

Original Research Article

Evaluation of breast mass and applicability of histopathology and sonomamography for accurate diagnosis of malignant masses

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Abstract

Breast or mammary gland is a modified sweat gland. The mammary gland is a superficial organ. Breast carcinoma is the most common cancer in women all over India and accounts for 25% to 31% of all cancers in women in Indian cities. With the increased incidence of breast cancers every breast lump needs to be evaluated so as to assure the patient of its nature. The study was based on 50 patients who were referred to the Department of Radiodiagnosis and Imaging for evaluation of breast lesions. A detailed breast specific history was taken including menstrual history, history of mastalgia, lactational history, past and family history of any breast problem. Results showed that, highest incidence of breast lesions was found in the age group of 20-29 years containing (36%) of all cases. The second peak was seen in the age group of 40-49 years containing (18%) of all cases. Left sided lesions were slightly more common. While it was observed that of the 50 cases referred ultrasound correctly diagnosed 42% cases as malignant as compared to 18 % diagnosed as malignant by histopathology. The findings of the study portray that Ultrasound (US) should be used as the initial examination in patients and shall also be used as adjuvant to mammography in older patients.

Key words

Breast mass, Histopathology, Sonomammography, Malignant mass.

Introduction

Breast is a modified sweat gland. In the male the breast is with few exceptions a dormant structure while in the female from Puberty to death, the breast is subjected to constant physical changes related to menstrual cycle, pregnancy, lactation and menopause. This marked difference in function with rapid proliferation and progression during pregnancy (which may be often repeated) and the regressive changes following the menopause explain, to a certain extent, the more frequent occurrence of carcinoma in the female breast [1]. With the increased incidence of breast cancers every breast lump needs to be evaluated so as to assure the patient of its nature. Accounting for 20% of all cancers, it is one of the commonest causes of death in middle aged women in the western world and affecting half a million women worldwide each year [2]. In United Kingdom approximately 25,000 new cases are registered per year with a high mortality accounting for 15,000 deaths per annum. In United States it is the leading cause of death among 40-44 year old women [3].

For proper diagnosis many investigations are done which include Ultrasound (US), mammography or Magnetic Resonance Imaging (MRI). However Ultrasound has remained the first examination (before mammography or MRI) for the evaluation of a palpable lump in women [4]. The indications of ultrasound in patients with breast lumps are; to evaluate mass demonstrated on mammography, evaluation of focal asymmetry and evaluation of suspicious finding requiring biopsy. Ultrasound may also be used as an adjunctive examination to evaluate nipple discharge or to evaluate focal pain [5]. Breast ultrasound requires high frequency transducers that are optimized for near field imaging. High resolution linear array, 7.5-12 MHz transducers are used, which are focused at 1.5-2.0 cm, an ideal focal length for breast ultrasound, minimizing volume averaging [6].

The breast can be divided into three layers from superficial to deep. Most significant pathology

arises in the mammary layer [7]. The sonographic appearance of these layers is variable depending on the amount and distribution of fat, connective tissue, and glandular and ductal tissue. The appearance also depends on hormonal status and can range from a clear stratification of layers to a homogeneously heterogeneous appearance [8]. Most important is the ability to recognize normal structures that are usually seen: skin, Cooper's ligaments, fat lobules, and fibrous tissue. These make up the stromal component of the breast, ducts (from which most significant pathology will arise), and chest wall structures [9].

The sonographic Breast Imaging Reporting and Data System (BIRADS) Nomenclature and Lexicon categorises the findings from category 1 to category 5 [10]. Sonographic BIRADS 1 corresponds to sonographically normal tissues and sonographic BIRADS 5 category is termed malignant and indicates a risk of malignancy of 90% or greater [11].

The differentiation of benign from malignant solid masses has been the leading focus of research in breast ultrasound. With advancing technology and an increasingly cost conscious healthcare system, breast imaging has been challenged with not only the earlier identification of malignancy but also the reduction of the benign biopsy rate. Ultrasound features that most reliably characterize masses as benign are a round or oval shape (94%), Circumscribed margins (91%), width to anteroposterior dimension ratio greater than 1.4 (89%). Features that characterize the masses as malignant are an irregular shape (61%), microlobulated (67%), spiculated margins (67%) and width to anteroposterior dimension ratio of 1.4 or less (40%) [12]. Although mammography is the primary imaging modality for the early detection of breast cancer, ultrasound, used in conjunction with mammography, can further increase the cancer detection rate [13]. The different histologic characteristics account for some variability in ultrasound appearance. Most invasive ductal carcinomas exhibit irregular or

ill-defined margins related to infiltrative and fibrotic components. Carcinomas of uniform cell type or types that do not invade aggressively may appear as well circumscribed masses [14].

Stavros, et al. reported a 98.4% sensitivity for diagnosis of malignant masses using ultrasonographic criteria for malignancy. These results reflect the high resolution of state-of-the-art equipment and expanding skills of the radiologist [15]. Although MRI has been shown to be more accurate than ultrasound for evaluation of silicone gel implant integrity, ultrasound can be used as the initial evaluation [16].

The present study was one with the aim to evaluate breast masses in patients presenting with symptoms of breast disease and to find out general applicability of ultrasonographic (US) features in differentiating benign from malignant breast masses.

Materials and methods

This prospective study was conducted in the department of Radiodiagnosis and Imaging, Government Medical College and Associated Hospitals, Srinagar, Jammu and Kashmir in the year 2103-2014. The study was based on 50 patients who were referred to the Department of Radiodiagnosis and Imaging for evaluation of breast lesions.

A detailed breast specific history was taken including menstrual history, history of mastalgia, lactational history, past and family history of any breast problem. The inclusion criteria included that the patients were married women and men who were coming to the Out Patient Department of the hospital from March 2013 to July 2014. Ethical clearance was granted by the institutional ethical committee. Subjects with pre diagnosed systemic illness and subjects with any type of medication were not included into the study. While the age was not set as a criteria for selection of the patients. All the subjects who were taken into the study were explained the

subject of the study and an informed written consent was acquired from them prior to the start of the study.

All US examinations were performed with (iU22 Phillips) using a high frequency 7-10 MHz linear array transducer. The scanning protocol included both transverse and longitudinal real time imaging of the breast masses with representative hard copy images acquired in each plane, particular attention was given to scanning patients in radial and antiradial planes.

Breast masses were evaluated with respect to shape (Oval, round, lobulated or irregular), margins (circumscribed, ill defined, spiculated or micro lobulated), width to anteroposterior dimension ratio, posterior echoes (enhanced, unaffected, decreased) and echogenicity (intensity of internal echoes). Final assessment category for each case was established modeled on the American College of Radiology Breast Imaging Reporting and Data System (BIRADS). Each mass was categorized as benign (negative, benign or probably benign) or malignant (showing a suspicious abnormality or highly suggestive of malignancy).

The data were analyzed using a prescription as a unit. The primary analysis included all prescription who satisfied the inclusion criteria. Data were entered into an Excel Sheet database (MS Office Excel 2000; Microsoft Corporation, Redmond, WA, USA). The Data was analyzed using Minitab 16.1.1 version of statistical software.

Results

The present was carried out over a period of one year. The study was based on 50 patients who were referred to the Department of Radiodiagnosis and Imaging, Government Medical College and Associated Hospitals, Srinagar, Jammu and Kashmir for evaluation of breast lesions.

Table - 1 shows the distribution of the cases as per the age distribution, it was observed that, highest incidence of breast lesions was found in the age group of 20-29 years containing (36%) of all cases. The second peak was seen in the age group of 40-49 years containing (18%) of all cases.

Table – 1: Distribution of cases according to age.

Age (Years)	No. of patients	%
0 -9	0	0
10 - 19	8	16
20- 29	18	36
30 - 39	6	12
40 - 49	9	18
50-59	4	8
60-69	4	8
> 70	1	2
Total	50	100

Table - 2 shows the distribution of the cases according as per parity. It was observed that most of the patients were nullipara, i.e., 24 (48%) out of 50 patients were not having any children while rest of the patients had variable number of children ranging from 1 to 5.

Table – 2: Distribution of cases as per parity.

No. of children	No. of patients	%
Nil	24	48%
1	4	8%
2	9	18%
3	8	16%
4	3	6%
5	2	4%
Total	50	100%

Table - 3 shows the distribution of the lesions as per the site and site. It was seen that the left sided lesions were slightly more common than the right sided lesions, 27 Out of 50 lesions were left sided. On both sides upper outer quadrant was the dominant site for the lesions. Two cases involved the whole breast and two lesions involved more than one quadrant.

Table – 3: Distribution of cases as per site and side.

Site	Left	Right
Inner upper quad	8	6
Outer upper quad	16	14
Outer lower quad	2	2
Inner lower quad	1	1
Total	27	23

Table - 4 shows clinical presentation of the cases as per different complaints of the patients. The most common complaint that made the patients to attend the hospital was breast lump. This was complaint in 39 out of 50 patients comprising (78%) of cases. The second common was pain associated with lump in seven patients (14%).

Table – 4: Clinical presentation of the cases as per different complaints.

Presenting complaints	No of patients	%
Lump alone	39	78%
Pain plus lump	7	14%
Discharge from nipple	2	4%
Any other	2	4%
Total	50	100%

Table - 5 presents the diagnosis of the lesions in respect to different methods used. It was seen that histopathology diagnosed 82% cases as benign as compared to 58% which were diagnosed as benign by Ultrasound. While it was observed that of the 50 cases referred ultrasound correctly diagnosed 42% cases as malignant as compared to 18 % diagnosed as malignant by histopathology.

Discussion

The following study was carried out in the Department of Radiodiagnosis and Imaging, Government Medical College and Associated Hospitals, Srinagar, Jammu and Kashmir over a period of one and a half year from March 2013 to July 2014. The study was based on 50 patients who were referred to the Department of

Radiodiagnosis and Imaging for evaluation of breast lesions.

Table – 5: Diagnosis of the lesions in respect to different methods used.

		Benign	Malignant	Total
Histo-pathology	n	41	9	50
	%	82%	18%	100%
Ultrasound	n	29	21	50
	%	58%	42%	100%

The mammary gland is a superficial organ. Breast carcinoma is the most common cancer in women all over India and accounts for 25% to 31% of all cancers in women in Indian cities [11]. Due to lack of awareness and almost non-existent breast screening practices, patients present with palpable breast cancers, a profile very different from their counterparts in developed countries where most of the breast cancers are screen detected.

In the recent years it has been observed that increasing awareness, associated anxiety & stress among women who perceive every lump in breast as carcinoma, compels the patient to seek the medical advice. With the increased incidence of breast cancers every breast lump needs to be evaluated so as to assure the patient of its nature [2]. With increase awareness and use of mammography, younger women are being referred more frequently. At times it becomes difficult, if not impossible; to reassure the patient about the future course a certain lump may take. In addition the diagnostic accuracy of the breast lump is important as breast cancer is one of the most treatable of all human malignancies when diagnosed early. Accounting for 20% of all cancers, it is one of the commonest causes of death in middle aged women in the western world and affecting half a million women worldwide each year [3].

Out of total fifty patients with breast lesions included in this study only 1 (2%) was male. The incidence is almost similar to observations as

reported by previous authors from different parts of the world which ranges from 0.5% to 3.3% [2, 17, 18]. While on the contrary Tyagi, et al. in his study of 92 patients observed much higher incidence (6.4%) of male breast cancer [1]. The highest incidence was in age group 20–29 (36%) and second highest in 40–49 years (18%). The peak in age group 20–29 indicates that most of the lesions were benign. This type of bimodal distribution is due to the high incidence of benign breast lesions in younger age group. The second peak is due to the presence of malignant lesions in older age group. The incidence of 36% in the present study corresponds with reported 39.8% in 21–30 years group a previous study done in 1998 [19].

The benign breast lesions seen in the present study as well as different histological types were seen in most of the patients one decade earlier in Indians as compared to white females [20, 21]. The results of the present reflects early maturity and menarche in tropical and temperate climates. The second peak seen in 40 – 49 year age group is caused by high incidence of cancer. This finding is consistent with many previous studies who have reported similar incidence in similar age groups [2, 22]. The present study further revealed that out of 50 patients 30 (60%) were married and 20 (40%) were unmarried. All the malignant cases belonged to the married group. This finding is consistent with findings of previous studies which have yielded similar results [23, 24]. The present study showed that 24 (48%) of the patients were nullipara, similar to many previous studies in similar populations [25].

The present study also revealed that lump is the commonest presentation with incidence up to 96% which is similar to many previous studies [26, 27, 28]. While many previous studies are in coconscious with the finding of involvement of left breast more than right breast [2, 26]. In the present study Benign histological diagnosis was seen in 82% of the lesions and malignant diagnosis was seen in 18% of the cases. Similar

results have been reported by other authors [5, 15].

The results of the present study displays that breast US is an essential problem-solving tool in the breast radiologist's armamentarium. This study reinforces that belief by demonstrating that high-resolution US of the breast can successfully help distinguish many benign from malignant solid nodules [5]. It has been reported earlier that US is less sensitive for demonstration of micro calcifications than is mammography. The smaller the calcifications, the lower the sensitivity of US for showing them [5, 29]. However, the currently used high-frequency transducers can show a higher percentage of mammographically visible calcifications than could the previously used lower-frequency transducers. Calcifications appear as bright punctate echoes that appear larger than their true size, but they are not large enough to create acoustic shadowing [30].

Conclusion

In conclusion we believe that high frequency US has a definite place in the investigation of symptomatic breast disease. It should be used as the initial examination in patients and shall also be used as adjuvant to mammography in older patients.

The findings of the study conclude that majority of patients were females (98%), and maximum incidence of lesions was observed in 20 - 29 years age group (36%). It can also be concluded that certain Ultrasonography features can be helpful in differentiating benign and malignant breast lesions.

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