's breast represents potentially a serious lesion and requires prompt evaluation. The average age of the patient with palpable breast lumps was 40 years. The highest incidence of breast lumps was in the age group of 20-29 years (42%) followed by 40-49 years (20%). This corresponds to a great extent with that of Khanna *et al.* [3] which was 39.8% in the age group of 21-30 years. Out of 100 cases in our study 95 were detected by ultrasound for the presence of lump, thus giving a sensitivity of 95%. This is in

close conformity with results reported by Rubin *et al.* [4] (91%), Smallwood [5] (92.5%), and better than the results reported by Fleishcher *et al.* [6] (84%) and Mansoor *et al.* [7] (86%). In our study 95% of the cases of malignancy were married and all of them were more than 30 years of age. Carcinoma of the breast was histologically found in 15 cases out of which 10 were correctly diagnosed by ultrasound, thus a sensitivity of 67%. This diagnostic accuracy was better as compared to Kopans *et al.* [8] (52.6%), Mansoor *et al.* [7] (57.14%). Out of the 11 cases diagnosed by the ultrasound, 10 were irregular, non-circumscribed hypoechoic masses. In the study by Durfee *et al.* [9] 97% of cancers were hypoechoic. Benign lesions of the breast were more readily diagnosed by ultrasound than malignant lesions. Sensitivity of the ultrasound in diagnosis of fibroadenoma of the breast was 82%. This is consistent with the findings of Fleishcher *et al.* [6] (89%), Hyashi *et al.* [10] (93%) and Mansoor *et al.* [7] (81.8%). The accuracy of ultrasound in diagnosing cystic breast lesions was 92%, which is in

accordance with findings of Fleishcher *et al.* [6] (96%) and Mansoor *et al.* [7] (90.9%). The Ultrasound features most predictive of a benign diagnosis were oval or round shape (97% were benign), circumscribed margins (81% were benign) and width AP ratio > 1.4 (90% were benign). This was similar to the results of Rahbar *et al.* [11] where in these features were present in 94%, 91% and 89% respectively. The features most predictive of a malignant diagnosis were irregular shape (52% were malignant), Non-circumscribed margins (36% were malignant) and width AP ratio = 1.4 (31% were malignant). These results were again in conformity to the results obtained by Guita Rahbar *et al.* [11], where in these features were present in 61%, 50% & 40% respectively. In another study a sensitivity value of 95%, specificity of 94.10%, positive and negative predictive values of 95.50% and 93.75% were noted [12]. Similarly another study suggested that Ultrasound use should be considered in most instances of a palpable breast finding, particularly in young women. A primary advantage is the ability to directly correlate the physical exam finding with imaging. Ultrasound is useful in characterizing palpable masses as well as detecting cancer in women with negative mammograms. The negative-predictive value of imaging for cancer in the evaluation of a palpable lump is very high, which may reassure women with low-suspicion palpable findings [13]. Most recent study also suggests that the negative predictive value of sonography for palpable breast masses with probably benign morphology was very high (99.4%) [14].

Conclusion

Ultrasound is a simple, time saving tool for evaluation of breast masses. It should be the first investigation to be done in young females or pregnant women where mammography is not advisable. Its sensitivity for detection of cystic masses is very high so it has a definite role in differentiation of cystic from solid masses of the breast. The sonographic evaluation of a simple cyst should eliminate the need for further invasive procedures including aspiration and biopsy. The role of ultrasound in diagnosis of carcinoma of the breast needs further evaluation before it can be used for screening of carcinoma breast.

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