

Whither breast imaging in South Africa?

IJ Movson

MBChB, DMRD (London)

*Consultant Radiologist, Department of Radiology,
Addington Hospital, University of Natal*

We are living in an age of sophisticated technology in which the explosion of scientific data and research is tending to overwhelm us. It is an age in which it is becoming impossible for one person to have an in-depth knowledge of every branch of radiology. We need to keep a sense of proportion, a sense of balance. The philosophy of using a machine gun to shoot a fly instead of a fly swatter is an expensive one. People are not even aware that they are practising this philosophy which is unrealistic in this age of cost consciousness. This is especially relevant in South Africa where the health budget is limited, and will be so for a long time.

The breast is a skin appendage with straight forward anatomy, with a relatively limited number of pathologies affecting it. For practical purposes the whole of mammography is dedicated to the early diagnosis of breast carcinoma, in an attempt to influence favourably the prognosis and survival rate of this common disease which affects approximately 10% of the female population. The fact that there is such a plethora of mammographic publications in every radiological journal, shows how little we understand the disease and how relatively primitive is our ability to diagnose this condition early.

In spite of all the modalities we have, the anticipated reduction of mortality of breast carcinoma in a screened population is 30%. This is substantial but illustrates once again, how inadequate our current knowledge is, because 70% of the targeted population has not been helped. My remarks are to emphasise the need for a realistic cost effective approach.

Film screen mammography

The mainstay of the diagnosis of breast disease will for a long time depend on a foundation made up of three layers:

- Clinical examinations
- Film screen mammography
- Ultrasound

In selling real estate we all know that the three most important factors in selling a home are location, location, location. In mammography we also have three important factors for success, namely **dedication, dedication, dedication.**

This dedication must start with the radiologist undertaking mammography, who must be familiar with every facet of the subject. He or she must know how to achieve the best possible diagnostic radiograph with the equipment available. The technical side of mammography, including quality control, is well documented. The radiologist must work step by step with the radiographer in the production of the mammogram, which means tailoring views required to solve a particular problem. Most of us doing mammography in

South Africa are self taught, and this includes our radiographers. Specialised courses for radiographers and radiologists are not freely available in South Africa. Most of us have learned by trial and error. Having visited mammographic centres in Britain and the USA, I am convinced we can produce excellent work by our dedication to mammography. If you cannot send your radiographers on dedicated courses, try to send her to a local mammography centre where good work is being done. There is an excellent video film which was produced by the American College of Radiology. It is worth purchasing this video which can be repeatedly reviewed by the mammographers in your department. This video becomes a readily available hands-on teacher for all the staff doing mammography, especially for those in relatively isolated situations (American College of Radiology).

Radiologists should also try to visit dedicated centres overseas, and if this is not possible, visit local centres dedicated to good work. We have to be constantly self critical, and to constantly review the quality of our work. It is amazing with intelligent experience, how quality does improve. Try to do double reading wherever possible. If this is not possible, keep your problem cases aside and discuss them with another colleague involved in mammography.

The question of whether a radiologist should be involved in breast examination of the patient remains controversial. I personally strongly believe that this should be done. In our department, after the mammogram has been reviewed by the radiologist, the patient is informed that we prefer to examine the patient and that after the examination we again review the mammogram to decide whether we require further views or ultrasonography for further elucidation.

We know that in as many as 15% of cases, a clinically palpable mass may not be detected at mammography. By constantly practising clinical examination together with the

to page 5

from page 4

mammographic and ultrasonographic findings at hand, the dedicated mammographer can become skilled in interpretation of breast disease. On occasions a carcinoma missed by the surgeon or by an experienced gynaecologist is found by the radiologist because he or she has the added advantage of seeing the mammogram before examining the patient. This holistic approach to medicine is worth striving for.

Young people under the age of 30 years are not infrequently sent to our department. Doctors often do not understand the limitations and undesirability of doing mammography at such an early age. Under these circumstances, we refer the patient to a breast surgeon for opinion. The examination is initially limited to a medio-lateral oblique view. The cranio-caudal view is only done if it is felt that this view will be contributory. We often complement this investigation with a breast ultrasound examination.

If there is a strong family history of breast carcinoma at an early stage, i.e. the patient's mother or sister had a carcinoma at an early age, our criterion for not undertaking the mammogram is not so strict.

It is important to establish a rapport with one's referring colleagues and to assure them that we are not competing with them - we are after all, on the same side, namely the side of the patient. As a radiologist, I do not think it is our duty to supersede the referring surgeon in giving advice. It is best to leave this to the doctor who is treating the patient. I always explain this to the patient and this can avoid unpleasantness with one's colleagues.

It is always important to obtain a follow-up histological report of all cases which have had a biopsy. This is the best way to learn and to get perspective of which way our assessment of mammograms is going.

I would like to comment on a few practical points which are of relevance and are contributory towards achieving excellence:

1. A dedicated viewing box is an essential

requirement for adequate mammography. If you do work without such a box, the difference with one is unbelievable. Most ordinary boxes have a weaker light than the dedicated box. This results in underillumination of the mammogram. I am sure that all radiologists involved in mammography will confirm that underillumination and underpenetration of the breast associated with inadequate compression of the breast are very important reasons for the missed diagnosis of breast carcinoma. Adequate processing is of course absolutely essential.

2. With regard to exposure factors, we try and work within the 100-200 mAs range. We have found we get our most diagnostic studies in the range. With experience, the radiographer can adjust her initial Kv reading and density to obtain the above mAs.

3. It is important to choose a radiographer with empathy for her patients to do mammography. The patients coming for mammography are amongst the most frightened and apprehensive in the world - frightened about the procedure and apprehensive, with good reason, about the outcome of the examination. "Is this cancer doctor?" is the standard question we are asked.

Mammography currently remains an art in spite of all the scientific background for this procedure.

Ultrasonography

Ultrasonography¹ of the breast is an absolute necessity in any mammographic department. For some time the main use of ultrasonography has been in differentiating solid from cystic lesion, but not absolutely for a solid lesion.

Where possible, one should have available high resolution real-time equipment, preferably linear array transducers of 7-10 MHz frequency. The technique of ultrasound of the breast is well documented. The ideal situation would be for the

mammographer doing the clinical and mammographic examination to also be able to do the ultrasound examination. For many reasons this is not always possible.

Ultrasound is a modality useful in solving mammographic and clinical problems. It is universally not accepted as a breast screening modality at this point in time. It is most often used in assessing indeterminate masses with well defined or poorly seen margins. When a mass is palpable and not visible on a mammogram, especially in the dense breast, ultrasound is used to differentiate solid from cystic lesions. If solid, biopsy may have to be considered.

With modern equipment one can diagnose cysts 2-3 mm in diameter. It is important to realise that large deeply situated cysts within a large fatty breast may remain undetected. Calcified circumscribed masses do not require an ultrasound examination. They are usually due to an involuting fibroadenoma. Pleomorphic microcalcification with a mass usually requires a biopsy to exclude malignancy.

Ultrasound is useful to assess inflammatory disease and to assist in the diagnosis of breast abscess or post surgical fluid collection.

More and more radiologists are trying to make a definitive diagnosis of breast carcinoma by ultrasound, but according to the literature, ultrasound has too high a false negative rate, to be acceptable as a screening modality. It also cannot detect fine microcalcifications as well as mammography can. Ultrasound also has a distinct false positive rate. Ultrasound is now being used for guided aspirations, core biopsy and needle localisation of solid lesions visible at ultrasound.

Ultrasound guided mammotomy

A new technique of ultrasound guided mammotomy² is being developed. A new biopsy device, a mammotome, uses a

from page 5

vacuum within a tissue transport mechanism, enabling multiple tissue sampling with one insertion of the instrument under ultrasound guidance. This method gives a better and more accurate sampling of breast tissue suspicious of malignancy.

Colour Doppler ultrasound

The principle of this technique³ is based on the fact that tumours larger than a few millimetres stimulate neovascularisation. These give rise to flow signals which can be detected as high velocity signals of a specific nature. High velocity flow is detected only in malignancies. There is the potential with this technique to differentiate malignant from benign lesions. Cancers as small as 10 mm are found to be positive for flow signals.

Recently there has been the addition of a micro bubble contrast agent for colour Doppler ultrasound. A new agent, Levovist (SHU 508A; Schering AG) has been developed, and contains micro bubbles small enough to cross the lung barrier. This technique increased the sensitivity and specificity of four patients to 100% enabling the accurate differentiation of benign masses from carcinoma³. This work in progress is very exciting and hopefully will have a great future.

Other methods of breast imaging are as follows:

Xeromammography

This modality, which was popular for several years, has been phased out by the excellence of modern film screen equipment. Xeromammography is no longer used in South Africa.

Scintimammography

Technetium 99-M Sestamibi is being used experimentally to try and improve the sensitivity and specificity in the diagnosis of breast carcinoma. This compound is a

cardiac perfusion agent which accumulates in myocardial tissue in proportion to the regional coronary blood flow⁴. The effectiveness is as yet unknown and is not a method for general use at this stage.

Digital mammography computer aided diagnosis

This modality is in the developmental stage and may well have a great future. "Thus far no artificial intelligence system that derives its input directly from a mammographic image has been shown to improve accuracy of diagnosis beyond that of an unaided radiologist"⁵.

The role of MRI in assessing and managing breast disease

"The value of MRI for breast cancer is as yet not widely accepted by the medical community, let alone the public. Finally, the cost of contrast enhanced magnetic resonance imaging and scarcity of magnetic resonance units capable of performing an adequate breast study prohibits examination of even a fraction of the adult female population".⁶ I think this one sentence describes in a succinct way the current status of this modality, very applicable to our situation in South Africa. It would appear that there is a consensus of opinion that MRI should be confined to certain difficult cases, and that decisions in clinical management must be made together with mammographic and clinical information.

Position emission tomography - PET

PET is a very specialised expensive form of nuclear medicine not readily available for general use in this country in the foreseeable future. The current opinion is that PET may have an important role as a

non-invasive early indicator of treatment efficacy, and may therefore have a role in planning chemotherapy.⁷

Conclusion

Different methods of breast imaging have been described. Some have been discarded and some are in the investigative and developmental stage. Some of these are time consuming and expensive. They can only be done in special cases. Research must continue, and hopefully our diagnosis of breast carcinoma will be successful at an early stage. For practical purposes however, we have to rely on modalities which are affordable and accessible to most people, in a country such as ours and probably the world at large. These modalities are mammography and ultrasonography.

References

- 1 Valerie P, Jackson MD. The Current Role of Ultrasonography in Breast Imaging. *RCNA Vol 33*, No 6; November 1955.
- 2 Parker SH, Dennis MA, Stavros AT, Johnson KK. Ultrasound Guided Mammotomy-A New Breast Biopsy Technique. *JDMIS 12*:113-118; May/June 1996.
- 3 Keder RP, Cosgrove D, McReady VR, Bamber KC, Carter ER: Micro Bubble Contrast Agent for Color Doppler US: Effect on Breast Masses. *Work in Progress: Radiology*. 1996; 198:679-686.
- 4 Khalkhali, Cutrone JA, Mena IG *et al*. Scintimammography: The Complementary Role of Tc-99m Sestamibi Prone Breast Imaging For The Diagnosis of Breast Carcinoma. *Radiology* 1995; 196:421-426.
- 5 Stephen A Geig & Martin J Yaffe. Digital Mammography, Computer Aided Diagnosis, and Telemammography. *RCNA* November 1995; p1205.
- 6 Teresa A Coons, PHD - MRI's Role in Assessing and Managing Breast Disease. *Radiological Technology*, March/April 1996. Vol 67: No 4; p311-336.
- 7 Dorit D, Adler and L Wahl RL: New Methods for Imaging The Breast: Techniques, Findings and Potential. *AJR*, 1995; 164: 19-30