Diagnostic performance of breast MRI in the evaluation of contralateral and ipsilateral breast in patients with diagnosed breast cancer

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Aims and objectives

BACKGROUND/INTRODUCTION:

Patients with unilateral breast cancer have an added risk of cancer in the contra lateral breast with prevalence of 1-4%.[1] These patients have a higher rate of distant metastasis. It is important to diagnose contra lateral breast cancer at the time of initial diagnosis as this will be associated with early cancer stage and hence better survival.[2] The sensitivity of screening mammography is reduced in women with heterogeneously dense /dense breast parenchyma but whole breast ultrasounds is useful in the detection of mammographically and clinically occult ipsilateral and contra lateral breast cancer.[3]

Breast MRI has emerged as an important adjunctive tool and multiple studies have shown increased detection of tumor foci not identified on mammography /ultrasound. An additional occult cancer detected on breast MRI ranges from 3-24% and this subsequently alters the treatment option.[4]

OBJECTIVE:

The purpose of our study is to evaluate the diagnostic accuracy of breast MRI in the evaluation of contra lateral breast in patients with diagnosed breast cancer.

The secondary objective is to evaluate accuracy of breast MRI in diagnosing multi focal and multicentric lesions in the ipsilateral breast.
Methods and materials

Study Design

Cross sectional analytical study

Setting

Radiology department Aga Khan University hospital

Sampling technique

Non-probability convenience technique

Study population:

Inclusion criteria:

Newly diagnosed breast cancer patients [on histopathology] of either sex undergoing MRI breast examination

Exclusion criteria:

MRI breast done for other indications like for assessment of BIRADS 3 lesions, implant evaluations, screening, and neoadjuvant response evaluation, differentiation of scar versus recurrence were excluded

Patients were also excluded if no follow-up imaging was available.

Patient's mammography and ultrasound done at the time of breast cancer diagnosis were also assessed. The MRI findings were correlated with histopathology. In addition follow-up imaging i.e. mammography and ultrasound were also assessed for establishing stability of negative findings and for benign lesions detected.
Statistical Analysis Plan:

Data was entered and analyzed in SPSS 20.0 version. Means and Standard deviation were computed for quantitative variable like age, and proportions reported for qualitative variable. Sensitivity, specificity, positive and negative predictive values was computed for MRI breast in the evaluation of contra lateral and ipsilateral breast in patients with diagnosed breast cancer.

Reported sensitivity of breast MRI for the detection of breast carcinoma is 92% [5] with confidence interval of 95%, bound on error of 8%, the calculated sample size was N=45.

Breast MRI technique

All cases underwent a breast MRI in a 1.5 tesla unit .The conventional departmental breast MRI protocol was carried out using breast coil with patient in prone position.

The field of view was 300-340 mm and slice thickness 4 mm

Prior to post contrast images axial TRIM, T1 and T2 weighted images were obtained. In addition diffusion weighted images and sagittal T2 fat sat images also obtained.

This is followed by dynamic post contrast images in the axial plane . Vascular access obtained with a cannula for the administration of Gad at a dose of 0.1 moll/body weight followed by saline flush.

The dynamic image sequence was repeated six times with 30 sec interval and the images were obtained in the axial plane. The delayed post contrast image obtained in coronal plane.

Post processing included subtracted images , 2D and 3D MIP (maximum intensity projection) reconstructions and kinetic curve analysis.

The images were interpreted by radiologist with more than 5 years' experience in breast imaging on soft copy using PACS with provision of manual window setting and parameters optimization. The radiologist was provided with patient clinical history and all available imaging like mammograms and ultrasound of breast. The breast lesion was categorized using BIRADS MR Lexicon.
Results

Out of the 157 MRI breast done during the period of 2008 to 2012, 49 were done in patients with diagnosed breast cancer.

All patients were females with age range from 26 to 71 years with mean age of 50.7 years

The patient follow-up imaging was available for a period of 1-5 years.

Second look ultrasound was done in 15 patients.

Regarding the initial presentation of the patients 69% (n=34) presented with breast lump, 20% (n=10) underwent breast imaging for screening. The other indications for imaging were pain 8% (n=4) and nipple discharge 2% (n=1).

The size of the index lesion at the time of presentation was 1-2 cm in 43% (n=21) followed by 2-5 cm in 35% (n=17). Less than 1 cm index lesions accounted for 14% while more than 5 cm were 8%.

The predominant histopathology of the breast lesions was infiltrating ductal carcinoma 61% followed by infiltrating lobular carcinoma in 22%. The others were papillary carcinoma, mucinous carcinoma and DCIS etc.

The breast density on mammography was heterogeneously dense in 45%, fibro glandular in 31% and dense in 20%. The breast parenchyma was fatty on mammography in only 4%.

The sensitivity, specificity, positive and negative predictive value of breast MRI in the present study as shown in Table 1.

<table>
<thead>
<tr>
<th>MRI for evaluation of</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive predictive value</th>
<th>Negative predictive value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contra lateral breast</td>
<td>100 %</td>
<td>95.4 %</td>
<td>71.4 %</td>
<td>100 %</td>
</tr>
<tr>
<td>Multifocal/ multicentric lesions</td>
<td>87.5 %</td>
<td>84.6 %</td>
<td>63.6 %</td>
<td>95.6 %</td>
</tr>
</tbody>
</table>
Images for this section:

Fig. 1

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Fig. 2

False positive MRI breast for multifocal lesions. Multiple foci of enhancement, on histopathology diagnosed as multiple intra ductal Papilloma

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Fig. 3

False positive MRI breast for multicentric disease. On histopathology diagnosed as apocrine metaplasia.
Fig. 4

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Conclusion

DISCUSSION:

Breast MRI is reported to have high sensitivity (94-100%) but low specificity that ranges from 37-97% (6) in addition it is an expensive test. These factors restrict its usage as a screening modality for the population and hence it is utilized for limited indications like women with genetic predisposition, strong family history /personal history of breast cancer, women with lobular carcinoma or atypia, etc. (7)

In this retrospective study we have tried to evaluate the diagnostic performance of breast MRI in the detection of an otherwise contra lateral breast cancer in addition to multifocal / multicentric lesions. In this study cancer was detected in contralateral breast in patients with diagnosed breast cancer sin 8% which is in line with the various published reports in literature (3% -24%)(8) In Asian population however synchronous bilateral cancer ranges from 1.5 -2% (9) which is much lower than our study. This may be related to the non-existing screening programme in our population and hence patients present late with palpable tumors as is also evident in our study since majority of our patients presented when the size of index lesion was in the range of 1to 5cm. Among the true positive cases of contralateral cancers, 50% were seen in patients with lobular carcinoma, and is in keeping with the study by Lesser et al.(10) In the present study multifocal/multicentric lesions were detected by MRI in 13% which is within the range provided in literature i.e. 4.2% to 29% (11,12)

Small sample size was one of the limitations of the study due to which results cannot be generalized. The other limitation was the non-availability of MRI guided biopsy system that resulted in biopsy of those MRI detected lesions which were seen on second look ultrasound.

CONCLUSION:

MRI is a valuable and reliable modality for exclusion of suspicious lesions in the contra lateral breast in patients with diagnosed breast cancer. In addition MRI breast shows reasonable diagnostic accuracy with respect to multifocality and multicentricity in the ipsilateral breast.
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