

Positron emission mammography is a useful adjunct in assessment of dense breasts

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SUMMARY

Worldwide breast cancer remains as the most common malignancy in women and the numbers who form a subgroup with dense breast parenchyma are substantial. In addition to mammography, the adjuncts used for further evaluation of dense breasts have been anatomically based modalities such as ultrasound and magnetic resonance imaging. The practice of functionally based imaging of breasts is relatively new but has undergone rapid progress over the past few years with promising results. The value of positron emission mammography is demonstrated in patients with dense breasts and mammographically occult disease.

INTRODUCTION

Breast carcinoma remains the most common type of cancer in women. In Malaysia, the incidence of breast cancer approximates 46 per 100,000 women.¹ The use of mammography has increased the cancer detection but the benefit in younger women aged around 50 is said to decrease by up to 40 percent, due to the density of breast parenchyma.² Debate continues amongst breast clinicians as to the best practice in terms of evaluating dense breasts.

When the mammographic results are equivocal, many centres practise further assessment with adjuncts such as ultrasound or magnetic resonance imaging (MRI). These modalities primarily rely on detecting a space occupying lesion. In contrast, nuclear breast imaging detects masses based on hypermetabolic activity. This can significantly improve the detection rates of cancers in dense breasts. The cases presented demonstrate the value of positron emission mammography (PEM) as a useful adjunct.

CASE SERIES

A 44-year-old lady presented with a palpable mass in the right breast. The mammography performed showed dense parenchyma in both breasts (Figure 1A). The palpable lesion was mammographically occult. PEM performed demonstrated a hyper-metabolic mass corresponding to the clinical finding in the right breast (Figure 1B). An intra-ductal component contiguous with the primary lesion was also visualised. In addition, an adjacent satellite nodule was detected.

The second case is of a 51-year-old lady who presented with a palpable left axillary mass suspicious for lymphadenopathy. Clinically it was difficult to discriminate any tumour from the “lumpy” left breast. On mammography, both breasts were heterogeneously dense which obscured any lesions (Figure 2A). PEM performed confirmed the presence of a sub-centimetre hypermetabolic nodule (Figure 2B).

The final case is of a 59-year-old lady presented with a palpable mass in right breast and clinical suspicion of associated axillary lymphadenopathy. Mammography demonstrated a spiculated lesion and an adjacent satellite nodule in the right breast (Figure 2C). A smaller nodule in a different quadrant, seen adjacent to a blood vessel, was thought to be a benign intra-mammary lymph node. On PEM, all three lesions showed hypermetabolic activity, including the nodule in the different quadrant (Figure 2D). The axillary lymph nodes identified on palpation and visualized on mammography were not hypermetabolic on positron emission mammography.

DISCUSSION

In younger women, detecting a breast lesion against dense parenchyma can be difficult. Radiological modalities such as ultrasound and MRI remain useful adjuncts. However, there are instances whereby these modalities have limitations. For example, some women cannot undergo evaluation with an MRI due to contra-indications or claustrophobia. With the advent of nuclear based imaging modalities such as breast specific gamma imaging and PEM, there are other alternatives in assessing dense breasts. Several studies have shown that nuclear techniques are comparable to radiological modalities.³

The first case shows the superiority of PEM over mammography when assessing dense breasts. Despite having a palpable mass, the conventional mammogram was unable to delineate the lesion. Not only was PEM able to show the primary lesion, together with its intra-ductal component, an additional satellite nodule was also detected. Post-surgical histology confirmed the lesion be lobular carcinoma of the breast. Small nodules can be especially difficult to detect in dense breasts using mammography. PEM has been shown to be able to detect tumour nodules even less than 1cm with up to 70% sensitivity.⁴ In young patients with

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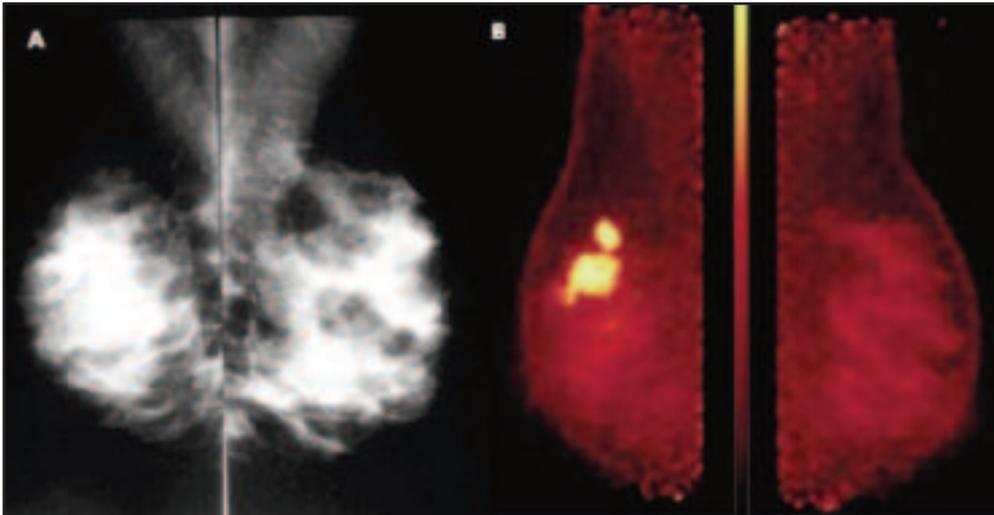


Fig. 1: From left to right, image A shows mediolateral oblique mammographic views of both breasts of a 44-year-old lady who presented with the palpable mass in the right breast. No corresponding lesion was detected in the right breast against the background of dense parenchyma. Image B of the positron emission mammography performed on this patient demonstrated a hyper-metabolic focal mass corresponding to the clinically palpable lesion in the right breast with an intra-ductal component and an additional satellite lesion.

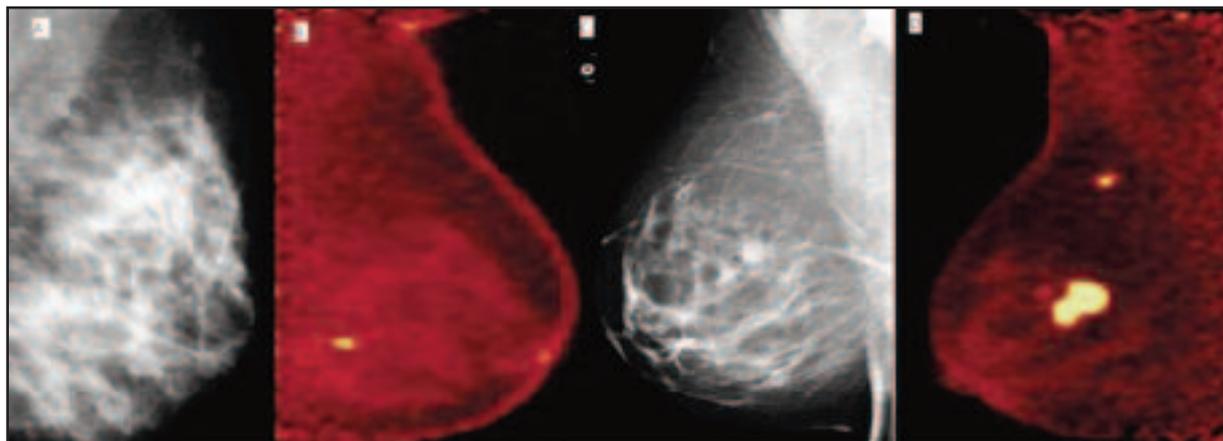


Fig. 2: From left to right, image A shows mediolateral oblique mammographic view of a 51-year-old lady presented with the palpable mass in the left axilla. The breast density obscured the primary lesion. Image B is the positron emission mammography of the same patient confirming the presence of a sub-centimetre hyper-metabolic focus. Image C shows a spiculated lesion with an adjacent satellite nodule in the mediolateral oblique view on mammography of the right breast of a 59-year-old lady. Image D shows PEM correlated with mammographic findings. In addition, a third smaller hypermetabolic lesion was seen in a different quadrant. No sinister activity was visualised in the axilla.

“lumpy” breasts, differentiating tumour from normal parenchyma can be problematic. Further, lumpy breasts usually correspond to increased density on mammography. The second case shows the value of PEM detection of even small lesions against heterogeneous dense parenchyma; this lesion was histologically proven to be primary breast carcinoma.

The detection of additional lesions in breast carcinoma is of paramount importance in subsequent management requiring differing treatment protocols. The presence of nodal disease and/or distal metastasis also alters therapy. Our third case demonstrates the ability of PEM not only in detecting the additional lesion in a different quadrant but, also its advantage of ruling out nodal metastasis. In this instance,

the presence of possible nodal disease was excluded correctly based on imaging alone. Subsequent histology corroborated with the imaging findings. Studies have demonstrated the usefulness of PEM in the detecting additional lesions.⁵

CONCLUSION

Assessment of dense breasts using mammography continues to be difficult. In addition to the radiological modalities, newer nuclear based breast imaging such as PEM are growing. Our cases demonstrate that these methods are useful adjuncts, especially in evaluating dense breasts. With increased usage of these adjuncts and with greater understanding, breast specialists and patients will benefit from these evolving tools.

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