

Comparison of Magnetic Resonance Imaging and Mammography Images of Diagnosis of Breast Masses

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A B S T R A C T

Introduction: Breast cancer challenges whole health care system and second most common carcinoma in Indian women. The present study aimed to access the diagnostic accuracy of MRI in diagnosis of malignant features of the breast masses as compared to mammography findings.

Materials and methods: A total of 60 patients provisionally diagnosed as breast mass lesion were included in this study. The cytopathological techniques used for all the breast mass. MRI and mammography techniques performed for all patients.

Result: In total 60 patients, 45 were palpable and 15 were non-palpable masses. In case of palpable lesions, MRI and mammography showed high sensitivity 95% and 90% respectively. MRI reported 50% specificity as compared to mammography 30%. For non-palpable cases, sensitivity of MRI was 90% as compared to mammography 70%, while specificity of MRI was 50% and mammography showed 25% specificity.

Conclusion: In conclusion MRI showed better sensitivity and specificity in detection of breast cancer, which way it can reduce the unnecessary biopsies for doubtful palpable breast mass.

Keywords: Breast Mass, Palpable and Non-Palpable, Magnetic Resonance Imaging, Mammography, Cytopathology.

INTRODUCTION

Breast cancer is highly devastating and second most common cancer in Indian women. The National cancer registry project reported, 52,000 women develop breast cancer per year.^{1,2} In recent scenario, breast care is the biggest challenge for entire health care system. There are several risk factors associated with breast cancer are like, fibrocystic disease of breast, family history of breast cancer, previous personal history of breast cancer, elderly primi diminished lactation, nulliparity, late menopause, early menarche, huge exposure to ionizing radiation, history of cancer endometrium, colon or ovary etc.^{3,4,5} Therefore early detection of breast cancer is necessary for the better prognostic value. The main problems in breast cancer are lack of awareness, psychological reasons, fear of disease, which is the main cause of ignorance and hiding of the disease. These factors are creating breast cancer in its late stage. The previous study reported 90% of breast cancer diagnosed are in the stage II, III and IV.⁶ The breast cancer can be diagnosed discovery of breast mass either by patients or by mammography technique. In most of suspicious cases leads to be benign.^{7,8} Most of these patients are referred to diagnosis of mammography, ultrasound, colour Doppler ultrasound, galactography, fine needle aspiration and in

few cases with open surgical biopsy.^{9,10} All these above radiological techniques has low specificity which leads to unnecessary testing of benign cases in results anxiety for patients and excess cost in health care.^{11,12} Hence, there is need of highly specific radiological diagnosis to reduce the number of unnecessary diagnostic test. The mammography is the most widely used method, especially accurate for non-palpable carcinoma.^{13,14} The mammography has low positive predictive value, hence it is not useful for the patients younger than 50 years age and in palpable breast carcinoma.^{14,15,16} This turns to excessive unnecessary biopsies without proof of malignancy. Other methods used to detect breast cancer are like ultrasound, colour Doppler ultrasound, mammography and magnetic resonance imaging.¹⁷ MRI has proven to be useful method for detection of breast cancer, due to its ability to imaging excellent soft tissue contrast. The sensitivity of MRI higher as compared to mammography technique.^{19,20} The contrast enhanced MRI and dynamic MRI found to be more accurate in diagnosis of malignancy and also it can differentiate malignancy versus scarring and implants. Therefore the present study aimed to evaluate the diagnostic accuracy of MRI and mammography in the detection of malignant feature of breast masses.

MATERIAL AND METHODS

A total of 60 clinically suspected patients were studied. Out of total, 45 patients had palpable mass and 15 patients had non palpable mass. 40 patients were of above 50 years age and the remaining 20 patients below 50 years age group. This study was conducted in Department of Radiology, B M Patil Medical Collage & Research Centre, Vijayapur, Karnataka, during the period of 2 years from March 2018 to February 2020. All patients gone through clinical examination with mammography, MRI and ultrasound examination. Informed consent was collected from all patients included in this study. The MRI study of both breasts done with 1.5 T MR system (Magnetom Vision, Seimens Medical System) and dedicated double breast coil. MRI diagnosis was performed with breasts were placed firmly by using cushions of different sizes inserted in the coil openings to minimize motion artefacts. After MRI study, fine needle aspiration was done for palpable breast mass and stereotactic biopsy was performed in case of non palpable masses. The aspirated and biopsied materials were examined for cytopathological findings.

RESULTS

A total of 60 clinically suspected patients were studied. Out of total, 45 patients had palpable mass and 15 patients had non palpable mass [Table 2]. 40 patients were of above 50 years age and the remaining 20 patients below 50 years age group [Table 1]. Breast cancer was confirmed in 20 cases by cytopathology. 15 of these cancers were palpable with size varies from 10mm to 80mm. Mammography was reported 12 cancers of the breast and MRI was able to diagnose 18 cases. MRI showed false negative scans in 2 ductal carcinomas with diameters of 8 mm and 9 mm. In both of above patients mammography results were doubtful but the malignancy not diagnosed by mammography or ultrasound. In three cases mammography and ultrasound results were

Age group	Total number
<50 years	20
>50 years	40

Table-1: Age group distribution in patients with breast mass (n= 60)

Category	Total number
Palpable mass	45
Non palpable mass	15

Table-2: Characteristics of breast masses in patients (n= 60)

Methods with category of lesions	Sensitivity	Specificity
Mammography with palpable lesions	90%	30%
Mammography with non palpable lesions	70%	25%
MRI with palpable lesions	95%	50%
MRI with non palpable lesions	90%	50%

Table-3: The sensitivity and specificity of mammography and MRI for the diagnosis of breast mass lesions

showed negative. But because of clinical examinations and family history of breast cancer the patients were examined by both non contrast and contrast enhanced MRI. In 1 case mammography showed asymmetric density of breast tissue but MRI reported diffuse contrast enhancement of low intensity. Mammography and ultrasound did not show intra-ductal tumour growths. But MRI reported 4 cases. In case of palpable lesions, MRI and mammography showed high sensitivity 95% and 90% respectively. MRI reported 50% specificity as compared to mammography 30%. For non-palpable cases, sensitivity of MRI was 90% as compared to mammography 70%, while specificity of MRI was 50% and mammography showed 25% specificity [Table 3].

DISCUSSION

The breast masses can be frequently examined by mammography technique. It is necessary to differentiate the mass lesions correctly so it's easy to differentiate between benign and malignant lesions. The widely used method to diagnose breast mass is mammography, which has diagnostic sensitivity of 85-95%.^{8,11-13} But due to its low diagnostic specificity, there is need to do additional diagnostic procedures.^{12,21} Usually younger women has denser breast, also use of oestrogen replacement therapy increases the breast density during or closely after the beginning of menopause. The mammography method has lower sensitivity to diagnose dense breast parenchyma and younger age group.²²⁻²⁴ Recently to diagnose breast mass, non invasive procedures like, MRI, colour Doppler ultrasound, and ultrasound are additional diagnostic methods. Although non invasive methods are available to diagnose breast masses, but in certain cases biopsies and fine needle aspiration are necessary to obtain reliable results.^{10,11,25} The breast cancer cases are related to tumour angiogenesis. The increased blood vessels can increase the vascular permeability, which increase tumour blood volume leads to arteriovenous shunt formation, altered capillary bed transmit time, increased interstitial pressure due to absent lymphatic vessels in tumours result form tumour angiogenesis and create characteristic patterns of intravenously injected contrast medium that can be differentiated from those related to benign lesions.^{2,26-28} In this study the sensitivity was higher for MRI than mammography. But the specificity showed lower for both MRI and mammography as per our study. Most of the cases mammography did not distinguish between benign and malignant lesions, also MRI not provided any additional information for these cases. Although some studies reported good specificity of MRI, and few studies showed MRI specificity ranges between 30-70%.^{19,25,29,30} Our study reported low specificity of MRI for the diagnosis of breast mass. In our study both mammography and MRI reported higher diagnostic sensitivity to examine palpable breast masses (95% and 90% respectively). In case of non palpable breast mass, MRI showed higher sensitivity than mammography i.e. 90% and 70% respectively. In case of benign breast mass, mammography and MRI both reported 50% false positive results. One most important limitation

of mammography method are the dense breasts resulting from changes during menstrual cycle, fibrocystic changes, lactation and oestrogen replacement therapy. In case of MRI, it has limitation like, long repetition time which does not optimize the T1 weighted images.^{28,31} In conclusion MRI showed better sensitivity and specificity in detection of breast cancer than mammography, which way it can reduce the unnecessary biopsies for doubtful palpable breast mass.

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