HAS HISTOLOGY OF MALIGNANT BREAST CANCER ANY IMPACT ON SONOGRAPHIC IMAGE CHARACTERISTICS?

Kassim A. H. Taj-Aldean*, Kadhim Ch. Hasan
Dept. of Surgery/ College of Medicine /Babylon University, Hilla, Iraq.
Dept. of Surgery/ College of Medicine /Babylon University, Hilla, Iraq.
Email: kassim33amir@yahoo.com

Abstract

This study aimed to determine if the histopathological type of malignant breast cancer affects the imaging pattern when the breast is evaluated by ultrasound. A prospective study of female patients with palpable breast mass (es), which were suspected to be malignant, was done over nine months period. Those who had palpable suspect masses were included. They were examined by 2 seniors consultant in radio imaging of more than 5 years' experience in breast ultrasound. Tru-cut or Open surgical biopsies and histopathological examinations were done for the lumps of all the enrolled cases whether radio imaging examinations indicated malignancy or not. Out of 107 cases, 7 were excluded; 3 were proved benign sonographically and histopathologically, 1 case was recurrent breast cancer,1 case escaped follow up while 100 were diagnosed histopathologically as malignant breast cancers. Out of the 100 malignant breast cancer cases,16(16%) were misdiagnosed as benign by sonographic evaluation. The false negative rate was 16%. The histopathological types of cancer cases were 82 (82%) infiltrating ductal carcinomas. Infiltrating lobular carcinomas 6(6%), medullary carcinomas 4 (4%) mucinous carcinomas 4(4%) and 4(4%) papillary tumors. All 82 infiltrating ductal carcinomas and 2 out of 4 (50%) papillary tumors were correctly diagnosed. All cases of Infiltrating lobular carcinomas 6 (6%), medullary carcinomas 4(4%) mucinous carcinomas 4(4%) in addition to 50% papillary type were misdiagnosed. The study concluded that histology of the tumor has a significant impact on sonographic presentation of breast cancer. True- cut or open biopsy can solve the problem if the clinical exam suspects malignancy.

Key Words: Breast mass, Breast ultrasonography, Breast biopsy, False negatives in mammography

Introduction: Continuous advance in technologic, such as perfusion US imaging, harmonic and compound imaging, new Doppler-based techniques, micro bubble contrast agents, three-dimensional US, transducers of high-frequency,

and US detection of micro calcifications all carry promise of further increases in US utility in the detection and diagnosis of cancer of breast (1). In certain cases for whom mammograms only manifest with isolated micro calcification, US may discover small occult cancers (2). The potential benefit of US examination for suspicious breast micro-calcifications is to identify a mass lesion associated with the calcifications and to guide the needle biopsy or hook-wire localization in cases for which stereotactic biopsy or localization cannot be performed or is unavailable (3). The cancer of breast is no characterized by medical imaging and clinical examination but by intrinsic attributes. The tumor has a biological, HER_2 expression hormone receptor status, and a genetic or proteomic background (4). The ultrasound of breast is simple imaging tool recognized over 27% malignant mass missed by mammography in those symptomatic women according to that the routine examination women with dense breast on mammography is ultrasound (5).

The lesion cystic in breast with thick wall, septa inside (thick septation), solid nodule inside, solid masses with cystic foci eccentric and predominately solid should be examined at biopsy, the 18 of 79 of cystic lesions complex proved to be malignant (6). Relationship between the pathologist, radiologist and oncologist and is important to avoid missing any case of cancer of breast (7).

Materials and Methods

A prospective study of female patients who presented or referred to the breast clinic in Al Hilla General Hospital during a 9 month period from June 2014 to March 2016, with palpable breast mass (es), which were suspected to be malignant. These patients after having been examined by the general surgeon, those who had palpable suspect masses were included. Recurrent breast tumors and skin involvement were excluded. They were examined by 2 seniors consultant in radio imaging of more than 6 years' experience in ultrasound of breast.

The following sonographic features were evaluated; shape, orientation, margin, boundary, posterior acoustic features, distortion in architectural of tissue surrounding, and changes in ligaments of Cooper's. Tru-cut or Open surgical biopsies and histopathological examinations were done for the lumps of all the enrolled cases whether radio imaging examinations indicated malignancy or not. The histopathological examinations were performed in Al Hilla Teaching Hospital Histopathological Unit and in a private histopathological clinic provided that the pathologist had an experience of more than 5 years. The radio imaging results were reviewed with the histopathologic committee assessment of biopsy of the histopathologically reported malignant cases. Repeat biopsy was undertaken if the previous biopsy was Tru-cut.

Results

One hundred and seven cases; after they had had clinical and sonographic evaluation, 2 cases were associated with skin involvement so they were not enrolled in the study. One hundred and five patients underwent breast biopsy (85 open, 20 Tru-cut). Histopathology diagnosis indicated that, 3 benign which were excluded, too. Out of 102 malignant breast cancers; 2 were excluded:1 case being recurrent cancer, while the other escaped follow up so only 100 were studied.

The included patients, all were females, their age range was 25 –75 years, mean age 47 years. Out of the 100 malignant breast cancer cases, 16 (16%) were misdiagnosed as benign by sonographic evaluation. The false negative rate was 16%. The histopathological types of cancer cases were 82 (82%) infiltrating ductal carcinomas fig.1. Infiltrating lobular carcinomas 6(6%) fig.2, mucinous carcinomas 4(4%) fig.3 medullary carcinomas 4(4%) fig.4 and 4(4%) papillary tumors fig.5. All 82 infiltrating ductal carcinomas and 2 out of 4 (50%) papillary tumors were correctly diagnosed. All cases of Infiltrating lobular carcinomas 6(6%), medullary carcinomas 4(4%) mucinous carcinomas 4(4%)in addition to 50 % papillary type were misdiagnosed.

Table 1: Distribution of patients within age groups.

Age range (in years)	No. of patients	%
15-39	21	21
40-49	34	34
50-59	25	25
60-69	12	12
70 +	8	8
Total	100	100

Table 2: Percentages of histolpathogical types of malignant breast lesions.

Malignant breast tumor type	No. (%)
Invasive ductal carcinoma	82(82%)
Invasive lobular carcinoma	6(6%)
mucinous carcinoma	4(4%)
Medullary carcinoma	4(4%)
Papillary carcinoma	4(4%)
Total	100(100%)

Table 3: Echogensity type of malignant lesions.

Malignant tumor	hypoechoic	isoechoic	hyperechoic	No. (%)
Invasive ductal carcinoma	70	10	6	86(84%)
Invasive lobular carcinoma	3	2	1	6(5.8%)
Invasive mucinous carcinoma	1	2	1	4(3.9%)
Medullary carcinoma	1	2	1	4(3.9%)
Papillary carcinoma	1	1	0	2(1.9%)
Total				102(100%)

Table 4: Features of malignant breast masses.

| Feature	Invasive ductal	lobular	mucinous	medullary	papillary
Shape					
regular	10	4	2	3	1
Irregular	76	2	2	1	1
Margin					
Circumscribed	26	3	3	3	2
Ill defined	60	3	1	1	0
Spiculation					
present	68	4	1	2	1
absent	18	2	3	2	1
Echotexture					
Homogenous	23	2	3	3	2
Heterogeneous	63	4	1	1	0
Posterior echo intensity Enhanced	46	1	3	3	0
Unaffected	40	5	1	1	2
microlobulation					
Present	60	3	2	2	1
absent	26	3	2	2	1
calcification					
linear	10	1	1	1	0
Punctuate	26	3	0	1	1
absent	50	2	3	2	1
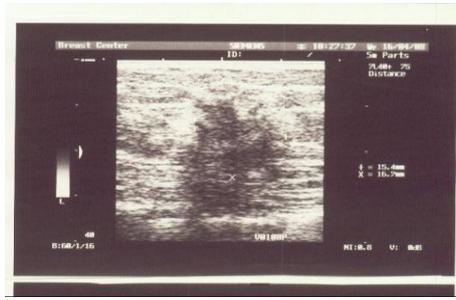
Figure 1. Ductal carcinoma. The feature s of malignancy on US image. The mass obscure margin, irregular high width to AP dimension has an irregular shape, indistinct margins, and a width-to-AP dimension Biopsy results invasive ductal carcinoma.

Figure 2. Invasive lobular carcinoma the mass is hypo echoic, with posterior acoustic shadowing, and well defined.

Figure 3. mucinous carcinoma, 1.0-cm oval-shaped mass. The mass seen hypo echoic and the irregular   margin.

Figure 4. Medullary   carcinomas. US scan shows lesion corresponds to oval mass of low echogenicity with echogenic center   in upper outer quadrant. The mass was classified as suspicious for benign.

Figure 5. Papillary carcinoma with homogeneous echo texture. Sonogram shows a well-circumscribed, elongated

mass. Echo texture is nonhomogeneous with echogenic areas no hypo echoic background.

Discussion:

About 4% of palpable breast cancers appeared normal, benign or nonspecific on both mammography and US. in this study using sonography false negative rate was 16% (8).

When any radio imaging modality; mammography or sonography report considers a malignant breast lesion as benign, the sequel of false reassurance may be dangerous through causing delays in diagnosis, and in turn presentation of carcinoma will be in advanced stage (9).

Usefulness of adjuvant ultrasonography (US) to evaluate the palpable breast masses in patients without corresponding mammographic abnormality has been documented, with cancer detection rate of approximately 84%. This implies that breast cancers may escape detection with the mammographic findings of normal or seemingly benign abnormalities. Evaluation with US is thus essential to avoid the overlook of lesion in cases of palpable breast cancer without obvious mass on mammograms (10).

Both mammographic and sonographic assessments are important in the exactly diagnosis of mucinous carcinoma, the prediction of stage, and the extension of the tumors (11).

Sometimes in Medullary carcinoma, because of inflammatory reaction, it shows contours are blurred, ultrasound and mammography and diagnosis is difficult due to no pathognomonic aspect (12).

The circumscribed margins on sonographic examination is the only differential finding between invasive and non-invasive papillary cancers was reported by Kim et al (13).

Winchester et al reported that the lack of desmoplastic reaction may make the lesion impalpable and invisible, both clinically and mammographic ally, which could partly explain why lobular carcinomas were larger at diagnosis than IDCs (14).

In Albayrak and colleagues' study, four (10.5%) invasive lobular carcinoma tumors were sonographically invisible (15), while six (100%) were missed in this study.

Whatever the experience of radiologist, 100% accuracy in evaluation of breast cancer can't be expected, Kirby et al stated that an experienced radiologist can detect breast cancer with a false-negative rate of 7% and a false-positive rate of 10% and, in our study because the sample was small no false positive case was recorded while a false negative rate of 16% was recorded (9).

In our sample of study found that the causes of failure of US are mistakes in image interpretation, geographic scanning misses, and sonographically invisible invasive to ours except that *in situ* carcinomas. Similar result was

reported by several authors (16).

Murphy and his colleagues in their study over a 10-year period (1994-2004), concluded that asymmetrical density and distortion were the most commonly misinterpreted or overlooked lesion in symptomatic patients as we found in our study (17). In this study, we had to proceed to tru cut or open biopsy if sonography failed to identify a malignant mass similar result found in Bennett (18). Günhan-Bilgen and Oktay in their study of tubular carcinoma sonographically occult in 6% while in our study no case of tubular carcinoma was found for comparison (19). ILC often presents diagnostic difficulties for conventional imaging and physical examinations and, resulting in sensitivities lower for the detection of ILC than for IDC in this study all IDC were diagnosed sonographically but all ILC were misdiagnosed (20). A clinically suspicious mass should be biopsied regardless of imaging findings, Lin et al. reported that 10 to 15% of lesions can be occult on mammographically (21), while our study concluded that 16% were missed sonographically. All US examinations were performed with siemens versa transducer of 7-MHz linear-array The protocol scanning included both longitudinal and transverse imaging of the solid masses, with representative hard-copy images acquired in each plane. In symptomatic women with mammographically dense breasts we recommend that ultra sound scanning in routine evaluation. When there is difference between the histopathology and imaging results, another biopsy would have avoided a delay in some cases. A normal ultrasound examination should not deter the radiologist from proceeding to stereotactic biopsy, if mammographic lesion index is suspicious of malignancy (22). Several study over a 10 year period concluded that distortion and asymmetrical density were the most commonly overlooked lesion in symptomatic lesion in symptomatic patients as we found in our study (23, 24). The surgeon should know the diagnostic defaults of each radiolologic modality so that he will shift to appropriate modality if the early results of a certain modality are not pointing to the clinical suspicion of breast cancer. Limitation of the study: Mammography was not done during the period of the study because of shortage of radiology films. The period of the study was short that only a small sample could be collected so that not all subtypes of breast cancer were detected.

Conclusion: In conclusion, results of this study indicate that the histopathological type of cancer of breast affects the sonographic evaluation through misleading the diagnosis either because of presence of only the subtle signs of malignancy or sonography cannot detect specific histological types such as lobular and medullary carcinomas. The surgeon should know the diagnostic defaults of each radiologic modality in order to request the appropriate modality if the results of a certain modality are not explaining the clinical suspicion of breast cancer.

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Corresponding author:

Kassim A.H. Taj-Aldean

Department of Surgery

College of Medicine/Babylon University

Hilla / Babylon Governorate, Iraq

Email: kassim33amir@yahoo.com , kassim33amir@gmail.com