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RESEARCH ARTICLE

A COMPARATIVE STUDY OF MRI AND TRIPLE ASSESSMENT IN EVALUATION OF PALPABLE BREAST MASSES

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ABSTRACT

Introduction: A lump in the breast is of great concern to the patients and is also a challenge to the diagnostic judgement of the surgeon. Early diagnosis of breast cancer has increasingly resulted in a more conservative surgical approach to the disease. **Methods:** The present, comparative study was conducted in the Postgraduate Departement of General Surgery and Department of Radiodiagnosis and Imaging, Government Medical College Srinagar,for a period of obout two and a half years. A total of 60 patients underwent clinical examination by surgeon, FNAC by pathologist. Mammography/ultrasonography was done and evaluated by radiologist blinded to FNAC/Clinical examination reports, MRI breast was arranged and evaluated by radiologist blinded to result of triple test. **Results:** Most common age group affected was 50 to 70 years with a mean ± SD of 50.9±14.47. Most common location of breast lesions in patients was upper outer quadrant 31 (51.7%) and least common location was lower inner quadrant 4 (6.6%). Left sided lesions 31(51.67%) were more than right sided lesions 28 (46.67%) with only 1 (1.66%) bilateral lesion. Benign lesions were present in 28 (46.33%) patients and malignant lesions were present in 32 (53.33%) patients. Pain was the most common symptom present in the patients 25 (41.7%) followed by nipple discharge 7 (11.7%) and then weight loss, 6(10%) patients. Skin changes were present in 20% patients,4 (6.67%) had nipple retraction, enlarged axillary lymph nodes were seen in 21 (35%) patients. the accuracy of triple test in the evaluation of breast lesions with 96.9% sensitivity and 67.9% specificity and positive and negative predictive value of 77.5% and 95.0% respectively. the accuracy of MRI in the evaluation of breast lesions with 96.9% sensitivity and 89.3% specificity and positive and negative predictive value of 91.2% and 96.2% respectively. **Conclusion:** Magnetic Resonance Imaging (MRI) breast is equally sensitive to triple assessment in the evaluation of breast masses. It is more specific than triple test in the evaluation of palpable breast masses. Positive predictive value and negative predictive value of MRI is more than triple assessment. MRI is able to detect occult lesions of opposite breast.

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INTRODUCTION

Breast problems can present themselves in a number of ways like breast pain, nipple discharge, cystic lesions and more commonly as a lump. A lump in the breast is of great concern to the patients and is also a challenge to the diagnostic intelligence and judgement of the surgeon (Bland *et al.,* 2005; Iglehart and Kaelin, 2004). Fibroadenoma is the most common benign breast mass, invasive ductal carcinoma is the most common malignancy (Schoonjans and Brem, 2001). Most masses are benign, but breast cancer is the most common cancer and the second leading cause of cancer deaths in women.

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Although most breast cancers occur in women older than 50 years, 31 percent of women diagnosed with breast cancer between 1996 and 2000 were younger than 50 years (Susan Klein, 2005). An efficient and accurate evaluation can maximize cancer detection and minimize unnecessary testing and procedure. Early diagnosis of breast cancer has increasingly resulted in a more conservative surgical approach to the disease. However, this approach should be based on the exclusion of undetected malignant foci in the breast (Osteen, 1994; Esserman *et al.*). The Triple test, initially described in 1975, is the evaluation of palpable breast masses by physical examination, mammography and fine-needle aspiration cytology (FNAC) in women aged 40 years and older[7]. The triple test is accurate and can replace open surgical biopsy for diagnosis when all 3 components are concordant, that is, all

benign or all malignant. This observation in 1995, resulted in a substantial reduction in the need for open surgical biopsies. However, approximately 40% of cases had non-concordant tests, thus requiring biopsy. In 1998, triple test was improved with the concept of a triple test score (TTS), in which each component of the triple test was rated as benign, suspicious, or malignant, and assigned 1, 2, or 3 points, respectively. This scoring system further allowed to reduce the number of required open biopsies when evaluating women aged 40 years or older with palpable breast masses (Rajan *et al.,* 2013; Morris *et al.,* 1998). Magnetic resonance imaging (MRI) of the breast is a useful adjunct to mammography and ultrasonography, when specific clinical indications exist. Potential indications for breast MRI include staging and treatment planning, evaluating palpable masses in the silicone augmented breast, detecting recurrent cancer in the post treatment breast, identifying a clinically or mammographically occult primary tumour. Spatial resolution has improved considerably with the advent of surface coils. The use of intravenous gadolinium, which passes into the extra-vascular space and accumulates in tissues with rich vascularity, has increased both the sensitivity and specificity of the investigation (Weinreb *et al.,* 1995).

Aims and objectives

1. To compare sensitivity and specificity of MRI versus triple assessment in diagnosis of breast masses.
2. To compare positive predictive value and negative predictive value of MRI versus triple assessment in diagnosis of breast masses.
3. To evaluate the lesions of opposite breast.

MATERIALS AND METHODS

The present, comparative study was conducted in the Postgraduate Department of General Surgery and Department of Radiodiagnosis and Imaging, Government Medical College Srinagar, for a period of about two and a half years between october 2013 to april 2016.

Inclusion criteria were: All patients with suspicious palpable breast masses.

Exclusion criteria were

1. All patients with infective masses.
2. Patients having contraindications to MRI.
3. Patients having contraindications to administration of contrasts.

After obtaining the ethical clearance from the Institutional Ethical Committee, the study was conducted over a period of 1 ½ years in patients attending the surgical OPD of SMHS Hospital, Government medical college, Srinagar. All patients were subjected to complete clinical and radiological evaluation. This involved thorough history taking including personal history, especially with respect to previous breast cancer or biopsies with benign histology, family history of breast or ovarian cancer, abnormalities suspicious of malignancy (e.g., palpable mass, skin retraction, nipple discharge), hormonal status and previous allergic reaction after administration of MR contrast material. Previous imaging studies such as mammography and/or sonography, and their findings were evaluated and recorded. All underwent clinical examination by surgeon, FNAC by pathologist. Mammography/ultrasonography was done and evaluated by radiologist blinded to FNAC/Clinical examination reports, MRI breast was arranged and evaluated by radiologist blinded to result of triple test. MRI report was generated according to BIRAD system of reporting which is as follows:

0	Incomplete assessment; need additional imaging evaluation
1	Negative; routine mammogram in 1 year recommended
2	Benign finding; routine mammogram in 1 year recommended
3	Probably benign finding; short-term follow-up suggested
4	Suspicious abnormality; biopsy should be considered
5	Highly suggestive of malignancy; appropriate action should be taken

Stastistical analysis

The results of the observations at the end of the study were entered in Microsoft Excel and descriptive analysis of the data was done. Categorical variables were summarized as frequency and percentage. Two-way cross tabulation was used to summarize relationship between categorical variables. Mean and standard deviation was used to summarize continuous variables.

RESULTS AND ANALYSIS

In this study period of about two and a half years, a total of 60 patients were evaluvated and managed. Most common age group affected was 50 to 70 years with a mean $\pm$ SD of 50.9±14.47. Youngest patient was 26 years old and oldest patient was 81 years old. Most common location of breast lesions in patients was upper outer quadrant 31 (51.7%) and least common location was lower inner quadrant 4 (6.6%) (Table-1).

Table 1. Location of breast lesion in studied patients

Location	No. of Patients	Percentage
Upper Outer Quadrant	31	51.7
Upper Inner Quadrant	10	16.7
Lower Outer Quadrant	9	15.0
Lower Inner Quadrant	4	6.6
Central	6	10.0

Left sided lesions 31(51.67%) were more than right sided lesions 29 (48.33%). Benign lesions were present in 28 (46.33%) patients and malignant lesions were present in 32 (53.33%) patients (Table-2).

Table 2. Type of Lesions

Type of Lesions	Number of patients	Percentage
Benign	28	46.67
Malignant	32	53.33

Pain was the most common symptom present in the patients 25 (41.7%) followed by nipple discharge 7 (11.7%) and then weight loss, which was present in 6(10%) patients. Most patients had duration of symptoms for less than one year, mean duration of symptoms was 1.1 $\pm$ 0.93 years. Range was from 1 month to 4 years. Skin changes were present in 20% patients. Most common skin change was skin puckering which was seen in 9 (15%) patients, peau-d-orange was present in 3 (5%) patients. Out of a total of 60 patients, 4 (6.67%) had nipple retraction. Out of a total of 60 patients, enlarged axillary lymph nodes was seen in 21 (35%) patients. The accuracy of triple

test in the evaluation of breast lesions with 96.9% sensitivity and 67.9% specificity and positive and negative predictive value of 77.5% and 95.0% respectively (Table-3).

Table 3. Accuracy of triple assessment test in evaluation of breast masses

Variable	Value	95% Confidence Interval
Sensitivity	96.9%	(83.8%, 99.9%)
Specificity	67.9%	(47.6%, 84.1%)
Positive Predicted Value	77.5%	(61.6%, 89.2%)
Negative Predicted Value	95.0%	(75.1%, 99.8%)
False Positive Rate		3.1%
False Negative Rate		32.1%

Table-4 shows the accuracy of MRI in the evaluation of breast lesions with 96.9% sensitivity and 89.3% specificity and positive and negative predictive value of 91.2% and 96.2% respectively.

Table 4. Accuracy of MRI in evaluation of breast masses

Variable	Value	95% Confidence Interval
Sensitivity	96.9%	(83.8%, 99.9%)
Specificity	89.3%	(71.8%, 97.7%)
Positive Predicted Value	91.2%	(76.4%, 98.1%)
Negative Predicted Value	96.2%	(80.4%, 99.9%)
False Positive Rate		3.1%
False Negative Rate		10.7%

DISCUSSION

Our study was conducted on 60 patients who were admitted, investigated and operated in the Postgraduate Department of the General Surgery, Government Medical College, Srinagar, between October 2013 to April 2016. Mammography / ultrasonography and FNAC have markedly increased the accuracy of preoperative diagnosis of breast diseases. Above modalities are being used together as combined tool for diagnosis and is known as triple assessment. Triple assessment which includes clinical examination, FNAC and radiological investigation (mammography and ultrasonography) is very effective for the diagnosis of breast lesions. It is generally accepted that >95% of palpable malignant breast lesions can be diagnosed in this way (Hermansen *et al.,* 1987). However, the specificity of triple assessment for diagnosis of breast masses is low which continues to give rise to concerns that false positive results will lead to both physical and psychological problems. Attempts at improving the accuracy of triple assessment have focused principally, on three areas: scoring systems, core needle biopsy, and improvements in the quality of imaging (Kerin *et al.,* 1995). MRI has an advantage over other routine investigations in identification of breast lesions and to distinguish between benign and malignant lesions. This advantage is attributed to its mechanism of action, which is that contrast enhanced MRI is dependent on tumour vascularity and permeability and not on tissue density (Buckley *et al.,* 1997). Most common age group suffering from the disease in our study was 50-70 years followed by 30-50 with mean age 50.9 years (range 26 – 81 years). This is in accordance to other reports published from Indian subcontinent which show that carcinoma breast in Indian population occurs a decade earlier than western group (Sandhu *et al.,* 2010; Murthy *et al.,* 2009). Most common location of mass was upper outer quadrant (51.6%) followed by upper inner quadrant (16.6%), lower outer quadrant (15%), central (10%) and last was lower inner quadrant (6.6%). Similar findings were recorded by Seth Rummel *et al.* (2015). Of the 60 masses 31 involved left breast that is 51.6%, 29 masses involved right breast that is 48.33 %. Similar observations were made by Muhammad Naeem *et al.* (2008). It was observed that out of 60 cases, there were 28 (46.67%) benign and 32 (53.33%) malignant lesions. This did not correlate well with the study of Todd Kumm *et al.* (2010) who reported an incidence of 72% for benign and 28% for malignant lesions. This higher incidence of malignant lesions in our study was possibly because most of benign lesions were uncomplicated and were not included in the study and therefore, were not subjected to triple assessment or MRI and were treated on OPD basis.

Mastalgia: It was present in 41.7% patients. Similar observations were made by Tibor Decholnoky (1939). Cyclical mastalgia was present in 66.6% and non-cyclical mastalgia was present in 33.3% of the patients complaining mastalgia. These results are comparable with the study by Katiyar *et al.* (2013). Mastalgia was more common in benign masses as compared to malignant masses. Similar results were found by Lumachi *et al.* (2002)

Nipple Discharge: It was present in 11.7% patients. Almost similar results were seen by Geller *et al.* (2002). Weight loss: is the characteristic feature of advanced cancers. It is attributed to increased catabolism and decreased anabolism coupled with anorexia. In our study weight loss was seen in 10% patients, all of them were suffering from malignant disease, Similar results were found by Tchekmedyian. In the present study 53.3% had symptoms for less than 1 year, 36.7% had symptoms for 1 to 2 years and 10% had symptoms for more than 2 years. Similar results were found by Ochicha *et al.* (2002). In our study malignant lesions presented earlier than benign lesions which correlated with the finding of Yussuf *et al.* (2003).

Skin changes: it involves skin puckering (dimpling) and peau-d-orange appearance. Skin puckering was present in 15% patients, similar observation was made by Helvie *et al.* (1993). Peau-d-orange appearance was present in 5% patients in our study which was comparable to the observations made by Cucin *et al.* (1980). Nipple retraction was present in 6.67% patients in our study, almost similar findings were noted by Adrada *et al.* (2009). Enlarged axillary lymph nodes were present in 35% patients almost same results were observed by Mobbs *et al.* (2005) who observed enlarged axillary lymph nodes in 40.8% patients.

Triple Assessment: Overall accuracy of triple test was sensitivity 96.9%, specificity of 67.9%, positive predictive value of 77.5% and negative predictive value of 95%. Similar results have been seen by Philip Drew *et al.* (1999) with sensitivity of 99.2%, specificity of 59.1%, positive predictive value of 67.4 % and negative predictive value of 98.9 %. Shortcoming of the triple assessment is the high rate of false positive results due to its low specificity.

Magnetic Resonance Imaging (MRI)- MRI has emerged as one of the most accurate investigation in the evaluation of the breast masses and it proved same in our study as well. Its results were sensitivity 96.9%, specificity 89.3, positive predictive value 91.2%, negative predictive value of 96.2%. Similar results have been seen by Berg *et al.* (2004) who reported the sensitivity of MRI as 97%, Lehman CD et al (2007) reported specificity of MRI 88%, Kinkel *et al.* (2000) reported positive predictive value of MRI as 97%, Mitsuhiro T

et al. (2006) reported negative predictive value of MRI as 98%.MRI was able to detect occult lesions of the opposite breast in 1.66% patients which were missed by triple test. Similar results were observed by Kriege *et al.* (2004) who found that MRI was able to detect occult lesions of opposite breast in 1.2%.

Conclusion

Magnetic Resonance Imaging (MRI) breast is equally sensitive to triple assessment in the evaluation of breast masses. It is more specific than triple test in the evaluation of palpable breast masses. Positive predictive value and negative predictive value of MRI is more than triple assessment in the evaluation of palpable breast masses. MRI is able to detect occult lesions of opposite breast which can be missed by triple assessment.

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