

BREAST BIOPSIES – WHEN, WHY AND HOW

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ABSTRACT

Breast cancer is now the most common cancer among Singapore women. The incidence had risen relentlessly over the last several decades to reach 54.9 per 100,000 per year by the year 2002. Regular breast screening plays a cardinal role in the fight against breast cancer. Mammography is still the only proven modality in breast screening. The margins, degree of density, spiculation and surrounding architectural distortion are important to determine if a mammographic density is sinister. Microcalcifications that are clustered, very fine, branching and varying in shape represent the presence of a carcinoma. Breast ultrasound is currently not recommended for population breast screening. Its main draw back is its inability to demonstrate microcalcifications that is often associated with ductal carcinoma-in-situ. Lesions detected on ultrasound are also known to have a high false positive rate and thus increasing the need for biopsy. Ultrasound is presently used for assessing either a palpable lesion or non-palpable mammographic abnormality. The decision whether to biopsy a particular lesion is not based solely on what a lesion looks like on mammogram or ultrasound. Other factors need to be considered. Patients with a higher risk of breast cancer include those with a family history of breast cancer, history of breast cancer, atypical ductal hyperplasia or lobular carcinoma-in-situ. Age is also an important consideration. Breast surgeons now advocate a biopsy to diagnose a malignancy before definitive surgery. Minimally invasive breast biopsy involves two components, a stereotactic or an ultrasound guidance system and the needles used.

INTRODUCTION

Breast cancer is now the most common cancer among Singapore women. The incidence had risen relentlessly over the last several decades to reach 54.9 per 100,000 per year by the year 2002.

The public health authority response to this rising incidence of breast cancer is raising public awareness and understanding of this disease. This will hopefully encourage women to undergo breast screening. Regular breast screening plays a cardinal role in the fight against breast cancer. With more widespread screening family physicians need an understanding of how screen detected breast abnormalities are managed.

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BREAST SCREENING MODALITIES

Mammography is still the only proven modality in breast screening. Eight randomized controlled trials in mammography screening have been reported. The larger trials include the American (Health Insurance Plan (HIP)) trial and the two Swedish trials (Malmo and two county trials). These trials (references) showed an average of 20% reduction in breast cancer mortality from breast screening.

Breast ultrasound is currently not recommended for population breast screening. Its main draw back is its inability to demonstrate microcalcifications that is often associated with ductal carcinoma-in-situ. Lesions detected on ultrasound are also known to have a high false positive rate and thus increasing the need for biopsy. However the role of breast ultrasound is being evaluated in the screening of dense breast, for example in young patients with strong family history of breast cancer.

The MOH Singapore currently recommends annual screening mammography for women aged 40 to 49 and thereafter once two-yearly. For patients with family history of breast cancer in first-degree relatives, they should commence screening 5 years before the age of diagnosis in the relative.

MAMMOGRAPHY

Mammographic Densities

Mammographic abnormalities can essentially be grouped into two categories. They are opacities and microcalcifications. Radiologists classify these abnormalities into BIRADS (Breast Imaging Reporting and Database System) categories. The meanings these categories convey are listed in Table 1.

Table 1. BIRADS classification

| BIRADS Category | Assessment | Cancer Risk | Recommendations |
|-----------------|---------------------------------|-------------|---|
| 0 | Assessment incomplete | NA | Need further evaluation e.g. cone/magnification views |
| 1 | Normal | Nil | Routine screening |
| 2 | Benign | Nil | Routine screening |
| 3 | Probably benign | <2% | Short term eg. 4-6 months mammographic follow up |
| 4 | Suspicious | 30-40% | Consider biopsy |
| 5 | Highly suggestive of malignancy | 98-99% | Biopsy required |

The margins, degree of density, spiculation and surrounding architectural distortion are important to determine if a mammographic density is sinister. A dense lesion with spicules and ill-defined margins is a breast cancer with 99% certainly (Fig. 1).

Figure 1. Breast cancer presenting as an ill defined mammogram density



An intramammary node and an island of glandular tissue are common differentials of a mammogram density. This is often seen in the superior aspect of the breast, well defined with a radiolucent notch. Asymmetric density could also be due to an island of normal glandular tissue. This is usually further assessed with a cone compression view. A cone compression spreads out the island of glandular tissue and a false density dissipates with this view. With the converse where the lesion becomes more distinct during cone compression a biopsy may be needed.

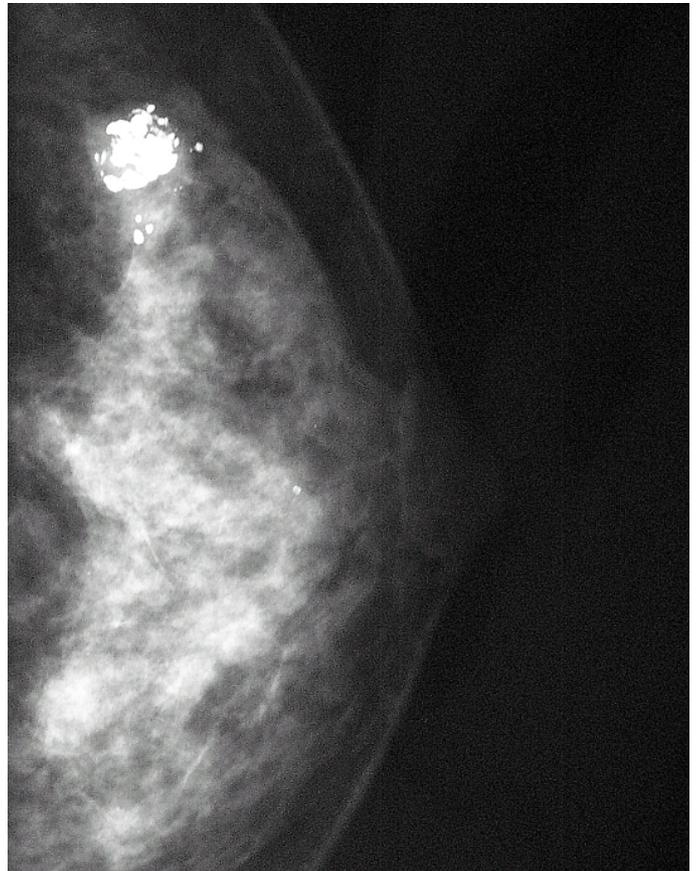
Mammographic Microcalcifications

Microcalcifications can indicate the presence of a cancer, often a ductal carcinoma-in-situ. Mammogram is the only imaging modality that can reliably detect microcalcifications. Microcalcifications that are clustered, very fine, branching and varying in shape represent the presence of a carcinoma (Fig. 2). On the other hand, heavy spherical calcifications are benign (Fig. 3). Also benign are microcalcifications with a ‘saucer’ shape. These are due to calcifications settling at the bottom of microcysts found in fibrocystic changes. Magnification views are often obtained to help view the microcalcifications better.

Figure 2. Malignant microcalcifications



Figure 3. Benign calcifications



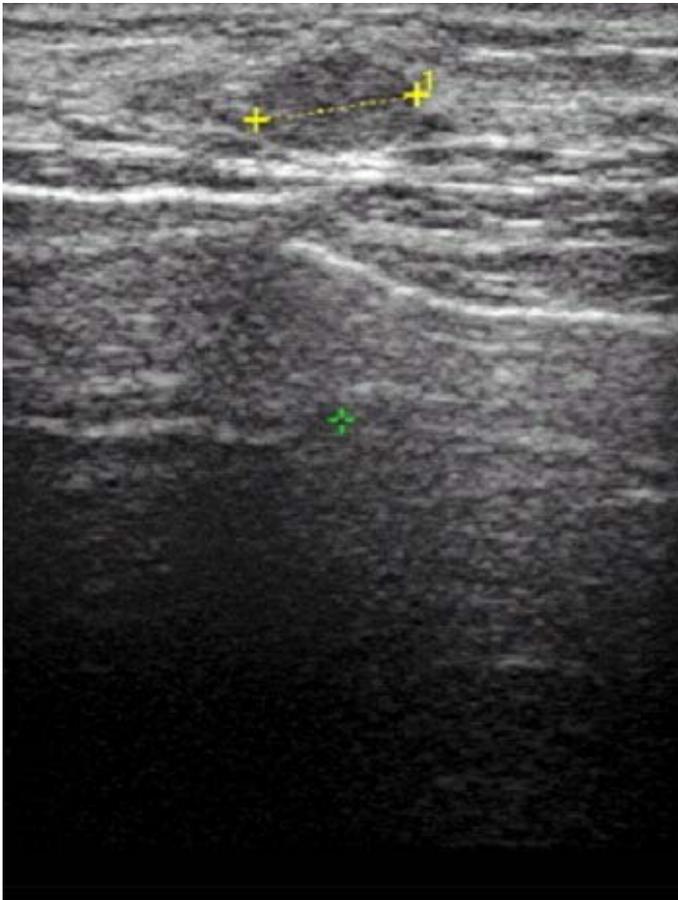
Scattered microcalcifications especially if bilateral often represent benign changes.

ULTRASOUND ABNORMALITIES

A linear high frequency (10 to 13 Mhz) ultrasound probe is necessary for breast ultrasound examination. Ultrasound is presently used for assessing either a palpable lesion or non-palpable mammographic abnormality.

It can help distinguish between a solid and cystic lesion. If solid the size, edges and distal shadowing are further assessed (Fig. 4). Solid lesions with irregular margins, heterogenous internal echoes and distal *hypoechoic* shadowing are classical of cancer (Fig. 5). All lesions that are 'taller than wide' also need to be biopsied. Fibroadenomas are often documented as well defined ovoid lesions with homogenous internal echoes. However it is prudent to note that some cancers can be indistinguishable from a fibroadenoma on ultrasound. This is especially true of medullary carcinomas.

Figure 4. Fibroadenoma: Well defined, even echoes

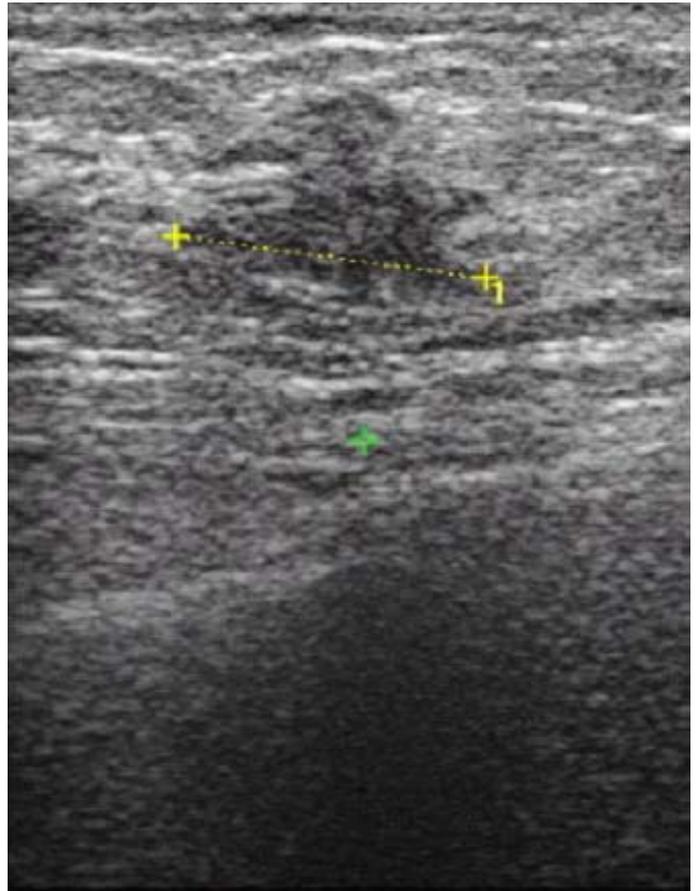


Benign cysts are often multiple and bilateral. They are well defined and anechoic (black) lesions with *hyperechoic* distal shadowing (Fig. 6). If solid echogenic areas are seen within the cyst a biopsy is warranted as a papillary lesion (which can have a malignant component) needs to be excluded.

WHEN TO BIOPSY

The decision whether to biopsy a particular lesion is not based solely on what a lesion looks like on mammogram or ultrasound. Other factors need to be considered. A patient with higher risk

Figure 5. Breast carcinoma: Irregular, hypoechoic lesion



for breast cancer may tilt the decision towards the biopsy of a lesion. Patients with higher risk of breast cancer include those with a family history of breast cancer, history of breast cancer, atypical ductal hyperplasia or lobular carcinoma-in-situ. Age is also an important consideration.

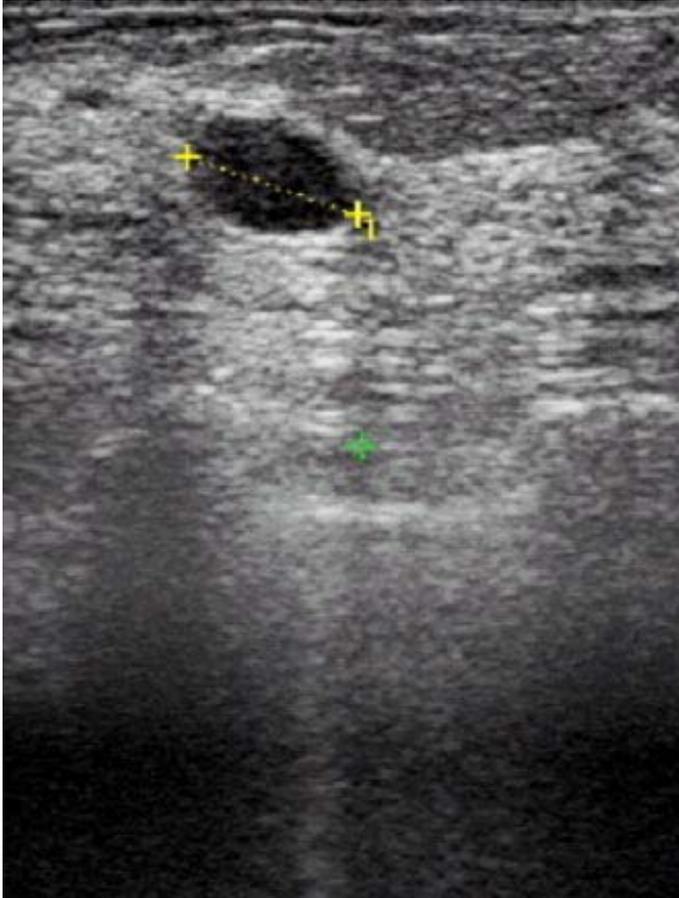
It is often useful to compare the present imaging with previous screening. If a lesion had been documented previously and had remained unchanged it helps in the decision to manage it conservatively. It should be noted however that lesions needed to be followed up for at least three years before one can be confident that it is benign. Conversely a new lesion documented in a patient with previous normal breast screening needs closer attention.

Lastly in some patients biopsy of a lesion may help allay their anxiety. However it is important to understand the patient's anxiety, determine if this can be addressed before proceeding to a biopsy. Often it has to be explained to the patient that if a breast lesion is benign it does not transform into a malignancy with time.

WHY BIOPSY

Breast surgeons now advocate a biopsy to diagnose a malignancy before definitive surgery. Two developments brought about the change in practice. Firstly is the availability of reliable minimally invasive biopsies. Secondly is the availability of more options in the management of breast cancers. These include wide excision and mastectomy with or without reconstruction.

Figure 6. Breast cyst: Hypochoic, well defined with hyperechoic shadow



Also available is the more recent choice of a sentinel node biopsy or axillary clearance in the management of the regional nodal basin. A preoperative diagnosis of malignancy offers the patient the opportunity to understand and participate in her own management.

HOW TO BIOPSY

Minimally invasive breast biopsy involves two components. First is the guidance system. It can be a stereotactic where x-rays are used to locate a lesion. This can be done with the patient in a prone or upright position. The upright system is more cost efficient. However its disadvantage is the occasional syncope in patients undergoing the biopsy. If a lesion is seen on ultrasound then the ultrasound will be used to target the biopsy.

Essentially three needles are being used for minimally invasive breast biopsy. This includes doing a fine needle aspiration for cytology (FNAC), often used to aspirate a cyst. A core cut biopsy needle obtains a core of the lesion for histology. A more recent introduction is a Mammotome needle. This is an example of a vacuum assisted biopsy. This allows for a larger volume of tissue to be obtained for histology. This is especially useful in the biopsy of microcalcifications. All three needles can be used with stereotactic guidance or be ultrasound guided.

CONCLUSION

The family physician needs to be familiar with the management of screen detected lesions. Family physicians play a vital role in reassuring patients that a particular lesion does not need any surgical intervention. Conversely they can help reassure a patient and encourage her to go for the needed biopsy.

REFERENCES

1. Smith RA et al. The randomized trials of breast cancer screening: what have we learned? *Radiol Clin N Am* 42 (2004) 793-806.

LEARNING POINTS

- **Regular breast screening plays a cardinal role in the fight against breast cancer.**
 - **Mammography is still the only proven modality in breast screening. Clinical trials showed an average of 20% reduction in breast cancer mortality from breast screening.**
 - **Breast ultrasound is currently not recommended for population breast screening. Ultrasound is presently used for assessing either a palpable lesion or non-palpable mammographic abnormality.**
 - **The decision whether to biopsy a particular lesion is not based solely on what a lesion looks like on mammogram or ultrasound. Other factors need to be considered.**
 - **Patients with a higher risk of breast cancer include those with a family history of breast cancer, history of breast cancer, atypical ductal hyperplasia or lobular carcinoma-in-situ. Age is also an important consideration.**
 - **Breast surgeons now advocate a biopsy to diagnose a malignancy before definitive surgery.**
 - **Minimally invasive breast biopsy involves two components, a stereotactic or an ultrasound guidance system and the needles used.**
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