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MODIFIED TRIPLE ASSESSMENT IN

BREAST LUMPS

DISSERTATION SUBMITTED FOR

BRANCH - I M.S (GENERAL SURGERY)

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BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled **"A STUDY OF MODIFIED TRIPLE ASSESSMENT IN BREAST LUMPS "** submitted by **Dr. M. GANDHIMATHI** to the Tamil Nadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirement for the award of **M.S Degree Branch – I (General Surgery)** is a bonafide research work were carried out by her under direct supervision & guidance.

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DECLARATION

I **Dr. M. GANDHIMATHI** declare that, I carried out this work on, **"A STUDY OF MODIFIED TRIPLE ASSESSMENT IN BREAST LUMPS"** at the Department of Surgery, Govt. Rajaji Hospital during the period of December 2007 to November 2009. I also declare that this bonafide work or a part of this work was not submitted by me or any others for any award, degree, diploma to any other University, Board either in India or abroad.

This is submitted to The Tamilnadu Dr. M. G. R. Medical University, Chennai in partial fulfillment of the rules and regulations for the M.S. degree examination in General Surgery.

Place : Madurai **Dr. M. GANDHIMATHI**

Date : 14-12-2009

CONTENTS

INTRODUCTION

Until a few years ago, it was generally believed that a breast tumour should be excised and histologically examined to determine its nature with certainty – because the preoperative physical assessment alone was associated with too much uncertainty.

Eventually, with the advent of mammography, a radiological tool became available to the surgeons to make a pre-operative diagnosis of the breast with a reasonable degree of accuracy. However, it was the introduction of FNAC that changed the entire outlook to the matter. The combination of clinical examination, Mammography and FNAC came to be called upon as the *'Triple Test'* for assessment of breast lumps and has now become the gold standard in the work-up of the same.

Breast Ultrasound has now become available at higher resolutions, and is proving to be a highly useful adjunct to mammography. The wide acceptance of ultrasound as a diagnostic modality has been documented extensively in literature. However, opinions vary about the usefulness of USG breast in the evaluation of masses, and, surgeons are cautioned to be aware of its attributes as well as its deficiencies.

The '*Modified Triple Test*' utilizes-clinical Examination, Ultrasonography of the breast as the radiological method, and FNAC/ CNB for the diagnosis of palpable breast lumps; and it is gaining acceptance with the recent advances in technology and refinements in the interpretative criteria of sonographically characterized masses.

Today the studies concentrate on whether a benign result of the tests mentioned above makes excision biopsy unnecessary. Most often, this question arises in connection with localized changes in breasts with Fibrocystic diseases. For these tests to be adopted they must however, have the some degree of accuracy as excisional biopsy-because, non-excision of a malignant tumor is unacceptable.

REVIEW OF LITERATURE

Medical literature abounds with studies of evaluation of breast lumps that emphasizes that the statement “every palpable mass must be assessed and clarified”.

Hermansen C.et.at in 1987 prospectively studied 650 breast tumors and applied the term ‘*Triple test’* to the triad of clinical examination; mammography and FNAC used to diagnose tem. He concluded that the diagnostic accuracy of the triple test is comparable to that of histological examination. Hardy JR. et al assessed 143 patients with palpable breast nodules with clinical examination; FNAC; mammography; ultrasonography and magnetic resonance imaging (MRI) and concluded that the combination of cytology and ultrasound was best at correctly diagnosing malignancy.

Lawrence N Bassett et.al assessed the usefulness of mammography and sonography in women less than 35 years of age (1016women) during a 8 years period. This study found that mammography was not useful in women less than 35 years. However sonography was useful in avoiding unnecessary biopsies and for this reason was the initial examination in younger women.

But it was not useful in detecting nonpalpable carcinomas or in differentiating benign from malignant solid masses.

Vetto JJ et at in 1996 studied 55 women below the recommended age of screening mammography with the 3 elements of' *Modified Triple Test'*(C/E, USG; FNAC/CNB). The test had a specificity and negative predictive value of 100% for malignancy. They concluded that use of MTT for diagnosis of palpable breast lesions in younger women yields high diagnostic accuracy without the need for routine open biopsy, resulting in overall reduction in patient charges.

Purasri P et al retrospectively assessed 603 patients with breast lumps using the '*Quadruple test'*- C/E/USG/Mammography/FNAC. A stepwise logistic discriminant analysis was used to derive a novel diagnostic index. This predicted the diagnosis in 98% of women <35 years correctly.

Hatada T et al retrospectively studied 114 lesions and compared diagnoses obtained by standard FNAC and that of ultrasound guided FNAC with surgical findings and found the accuracy to be 65% and 86% respectively. They concluded that

USG-guided FNAC improves the preoperative diagnosis especially in patients with tumor less than 2cm.

Heiken TT et al conducted a prospective analysis of office-based breast ultrasound, on 660 breast lesions and found that suspicious lesions determined by USG had a 75% chance of being malignant; however 5% of lesions characteristic of fibroadenoma turned out to be malignancies.

Jill S Montrey attempted to determine the usefulness of ultrasound as screening tool for breast cancer in women<35 years, with indeterminate mammography, persistent symptoms and high risk history.

Literary review of Breast USG for screening:-

Carcinoma detected

Frazier et al	1092(3)	3/135 (2.2%)
Kopens et al	1985(2)	3/127(2.4%)
Basset et al	1987(1)	1/612(0.2%)
Frazier et al	1985(4)	36/600(6%)

Thus breast ultrasonography when used correctly can be effective, but is not fool proof, especially in lesion<1cm.

DISCUSSION

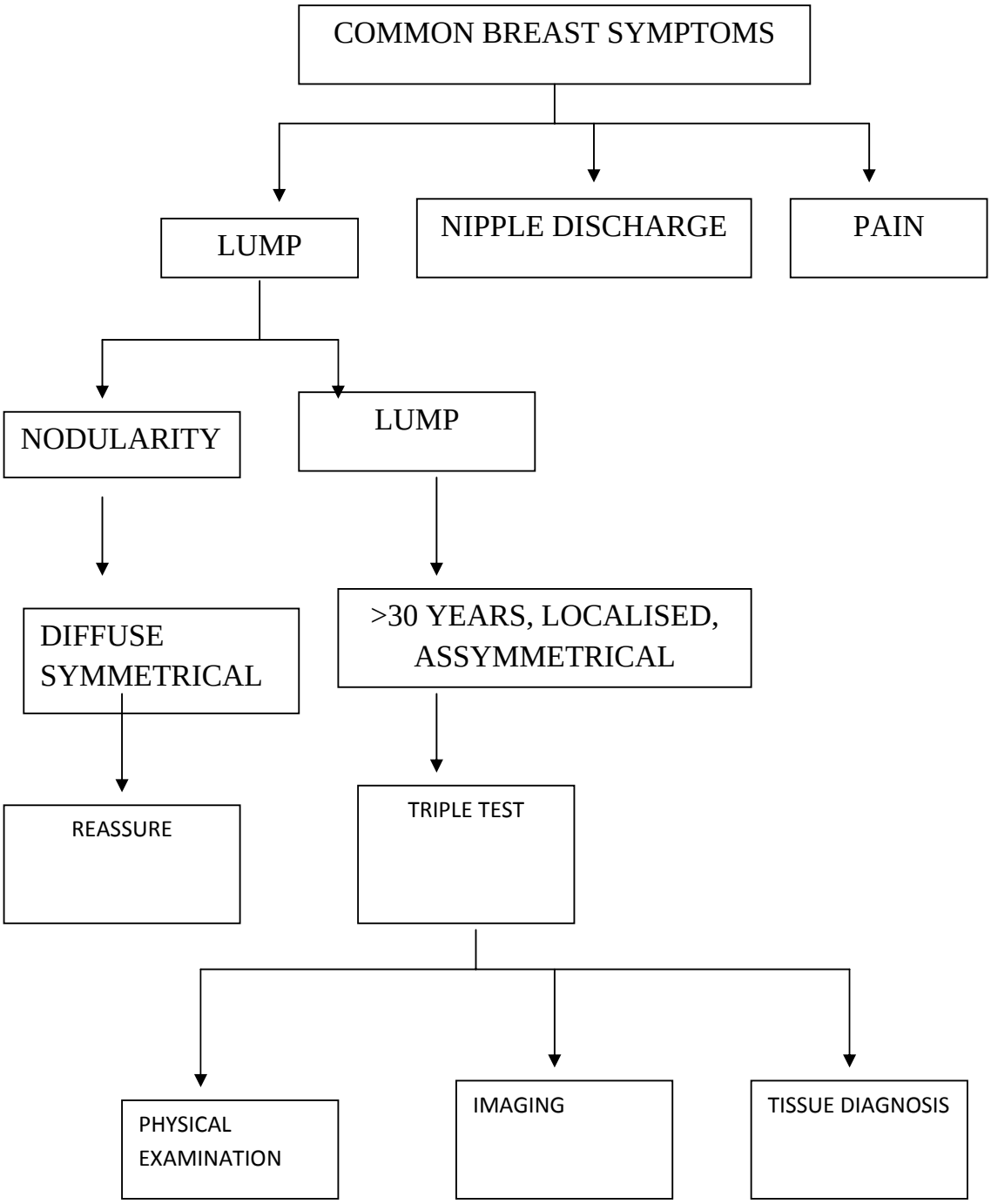
ASSESSMENT OF BREAST LUMPS

Breast lumps are source of anxiety to patients and a stratified approach has to be adopted to properly (chart I) evaluate and treat them. Though benign breast diseases are more common; there is a preoccupation with malignancy (undue but understandable) amongst the patients and physicians alike.

The ultimate diagnosis and treatment of a patient with a dominant breast mass rests with the clinician. A dominant breast mass is defined as a solid or cystic lump that persists throughout the menstrual cycle.

The pre op assessment of a breast mass begins with a through history and systematic physical examination. However it is generally accepted that this alone can be inadequate for an accurate diagnosis. The breast is naturally multinodular and hence the difficulty in appreciating small nodules amidst the normal lumpiness is apparent. Apart from this is the varied expertise of the examiner in breast palpation. Thus imaging of the breast using various physical imaging modalities is important.

DIAGNOSTIC PROTOCOL



The earliest recorded case of breast imaging is that SALOMON, a German pathologist who in 1913 reported the use of the recently developed X-ray to visualize breast structure in amputated breasts. He demonstrated the irregular mass density and microcalcification which are still in use as the most important benchmarks to identify possible breast malignancy. Even today mammography remains the method of choice for detecting the occult, nonpalpable lesion and remains the standard for imaging of breast against which other modalities advocated now are measured.

Other imaging modalities have now been introduced for

- Visualizing lesion missed by mammography
- To replace mammography with another efficient, more economic device.

The diagnostic utility of ultrasonogram was document in 1950s; but it was only with the development of “grey scaling” by Korsakoff and associates in Sweden years later that better tissue representation was obtained. Recent technical advances in ultrasonography have expanded the potential utility of this modality in the evaluation of breast lesions far beyond distinguishing solid abnormalities from cystic ones.

Tissue diagnosis remains the most reliable confirmatory tool for breast lumps. In 1912 Ward used fine needle aspiration (FNAC) Cytology to examine lymph nodes for lymphoma. Eventually the procedure was attempted on patients with breast lumps in 1926 by Martin and Ellis at New York. Cytological interpretation requires skill particularly in view of cell types and pathologies encountered, but high levels of accuracy can be obtained with experience.

CLINICAL EXAMINATION

A palpable breast mass may be identified when it becomes sufficiently large to be differentiated from surrounding breast tissue physically by an examiner – usually the patient or the physician; or is perceived on an imaging examination. Determining by physical examination whether a mass is present can be difficult as all breasts are variable in the combination of glandular tissue, fibrosis and fat. True masses are generally asymmetric in relation to the other breast; distinct from the surrounding tissue and three dimensional.

The underlying cause of complaints about the breast proves to be benign in the overwhelming majority of cases. Breast symptoms, however, induce such a great anxiety in the patient that malignancy needs to be excluded as speedily as possible.

The first steps in this are the classic ones of history and physical examination.

Essential points in the history include:

- Age
- Menstrual status
- Family and reproductive history
- Lactational history

- Radiation to the chest
- H/o benign breast disease
- Previous biopsy

In physical examination of patients with a breast complaint-seclusion, warmth and privacy are particularly important in the examination of the breast. This avoids discomfort and embarrassment to the patient. Good lighting enables detection of minor abnormalities. The patient sits stripped to the waist. Attention is paid to.

Inspection from bed end :

1. Arms by the side of the body.
2. Arms raised straight above her head
3. Hands on her hips pressing and relaxing

Symmetry of nipples and breasts.

1) Both Breasts are inspected

1) Position – Displaced in any direction.
2) Size& shape–Whether larger (or) Smaller than its fellow
3) Any puckering (or) dimpling

2) Skin over the Breast

1.Colour & Texture

2. Engorged veins

3. Dimple retraction

4. Peud’e orange

5. Nodules

6. Ulceration and fungation.

3) Nipple:

1.Symmetry

2.Position

3.Size & Shape

4.Discharge

4) Areola

Colour, Size, Surface

5) Arm & Thorax

6) Axilla & Supraclavicular fossa.

Palpation:

(1)Palpate Normal Breast first

(2)All four quadrants should be palpate systematically along with axillary tail.

(3) Deeply systematically from the areola concentrically.

(4) If any lump is detected it is felt by palmar surface of the finger with hands flat site number size shape surface margin consistency should be noted

(5) Fixity to skin, breast tissue and underlying fascia muscle is noted.

Examination of Lymph nodes

1) Axillary
    a. Pectoral group
    b. Brachial group
    c. Subscapular group
    d. Central group
    e. Apical
2) Supraclavicular Nodes

Examination of Other Systems :

Particularly valuable in practice are

a) Inspection with arms firstly dependent, then elevated
b) Initial light touch over the breasts prior to systematic deeper palpation in concentric circles, working outwards.
c) Simultaneous examination of the axilla performed from behind the patient.

Malignant lesions may be firm and have indistinct borders and attachments to the skin or deep fascia with dimpling or nipple retraction. Benign lesions typically have discrete borders, well defined margins and are mobile. Cysts can be differentiated from solid lesions by palpation.

Rosner et al reported that physical examination can correctly identify only 58% of 66 patients with cysts. Significant discordance among experienced examiners may occur. In one study surgeons performed physical examination independently and agreed on the need for biopsy in only73% of 15 masses subsequently proved malignant. (Boyd et al).

Somers et al studies certain palpable abnormalities defined asa areas of thickening, prominence of tenderness without an associated dominant mass on physical examination; no suspicious mammographic lesion; and rubbery, firm, cystic soft mass, needle sensation by FNAC. The incidence of malignancy in these ‘suspicious’ group was less than 1 % (1/106), leading to the conclusion that this subset of patients with palpable abnormalities did not require surgical biopsy.

Nevertheless, the physical findings of benign disease and malignancy in its earliest stages may overlap; and without the use of FNAC and/or breast imaging, some palpable malignant lesions may be followed up inappropriately; leading to serious consequences for both the patient and the physician.

Although some masses exhibit distinct physical findings, an imaging evaluation is required in almost all cases to characterize the palpable lesion, search for ipsilateral multifocal or multicentric carcinoma, and screen the contralateral breast. A negative imaging evaluation, however, should never over rule a strongly suspicious finding on physical examination or vice versa.

ULTRASOUND OF THE BREAST

Although diagnostic ultrasound equipment has been available since the 1950s, it is only in relatively recent years that the widespread use of this technique has been accepted by radiologists and then by surgeons. A lot of this has related difficulties with earlier machines.

HISTORY

The transducers that produce the ultrasonic signal were initially quite crude devices that operatively low frequencies. Although penetration of the signal is better at these frequencies, resolution of tissue abnormalities is not as good. It was not until the development of ‘gray scaling’ by Korsakoff and associates in Sydney that better tissue representation was obtained. As the name of the technique implies, the images now obtained were in shapes of gray and this shading was corresponding to tissue changes and particularly to areas of localized pathology. Improvements in transducer design followed, allowing various frequencies to be used, with the higher frequencies used in areas such as the breast, thyroid and testis.

Colour Doppler provides additional information about the vascularity and helpful in characterization (Delorme & Huber 1998) Blood flow is demonstrated by frequency shift produced by movement of RBC. Use of a microtubule contrast agent may further enhance detection of flow.

Even with all the advances it must be state and emphasized that the use of USG equipment is very operator dependant and interpretation of the images requires a large amount of practical training. Skilled interpreters of ultrasonic images, do however, follow 3 golden rules-

1. Never make an interpretation on a single image, superimpose the ultrasonic images mentally to formulate a 3 dimensional of the scanned tissues and to ensure that the displayed feature is consistent with the 3D image.
2. Because a feature is displayed it is not necessarily real- always rule out artefacts.
3. Because a feature is not displayed it is not necessarily not there.

The original use of USG was to determine whether a breast mass was a cyst or solid lesion. Advances in technology and

refinements in interpretative criteria have expanded the role of USG in characterizing masses as having benign, malignant or equivocal features.

BREAST ULTRASOUND TECHNIQUE:-

- Confirm the location of the mass noted on physical examination; a diagram from the referring physicians to demonstrate the lesions position.
- A high resolution small parts transducer 7.5 – 15 MHz is used.
- Evaluate the Region of Interest (ROI) to assess the clinical abnormality is corresponding to the ultrasound findings.
- Patient positioning: The patient is positioned in an oblique manner with a pillow placed under the shoulder of the breast to be examined. The degree of obliquity is determined by the breast – aiming to have the breast spread evenly over the chest wall, with the nipple pointing to the ceiling. The arm should be elevated over the patients head to facilitate even distribution of the breast tissue, but should not be elevated that the breast is retracted superiorly. A little care exercised in patients makes the USG localization of the lesion less of a problem.

a. Lumps felt better in the upright position may by scanned in that position.
b. Fluid levels in cystic masses may be confirmed by changing to upright/ decubitus position.

- Region of interest is trapped with the examining finger and the transducer is placed directly over the abnormality.
- Examine in overlapping radial/ antiradial planes – to determine relation of lesion to ducts and avoid errors as mistaking fat islands for solid masses.
- The entire periphery of the lesion must be evaluated in multiple planes through a 180 degree are to determine the nature of margins, its shape and appearance of surrounding tissue.
- Compression of tissue with the transducer is helpful in spreading apart breast tissues, flattening islands of fatty tissue, and eliminating artificial shadowing.
- The rest of the breast tissue is systematically imaged from periphery to the nipple.
- The retroareolar area can be evaluated with the transducer angled into the area in multiple planes.

LABELING OF LESIONS:

- The lesion is labeled on a clock face.
- Its distance form nipple is given in centimeters.
- The greatest diameter should be measured.
- The height (AP diameter) is determined obtain a height/width ratio.

NORMAL APPEARANCE OF THE BREAST

Knowledge of normal variations of breast architecture is essential for the detection and accurate diagnosis of abnormalities. Breast is seen on ultrasound as a multilayered structure, the skin and the fibroglandular plate being relatively echogenic while the subcutaneous and retromammary fat layers are echo poor.

Skin:

The skin is imaged as an echogenic layer of approximately 3mm or less in thickness, often a hypoechoic central line. Large areas of skin thickening are difficult to recognize without comparing the ROI to the opposite breast or to a normal area with in the same breast. A stand-off pad may be used to detect subtle abnormalities.

SUBCUTANEOUS TISSUE:

The subcutaneous fat layer is a hypoechoic layer situated between the skin line and the breast parenchyma. Cooper's ligaments are imaged as curvilinear lines extending from the breast tissue to the superficial fascial layer- producing a scalloped appearance.

Breast cancer does not arise in the subcutaneous but may involve it by direct extension.

Focal increased echotexture; Malignancy, inflammatory lesions, edema, fat necrosis, or biopsy scar.

Diffuse increased reflectivity; edema of any cause (eg., Heart failure) diffuse, from of breast cancer, inflammatory breast cancer, inflammatory mastitis, or radiation therapy.

Lesions indigenous to this plane are sebaceous cysts, epidermoid inclusion cysts, hemangiomas, and rarely smooth muscle and fibrous tissue tumors.

NIPPLE AND AREOLA:

This is difficult area to visualize because of difficulties with transducer contact by nipple protrusion or inversion, producing air trapping which is a source of shadowing. Compression of the nipple

and imaging with multiple planes angled toward the subareolar region can be help. Ducts can be visualized and traced upon the breast tissue, echogenic areas within the ducts usually represent debris. Visualization of a mass within a dilated duct may indicate a papilloma, carcinoma or other lesion.

BREAST PARENCHYMAL LAYER:

The breast tissue is more dense and uniform in the younger patient, age and parity however, are not good predictors for the USG appearance for any one individual.

The breast parenchyma consists of ductal, lobular and fibrous tissue in varying proportions,. The normal appearance of the breast can range form almost completely fatty with only a few echogenic fibroglandular tissue with little or no fat. Fibroglandular layer has a flat post surface while the anterior surface is cone shaped gathering towards the nipple.

Ductal elements can be made out in the glandular layer they are widest at the lactiferous sinuses under the areola but in the periphery of the gland as fine echo poor lines.

RETROMAMMARY AREA:

It is a hypoechoic fat plane, superficial to the fascia pectoralis. Usually well demonstrated deep to the echogenic glandular tissue.

LYMPHNODES, ARTERIES, AND VEINS

Lymph nodes are frequently imaged within the breast and axilla as oval nodules with an eccentric hyperechoic hilum and a surrounding less echogenic rim of tissue;

Benign nodes - large in size but maintain their morphology.

Malignant nodes- only gross abnormalities can be detected, when they appear as lobulated hypoechoic nodules.

Blood Vessels :

Normal vessels of the breast seen as coloured lines that typically run along normal structures. They taper smoothly and branch regularly as they pass towards the gland. Colour Doppler can be used to demonstrate vascular structure within the breast and tumours.

CHARACTERIZATION OF BREAST MASSES

CYSTS:

The first step in characterizing breast masses is cyst/solid differentiation. When the breast meet all of the diagnostic criteria for cysts the USG accuracy approaches 100%.

The criteria include:

1. Round, oval lobulated shape
2. Anechoic
3. Well-defined posterior border
4. Increased through and through transmission
5. No alteration of surrounding parenchyma

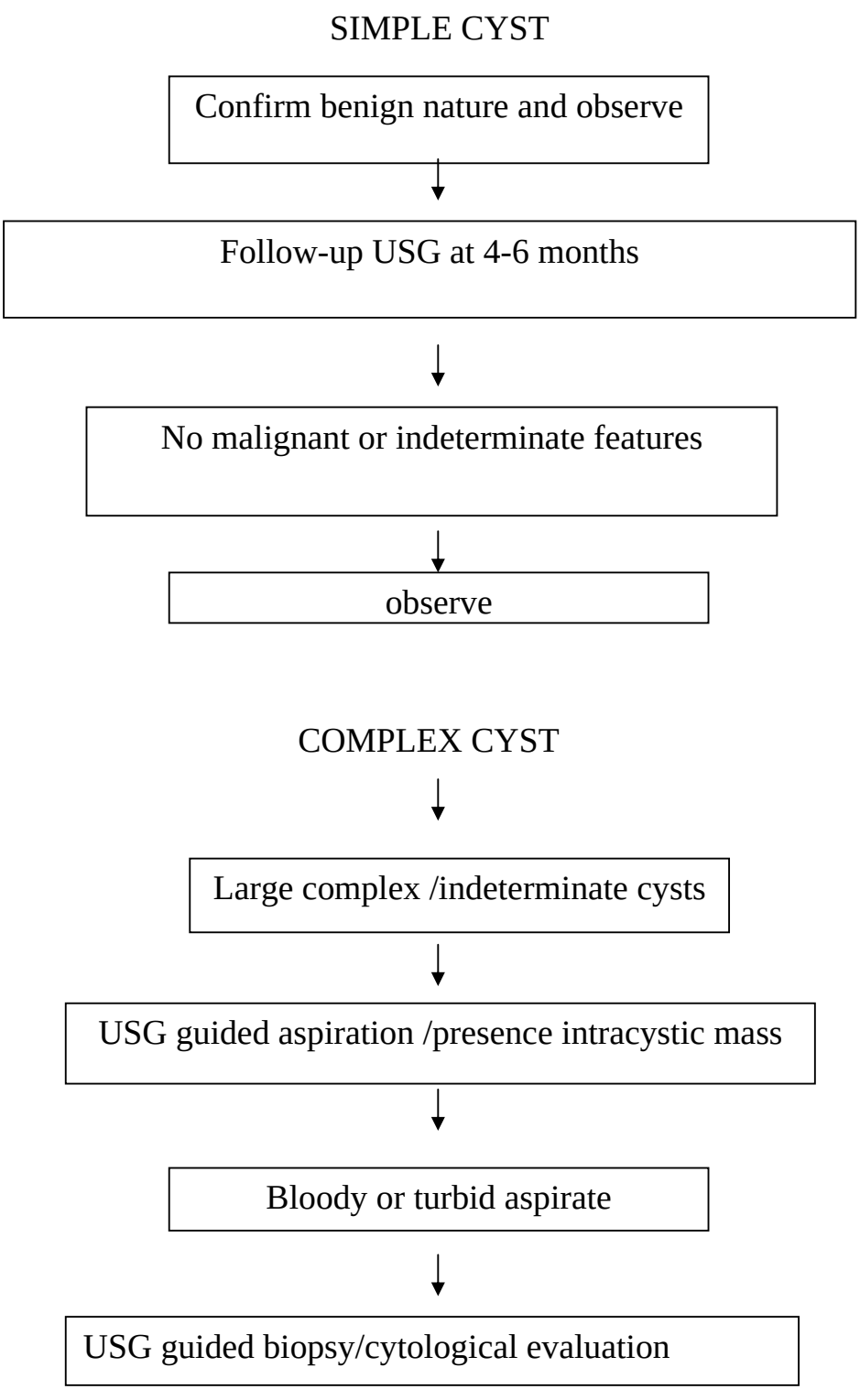
Unfortunately, not all cysts display these criteria. The resolution of USG for cystic lesions is up to 5 mm with 100% accuracy.

The presence of internal echoes is the most common diagnostic difficulty in cyst/solid differentiation. Cysts have internal echoes due to

- Presence of cholesterol or calcium
- Hemorrhage
- Infection

FOLLOW UP OF CYSTIC LESIONS

Chart-(2)



SOLID MASSES:

Ultrasound features of a solid includes:

- Primary signs – Changes produced by the mass itself
- Secondary signs – changes produced in the tissues surrounding a mass.

BENIGN CHARACTERISTICS OF SOLID MASSES-

The diagnosis of a benign nodule based on USG findings is rarely specific. The appearance of fibroadenomas, focal fibrocystic changes, tubular adenomas and other benign solid nodules overlap.

Characteristic of benign solid lesions include-

1 Shape-oval, round with few lobulations.
2 Margins that are sharply demarcated with a thin echogenic pseudocapsule.
3 A depth/width ratio of <1
4 No disruption of surrounding tissues
5 Homogenous low level internal echoes are usually present.
6 Move freely
7 Compressible
8 Low in vascularity
9 Vessel architecture is simple

Characteristic of malignant solid lesions:

Irregular with ill defined borders

Internal echoes are heterogenous

Interrupt the surrounding breast architecture

Drag the surrounding tissue as they are moved

Incompressible

Vascular

Vessels are tortuous and irregular

FIBROADENOMAS:

They are most common benign solid nodules. They are most commonly detected in the younger age group. The USG appearance is determined by the relative amounts of fibrous and epithelial tissue.

a) Enhanced through and through transmission

b) Posterior attenuation in relation to the fibrous component

c) Coarse calcifications in degenerating fibroadenoma producing shadowing.

d) Tubular structures seen with lactating and juvenile types.

e) Differentiated from fat lobules by their non compressible characteristics

LIPOMAS AND FIBROADENOMYOLIPOMAS :

1. Lobulated masses that do not distort surrounding tissues
2. Presence of internal echoes due to fat.

FAT NECROSIS:

Focal hyperechoic nodule with a central lucency

MALIGNANT CHARACTERISTICS OF BREAST LESIONS

Stellate masses

Circumscribed masses

Diffuse edema changes

Calcifications.

Stellate masses:

Desmosplastic reaction produces contraction of the breast tissue towards the mass disrupting the normal parallel soft tissue planes.

- These masses have an irregular hypoechoic lesion with distortion of the surrounding breast tissue.
- Disruption of normal trabecular structures.
- Extension along the plane of the ducts.
- Posterior acoustic shadowing.
- Increased reflectivity of the subcutaneous tissue.

DD *of stellate lesions:*

- Carcinoma (Most common)
- Radial Scar
- Sclerosing adenosis
- Post surgical scarring

Circumscribed masses:

Breast cancer also commonly presents as hypoechoic masses that appear to displace breast tissue.

- Oval, round
- Multilobulated
- Height/width ratio>1
- >3 lobulations
- Reactive halo surrounding the mass

DD *of circumscribed masses:*

- Carcinoma – Usually the high grade NOS variety of ductal carcinoma & medullary colloid and papillary ca.,
- Metastatic lesions:- from lymphoma melanoma leukemia, sarcoma, adenocarcinoma from other sites.
- Inflammation and abscesses.
- Hematoma

- Phylloides tumor
- Fibroadenoma.

Diffuse edema changes:

A difficult type of carcinoma to distinguish is one that does no produce a mass but only diffuse changes in echotexture and parenchymal pattern.

- Subtle increased reflectivity of parenchyma and subcutaneous fat.
- Loss of normal orientation of tissue planes.
- Poor differentiation in the fat-parenchyma interface.

DD *of diffuse edema:*

- Lobular and ductal carcinoma, inflammatory carcinoma.
- Breast contusion
- Congestive cardiac failure (usually bilateral).
- Breast/chest wall irradiation
- Superior vena cava obstruction.
- Axillary lymphatic obstruction.

Calcifications:

Breast carcinoma may produce calcifications both with and without mass. Calcification of sufficient size and clustered variety in a homogenous tissue can be picked up by USG.

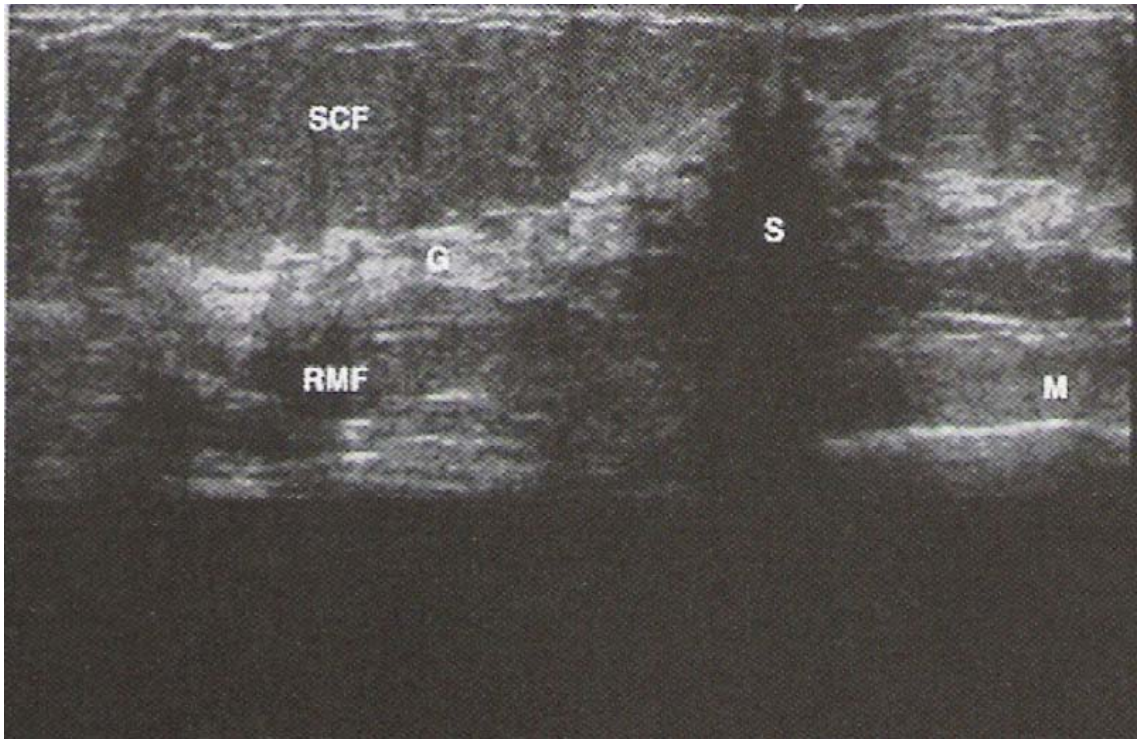
Intracystic carcinomas :

Rare lesions, usually papillary carcinoma that has obstructed a duct and bled producing a blood filled cyst.

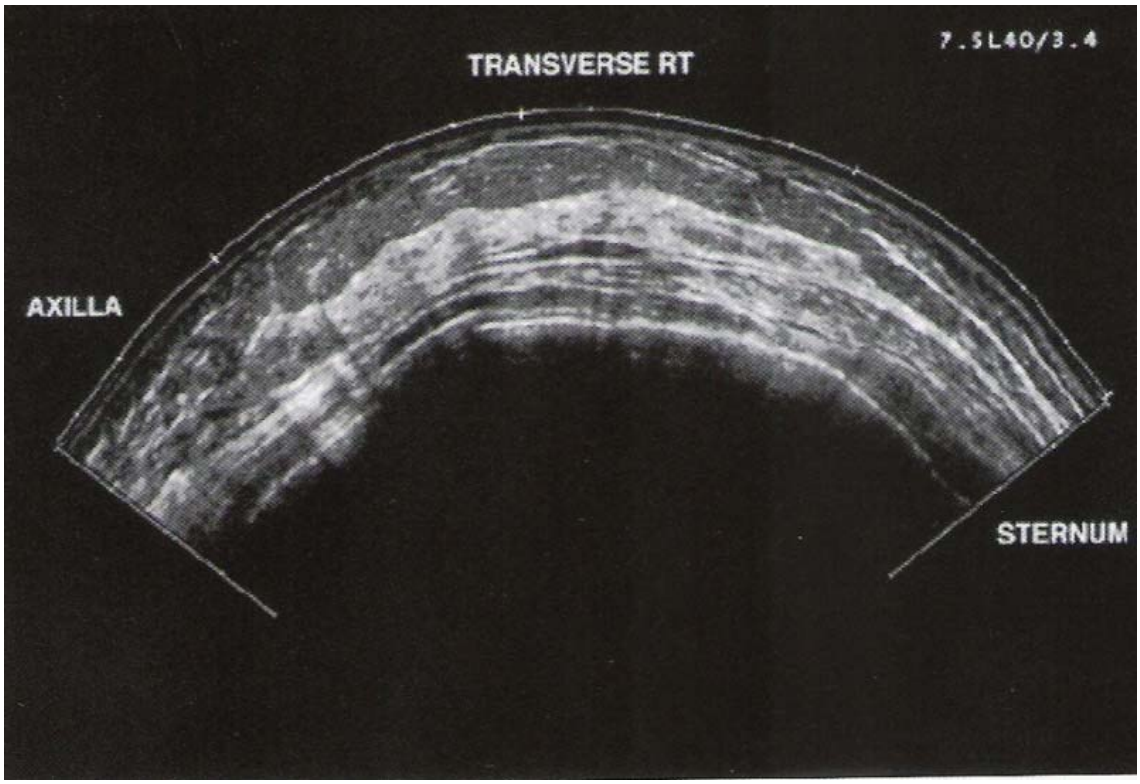
DD f intracystic mass:

- Papillary carcinoma
- Necrotic solid tumor
- Cysts containing hemorrhage, debris
- Abscess
- Hematoma

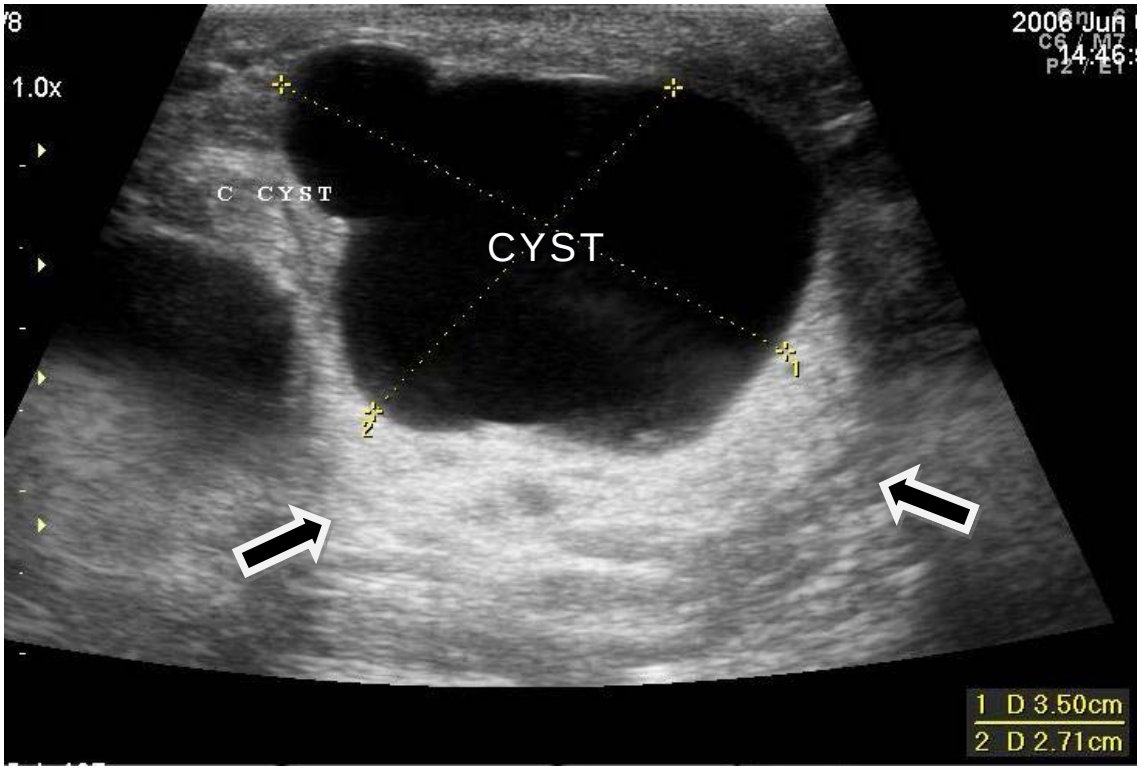
With the aid of the above criteria USG can come to a reliable diagnosis of breast lumps, depending upon the size of the lesions. The minimum size of cystic lesions picked up by USG are 2-3 mm. Solid lesions> 0.5cm are usually categorized with accuracy, 80% of solid lesions > 2cm and, 20% of lumps > 1-2cms and 5% of lump < 1cm is the diagnostic accuracy of USG.



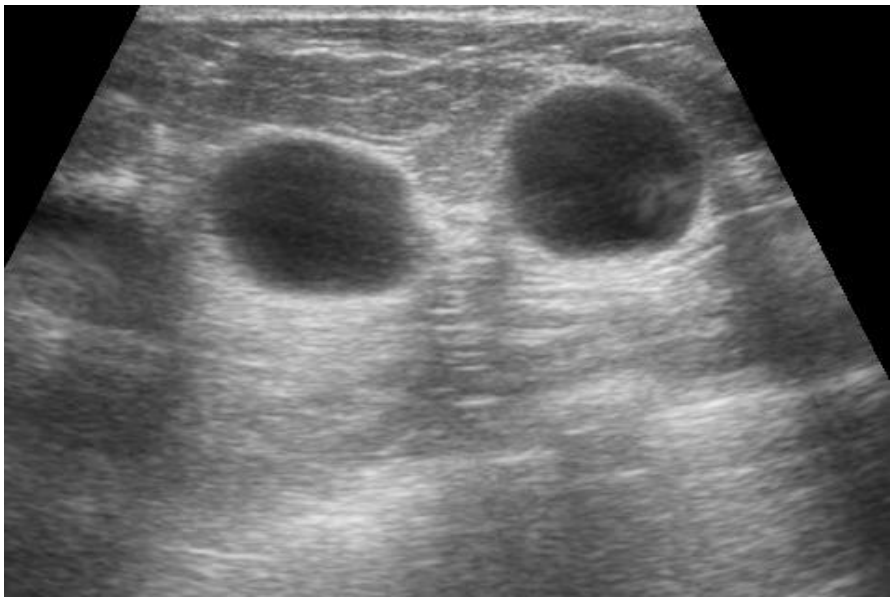
NORMAL BREAST : Showing subcutaneous tissue, glandular tissue(G), retromammary fat(RMF), nipple shadow(S), pectoralis muscle(M).



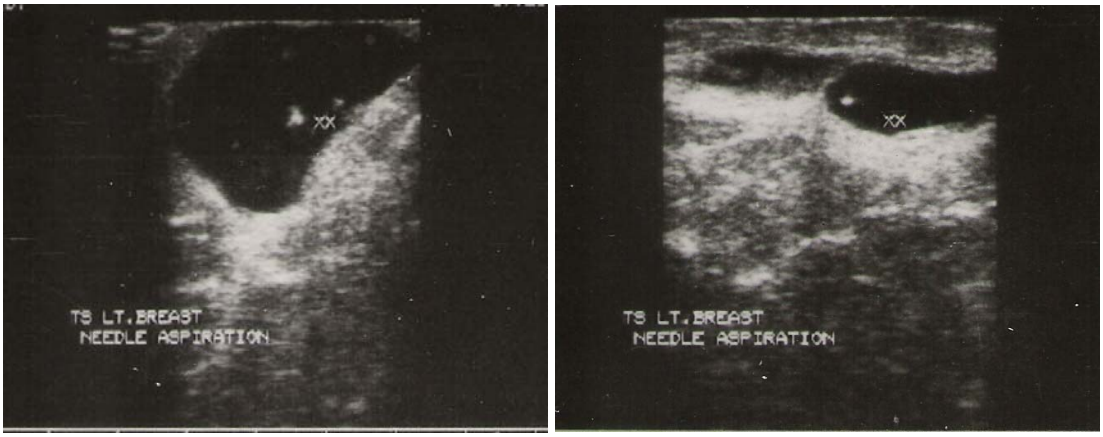
PANORAMIC VIEW OF NORMAL RIGHT BREAST. A whole breast section can be shown using extended field of view software.



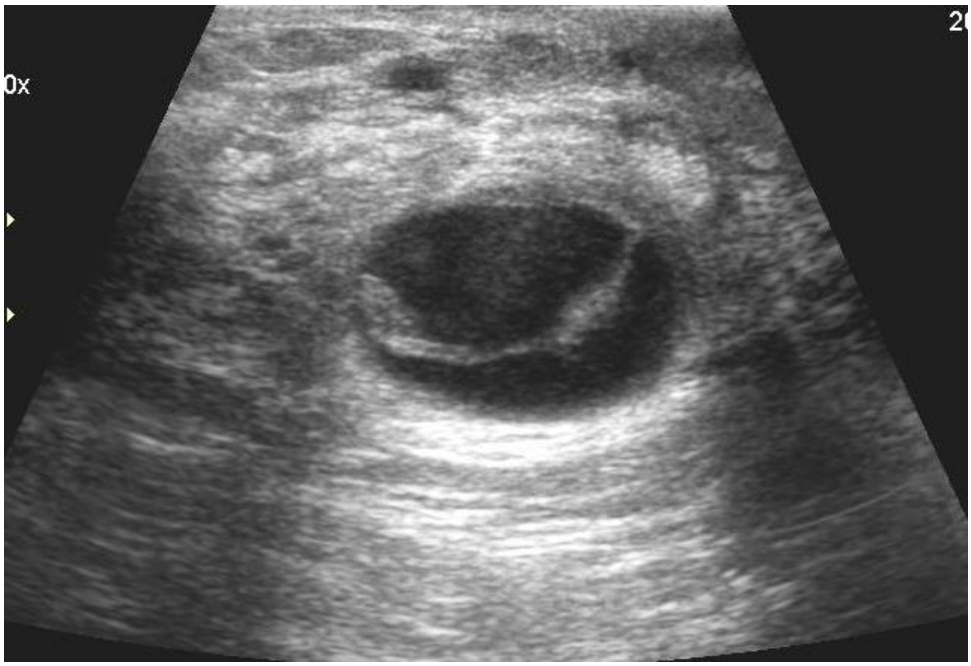
CYSTIC MASS: **Anechoic mass with regular margins and posterior acoustic enhancement.**



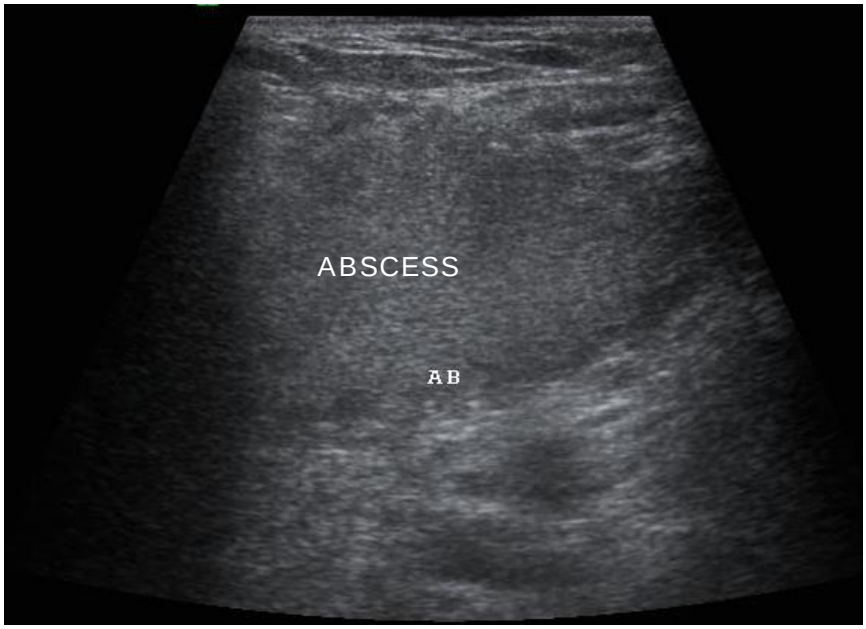
MULTIPLE SIMPLE CYSTS: **Anechoic cystic masses with regular margins and posterior acoustic enhancement.**



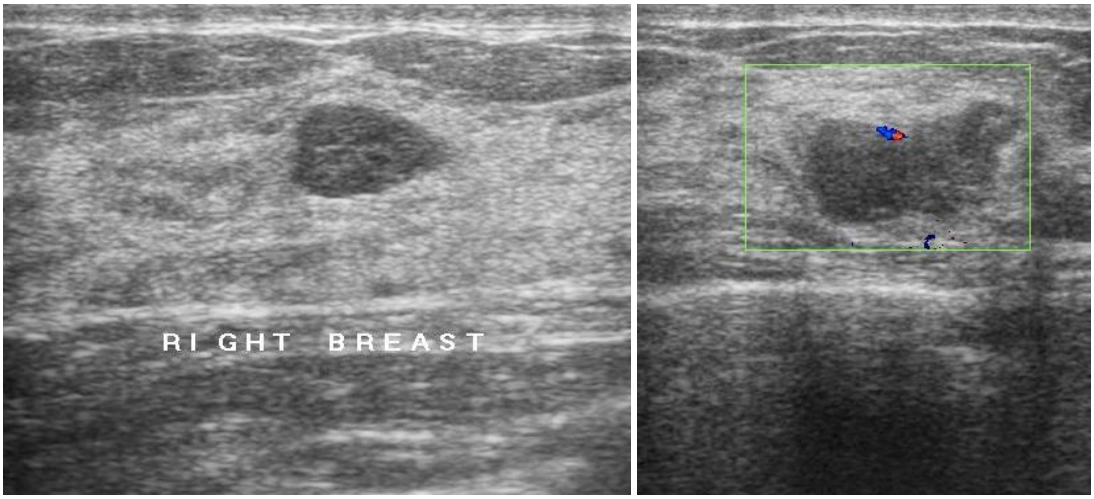
USG GUIDED ASPIRATION OF SIMPLE CYST: **Showing needle in situ and reduction in size of the cyst following aspiration**



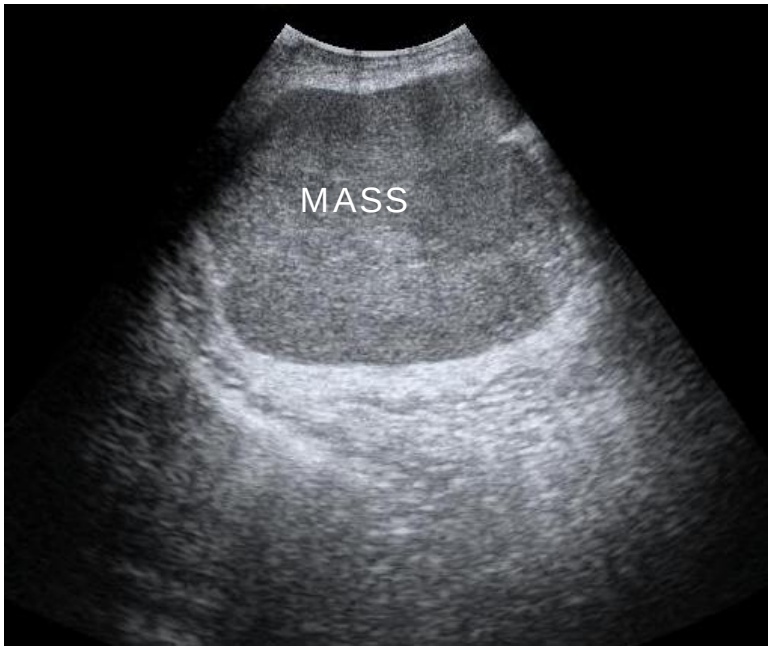
COMPLEX CYSTIC LESION: **Cystic lesion with septations and internal echoes.**



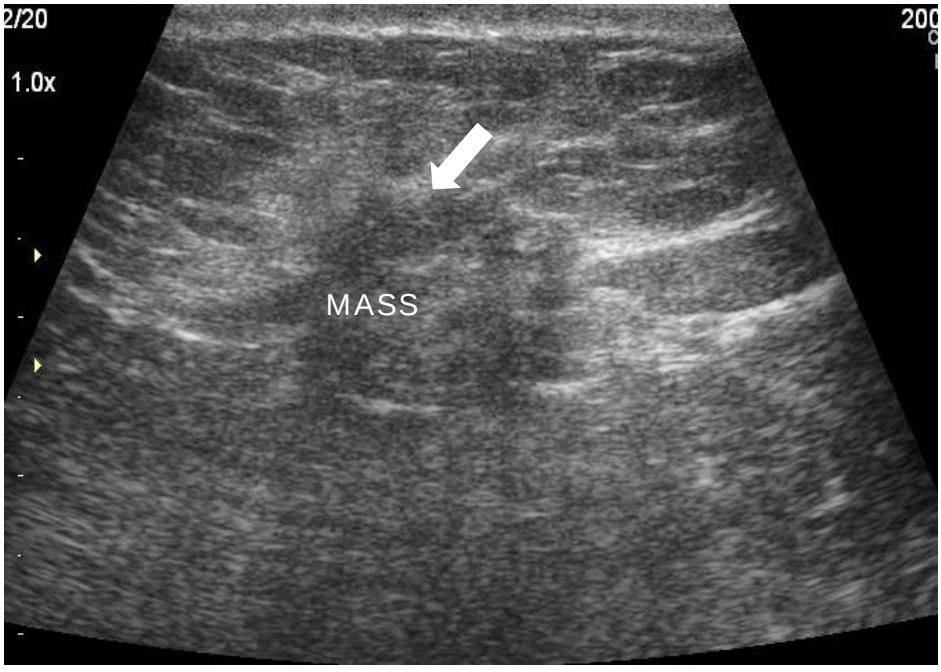
ABSCESS: Cystic lesion with irregular margins with debriduous materials and posterior acoustic enhancement.



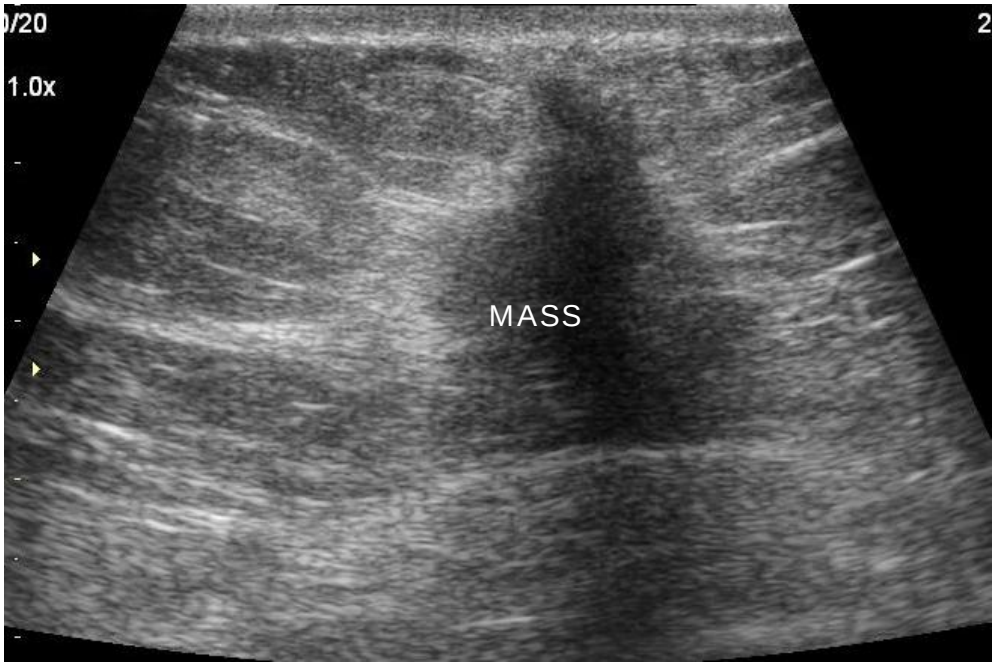
FIBROADENOMA: Hypoechoic mass with regular margins, predominantly transverse. Doppler study shows peripheral vessels.



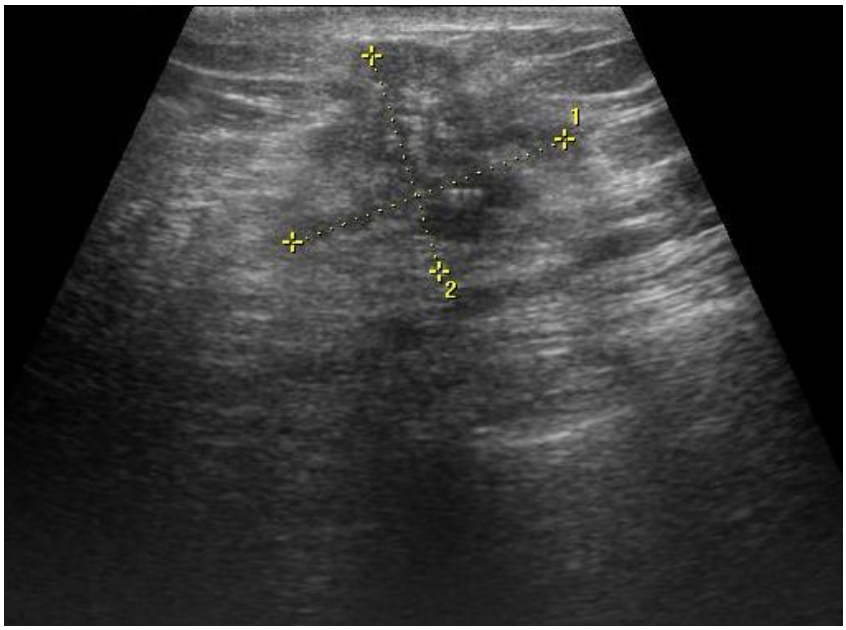
LARGE FIBROADENOMA: Well circumscribed, homogenously hypoechoic solid mass with minimal posterior enhancement.



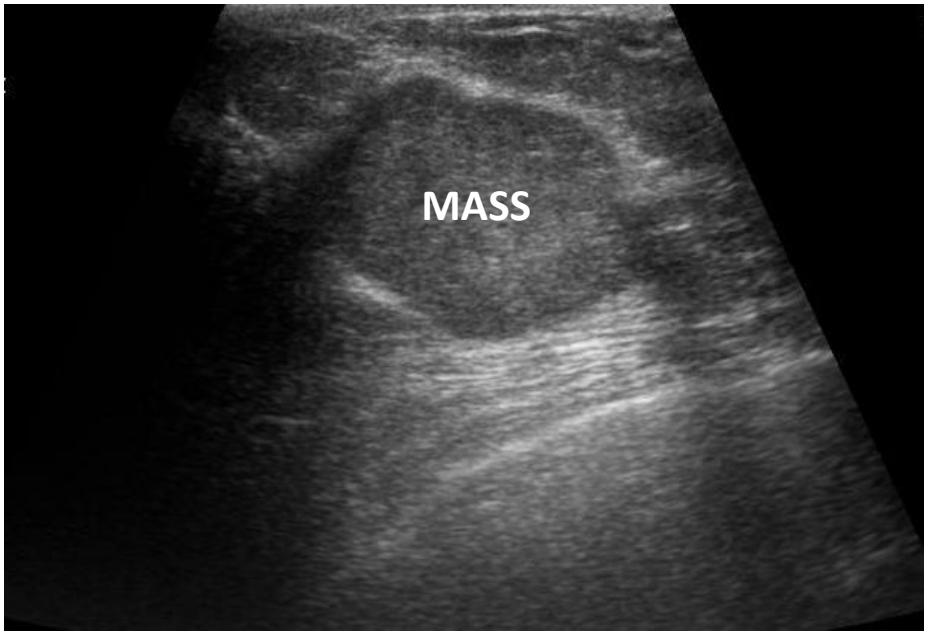
SOLID MASS: Irregular margins, mixed echogenicity – Suggestive of Malignancy.



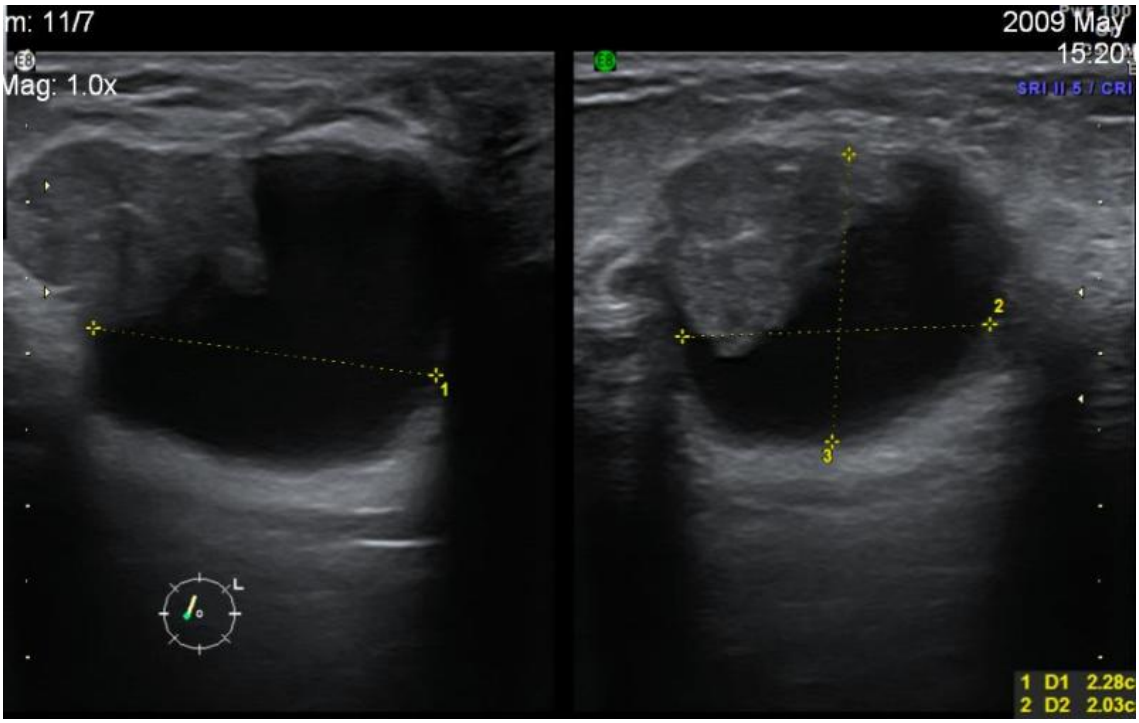
MALIGNANCY: Hypoechoic lesion, predominantly anteroposterior growth, Irregular margins with distortion of surrounding tissue.



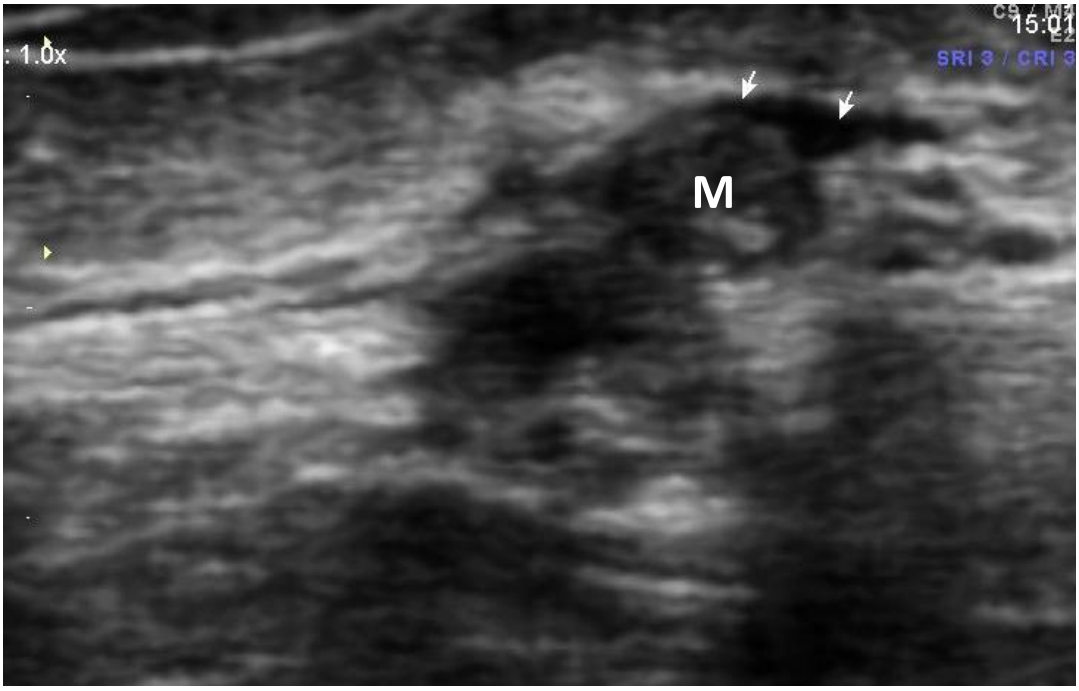
MALIGNANCY: Irregular mass with mixed echogenicity, downward growth.



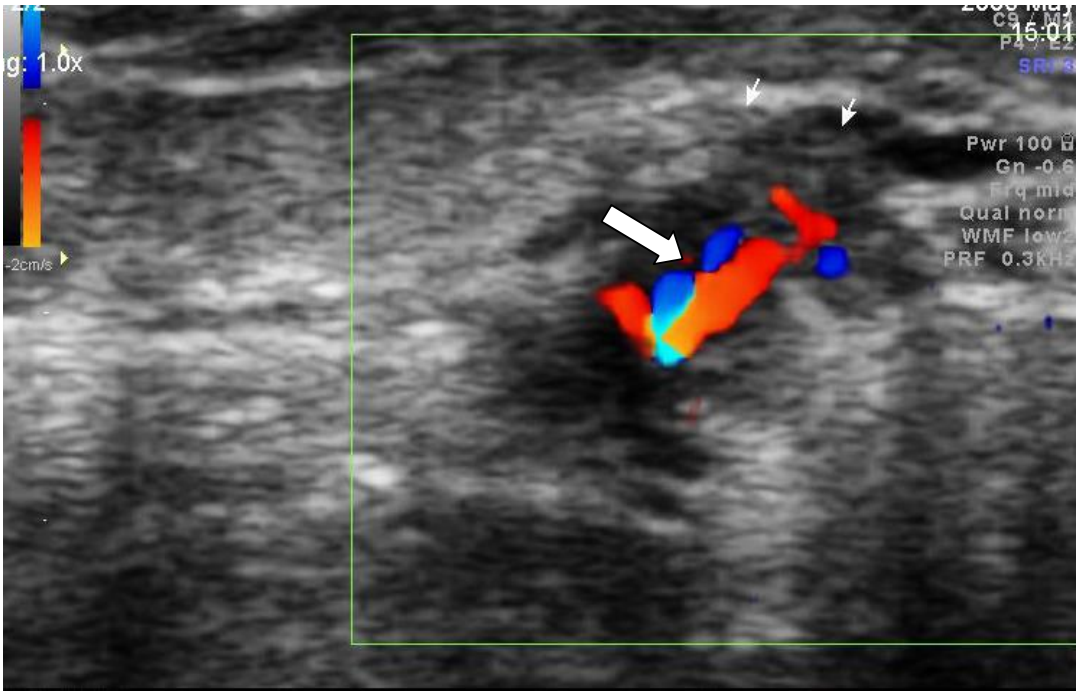
SUSPICIOUS LESION: **Well circumscribed, oval hypoechoic lesion which turned out to be malignancy.**



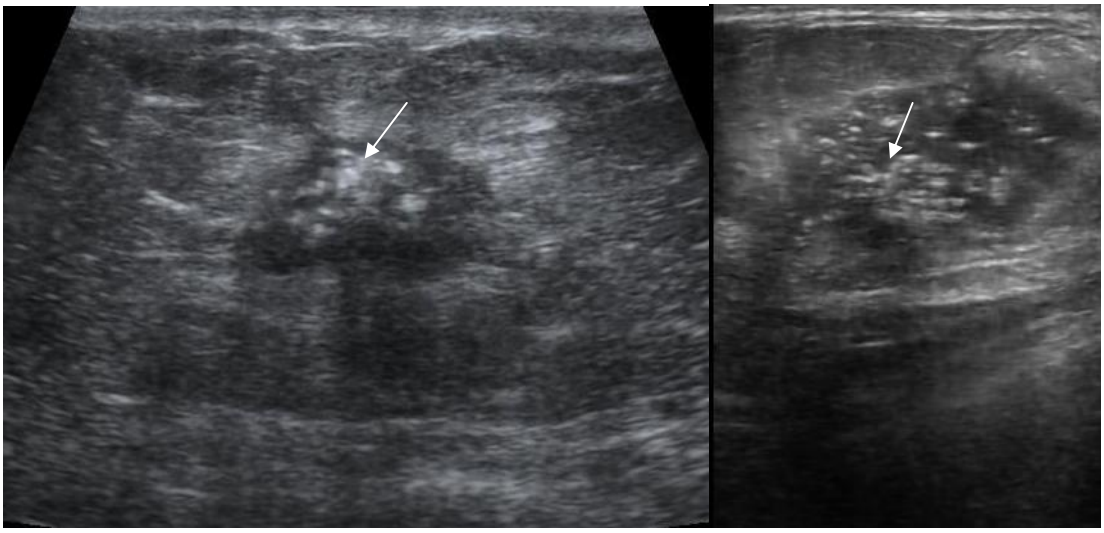
MALIGNANCY: **Irregular intracystic mass**



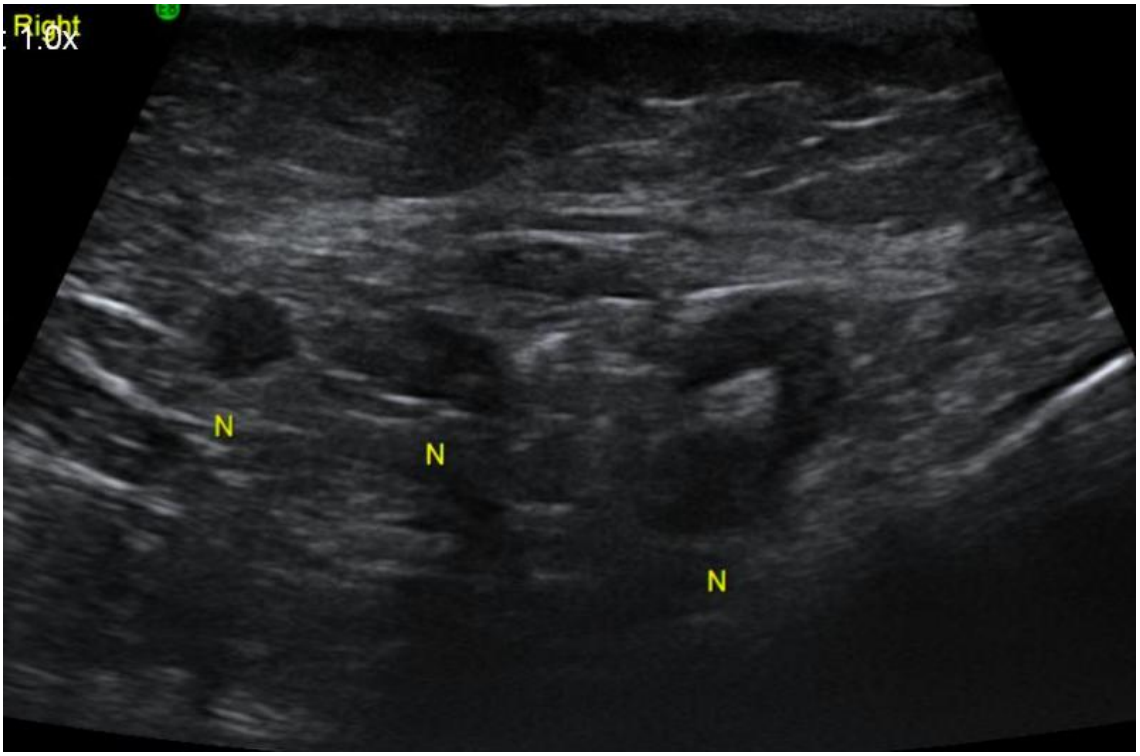
INTRADUCTAL CARCINOMA: Irregular mass within a dilated duct



Doppler study of malignant lesion shows penetrating vessels.



MALIGNANCY WITH CALCIFICATIONS



ENLARGED AXILLARY LYMPH NODES: **Rounded, multiple nodes**

INDICATIONS FOR BREAST ULTRASOUND

From the above discussion we can summarise the now standardized indications for Breast Ultrasound follows:

1. Evaluation of a palpable lump or mammographic abnormality
2. To confirm the existence of a lesion and its nature.
3. Single imaging modality in pregnant or lactating patient who present with symptoms.
4. To differentiate solid from cystic lesions.
5. For pathological examination of indeterminate lesions-guided FNA/CNB can be carried out.
6. Pre operative localization of lesions with needle placements, documentation of lesion removal by USG of biopsy specimen.
7. Follow up of surgically layer to the biopsy scar on skin, as well as for guidance for FNA/CNB.
8. Follow up after augmentation mammoplasty to detect extracapsular rupture /contour abnormalities of the prosthesis.
9. Follow up of probably benign lesions that have not been biopsied.
10. Adjunctive to mammography as a screening tool for Carcinoma breast.

ADVANTAGES OF USG OVER BREAST MAMMOGRAPHY

1 No risk of radiation and its inherent consequences.

2 Can qualify a lesion-as size, shape, echogenicity and relation to surrounding tissues as against a mammographic report of a 'density' which is less specific.

3 Sonographically guided biopsies are more accurate than stereotactic biopsies as the needle can be visualized in real time throughout the entire procedure. This adds confidence that the biopsy sample was obtained from the lesion.

4 Mammographic positioning for pre-operative localization of the masses is cumbersome and time consuming and less accurate. Hence USG is the modality of choice for guidance.

5 Surgically altered breast has confusing findings and is non-informative on mammography.

6 Palpable lumps following extracapsular rupture of prosthesis may be impossible to image by mammography.

7 Long term follow-up of benign nodules not excised is associated with risk of radiation on mammography and hence best performed by USG.

LIMITATIONS OF BREAST ULTRASOUND

Breast ultrasound usage is avoided in certain situations where no efficacy has been documented.

1 Routine evaluation of post operative breast.

2 Cancer Screening – as USG cannot detect all the non-palpable cancers that are also missed on mammography.

3 Cannot detect microcalcification well: small solid lesions in fatty or mixed breast tissue are not sonographically visible.

4 High false negative rate for non palpable cancers, (23%) which are smaller, clinically occult.

5 Substantial false positive rate-sonogram may pick up ’lesions’ which are rarely clinically significant.

6 Unreliable in lesions<1cm.

7 Less accurate in dense breasts.

These data suggest that breast ultrasound can be useful both as a single imaging modality and as an adjunct of mammography in evaluation of patients with breast lumps. In addition, ultrasound facilitates preoperative needle biopsy of non-palpable abnormalities, permitting timely and cost effective patient care.

MRI for Screening:

For high risk patients having life time risk of 15-20%

Have extremely dense breasts or unevenly dense breasts

Why MRI is not recommended for screening all women?

Major disadvantage is that breast MRI screening results has more false positives. If breast MRI were adopted as a screening tool for everyone, many would end up having unnecessary biopsy and it is also more expensive.

FINE NEEDLE ASPIRATION CYTOLOGY

The advent of cytology and availability of experienced cytologists has diminished the diagnostic of excision biopsy especially with regard to breast lumps.

FNAC can play a significant role in the early diagnosis of breast lumps a rule out malignancy, as an attractive alternative to open biopsy. It is our responsibility to further the integrity of this important procedure by understanding the merits and pitfalls of breasts FNAC and adhering to the defined guidelines.

HISTORY:

Martin and Ellis in 1926, New York first introduced the concept of FNAC in the midst of controversies regarding the credibility of the procedure. Breast FNAC is a simple complex procedure that is influenced by many variables. Accurate interpretation of breast FNAC requires clear guidelines for specimen acquisition, staining and preparation.

Bamforth in 1966 defined cytology as; “The examination of cells obtained by needle or drill biopsy in solid organs or tissue masses or form cut surface of such materials freshly removed by surgical biopsy.

Innumerable studies have now shown that cytological examination of cells obtained this way is a rapid and reliable method of diagnosing malignant diseases of the breast.

REQUIREMENTS:

1 Spirit swab to clean the skin.

2 Disposable 10ml or 20ml syringe with fine needle 22G/23G.

3 A number of 76mmx26mm microscopic slides

4 Fixatives like cytofix solution which is a commercial preparation, containing absolute alcohol as its main constituent.

5 Transport box for prepared slides

6 Complete lab. Request form giving patient's particulars

PROCEDURE:

The procedure is usually performed without anaesthesia. Very rarely local anaesthesia is used. Local anaesthesia is generally not necessary because it is painful and may obscure the mass.

1 The skin over the lump is wiped with antiseptic solution and the lump is fixed between the fingers and the thumb and held

steadily for needling then needle is guided through the skin into the lesion.

2 Once the needle is felt to enter the lesion, the plunger is retracted to create vacuum. Should be the lesion prove to be cystic the fluid should be aspirated in its entirety and expressed into a universal container and sent for cytological examination.

3 In the lump is found to be solid, the needle in gently moved back and forth into the substance of the tumor three or four times and is inserted into a different part of the tumor each time to dislodge the cells from the tumor, Dixon et al 1998.30 so that the aspirate will contain the sufficient material for cytological studies.

4 Throughout the technique a negative pressure must be sustained in the syringe. Only after the tumor has been repeatedly probed, should suction be released and the pressure in the syringe allowed to return gradually to atmospheric pressure and the needle is withdrawn from the breast. The pressure in the syringe must be adjusted in a way so that the aspirated cells are retained in the lumen of the needle (Leinster

2000:53) sustained suction as the needle is withdrawn result in, the cells being withdrawn into the barrel of the syringe rendering them inaccessible for processing .

PREPARATION OF ASPIRATE:

It is possible to make smear directly from the aspirate in the outpatient department. Alternatively, the aspirated cells can be suspended in fixative and transferred to cytologic laboratory for processing.

PREPARATION OF SMEAR:

- After aspiration the needle and syringe are withdrawn from the skin
- Although nothing is visible in the syringes cells should have collected inside the bore of the needle.
- The needle is disconnected from the barrel, the syringe is filled with air.
- A clean glass slide should be ready and the needle is reconnected to the barrel and the aspirated material is blown out into the slide.
- Any large tissue fragments which do not spread easily be crushed between the cover slip and slide.

- The smear is air dried and fixed in cytofix solution. Then the slide is duly labeled.

FIXATIVES:

A number of fixatives are used cytology-

- 95% Ethyl alcohol
- 95% Ethyl Alcohol with 3% glacial acetic acid – to improve the nucleoprotein fixing properties.

STAINING PROCEDURES:

Some cytopathologists prefer to interpret these slides stained

- Papanicolaou method – when available this may be preferred in cytology for its superior display of nuclear morphology and clear translucent demonstration of cytoplasm.
- Hematoxylin and Eosin method.

NORMAL CYTOLOGY OF THE BREAST

The mammary gland is a compound glad made up of independent units containing their own ducto-alveolar systems.

The alveoli are lined by simple cuboidal or low cuboidal epithelium which may alter in size depending on the secretary status of the breast. The ducts are also similar in lining, becoming pseudostratified along the main lactiferous and stratified as the approach the nipple.

The typical cytological features in different breast condition are given below.

BENIGN:

FIBROADENOMA:

- Duct cells are seen in large group and sheets surrounded by ‘stripped” nucleus (Housami at as 2001.18th)
- Monolayered groups of cohesive ductal cells
- Stromal tissue fragments
- Abundant naked nudes

FIBROCYSTIC DISEASE:

- Numerous small foam cells and large metaplastic apocrine cells with acidophilic cytoplasm.

- Dark pyknotic nuclei,
- Sheets and clusters of uniform elongated cells; with transparent cytoplasm and having dendritic processes.

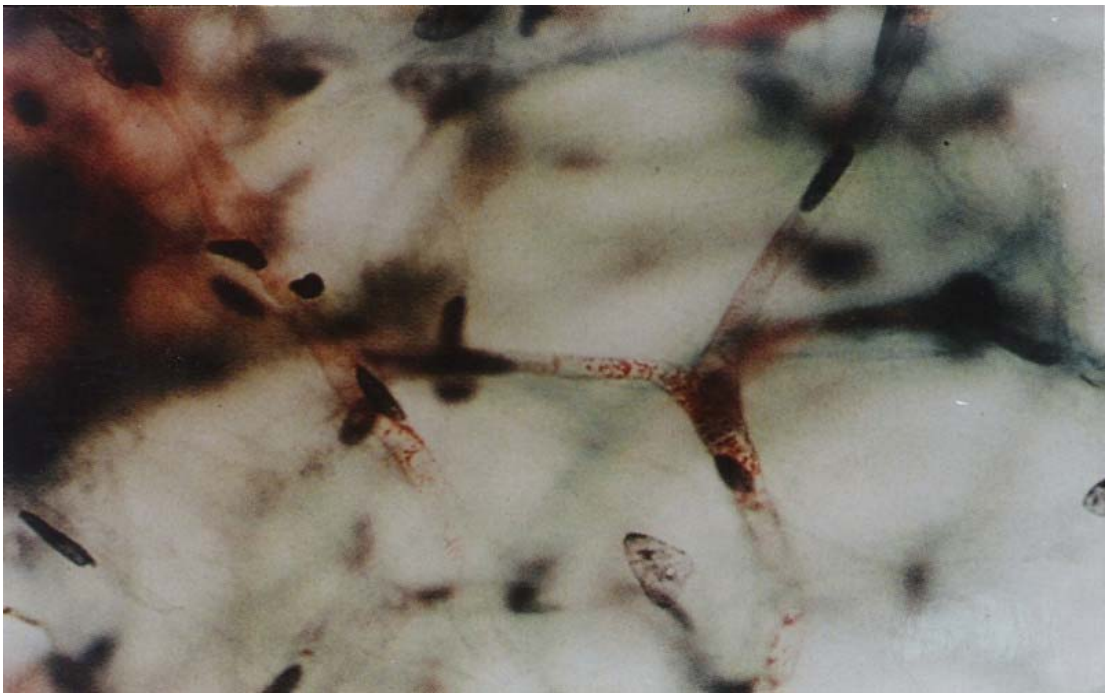
PLASMA CELL MASTITIS:

- Foam cells and sheets of degenerate epithelial cells are common.
- Lipid containing macrophages and occasional foreign body giant cells.
- Diagnostic feature is presence of large amounts of plasmacytes, Lymphocytes and eosinophils and few neutrophils.

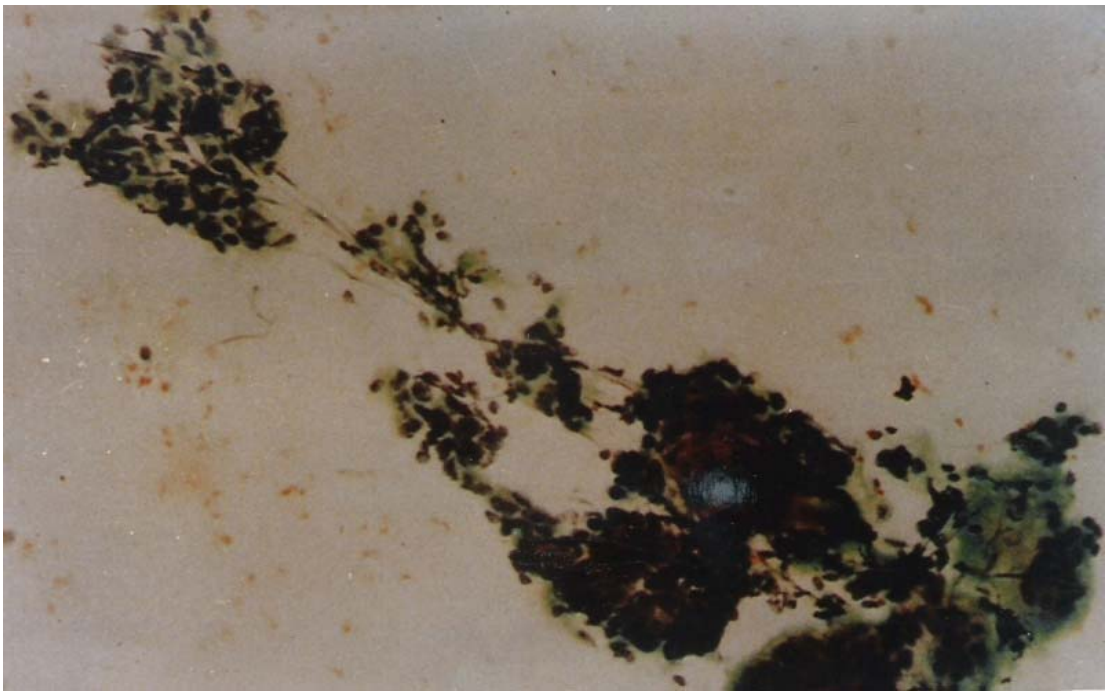
MALIGNANCY:

There are structured criteria for the diagnosis of malignancy by cytology, which are stratified into:

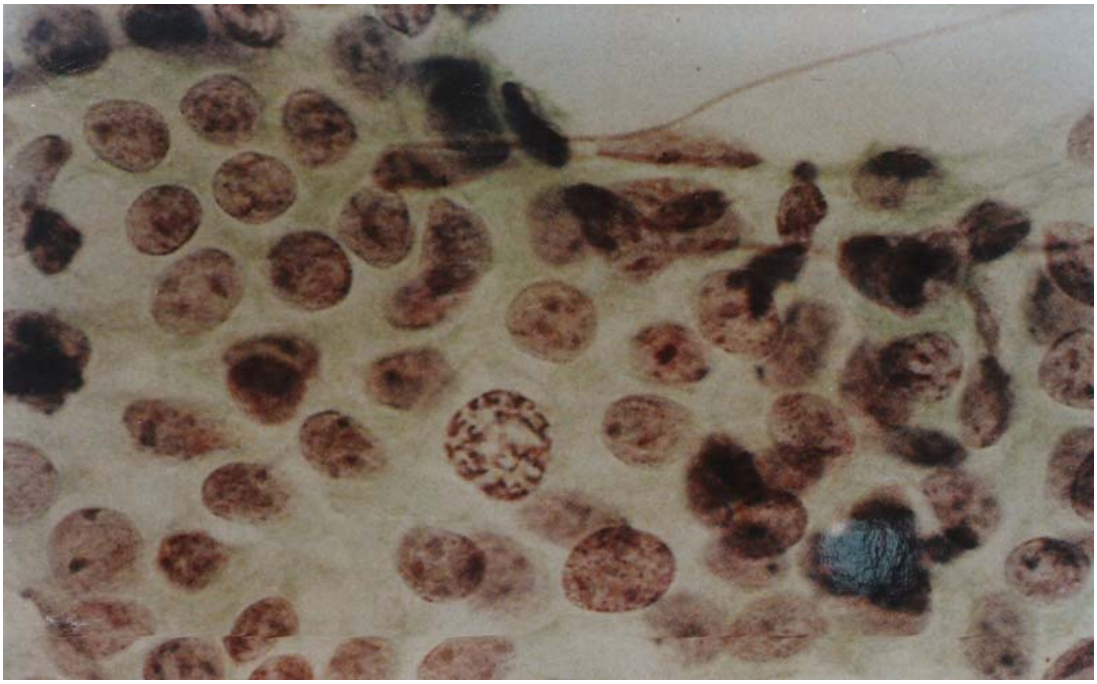
- Structural alterations in the cells
- Changes in inter relationship of cells in cell clusters
- Indirect criteria.



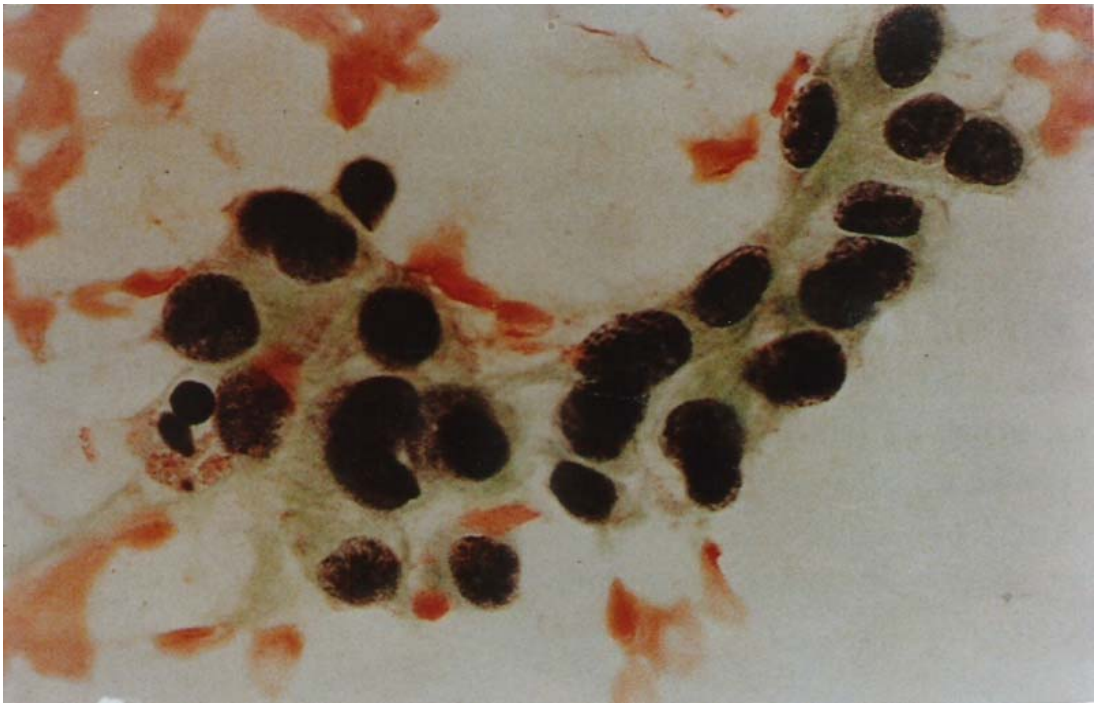
NORMAL BREAST CYTOLOGY: Loose fibrofatty tissue – Ramifying channels of fibrous tissue



FIBROADENOSIS: Hyperchromatic epithelial cells and cyanophilic connective tissue



FIBROADENOMA: Epithelial cells in cohesive sheet. Identical with each other and bland nuclei.



INTRADUCTAL CARCINOMA: Discrete dissociated malignant cells with small pear shaped nuclei.

Structural modifications:

- Alteration of nuclear cytoplasmic ratio with disproportationate enlargement of nuclei.
- Hyperchromasia due to increased chromosomal content, aberrant chromatin pattern.
- Increased number of nucleoli beyond the normal.
- Multinucleation with nuclear atypia, abnormal mitotic figures.
- Marked thickening of nuclear membrane.
- Cytoplasmic changes enhanced by staining, such as pronounced basophilia/acidophilia.
- Presence of cytoplasmic inclusions like pigment granules, leukocytes and cellular debris.
- Atypical vacuolation especially in adenorcarcinoma.

Cell-Cell changes:

- Enlargement of cells beyond normal shape
- Aberrant forms with associated nuclear atypia
- Degenerative or necrotic changes.
- Lack of uniform orientation of cells and nuclei

- Anisocytosis/anisokaryosis-with marked variation in size of cells/nuclei within the same cell cluster.
- Loss of distinct cell boundaries.
- Dense grouping of and crowding of cells and nuclei.
- Engulfment of one cell by another.
- Cells grouping into characteristic patterns.

Indirect Changes:

- Presence of blood.
- Increased Lymphocytes
- Prominent histiocytes and polymorphonuclear cells.

ADVANTAGES OF FNAC:

1 Does not require anaesthesia.

2 Tolerated by patients as an OP procedure

3 No specialized equipment required.

4 No damage to breast tissue that may occur with open biopsy

5 Though small hematomas may be encountered, neither hemorrhage nor sepsis is noted.

6 Remote chances of tumor seeding along needle tract.

7 Lymphatic/vascular dissemination of tumor is virtually unknown.

8 Can easily diagnose cysts / abscesses and treat them.

9 Eliminated need for open biopsy when a diagnosis of carcinoma is made that is the incidence of false positive in malignancy is almost nil.

10 Can be easily repeated.

LIMITATIONS

FNAC is analogous to looking through a key note to see an in entire room. Only a small portion of a lesion is sampled.

1. Cannot qualify the type of malignancy
2. False negative reporting when
    a. Small tumors <1cm
    b. Sclerotic lesions
    c. Deep seated tumors
    d. Large/pendulous breasts
    e. Lesions beyond the length of the needle.

CORE NEEDLE BIOPSY (CNB)

Dominant lumps>2cm in diameter can be proposed by a wide bore cutting needle; such as the Tru-Cut needle that has the advantage of producing a core of tissue which can be paraffin embedded and used as a normal histological specimen with a modern spring loaded device, with a local anaesthesia to the skin; a series of high quality cores can be obtained rapidly and almost painlessly.

ADVANTAGES:

- Ability to obtain a core of tissue that is sufficiently large for HPE
- Providing more details of tumor structure
- Ability to distinguish between invasive and IDCA
- Any pathologist can interpret the results obviating the need for special skill of a cytopathologist.
- Large amount of prognostic information can be obtained including
    - Biological grade
    - Receptor level
    - DNA analysis

DISADVANTAGES:

- Risk of seeding the needle tract with tumor cells.
- Biopsy should be adjusted to avoid carrying potentially malignant tissue into the chest wall.
- False positive incase of radial scars
- False positive incase of hard lesions, deflecting the needle into surrounding fat.

Thus CNB can be adopted as an alternative office biopsy technique to FNAC carrying sensitivity of 89%.

AIM OF THE STUDY

The study is conducted with the objective of assessing the combined and individual reliability of the Modified Triple Test in making a pre-procedural diagnosis of palpable breast lumps.

The components of the Modified Triple Test are:

1. Clinical Examination(C/E)
2. Breast Ultrasonogram (USG)
3. Fine Needle Aspiration Cytology/Core Needle Biopsy (FNAC/CNB)

MATERIALS AND METHODS

A prospective cross sectional study of 90 female patients attending the outpatient department at the Department of General Surgery, Government Rajaji Hospital, Madurai, with the complaint of a palpable lump/lumps in the breast was undertaken.

Male patients and female patients with advanced Breast Cancer that makes diagnosis obvious were excluded from the study (n=33)

The inclusion criteria were:

1 Females>30 years.

2 C/o breast lump – clinically palpable as a localized lesion differing from the surrounding breast tissue.

Each patient was put through the Modified Triple Test. On the basis of a systematic clinical examination, the lumps were grouped as – Malignant, Benign and inconclusive.

Ultrasound of the breast was performed by a Radiologist using a ALOKA SSD 4000 ultrasound machine with a 10MHz probe.

The lesions were classified as Malignant, Benign or Inconclusive based on the following features.

a. Malignant – ill defined, heterogeneous mass with sharp angulations; presence of microcalcifications.

b. Benign lesions were either cystic or solid.

Cysts – Round, oval, anechoic, well defined with through and through transmission in simple cysts. Abscesses show low level internal echoes.

Ultrasound examination also included the contralateral breast, axillae and internal mammary lymph nodes. For deeply seated lesions Sono-guidance was utilized to aspirate cysts and to take biopsies.

After this, FNAC/CNB was performed by the attending surgeon and sent for cytological/ Histopathological examination.

FNAC was reported as follows:

a. Insufficient materials: Cell content in the aspirate too poor for cytological assessment.
b. Benign cells Sufficient material with benign cells indicating Fibroadenoma or Fibrocystic disease.
c. Atypical cells: Slight atypia; interpreted as benign

lesion.

d. Suspicious: Malignancy – suspect cells; not interpretable as carcinoma with certainty.

e. Carcinoma: Cells indicative of malignancy.

Results were interpreted as follows:

a	-	repeat FNAC/CNB
b ,c	-	benign
d	-	inconclusive
e	-	malignant

The results of the modified Triple Test were then analysed individually and as a combination. Any component indicating a malignant report were taken as malignancy. Inconclusive reports were subject to excision biopsy on an inpatient basis. Patients with malignancy were treated with definitive surgery. The post procedural histopathological reports were compared to the results of the Modified Triple Test.

DATA ANALYSIS

Of the patients randomly referred for the study (n=90), patients not fitting the inclusion criteria were excluded (n=33). Thus 57 patients with breast lumps were inducted into the study.

Thus the final study group (n=57) under went the MTT followed by excision biopsy, the results of which were available for comparison.

The average age of women in this study was 41.84±9.1. The shifting to 47 years in patients with malignancy, the youngest was 30 years and the oldest was 68 years. This conforms with the suitable age for subjecting patients to screening procedure followed worldwide (i.e.) above 40 years. 9 women were nulliparous of which only 3 had malignant lesions. The rest (n-48) were multiparous. The results do not point to any positive association between parity and malignancy ($p>0.05$). (Table:1)

TABLE:1

ASSOCIATION BETWEEN PARTY AND BREAST PATHOLOGY

Parity	Malignant	Benign
Nulliparous	3	6
Multiparous	21	27

P>0.05

Benign lesions were more common amongst premenopausal women (n=33): though malignancy could not be excluded in this group (n=24). However all the lesions detected in perimenopausal (n=5) postmenopausal women were malignant (N=6 Table-2)

TABLE: 2

ASSOCIATION BETWEEN MENSTRUAL STATUS AND MALIGNANCY

Menstrual status	Malignant	Benign
Postmenopausal	6	0
Perimenopausal	5	0
Premenopausal	13	33

P<0.001

On excision biopsy, the 57 lumps were confirmed histopathologically as either Malignant (n=24) and Benign(n=33)

The pathological reports were:

Total no. of malignancies	= 24
Intra Ductal Carcinoma	= 21
Lobular Carcinoma	= 1
Medullary Carcinoma	= 1
Malignant cystosarcoma Phylloides	= 1
Total no. of Benign lesions	**= 33**
Fibroadenoma	= 14
Fibrocystic Disease	= 10
Breast Abscess	= 6
Benign cystosarcoma Phylloides	= 3

The associations between each component of MTT and the combined MTT with the biopsy report were subjected to computer generated analysis.

Clinical examination finding of a hard, irregular lump was more likely to be malignant, while a soft or firm mass with regular surface suggested benign lesions ($p>0.000$). Benign lesions most often confused with malignancy were Benign cystosarcoma phylloides & Fibrocystic disease.(Table-3)

Table:-3

Consistency	Malignancy	Benign
Hard	18	3
Firm	5	30
Soft	0	1
Surface		
Irregular	18	6
Regular	6	27

The initial indications of USG in differentiating a solid from cystic lesions may be non beneficial in coming to a correct diagnosis. Our study shows no association between the character of the lesion and diagnosis ($p>0.05$) Table-4

Table-4

ULTRASOUND FINDINGS AND HPE

	Malignant	**Benign**
Cystic	2	6
Solid	22	28

$p> 0.05$

A regular, well defined hyperechoic lesion was usually benign. An irregular; ill defined mixed echogenic mass indicated malignancy. Hypoechoic lesions were not characteristic of either (p=0.05) Echogenicity could not thus be used as a singular feature to rule out malignancy except when they were hyperechoic. (Table-5)

TABEL:5

ECHOGENICITY OF LESIONS AND HPE:

Echogenicity	**Malignant**	**Benign**
Mixed	10	6
Hypoechoic	14	23
Hyperechoic	0	4

P = 0.05

Ultra sound detected axillary nodes in all patients (n = 12) found to be clinically node positive, however it could not distinguish whether the node had malignant infiltration or not.

Ultrasound guided FNA / CNB was done in 6 cases; 2 of which were cystic lesions with a residual mass on aspiration of the cysts. Both turned out to be malignancies missed on routine FNAC.

Amongst the individual tests; clinical examination was more likely to miss a malignancy (Sensitivity 75%), as against ultrasound (Sensitivity 92%) or FNA / CNB (Sensitivity 100%) FNA / CNG correctly identified malignancy in all 24 cases; while ultrasound misinterpreted 1 case as malignant (a case of benign cystosarcoma phylloides) with specificities of 100% and 85% respectively.

The MTT was 85% specific with malignant lesions. But 5 cases were misdiagnosed as malignancies and turned out in 3 cases to be Fibrocystic Disease and 2 cases were benign cystosarcoma phylloides – both benign lesions. Inconclusive results (n=4) on MTT were also confirmed to be benign lesions. Thus MTT, though had false positives with respect to malignancy but no false negatives (ie.) a negative predictive value of 100%. These data responsible to the original triple test with its sensitivity (65% - 96%) and specificity (55%-98%) as reported in various studies. (Tables 6-10)

TABLE - 6

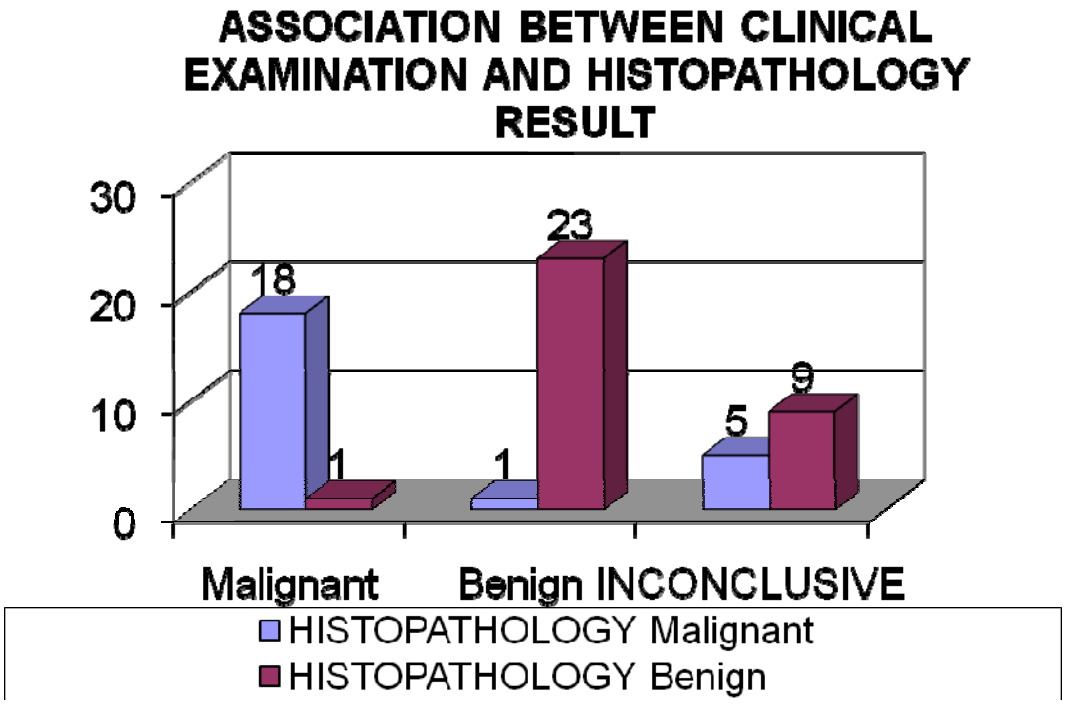
ASSOCIATION BETWEEN CLINICAL EXAMINATION AND HISTOPATHOLOGY RESULT

CLINICAL EXAMINATION	HISTOPATHOLOGY	
	Malignant	Benign
Malignant	18	1
Benign	1	23
Inconclusive	5	9

TABLE – 7

ASSOCIATION BETWEEN ULTRASONOGRAM AND HPE

ULTRASONOGRAM	HPE	
	Malignant	Benign
Malignant	22	3
Benign	1	28
Inconclusive	1	2


ASSOCIATION BETWEEN CLINICAL EXAMINATION AND HISTOPATHOLOGY RESULT
30
20
10
0
18
1
1
23
5
9
Malignant
Benign
INCONCLUSIVE
HISTOPATHOLOGY Malignant
HISTOPATHOLOGY Benign

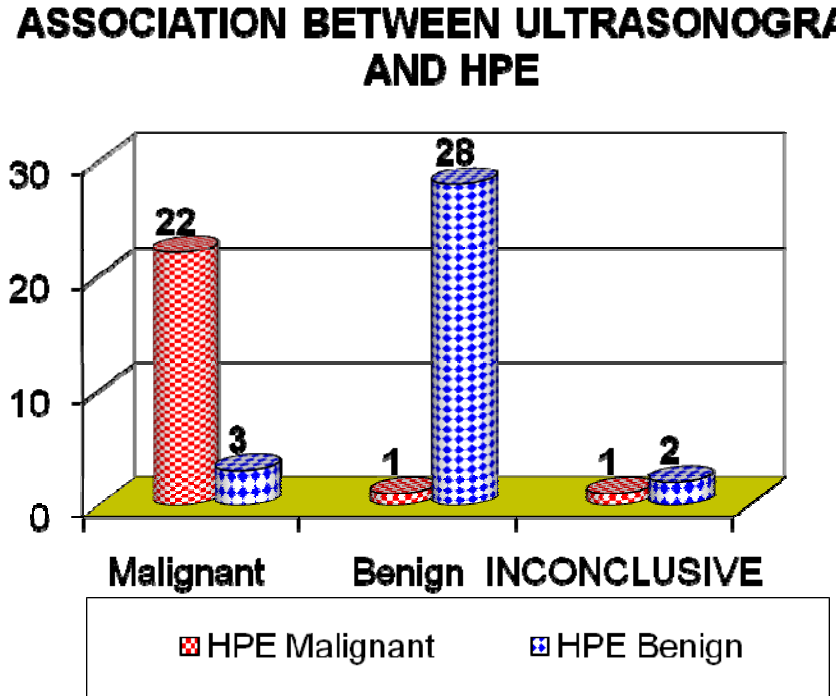

ASSOCIATION BETWEEN ULTRASONOGRAM AND HPE
30
20
10
0
22
3
1
28
1
2
Malignant
Benign
INCONCLUSIVE
HPE Malignant
HPE Benign

TABLE – 8

ASSOCIATION OF FNA/CNB WITH HPE

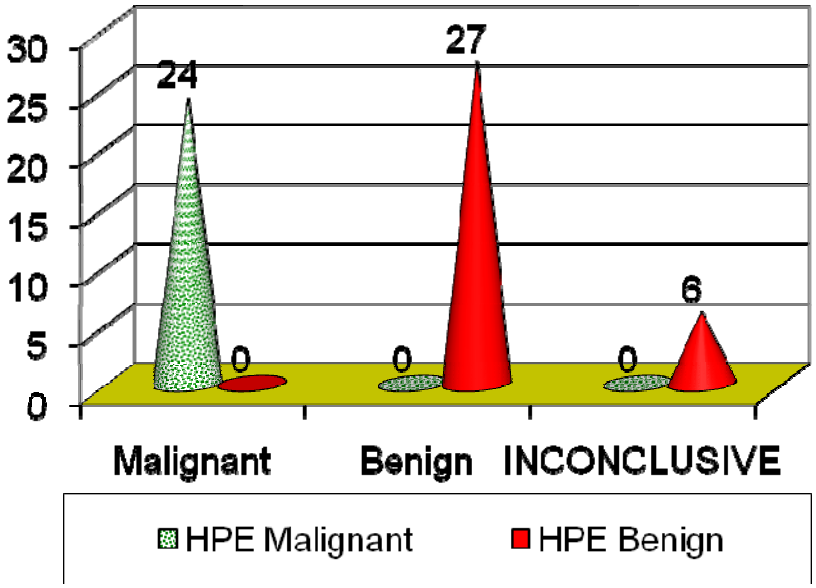
FNA/CNB	**HPE**	
	Malignant	Benign
Malignant	24	0
Benign	0	27
Inconclusive	0	6

TABLE – 9

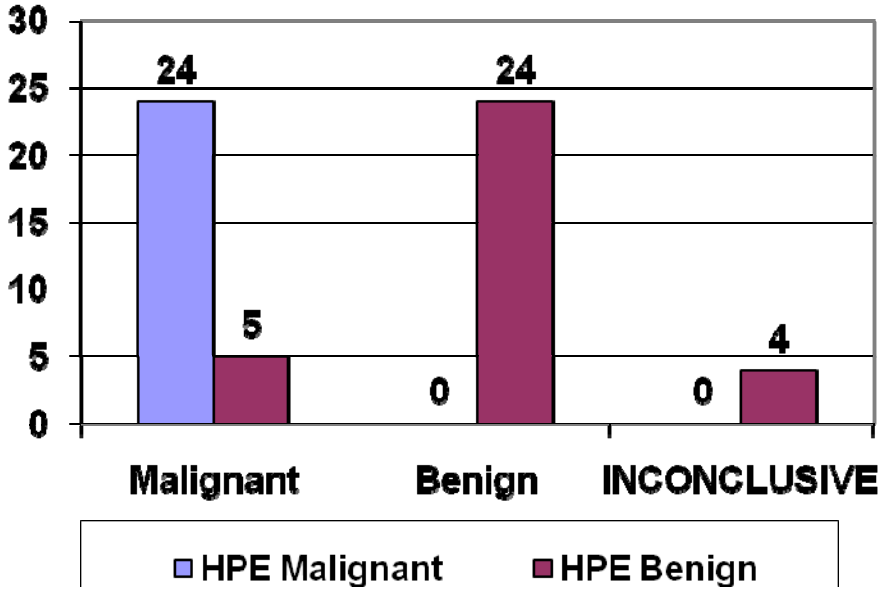
ASSOCIATION OF MODIFIED TRIPLE TESTS WITH HPE

MTT	**HPE**	
	Malignant	Benign
Malignant	24	5
Benign	0	24
Inconclusive	0	4

ASSOCIATION OF FNA/CNB WITH HPE



ASSOCIATION OF MODIFIED TRIPLE TESTS WITH HPE



STATISTICAL ANALYSIS

	C/E	USG	FNA/CNB	MTT
Sensitivity	**75% (53-80%)**	**92% (72-99%)**	**100% (83-100%)**	**100% (83-100%)**
Specificity	**97% (82-100%)**	**85% (67-94%)**	**100% (87-100%)**	**85% (67-94%)**
Positive Predictive value	**95% (70-99%)**	**81% (61-93%)**	**100% (83-100%)**	**83% (64-93%)**
Negative predictive value	**84% (64-90%)**	**93% (76-99%)**	**100% (87-100%)**	**100% (85-100%)**
'p' value	**< 0.001**	**< 0.001**	**< 0.001**	**< 0.001**

FNAC / CNB as a single test was a superior diagnostic test than the other two tests, but only when complemented by them could the lesion be characterized in all dimensions for the chosen interventional procedure.

When an inconclusive was reported the likelihood of malignancy increases in ascending order form FNAC / CNB, USG to C/E (n=0, n=1, n=5 respectively). All 4 cases deemed inconclusive after MTT were later diagnosed as Fibrocystic disease.

CONCLUSION

Detection and management of a breast mass requires an optimal environment for interpretation, relevant use of clinical information, technically excellent imaging procedures, proper interpretation of finding and pertinent recommendations.

Our results show that the diagnostic accuracy of combined physical examination breast USG and FNA/CNB is comparable to that of histological examination.

A fine collaboration between experienced radiologists, cytologist and the clinician is required. Ultrasound when replacing mammography serve as effective an imaging modality in palpable breast lumps and is more comprehensive.

Ultrasound breast aids biopsy techniques by guidance to the representative area than increasing yield.

CNB is a suitable alternative when FNA is inconclusive and may offer additional information.

Thus the use of MTT to complement findings in differential diagnosis of a lesion in a symptomatic women seeking medical care deserves acceptance and further evaluation. This may lead to less delay in treatment when malignancy is suspected and to avoidance of surgical exploration when a benign nature of lesion is suspected.

SUMMARY

Among the 3 components clinical examination has sensitivity of 75%. So malignancies are likely to miss. When combined with other 2 components having 92% and 100% sensitivity for USG and FNAC / CNB respectively. MTT has 100% sensitivity, 85% specificity which is comparable with original triple assessment which has sensitivity of 65 – 96% and specificity of 55-98% . Though MTT had false positives for malignancy there are no false negatives. The false positives are due to fibrocystic disease and benign cystosarcoma phylloides.

MASTER CHART

S.No.	NAME	AGE	I.P.No	Mens H/o	Parity	Clinical Examination			Usg Breast		FNAC	CNB	RESULTS			MTT	HPE
						surface	Consistency	Axillary Nodes	Echogenicity	Axillary Nodes			C/E	Usg	FNAC/ CNB		
1	KARUPPI	45	82121	A	M	IR	H	-	↓	-	+		±	+	+	+	IDCA
2	LAKSHMI	47	84129	A	M	IR	H	-	↓	-	-		±	±	-	-	FCD
3	RAMA	45	88123	A	M	R	S	+	↓	+	-		-	-	-	-	BA
4	FIRTHASE	32	89161	A	M	R	F	-	↓	-	-		-	+	±	-	FA
5	KAMALA	40	92121	A	M	R	F	-	↑↓	-	-		-	-	-	-	FA
6	POONAMA	45	93141	A	M	R	F	-	↑↓	-	-		±	-	-	-	FCD
7	POOCHI	45	95123	AB	M	IR	H	-	↓	-		+	+	+	+	+	IDCA
8	JEYAM	35	98912	A	M	R	G	-	↓	-	-		-	-	-	-	BA
9	RAKKU	40	99121	A	M	IR	G	-	↑↓	-		+	-	-	+	-	IDCA
10	MADACHI	59	412	B	M	R	H	+	↓	+	+		+	+	+	+	IDCA
11	RANI	47	479	A	N	IR	H	+	↑↓	+		+	+	+	+	+	IDCA
12	MARY	47	576	B	M	IR	H	+	↑	+	+		+	+	+	+	IDCA
13	KAVITHA	32	791	A	N	R	G	-		-	-		-	-	±	±	FCD
14	MAHA	32	992	A	N	R	G	-	↓	-	-		-	-	-	+	FA
15	LALITHA	40	1121	A	M	IR	H	+	↑↓	+	+		+	+	+	-	IDCA
16	MANI	35	1341	A	N	IR	H	+	↓	+	+		+	+	+	+	IDCA
17	RAMUTHAI	40	1472	A	M	IR	H	+	↑↓	+	+		+	+	+	+	IDCA
18	HAMSA	35	1739	A	M	R	F	-	↓	-		+	±	+	+	+	IDCA
19	RADHIKA	35	1812	A	M	R	F	+	↑↓	-	-		-	-	-	+	BA
20	PALANIAMMAL	55	1923	B	M	IR	H	+	↓	+	+		+	+	+		IDCA
21	KALAMANI	35	2128	A	M	R	F	+	↓	+		+	+	+	+	+	MCA
22	NIRMALA	42	3133	A	M	R	F	-	↓	-	-	-	-	-	-	+	FA
23	MILAFAR	41	4124	A	M	IR	H	-	↑↓	-	-		±	±	±	±	FCD
24	SEENIAMMAL	42	5151	A	M	R	F	+	↑↓	-	-		-	+	±	+	BCSP
25	POTHUMPONNU	52	6121	A	M	R	F	-	↓	-	+		+	+	+	+	MCSP
26	SADACHI	60	7129	B	M	R	F	+	↓	-		+	±	±	+	+	IDCA
27	SAMAYE	65	8131	B	M	IR	H	-	↓	-	+		+	+	+	+	IDCA
28	KASTHURI	38	9121	A	N	R	F	-	↓	-	-		-	-	-	+	BA
29	MANGALAM	59	11311	B	M	IR	H	+	↓	-	+		+	+	+		IDCA
30	PARVEEN	31	12119	A	M	R	F	-	↓	-	-		-	-	±	±	FCD
									↓								
									↑↓								

31	ANANDHI	31	13117	A	M	R	F	-		-	-		-	-	-	+	FA
32	CHITRA	30	23119	A	M	IR	H	+		+	+		+	+	+	+	IDCA
33	MERCY	35	24218	A	M	IR	H	+		-		+	+	+	+	+	IDCA
34	RAJAMAL	41	24075	A	M	R	F	-		-	-		-	-	-	-	FA
35	NOORJAHAN	36	25121	A	M	R	F	-		-	-		-	-	-	-	FA
36	MALATHI	34	27824	A	N	R	F	-		-	-		-	-	-	-	FA
37	KANNAKI	33	29121	A	N	IR	F	-		-	-		+	+	-	+	FCD
38	SEETHAI	56	30122	AB	N	IR	F	+		+	+		+	+	+	+	IDCA
39	KATHAYEE	40	31211	A	M	R	H	-		-	-		-	-	-	-	FA
40	SELVI	34	41219	A	N	IR	F	-	↓	-	-		-	-	-	-	FCD
41	SANGIAMMAL	46	42312	A	M	R	F	-	↓	-	-		-	-	-	-	FA
42	SAMAYEE	41	43912	A	M	R	F	-	↓	-	-		-	-	-	-	FA
43	UMA	35	44987	A	M	R	F	-	↓	-	-		-	-	-	-	BA
44	KRITHIGA	30	45679	A	M	R	F	-	↓	-	-		-	-	-	-	FA
45	VEERAYEE	56	57891	B	M	IR	H	-	↓	-	+		±	+	+	+	IDCA
46	POORNAM	49	67891	AB	M	IR	H	-	↑	-	+		±	+	+	+	IDCA
47	AMBIGAI	41	92124	A	M	IR	H	-	↑	-	-		-	-	-	-	FCD
48	MYITHISH	38	73141	A	M	IR	F	-	↑↓	-	-		-	-	±	±	FCD
49	ANDAL	35	74121	A	M	R	F	-	↓	-	-		-	+	-	+	BCSP
50	REENA	34	75142	A	M	R	F	-	↓	-	-		-	-	-	-	BA
51	KRISHNAMMA	60	76121	AB	M	R	F	+	↓	+	+		+	+	+	+	LCA
52	NILOFAR	32	78224	A	M	R	F	-	↓	-	-		-	-	-	-	FA
53	PREMA	31	79124	A	M	R	F	-	↓	-	-		-	-	-	-	FA
54	SUBBAMMAL	48	80127	AB	M	IR	H	-	↑↓	-	+		+	+	+	+	IDCA
55	LAKSHMI	50	81243	A	M	R	F	-	↑↓	-	-		-	+	-	+	FCD
56	NACHAMMAL	40	82176	A	M	R	F	-	↑↓	-	-		-	+	-	+	BCSP
57	PACHAIAMMAL	52	83178	A	M	IR	H	-		-	+		+	+	+	+	IDCA

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ABBREVIATIONS

MENS H/O
A –Premenopausal
B – Postmenopausal
AB- Perimenopausal

PARITY
M- Multipara
N- Nullipara

CLINICAL EXAMINATION

SURFACE
R- Regular
IR- Irregular

CONSISTENCY
H- Hard
F- Firm
S- Soft

USG-ECHOGENICITY
↓-Hypoehoic
↑-Hyperechoic
↓↑-Mixed

RESULTS
+ - Malignant
- - Benign
± - Inconclusive

HPE
FA – Fibroadenoma
FCD- Fibrocystic disease
BA- Breast abscess
BCSP- Benign cystosarcoma phylloides
MCSP- Malignant cystosarcoma phylloides
IDCA- Intraductal carcinoma
MCA- Medullary carcinoma
LCA- Lobular carcinoma