

RATIONAL IMAGING

Investigation of suspected breast cancer

Peter Britton, Ruchi Sinnatamby

Cambridge Breast Unit,
Addenbrooke's Hospital,
Cambridge CB2 0QQ
Correspondence to: P Britton
peter.britton@addenbrookes.nhs.uk

BMJ 2007;335:347-8
doi: 10.1136/bmj.39234.386470.BE

The patient

An 81 year old woman was referred to a multidisciplinary breast clinic with a lump in her right breast. Such patients undergo “triple” assessment—clinical examination, imaging, and, if necessary, needle biopsy. On clinical examination she had a mass in the upper outer quadrant, which was suspected to be an underlying carcinoma.

What tests do I order?

It is usual practice for patients over 35 years with discrete breast lumps to undergo mammography and ultrasound. In patients under 35 years, ultrasound is the first line investigation.

Mammography

Mammography has been evaluated more extensively than any other imaging technique and remains a mainstay of the diagnosis of breast cancer. Reported sensitivity in detecting palpable breast cancer is 80-90%,¹ but it is lower in patients with dense breast parenchyma. A normal mammogram can be seen in the presence of a palpable breast cancer, so national guidance recommends that all breast units should provide triple assessment clinics for symptomatic women rather than an open access imaging service for general practitioners.²



Fig 1 | Mammogram showing an area of parenchymal deformity corresponding to the palpable lump in the right breast (R; solid arrow). Another suspicious mass is seen inferiorly within the left breast (L; broken arrow)

LEARNING POINTS

- Modern diagnosis of breast cancer is based upon multidisciplinary team work using triple assessment of clinical examination, imaging (mammography and ultrasound), and needle biopsy
- Breast magnetic resonance imaging can aid local breast cancer staging but its exact role remains to be established
- Axillary staging using ultrasound and needle biopsy may detect patients with lymph node involvement preoperatively and thus reduce unnecessary sentinel lymph node biopsies

Ultrasound

Targeted breast ultrasound is the most useful test when evaluating a breast lump. It can distinguish between “lumpiness” caused by a ridge of normal dense parenchyma, a fluid filled cyst, or a solid mass. In expert hands, it can also help characterise solid lesions—its negative predictive value for correctly classifying benign masses is up to 99.5% and sensitivity for identifying malignancy is up to 98.4%.³

Breast needle biopsy

The above tests cannot replace histological confirmation, however, and in the United Kingdom, patients with a clinically suspicious or focal solid lesion routinely have a needle biopsy to establish a diagnosis. Core biopsy, with its higher sensitivity and specificity (96.7% and 98.7%), is replacing fine needle aspiration cytology (sensitivity 83.1%; inadequate rate 12.8%).⁴ Ultrasound guidance optimises targeting accuracy.

What other tests could I do?

If a diagnosis of breast cancer is made, definitive treatment (usually surgery) can be planned. In some patients, histopathological analysis of surgical specimens shows that disease is more extensive than first suggested by clinical examination and imaging. Further treatment may then be needed, such as margin re-excision, mastectomy, or additional axillary surgery. Can modern breast radiology provide more accurate information about local staging preoperatively? Two additional imaging and intervention techniques show potential.

Breast magnetic resonance imaging

Dynamic contrast enhanced breast magnetic resonance imaging is the most sensitive examination available

This series provides an update on the best use of different imaging methods for common or important clinical presentations. The series editors are Fergus Gleeson, consultant radiologist, Churchill Hospital, Oxford, and Kamini Patel, consultant radiologist, Homerton Hospital, London

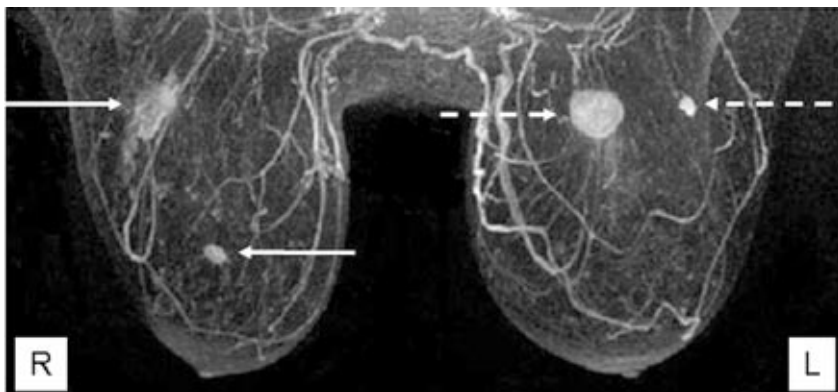


Fig 2 | Subtraction maximum intensity projection in three dimensions of dynamic enhanced magnetic resonance image showing two tumour foci in the right breast (R; solid arrows) and left breast (L; broken arrows). The normal breast vasculature is also clearly seen

for determining the extent of invasive breast cancer—it detects additional unsuspected tumour sites in 16% of patients.⁵ The information it provides on tumour size and extent can help determine whether breast conservation or mastectomy is the best surgical option.⁶ The technique is expensive however. In addition, UK machines are overloaded with work, and we do not know which patients with newly diagnosed breast cancer would benefit most from magnetic resonance imaging. A large UK multicentre trial is currently trying to answer this question.⁷

Axillary ultrasound and biopsy

Sentinel lymph node biopsy, with its high accuracy and low morbidity, is now the surgical method of choice for staging the axilla in patients with invasive breast cancer. The sentinel lymph node is identified at surgery after injecting radioisotope colloid and blue dye into the breast. Patients with malignancy in the sentinel lymph node will need a second operation to clear their remaining axillary nodes. Ultrasound and needle biopsy of the axilla before surgery can identify 42–63% of patients with involved lymph nodes, who may then have therapeutic surgery of both breast and axilla as a single procedure.^{8,9}

What happened to the patient?

Mammography detected an area of parenchymal deformity corresponding to the palpable lump. A further, impalpable, suspicious mass was also seen in the left breast (fig 1). Ultrasound confirmed that both lesions were solid, with features suggestive of malignancy. Bilateral core biopsies guided by ultrasound confirmed an invasive lobular carcinoma in the right breast and an invasive ductal carcinoma in the left breast. Our policy is to perform magnetic resonance imaging in patients with invasive lobular carcinoma, which may have a permeative growth pattern, as it is difficult to determine the extent of disease with standard imaging techniques. Magnetic resonance imaging confirmed the size and position of both known tumours but also showed extra foci in each breast (fig 2). Bilateral axillary ultrasound and core biopsy found no evidence of malignancy.

USEFUL READING

- Querci Della Rovere G, Warren R, Benson JR, eds. *Early breast cancer*. London: Taylor and Francis, 2005
- Heywang-Kobrunner SH, Dershaw DD, Schreer I. *Diagnostic breast imaging: mammography, sonography, magnetic resonance imaging, and interventional procedures*. New York: Thieme Medical Publishers, 2001

On the basis of these investigations the patient had bilateral mastectomies and sentinel lymph node biopsies at a single operation. Histology confirmed multifocal invasive lobular carcinoma in the right breast and invasive ductal carcinoma in the left breast, together with bilateral high grade ductal cancer in situ. One of the two sentinel lymph nodes on the right contained a 0.2 mm diameter micrometastasis; the remainder were free of tumour. After discussion with the patient it was decided that no further axillary surgery was necessary.

Contributors: PB received the commission for the article and selected the patient. The literature was searched by PB and RS. PB wrote the initial draft of the paper. RS reviewed and edited it and both authors revised it. PB is guarantor.

Funding: None.

Competing interests: None declared.

- 1 Moss HA, Britton PD, Flower CD, Freeman AH, Lomas DJ, Warren RM. How reliable is modern breast imaging in differentiating benign from malignant breast lesions in the symptomatic population? *Clin Radiol* 1999;54:676–82.
- 2 Royal College of Radiologists. *Guidance on screening and symptomatic breast imaging*. 2nd ed. London: RCR, 2003.
- 3 Stavros AT, Thickman D, Rapp CL, Dennis MA, Parker SH, Sisney GA. Solid breast nodules: use of sonography to distinguish between benign and malignant lesions. *Radiology* 1995;196:123–34.
- 4 Britton PD. Fine needle aspiration or core biopsy. *Breast* 1998;8:1–4.
- 5 Liberman L. Breast MR imaging in assessing extent of disease. *Magn Reson Imaging Clin N Am* 2006;14:339–49.
- 6 Bluemke DA, Gatsonis CA, Chen MH, DeAngelis GA, DeBruhl N, Harms S, et al. Magnetic resonance imaging of the breast prior to biopsy. *JAMA* 2004;292:2735–42.
- 7 Turnbull LW, Barker S, Liney GP. Comparative effectiveness of magnetic resonance imaging in breast cancer (COMICE trial). *Breast Cancer Res* 2002;4(suppl 1):39.
- 8 Damera A, Evans AJ, Cornford EJ, Wilson AR, Burrell HC, James JJ, et al. Diagnosis of axillary nodal metastases by ultrasound-guided core biopsy in primary operable breast cancer. *Br J Cancer* 2003;89:1310–3.
- 9 Bonnema J, van Geel AN, van Ooijen B, Mali SP, Tjiam SL, Henzen-Logmans SC, et al. Ultrasound-guided aspiration biopsy for detection of nonpalpable axillary node metastases in breast cancer patients: new diagnostic method. *World J Surg* 1997;21:270–4.

Endpiece

The medical profession's misfortune

It is the peculiar misfortune of the medical profession that its members can rarely dare to confess their ignorance, thinking it more or less necessary—in order to maintain their influence with their patients and with the world—to speak with equal decision, whether they are authorized by their knowledge to do so or not... The real fact is that the prestige of a reputation once attained, whether through the influence of charlatanism, good fortune, or superior merit, is not easily destroyed, and the very eccentricities and extravagances which repel patients of sense and delicacy, tend to confirm the prepossessions of those who are wanting in these qualities, and who are naturally apt to wonder at or admire what they do not understand.

George Peacock. *Life of Thomas Young, M.D., FRS*. London: John Murray, 1855.

Submitted by Jan Coebergh, assistant neurologist, The Hague, Netherlands