Comparison of Diagnostic Accuracy of Film-Screen Mammography and Ultrasound in Breast Masses

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ABSTRACT

Objective: To determine diagnostic accuracy of film-screen mammography and ultrasound in differentiating benign from malignant breast masses taking histopathology as gold standard.
Study design: Cross-sectional study
Study Setting: Department of Diagnostic Radiology in collaboration with Department of Surgery, Sir Ganga Ram Hospital, Lahore
Duration Six months (7th May, 2009 to 7th November. 2009).
Subjects and methods: 210 patients were selected by non probability purposive sampling who had a palpable breast lump. Mammography was performed using craniocaudal (CC) and mediolateral oblique (MLO) projections. Ultrasound examination was carried out using a 7.5 Mhz linear array transducer. The final diagnosis was established by comparing the results of ultrasound and mammography with that of biopsy.
Results: Sensitivity and specificity of mammography was 77% and 94.9% respectively. Positive and negative predictive value was 83.3% and 92.5% respectively. Diagnostic accuracy rate was 90.5% Sensitivity and specificity of ultrasound was 77% and 96.2% respectively. Positive and negative predictive value was 87% and 92.7% respectively. Diagnostic accuracy rate was 91.4%.
Conclusion: Prompt diagnosis and treatment of breast cancer is essential. With early diagnosis the chance of surviving breast cancer is higher than 90%. The study suggested that in terms of sensitivity and specificity both mammography and ultrasound are comparable.
Key words: Mammography, Ultrasound, Breast cancer.

INTRODUCTION

Breast cancer is the most common nonskin cancer in white women.[1] World wide breast cancer is the second most common type of cancer after lung cancer (10.4% of all cancer incidence) and the fifth most common cause of cancer death. In Pakistan multicenter studies have revealed that breast carcinoma is the most common malignant tumor among female population and accounts for 35.5% of all malignancies.[2] It is responsible for 40,000 deaths per year in Pakistan alone .

Mammography has been the gold standard in breast cancer detection for more than 40 years for its accuracy and especially for its ability to detect microcalcifications .There is more and more evidence showing that screening mammography (MMG) contributes to declining breast cancer mortality due to earlier detection.[3,4].However limitations in its ability to detect both small and lobular breast cancers, poor resolution in dense breast and a lack of significant improvement in cancer detection despite digital mammography and computer aided diagnosis has

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inevitably led to a search for other modalities to improve cancer detection in breast.

MATERIALS AND METHODS

Study was conducted for a period of six months commencing from 7th May, 2009 to 7th November, 2009. Patients referred to our department from surgical outdoor and indoor in this period fulfilling inclusion and exclusion criteria were enrolled in this study. Demographic history that is name, age, address were noted. After giving informed consent, the patients underwent mammography and ultrasound examination of both breasts. Ethical issues such as considering the privacy of the patient were considered and maintained. Patients between the age of 35-60 years referred from surgery (indoor/outdoor) having solid breast mass on clinical examination for mammography/ultrasonography were included in the study. All those patients with negative finding on any procedure were excluded also Birads category 0 and 6, taking Hormone Replacement Therapy (HRT) and   operated previously were excluded.

RESULTS

The details of results are given in tables 1,2,3,5 and 4

Table 1: Distribution of benign versus malignant disease (n=210)

Disease	n=	%age
Benign disease	158	75.2
Malignant disease	52	24.8

Table 2: Diagnosis of carcinoma breast with different modalities

Procedures	n=	%age
Biopsy	52	24.8
Mammography	48	22.8
USG	46	21.9

Table 3: Results of usg findings (biopsy as gold standard) (n=210)

Results of USG	Biopsy		Total
	+ve	-ve	
Positive	True (a) 40	False +ve (b) 6	a + b 46
Negative	False (c) 12	True -ve (d) 152	c + d 164
Total	a + c 52	b + d 158	n 210

Table 4: Results of mammography findings (Biopsy as Gold Standard) (n = 210)

Results of Mammography	Biopsy		Total
	Positive	Negative	
Positive	True +ve (a)40	False +ve (b)6	a + b 46
Negative	False -ve (c)12	True -ve (d) 152	c + d 164
Total	a + c 52	b + d 158	n 210

Table 5: Comparison of two modalities in diagnosing breast carcinoma(Biopsy as Gold Standard)

Modality	USG	Mammography
Sensitivity	77%	77%
Specificity	98.2%	94.0%
+ve Predictive value	87%	83.3%
-ve Predictive value	92.7%	92.5%
Accuracy Rate	91.9%	90.5%

DISCUSSION

Radiology chiefly includes MG (mammography) and USG (ultrasonography) followed by biopsy. The incidence of breast cancer death can be reduced by 30 % by the routine screening of healthy women with MG[5] This is because breast changes like asymmetry, neodensity, distortion of fibroglandular architecture and microcalcifications are picked up earlier than lesions that become clinically palpable, or are sometimes detected by self-examination Masses within the breast (whether symptomatic of asymptomatic) are frequently diagnosed by mammography.It is essential to define exactly what constitutes the lesion mass in order to differentiate benign from malignant lesions[6].

USG plays a key role in differentiating cystic and solid masses. It is useful in the evaluation of palpable masses not visible in radiographically dense breasts, abscesses masses that are not completely evaluable with MG and in young patients susceptible to radiation damage[6]. Both MG and USG methods have been used in attempts to reduce the negative to positive biopsy ratio.

Mammography, the primary method of detection and diagnosis of breast disease has a proved sensitivity of 85 % – 95%[7]. However, additional diagnostic procedures often become necessary in view of its low specificity.

MG can help physicians determine whether a lesion is potentially malignant and also screen for occult disease in the surrounding tissue[8]. Recurrent or complex cysts may signal malignancy; therefore, further evaluation of these lesions is required. USG is not considered a screening test, it is more sensitive than MG in detecting lesions in women with dense breast tissue[9] It is useful in discriminating between benign and malignant solid masses, and it is superior to MG in diagnosing clinically benign palpable masses (i.e., up to 97 percent accuracy versus 87 percent for MG).[10] It was found from the literature that MG is a well-established diagnostic modality for the breast. It has high diagnostic yield, but is not 100 % accurate[11] MG when combined with USG can yield significant improvement in accuracy rates.

In this study, diagnosis of malignant disease of breast regarding sensitivity of USG is 77% and that of mammography is 77%. Both the procedures are almost of equal sensitivity. The difference between these procedures is non-significant statistically (p>0.05). In ruling out the malignant disease of breast, the specificity of USG and mammography is 96.2% and 94.0% respectively. Both procedures i.e. USG and MG showed non-significant difference (p>0.05) when compared to each other.

CONCLUSION

Prompt diagnosis and treatment of breast cancer is essential. With early diagnosis the chance of surviving breast cancer is higher than 90%. The study suggested that in terms of sensitivity and specificity both mammography and ultrasound are comparable.

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