Mammography – any alternative imaging in 2005?

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According to 1999 Cancer Association of South Africa (CANSA) statistics, breast cancer is the most common cancer in South Africa among women and has overtaken the reported rates for cervical cancer. They report that the biggest increase has been in the Indian community and among black women between the ages of 30 and 50 years.[1]

CANSA statistics demonstrate that between 1973 and 1998 there was a 21% increase in the number of female breast cancers in South Africa – women less than 35 years old account for 2% of this increase. From 1998 to 1999, 11 507 new cases of breast cancer were reported in South Africa, comprising ± 19% of all cancers reported in the 2 years.[1]

However, the same source indicates that over the last 10 years there has been a 20% increase in survival primarily due to early diagnosis and improved treatments.[1]

The importance of early diagnosis cannot, therefore, be emphasised enough and since the early 1970s mammography has remained the mainstay of early detection of breast cancer.

But as mammography is now over 3 decades old, the question in 2005 is whether mammography is still the best option as a screening modality.

The alternatives are:

1. Self examination – this involves regular self assessment by the patient and relies on the abnormality being palpable and the patient having the education to recognise what is abnormal. Clinically this implies a size far bigger than is acceptable for screening purposes. It is hence only of use as an adjuvant to other investigations.

2. Sonar – ultrasound imaging of the breast is done routinely as an adjuvant to mammography but is of little value as a stand-alone investigation.

3. Magnetic resonance imaging (MRI) – this modality was FDA-approved in 1991 but only as a supplement to mammography. It lacks the spatial resolution available with mammography. However, it is an excellent problem-solving tool and may be useful for screening younger women at high risk for breast cancer, viz. those who are breast cancer genes 1 and 2 (BRCA 1 and 2) -positive.

4. Ductal lavage – this modality relies on breast cells extracted from the milk ducts exhibiting pre-cancerous or cancerous qualities. The cells are examined microscopically for suspicious changes. The rate of false-positives is still too high and although lavage may play a role in the assessment of high-risk women, it is still only FDA-approved as an adjuvant.[2]

5. Electrical impedance scanning – this method uses electrical potential principles to measure the way electrical current passes through cancerous tissue versus its passage though normal tissue. It was FDA-approved as an adjuvant in 1999 but is limited by its availability.[3,4]

6. Biofield diagnostic scanning – this modality is similar to the principle of electro-cardiogram (ECG). Electrical bio potentials are measured across the breast and correlate with the proliferative activity of the tissue. Its usefulness in screening has yet to be proven.[3]

7. Thermography – this is a heat-sensitive processing system that captures heat radiating from the body. It was FDA-approved in 1982 as a supplement to mammography.[5] According to the American College of Radiologists it has not shown value as a screening, diagnostic or adjunctive imaging tool.[3] A newer version known as computerised thermal imaging (CTI) is now under investigation.[5]

8. Scintimammography – this modality may be useful in selected cases following diagnostic mammography. The radioactive tracer 99mTc MIBI has been shown to accumulate differently in cancerous versus non-cancerous tissue.[6]

9. Position emission tomography (PET) – the isotope fluorodeoxyglucose (FDG) goes to places where cells are most active. PET scanning depends on changes in tissue metabolism. PET is being used to detect metastatic disease but is not currently being used for primary breast cancer detection because it does not reliably detect tumours smaller than 1 cm in diameter.[6,7]

10. Dynamic optical breast imaging (DOBI) – this uses differences in light transmission and absorption through normal and abnormal tissue. Its value has not yet been proven.[8]

11. Computer laser tomography – this uses a laser operating in the near-infra-red portion of the spectrum. Normal and abnormal tissue show differential transmission and refraction.[7] It is currently being investigated in trials but has not yet been approved by the FDA for general use.[7]

Over 30 years since its inception, mammography clearly remains the gold standard screening tool for breast cancer detection and is unlikely to be replaced by any other modality in the near future. The advent of digital mammography has changed the way images are recorded, viewed and stored but still relies on the same principles as film screen mammography to produce the image.

References

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