



Ultrasonographic evaluation of breast masses with Histopathologic concordance

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Abstract

Introduction: Detection of breast cancer in its earliest possible stage is the ultimate goal in imaging the breast and radiologist plays an important role in these. Breast lumps are common problem affecting females, which require proper workup, early diagnosis and treatment. Regarding diagnostic tool for the evaluation of breast disorders breast Ultrasonography (USG) is investigation of choice.

Aims & Objective: To study breast masses with the help of ultrasonography and to find correlation between USG and histopathology regarding same.

Materials and Methods: In the present study we observed 100 patients with breast lump came to OPD at MGM Medical College & Hospital, Aurangabad, Maharashtra, India. Study duration was from June 2018 to June 2020. The lumps in the breast were evaluated by Ultrasonography. The lesions were also evaluated pathologically and classified using the Van Nuys classification system. Statistical comparisons were made using Fisher's exact test.

Results: 18 out of the 100 cases were circumscribed masses. 58 out of 100 tumors were recognized with halo using Ultrasonography (USG). 52 out of these 58 tumors with halo were defined as 'histopathologic halo'. About 59.7% of the tumors in which internal echoes were equal / heterogeneous histopathologically were associated with poor collagenized stroma and heterogenous intratumoral structure. The ratio of carcinoma cells to stroma was 3:1-1:3.

Conclusion: Ultrasonographic (USG) cannot define the extension of carcinoma preoperatively, correlating US findings with histopathologic features of carcinoma cells can determine the extension of carcinoma.

Keywords: shoulder apophysis, painful shoulder, athlete, sports, cricket, acromion, paediatric

Introduction

Detection of breast cancer in its earliest possible stage is the ultimate goal in imaging the breast and radiologist plays an important role in these. Breast lumps are common problem affecting females, which require proper workup, early diagnosis and treatment. According to WHO in India about 1 lakh new patients are diagnosed annually^[1]. Prevalence is more in less developed regions compared to more developed regions^[2]. There is a significant increasing incidence, morbidity and mortality found in Indian population nowadays as described in global and Indian studies^[3-7] and currently the incidence has surpassed cervical cancer among Indian women^[8]. Possible contributing factors for increasing incidence are Marital status, location (urban/rural), BMI, breast feeding, waist to hip ratio, obesity, alcohol consumption, tobacco chewing, smoking, lack of exercise, diet, environmental factors. Lack of exclusive awareness programs, preventive measure, screening programs for early detection and availability of treatment facilities are other contributing factors.

Regarding diagnostic tool for the evaluation of breast disorders breast Ultrasonography (USG) is investigation of choice⁸. On Mammography its appearance vary greatly and Breast diseases are obscured by dense breast tissue in mammography⁹. Ultrasonography (USG) fills these lacunae and serves better in the detection of breast cancer if the patient is young or the masses are small^[10, 11]. Carcinomas are classically explained by irregular

solid masses with a heterogenous texture and reduced sound transmission in the Ultrasonography (USG), resulting in 'shadowing' behind the lesion. Some fulfill these criteria partially some not at all. Hence an accurate correlation of Ultrasonographic (USG) findings with their corresponding histopathologic features is considered most important in Ultrasonographic (USG) evaluation of Breast diseases^[12].

The management of palpable breast lesions includes triple assessment physical examination, imaging and fine needle aspiration or core biopsy. Before performing Breast-conserving surgery, it is very important to detect carcinoma extension and determine the excision area as accurately as possible for the benefits of the patients^[12].

Previous studies have demonstrated the benefits of Ultrasonography (USG) in differentiating benign from malignant breast disease. Ultrasonography (USG) can detect smaller non-palpable cancers by using high resolution equipment which is generally not detected on high-quality mammography. Mammography is cost efficient and accepted technique for evaluation of clinically suspected breast lesions but High-resolution Ultrasonography (USG) is a useful modality that helps to additionally evaluate breast lesions and also helps to characterize a mammographically non-detected palpable abnormality in dense breast. However there are limitations of the Ultrasonography (USG) also specially in detecting small lesions

^[13]. With these perspective these study of “Ultrasonographic evaluation of breast masses with histopathologic correlation” was undertaken to evaluate breast masses using Ultrasonography (USG) and correlate Ultrasonographic (USG) findings with histopathologic features.

Aim & Objective

To study breast masses with the help of ultrasonography and to find correlation between USG and histopathology for breast cancer detection.

Materials and Methods

It was a hospital based prospective observational study carried out at department of radiology, MGM Medical College, Aurangabad, Maharashtra. Patients referred to the radiology department presenting with breast swelling was confirmed by Ultrasonography (USG) for breast disorders. 100 cases of breast lesions were analyzed. Study duration was from June 2018 to June 2020.

Results were tabulated and statistical analysis was done with the help of SPSS software.

Inclusion criteria

1. Patients arrived at OPD of MGM Medical College & Hospital, Aurangabad with breast swelling which got confirmed by Ultrasonography (USG).

Exclusion criteria

1. Patients who have already been diagnosed were excluded.
2. Patients lost to follow-up were excluded.
3. Patients not consenting for USG or Histopathology were also excluded
4. The cases treated with neo-adjuvant chemotherapy excluded from the study.

Procedure

Ultrasonography (USG)

The Ultrasonography (USG) examination was carried out using the mechanical scanners of GE 8 Healthcare Voluson E8 with linear probe 10MHz transducer in department of Radiology.

Histopathology

Histopathological reports without prior knowledge of the breast Ultrasonography (USG) findings was obtained.

Malignant cells at the surgical margin and within 5 mm of the surgical margin were defined as positive margin. The accurate ratio between the cancer extension detected by the Ultrasonography (USG) and histopathology was evaluated. If discrepancies were found discrepant lesions were examined by Ultrasonography (USG) again. Statistical analysis was done by using (SPSS) software and ms excel. p-value of <0.05 was considered statistically significant.

Results

In present study 100 cases were examined. Age of the patients ranged from 18 to 75 years with mean age of 46 years.

A. Evaluation of The Margins of the Lesion

18 out of the 100 cases were circumscribed masses. Out of these 18 circumscribed tumors detected by Ultrasonography (USG), 14

cases (77.8%) were also described as circumscribed histopathologically. Not circumscribed masses were 82 in present study. 74 out of these 82 (90.25%) were also histopathologically described as ‘not circumscribed’. The rate of concordance between Ultrasonography (USG) and histopathological findings was 87.0%. (Table-2)

B. Evaluation of The Boundary Zone (Halo)

58 out of 100 tumors were recognized with halo using Ultrasonography (USG). 52 out of these 58 tumors with halo were defined as ‘histopathologic halo’ (Table 1). The rate of concordance was 87.6%. 42 out of the 100 tumors was described as masses without halo. (Table-2)

C. Evaluation of The Internal And Posterior Echoes

About 59.7% of the tumors in which internal echoes were equal/heterogeneous histopathologically were associated with poor collagenized stroma and heterogenous intratumoral structure. The ratio of carcinoma cells to stroma was 3:1–1:3. Tumors associated with low echo levels demonstrated marked collagenized stroma and the higher fibroblastic stromal ratio. As for posterior echo, accentuating tumors histopathologically demonstrated carcinoma cells proliferated in pushing, encapsulated and monotonous fashions, and were also demonstrated in all mucinous carcinoma examined. About 76.1% of the tumors classified as ‘no changes’ also demonstrated the patterns of marked intratumoral heterogeneity. In addition, ultrasonographically attenuating cases (28 out of the 100 tumors, 28%) were associated with marked collagenized stroma and higher fibroblastic stromal ratio.

Histopathological Correlations with Other Ultrasonographic Findings (Interruption of the Anterior or Posterior Borders of the Mammary Gland)

Interruption of anterior and posterior borders tumors were detected in 72 out of the 100 tumors. 60 out of the 72 tumors (83.4%) were also histopathologically interpreted as extension into adipose tissue. Non-interruption tumors were seen in 28 cases. 24 out of the 28 tumors (85.7%) were histopathologically infiltration in mammary gland or non-invasive carcinomas. The rate of concordance of these borders was 84.4%. (Table-2)

The Correlation between Final Ultrasound and Histopathological Diagnoses

The ratio of the correlation between histological types by Ultrasound diagnosis and histopathological types was 91.6% (92 out of the 100 tumors). The concordance rates between US findings and the following histologic types; IDC, DCIS, ILC and mucinous carcinoma were 95.2% (78 out of the 82 tumors), 25% (2 out of the 8 tumors), 66.7% (8 out of the 12 tumors) and 100.0% (2 out of 2 tumor), respectively (Table 3). Ultrasound has limited in its ability to detect the lesions with, 1 mm in diameter.

Table 1: Showing histological types

Histological types (all)	Total (100)
Invasive ductal carcinoma (IDC)	86
Ductal carcinoma in situ (DCIS)	4
Invasive lobular carcinoma (ILC)	6
Mucinous carcinoma	4

Table 2: Showing findings of USG

US findings	No. of cases	Rate of concordance (%)
Margin		
Circumscribed	18	77.8
Non Circumscribed	82	90.25
Boundary zone (halo)		
Halo (+)	58	87.6
Halo (-)	42	86.2
Associated findings (Interruption of the mammary borders)		
Interruption	72	83.4
Non- Interruption	28	85.7

Table 3: Showing the concordance rate between USG diagnosis and histological types

Histological types	Concordance	Not concordance	Rate of concordance (%)
IDC	78	4	95.2
DCIS	2	6	25
ILC	8	12	66.7
Mucinous	2	2	100

Discussion

Circumscribed masses are detected in cases in which carcinoma cells proliferated in both solid and expanded fashion. Non-circumscribed masses are detected when cells are arranged in clusters, cords and trabeculae and associated with mixed intraductal component and invasive areas. Halo is defined as one of the back scattering in Ultrasonographic (USG). 15 Such opposite sound wave of incident element is defined as back scattering. 32 Results of our present study demonstrated that halo was indeed characterized by carcinoma cells infiltrated or mixed fat tissue, carcinoma cells and fibroblastic stroma. Previous Literature suggests that the degree of internal hypoechoogenicity determines its sensitivity in predicting malignancy of the lesion [14, 15, 16]. In Our study anterior and posterior echoes were caused by the ratio of intratumoral carcinoma cells and fibroblastic stroma, and histological stromal characteristics. Internal echoes and posterior echoes were defined by histopathological intratumoral construction. Internal low echoic masses represented the high ratio of fibroblastic stroma and the stroma in these lesions turned out to have marked degrees of interstitial collagenization. Attenuation of posterior echo was detected in the tumors histopathologically associated with hyperplasia of collagenized fibroblastic stroma. The concordance rate between the Ultrasonographic (USG) findings and the histopathology findings was 91.6%. Results showed that DCIS and ILC were having lower concordance rates between estimated and actual histological types than the other types. ILC can be insidious and difficult to detect on routine physical examination and/or imaging including Ultrasonographic (USG). In addition, our study demonstrated that Ultrasonographic (USG) is limited to detect the lesions with less than 1 mm in diameter.

Conclusion

Breast conservation therapy is treatment standard for the majority of breast carcinoma. Several investigations reported the association of higher tumor recurrence rates with positive or close margins than with negative margins following breast conservation therapy. Hence it becomes very important to evaluate carcinoma extension preoperatively and determine the excision areas for performing breast conservation surgery as

accurate as possible. From the study we conclude that cases where Ultrasonographic (USG) cannot define the extension of carcinoma preoperatively, correlating US findings with histopathologic features of carcinoma cells can determine the extension of carcinoma. Study demonstrates the importance of correlation between histopathological and ultrasonographic findings of the breast lesions for improving the quality of Ultrasonographic (USG).

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