Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL11, ISSUE 04, 2020

Original research article

Ultrasonographic Evaluation Of Breast Masses With Histopathologic Concordance

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Abstract

Introduction: Imaging of the breast has as its ultimate purpose the early detection of breast cancer in its most treatable stages, and the radiologist plays a significant part in these efforts. Breast lumps are a prevalent disease that affects females and require adequate workup, early diagnosis, and treatment. Breast lumps can be caused by a variety of conditions. Ultrasonography of the breast, often known as USG, is the inquiry of choice when it comes to diagnosing tools for the evaluation of breast problems.
Keywords: Shoulder apophysis, painful shoulder, athlete, sports, cricket, acromion, paediatric

Introduction

Imaging of the breast has as its ultimate purpose the early detection of breast cancer in its most treatable stages, and the radiologist plays a significant part in these efforts. Breast lumps are a prevalent disease that affects females and require adequate workup, early diagnosis, and treatment. Breast lumps can be caused by a variety of conditions. In India, the World Health Organization estimates that approximately one lakh new patients are identified each year [1]. When compared to locations with a higher level of development, less developed areas have a higher prevalence [2]. As stated in global and Indian research [3-7], recent years have seen a large increase in the incidence, morbidity, and mortality rates seen in the Indian population. At the same time, the incidence of breast cancer has recently overtaken that of cervical cancer among Indian women [8]. It's possible that factors like marital status, location (urban or rural), body mass index, breastfeeding, waist-to-hip ratio, obesity, alcohol use, tobacco chewing, smoking, lack of exercise, food, and environmental factors are all contributing factors to the rising prevalence. Other variables that contribute to the problem include the absence of specialized awareness initiatives, preventative measures, screening programmes designed for early diagnosis, and treatment facilities.

Ultrasonography of the breast, often known as USG, is the inquiry of choice when it comes to diagnosing tools for the evaluation of breast problems.8. Its appearance on mammography can vary widely, and breast illnesses might be difficult to diagnose when thick breast tissue is present in mammography9. If the patient is young or the tumours are modest, ultrasonography (USG) is a better method for detecting breast cancer [10, 11]. This technique fills in the gaps left by other diagnostic methods. According to the traditional explanation, carcinomas are irregular solid masses that have a heterogenous texture and impaired sound transmission in the ultrasonography (USG), which results in "shadowing" behind the lesion. Some meet these characteristics just in part, while others do not in any way. It is for this reason that a precise correlation of ultrasonographic (USG) findings with their corresponding histopathologic aspects is considered to be of the utmost importance in ultrasonographic

ISSN: 0975-3583,0976-2833 VOL11, ISSUE 04, 2020

(USG) evaluation of breast disorders [12].
The treatment for breast lesions that may be felt by the patient comprises a "triple assessment," which consists of a physical exam, imaging, and either a small needle aspiration or core biopsy. Before undergoing breast-conserving surgery, it is extremely vital to determine the excision area as precisely as possible for the benefit of the patients [12]. Additionally, it is critical to check for the presence of carcinoma extension.
Ultrasonography, often known as USG, has been shown in previous research to be beneficial in distinguishing between benign and malignant forms of breast illness. The use of high-resolution equipment enables ultrasonography, often known as USG, to detect non-palpable tumours that are too small to be felt by the patient. These cancers are typically not found by high-quality mammography. High- resolution Ultrasonography (USG) is a useful modality that helps to additionally evaluate breast lesions and also helps to characterise a mammographically non-detected palpable abnormality in dense breast. While mammography is a cost-efficient and accepted technique for the evaluation of clinically suspected breast lesions, High- resolution Ultrasonography (USG) is a useful modality that helps to additionally evaluate breast lesions. Ultrasonography (USG), on the other hand, has a number of drawbacks, especially when it comes to the detection of tiny lesions [13]. In light of these considerations, a study titled "Ultrasonographic evaluation of breast masses with histopathologic correlation" was carried out with the objective of evaluating breast masses by means of ultrasonography (USG) and correlating the findings of ultrasonography (USG) with histopathologic characteristics.

Aim & Objective
Ultrasonography will be used to investigate breast lumps, and a correlation between USG and histopathology will be sought for so that breast cancer can be identified earlier.

The Components and Procedures
It was a prospective observational study that was conducted out in a hospital setting by the department of radiology. Patients who presented with breast swelling were sent to the radiology department. Ultrasonography (USG) was used to diagnose breast diseases in these patients. One hundred different breast lesion cases were investigated. The length of the study lasted from June 2018 till June 2020.
The tabulation of the results and the statistical analysis were both performed with the assistance of the SPSS software.

Standards for admittance
1. Patients presented themselves to the outpatient department reporting breast swelling, which was confirmed by ultrasonography (USG).

Exclusion conditions
1. Patients who previously had a diagnosis were not considered for this study.
2. Patients who could not be located for follow-up were disqualified.
3. Patients who refused to consent to either USG or histopathology were also disqualified from the study.
4. Participants who had their cancer treated with neo adjuvant chemotherapy were not allowed to participate in the trial.

Ultrasonography as a Method of Procedure (USG)
In the department of Radiology, the ultrasonography (USG) examination was performed utilizing the mechanical scanners of GE 8 Healthcare Voluson E8 with a linear probe 10MHz transducer.

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Histopathology

Histopathological results were obtained without first having prior knowledge of the findings of the breast Ultrasonography (USG).

It was determined to be a positive margin if there were malignant cells at the surgical margin or within 5 mm of the surgical margin. In this study, the accuracy of the ratio between the cancer extension found by ultrasonography (USG) and that found by histology was analysed. In the event that inconsistencies were discovered, the suspect lesions underwent a second ultrasound examination (USG). Both the SPSS software and Microsoft Excel were utilised in the process of carrying out the statistical analysis. A statistically significant p-value was determined to be lower than 0.05.

Results

In the current study, there were a total of 100 cases investigated. The ages of the patients ranged from 18 years old all the way up to 75 years old, with a mean age of 46 years.

A. An analysis of the Peripheral Borders of the Lesion

Eighteen of the one hundred cases involved confined masses. 14 of these 18 circumscribed tumours that were found by ultrasonography (USG) were also described as being circumscribed by the histopathologist. This constitutes 77.8% of the total. In the current investigation, there were 82 masses that were not delimited. The histological analysis of these 82 cases revealed that 74 of them, or 90.25 percent, were classified as "not circumscribed." The results of the ultrasonography (USG) and the histological examination agreed with one another 87.0% of the time. (Table-2)

B. An Assessment of "The Boundary Zone" (Halo)

Ultrasonography revealed the presence of halo around 58 of the 100 tumours that were examined (USG). The term 'histopathologic halo' was used to 52 of these 58 cancers that exhibited halo (Table 1). The percentage of those who agreed was 87.6%. The pathologists characterised 42 of the 100 tumours as masses that lacked a halo. (Table-2)

C. Assessment of the Internal as well as the Posterior Echoes

Approximately 59.7% of the tumours with equal or heterogeneous internal echoes histopathologically were linked with weak collagenization of the stroma and diverse intratumoral structure. The proportion of stromal cells to cancer cells ranged from 3:1 to 1:3. In tumours with low echo levels, a pronounced collagenization of the stroma and a greater fibroblastic stromal ratio were found. Concerning the posterior echo, enhancing tumours histopathologically exhibited carcinoma cells proliferated in pushing, encapsulated, and monotonous styles. These characteristics were also demonstrated in every instance of mucinous carcinoma that was investigated. The patterns of considerable intratumoral heterogeneity were also revealed by approximately 76.1% of the tumours that were classed as having "no alterations." In addition to this, ultrasonographically attenuating cases (28 out of the 100 tumours, or 28%) were related with substantial collagenization of the stroma as well as a greater fibroblastic stromal ratio.

Correlations of Histopathological Findings with Other Ultrasonographic Findings (Interruption of the Anterior or Posterior Borders of the Mammary Gland) 72 out of the 100 tumours were found to have invasion of the anterior and posterior boundaries of the surrounding tissue. The histological interpretation of expansion into adipose tissue was also given for sixty of the seventy-two tumours (83.4%). In total, 28 individuals were found to have malignancies that did not obstruct blood flow. Histopathological examination revealed that 85.7% of the tumours were either infiltrations in the mammary gland or non-invasive carcinomas. The degree to which these borders were in agreement was 84.4 percent. (Table 2)

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The Relationship between the Comprehensive Ultrasound and Histopathological Diagnoses. The connection between histological kinds determined by ultrasound diagnostic and histopathological types was 91.6%, according to the ratio of the correlation between the two (92 out of the 100 tumors). The frequencies of concordance between US findings and the histologic types of mucinous carcinoma, IDC, DCIS, and ILC were as follows: 95.2% (78 out of the 82 tumours), 25% (2 out of the 8 tumours), 66.7% (8 out of the 12 tumours), and 100.0% (2 out of 2 tumour), respectively (Table 3). The capacity of ultrasound to detect lesions with a diameter of one millimetre or more is limited.

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

In cases of cancer cells that have multiplied in both a solid and extended form, circumscribed masses can be found. Cells that are grouped in clusters, cords, or trabeculae and that are coupled with a mixed intraductal component and invasive areas are indicators of the presence of non-circumscribed masses. The term "halo" refers to one of the back scatterings used in ultrasonographic imaging (USG). 15 Back scattering is defined as the propagation of a sound wave in the opposite direction of an incident element. 32 The findings of this current investigation indicated that halo was, in fact, characterised by cancer cells that had penetrated or mingled with fat tissue, as well as fibroblastic stroma and carcinoma cells. Previous

ISSN: 0975-3583,0976-2833 VOL11, ISSUE 04, 2020

research seems to indicate that the degree of internal hypoechogenicity impacts the sensitivity of the test when it comes to determining whether or not a lesion is malignant [14, 15, 16]. According to the findings of our research, the ratio of intratumoral carcinoma cells to fibroblastic stroma as well as the characteristics of the histological stroma were responsible for anterior and posterior echoes. Internal echoes and posterior echoes were classified according to the histological structure of the intratumoral space. Internal low echoic masses were found to reflect a high ratio of fibroblastic stroma, and it was discovered that the stroma in these lesions had notable degrees of interstitial collagenization. It was found that the tumours histopathologically related with hyperplasia of collagenized fibroblastic stroma had an attenuation of posterior echo. The findings of the ultrasonographic (USG) examination and the findings of the histopathological examination were 91.6% consistent with one another. The findings demonstrated that DCIS and ILC had lower concordance rates between the estimated and real histological types in comparison to the other kinds of breast cancer. ILC might be imperceptible and challenging to diagnose with normal physical examination and/or imaging, including ultrasonographic testing (USG). In addition, the results of our research showed that ultrasonography (USG) is only able to detect lesions that are smaller than one millimetre in diameter.

Conclusion

The majority of breast cancer patients receive standard treatment, which consists of breast conservation therapy. Following breast conserving therapy, positive or close margins were associated with greater risks of tumour recurrence, according to the findings of several studies. Negative margins were associated with lower rates of tumour recurrence. As a result, it is of the utmost importance to analyse the extension of the carcinoma prior to surgery and to establish the excision areas in order to carry out breast conservation surgery with as much precision as is humanly possible. Based on the findings of the study, we have drawn the conclusion that in situations in which ultrasonographic (USG) imaging cannot determine the extent of carcinoma prior to surgery, determining the extent of carcinoma can be accomplished by correlating US findings with the histopathologic characteristics of carcinoma cells. This study highlights the significance of establishing a link between the histological and ultrasonographic findings of breast lesions in order to enhance the diagnostic accuracy of ultrasonography (USG).

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ISSN: 0975-3583,0976-2833 VOL11, ISSUE 04, 2020

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