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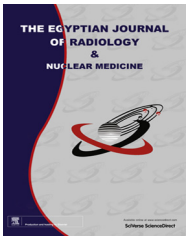

ORIGINAL ARTICLE

Dynamic MR-Mammography as the best method for diagnosis of invasive lobular breast carcinoma: A retrospective study

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KEYWORDS

ILC;
Dynamic MRM;
Asymmetric density;
Lobular mass

Abstract *Aim of the study:* It is a retrospective study aiming to provide diagnostic characterization of ILC in Dynamic MR-Mammography and to compare its diagnostic performance to mammography and ultrasonography.
Material and Method: A total of 56 cases of ILC were selected in retrospective review of mammography, ultrasonography and Dynamic MRM of 420 patients with invasive breast cancer.
Results: Asymmetric density was the commonest mammography finding and the measured sensitivity of mammography in detecting ILC was 87.5% (9/56 FN).The most common US manifestation of ILC was focal shadowing without a discrete mass and its sensitivity in detecting ILC was 84.9% (10/56 FN). At MR imaging, the most common manifestation of ILC was a solitary irregular or angular mass with speculated or ill-defined margins (33.9%of cases [n = 19]).The measured sensitivity is 96.5% (2/56 FN). Additional data such as those affected the patient management including the presence of multifocal or multicentric disease, chest wall involvement and contralateral breast cancer were encountered in 48.2% of cases [n = 27]. ILC has a tendency to demonstrate delayed maximum enhancement with washout exhibited by only a minority of lesions (21.4% [n = 12]).

Abbreviations: ILC, invasive lobular carcinoma; MRM, MR Mammography; FN, false negative

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Conclusion: MR imaging has proved to be superior to mammography and US in the detection and management of ILC. It provides useful information for further management and pre-surgical planning.

1. Introduction

Infiltrating lobular carcinoma of the breast constitutes about 7–15% of invasive breast cancers (1–4). It presents a diagnostic challenge because of its variable presentation on imaging and clinical examination. It is postulated that the histologic characteristics of infiltrating lobular carcinoma are responsible for the imaging difficulties. Typically these tumors show a single-file infiltration of malignant cells (1,5,6) through the breast stroma with a relative paucity of desmoplastic response, hemorrhage, necrosis, or calcification (6). The sensitivities in the detection of infiltrating lobular carcinoma have been reported as 57–81% for mammography (3,4,7–10) and 68% for sonography (3,8). Butler et al. (3) reported sonographic sensitivity of 87%, but they included cases of mixed infiltrating lobular carcinoma and invasive ductal carcinoma. Contrast-enhanced MR imaging of the breast is extremely sensitive in the detection of breast cancer (11–13). Weinstein et al. (14) reported more extensive tumor burden detection on MR imaging than on conventional imaging in patients with infiltrating lobular carcinoma.

Table 1 Mammography appearance of 56 cases of ILC in the study group.

Radiological findings	Number	Percentage
Mass	12/56	21.42
Asymmetric density	18/56	32.13
Architecture distortion	6/56	10.71
Microcalcification	11/56	19.64
Normal	9/56	16.10
Total	56/56	100.00

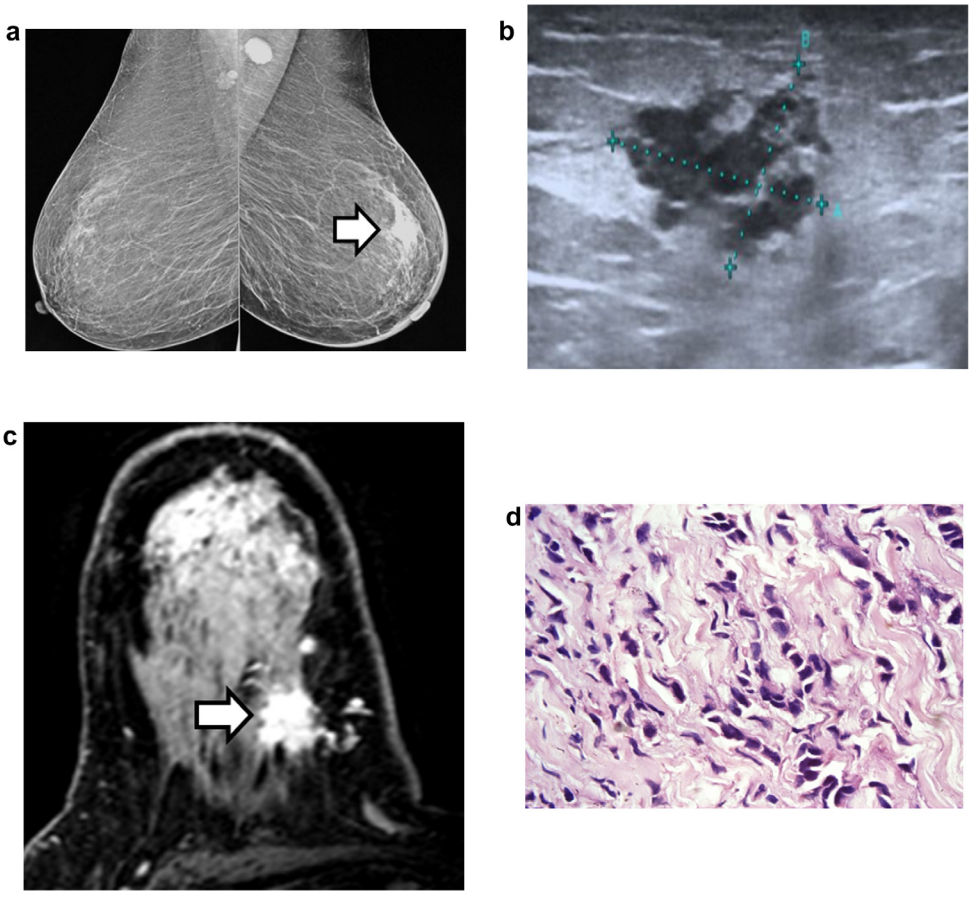

Fig. 1 "Invasive lobular carcinoma": (a) Screening mammography showing asymmetric density. (b) Breast sonography shows a focal illdefined hypoechoic mass. (c) Dynamic MRM shows intensely enhancing speculated outline mass lesion. (d)Histopathology: ILC seen as tumor tissue formed of pleomorphic dyscohesive epithelial cells with hyperchromatic nuclei arranged in Indian Files with surrounding fibrosis.

2. Aim of the study

It is a retrospective study aiming to provide diagnostic characterization of ILC in Dynamic MR-Mammography and to compare its diagnostic performance to mammography and ultrasonography.

3. Material and Method

A total of 56 cases of ILC were selected in retrospective review of mammography, ultrasonography and Dynamic MRM of 420 patients with invasive breast cancer who were seen from January 1, 2007, through October 31, 2010. The pathology of all cases was available for review.

4. Results

A total of 56 patients out of 420 invasive breast carcinoma (13.3%) were found to have ILC at histopathology. Among these 56 patients, the following mammographic manifestations of ILC were noted (Table 1): Asymmetric density was the commonest Mammographic findings (Fig. 1), it was encountered in (32.1% [n = 18]), masses (21.4% of cases [n = 12]), microcalcifications (19.6% [n = 11]), architectural distortions (10.7% [n = 6]), and Normal or benign findings (16.1% [n = 9]). Thus the measured sensitivity is 87.5% (9/56 FN), Table 1.

The most common US manifestation of ILC is focal shadowing without a discrete mass (23.1% of cases [n = 18]), followed by illdefined mass (30.4% of cases [n = 17]), Fig. 1, followed by irregular or angular mass (19.6% of cases [n = 11]), followed by lobular well circumscribed mass (21.4% of cases [n = 12]), followed by sonographically invisible lesions (17.9% of cases [n = 10]), (Table 2). Thus the measured sensitivity is 84.9% (10/56 FN).

At MR imaging, the most common manifestation of ILC in our study group (56 cases) was a solitary irregular or angular mass with speculated or ill-defined margins (33.9% of cases [n = 19]), Fig. 1, patchy regional enhancement (33.9% of cases [n = 19]), and enhancing foci and interconnecting enhancing strands (28.6% of cases [n = 16]), Fig. 2, Negative MRI was only encountered in 2 cases (3.6% of cases [n = 2]). Thus the measured sensitivity is 96.5% (2/56 FN).

Additional data such as those affected the patient management including the presence of multifocal or multicentric disease, Fig. 3, chest wall involvement and contralateral breast cancer were encountered in 48.2% of cases [n = 27], Table 3.

As regards the kinetic data evaluation, unlike most invasive breast carcinomas, which demonstrate a classic pattern of rapid enhancement and washout, ILC has a tendency to demonstrate delayed maximum enhancement, with washout exhibited by only a minority of lesions (21.4% [n = 12]) Table 3.

Table 2 Radiological appearance of 56 cases of ILC in the study group.

Ultrasound appearance	Number	Percentage
Acoustic shadowing without a discrete mass	18/56	32.1
Illdefined mass	17/56	30.4
Irregular or angular mass	11/56	19.6
Invisible lesion by US	10/56	17.9
Total	56/56	100.0

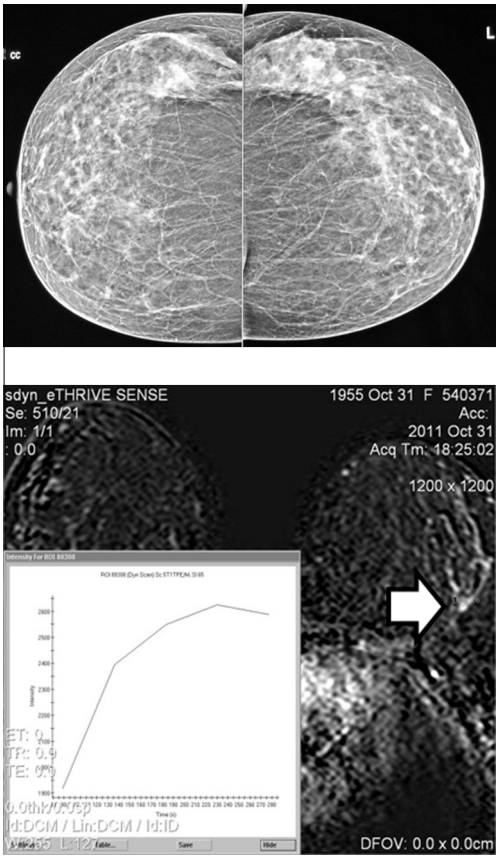

Fig. 2 "Invasive lobular carcinoma": Screening mammography showing invisible lesion. Dynamic MRM shows focal nodular enhancing lesion associated with enhancing septations. The time intensity curve shows delayed maximum enhancement followed by wash out.

5. Discussion

At MR imaging, the most common manifestation of ILC is speculated enhancing mass. Additional manifestations include a dominant lesion surrounded by multiple small enhancing foci, multiple small enhancing foci with interconnecting enhancing strands, architectural distortions, regional or focal heterogeneous enhancement, enhancing septa, and normal findings (15,19,20). In our study was a solitary irregular or angular mass with speculated or ill-defined margins (33.9% of cases [n = 19]), patchy regional enhancement (33.9% of cases [n = 19]), and enhancing foci and interconnecting enhancing strands (28.6% of cases [n = 16]), Negative MRI was only encountered in 2 cases (3.6% of cases [n = 2]). Thus the measured sensitivity is 96.5% (2/56 FN). These data are similar to the previous published reports (16,17,19,20).

Unlike most invasive breast carcinomas, which demonstrate a classic pattern of rapid enhancement and washout, ILC has a tendency to demonstrate delayed maximum enhancement, with washout exhibited by only a minority of lesions (21.4%) and this was also previously reported in a similar study (16).

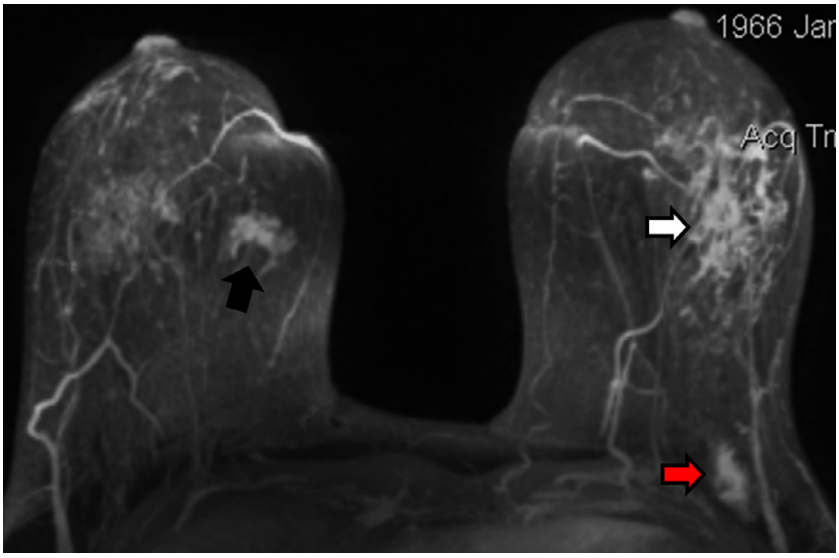

Fig. 3 "Invasive lobular carcinoma" of the left breast lower outer quadrant (white arrow), Dynamic MRM shows additional information, another mass is seen in the left axillary tail (red arrow) indicating multicentric disease and moreover there is another enhancing lesion in the lower inner quadrant of the right breast (black arrow) indicating contralateral breast cancer.

Table 3 MRI enhancement pattern of 56 cases of ILC in the study group.

MRI appearance	Number	Percentage
Enhancing mass	19/56	33.9
Patchy regional enhancement	19/56	33.9
Enhancing foci and strands	16/56	28.6
Normal findings	2/56	3.6
Total	56/56	100
Additional findings on MRI		
Multifocal disease	12/56	21.4
Multicentric disease	8/56	14.3
Contralateral disease	5/56	8.9
Chest wall invasion	2/56	3.6
Total	27/56	48.2
Kinetic data		
Rapid maximum enhancement	11/56	16.6
Delayed maximum enhancement	27/56	48.2
Continuous rising curve	18/56	32.2
Positive wash out	12/56	21.4

MR imaging has proved to be a useful adjunct to mammography and US in the detection and management of ILC, with a reported sensitivity of approximately 95% (20). These results are in agreement with our results, the sensitivity of MRI in our study is 96.5% (2/56 FN) while the sensitivity of mammography alone was 87.5% (9/56FN) and the sensitivity of ultrasonography alone was 84.8% (10/56 FN). MR imaging has been shown to be superior to mammography and US in detecting multifocality and multicentricity, as well as in estimating tumor size, which tends to be underestimated with conventional imaging (15). A meta-analysis by Mann et al. (16) found that MR imaging was able to help detect additional ipsilateral malignant findings not evident at mammography or US in 32% of ILC patients. In addition, unexpected cancer in the contralateral breast was seen exclusively at MR imaging in 7% of cases (16). Additional findings were found in 48.2% of our cases. Most importantly, these additional MR data have been shown to affect the clinical management of those patients with ILC, leading to changes in surgical management, likewise changing from conserving to radical mastectomy and that was also in accordance with the previously published reports (16,18,19).

The tendency of ILC to have atypical imaging and clinical appearances is related to its histopathologic features and its failure to elicit a desmoplastic response. Despite these diagnostic challenges, however, imaging remains crucial in the detection and management of ILC. Mammography, ultrasonography, and magnetic resonance (MR) imaging all play important roles, with each modality having its own advantages and limitations. The use of MR imaging as adjuncts to mammography and ultrasonography increases sensitivity in the detection of ILC and provides useful information for further management and pre-surgical planning.

6. Conclusion

MR imaging has proved to be a useful superior to mammography and US in the detection and management of ILC. It provides useful information for further management and pre-surgical planning.

References

(1) Rodenko GN, Harms SE, Pruneda JM, et al. MR imaging in the management before surgery of lobular carcinoma of the breast: correlation with pathology. AJR 1996;167:1415–9.
(2) Cornford EJ, Wilson ARM, Athanassiou E, et al. Mammographic features of invasive lobular and invasive ductal carcinoma of the breast: a comparative analysis. Br J Radiol 1995;68:450–3.
(3) Butler RS, Venta LA, Wiley EL, Ellis RL, Dempsey PJ, Rubin E. Sonographic evaluation of infiltrating lobular carcinoma. AJR 1999;172:325–30.

(4) Krecke KN, Gisvold JJ. Invasive lobular carcinoma of the breast: mammographic findings and extent of disease at diagnosis in 184 patients. AJR 1993;161:957–60.
(5) Framarino Dei Malatesta M, Fiorelli C, Bandiera AF, Veneziano M, Galati GM, Porfiri L. Infiltrating lobular carcinoma of the breast (ILC): diagnostic and therapeutic aspects. Eur J Gynaecol Oncol 1995;16:36–9.
(6) Rosen PP. The pathology of invasive breast carcinoma. In: Harris JR, Hellman S, Henderson IC, Kinne DW, editors. Breast diseases. Philadelphia: Lippincott; 1991. p. 272–6.
(7) Hilleren DJ, Andersson IT, Lindholm K, Linnell FS. Invasive lobular carcinoma: mammographic findings in a 10-year experience. Radiology 1991;178:149–54.
(8) Paramagul CP, Helvie MA, Adler DD. Invasive lobular carcinoma: sonographic appearance and role of sonography in improving diagnostic sensitivity. Radiology 1995;195:231–4.
(9) Helvie MA, Paramagul CP, Oberman HA, Adler DD. Invasive lobular carcinoma: imaging features and clinical detection. Invest Radiol 1993;28:202–7.
(10) Le Gal M, Ollivier L, Asselain B, et al. Mammographic features of 455 invasive lobular carcinomas. Radiology 1992;185:705–8.
(11) Nunes LW, Schnall MD, Siegelman ES, et al. Diagnostic performance characteristics of architectural features revealed by high spatial-resolution MR imaging of the breast. AJR 1997;169:409–15.
(12) Weinreb JC, Newstead G. MR imaging of the breast. Radiology 1995;196:593–610.
(13) Sherif H, Mahfouz AE, Oellinger H, et al. Peripheral washout sign on contrast-enhanced MR images of the breast. Radiology 1997;205:209–13.
(14) Weinstein SP, Orel SG, Heller R, et al. MR Imaging of the breast in patients with invasive lobular carcinoma. AJ 2002;179: 1179–84.
(15) Kneeshaw PJ, Turnbull LW, Smith A, Drew PJ. Dynamic contrast enhanced magnetic resonance imaging aids the surgical management of invasive lobular breast cancer. Eur J Surg Oncol 2003;29(1):32–7.
(16) Mann RM, Hoogeveen YL, Blickman JG, Boetes C. MRI compared to conventional diagnostic work-up in the detection and evaluation of invasive lobular carcinoma of the breast: a review of existing literature. Breast Cancer Res Treat 2008;107(1): 1–14.
(17) Schelfout K, Van Goethem M, Kersschot E, et al. Preoperative breast MRI in patients with invasive lobular breast cancer. Eur Radiol 2004;14(7):1209–16.
(18) Del Frate C, Borghese L, Cedolini C, et al. Role of pre-surgical breast MRI in the management of invasive breast carcinoma. Breast 2007;16(5):469–81.
(19) Weinstein SP, Orel SG, Heller R, et al. MR imaging of the breast in patients with invasive lobular carcinoma. AJR Am J Roentgenol 2001;176(2):399–406.
(20) Qayyum A, Birdwell RL, Daniel BL, et al. MR imaging features of infiltrating lobular carcinoma of the breast histopathologic correlation. AJR Am J Roentgenol 2002;178(5):1227–32.