A Dissertation on

" A STUDY OF PALPABLE BREAST LUMPS WITH EMPHASIS ON EARLY DETECTION OF MALIGNANCY USING A MODIFIED TRIPLE TEST "

Dissertation Submitted to

THE TAMIL NADU Dr.M.G.R. MEDICAL UNIVERSITY

CHENNAI- 600032

with partial fulfillment of the regulations

for the award of the degree of

M.S. GENERAL SURGERY

(BRANCH 1)

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Course : POST GRADUATE IN M.S GENERAL SURGERY

Period of Study : ONE YEAR

College : COIMBATORE MEDICAL COLLEGE AND HOSPITAL

Dissertation Topic : A STUDY OF PALPABLE BREAST LUMPS WITH EMPHASIS ON EARLY DETECTION OF MALIGNANCY USING A MODIFIED TRIPLE TEST.

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DECLARATION

I Solemnly declare that the Dissertation titled **" A STUDY OF PALPABLE BREAST LUMPS WITH EMPHASIS ON EARLY DETECTION OF MALIGNANCY USING A MODIFIED TRIPLE TEST "** was done by me at Coimbatore Medical College during the academic year July 2016 – June 2017 under the guidance of **Prof. Dr.V.Elango, M.S.** this Dissertation is submitted to the Tamilnadu Dr.M.G.R Medical University towards the fulfillment of the requirement for the award of **M.S. Degree in General Surgery (Branch-I).**

PLACE: **Dr. M.SARASWATHY**

DATE:

CERTIFICATE – II

This is to certify that this dissertation work titled **" A STUDY OF PALPABLE BREAST LUMPS WITH EMPHASIS ON EARLY DETECTION OF MALIGNANCY USING A MODIFIED TRIPLE TEST "** of the candidate **DR.M.SARASWATHY** with registration Number **221511313** for the award of **M.S in the branch of General Surgery**, I personally verified the urkund.com website for the purpose of plagiarism Check. I found that the uploaded thesis file contains 89 pages from introduction to conclusion and the result shows **0% (Zero)** percentage of plagiarism in the dissertation.

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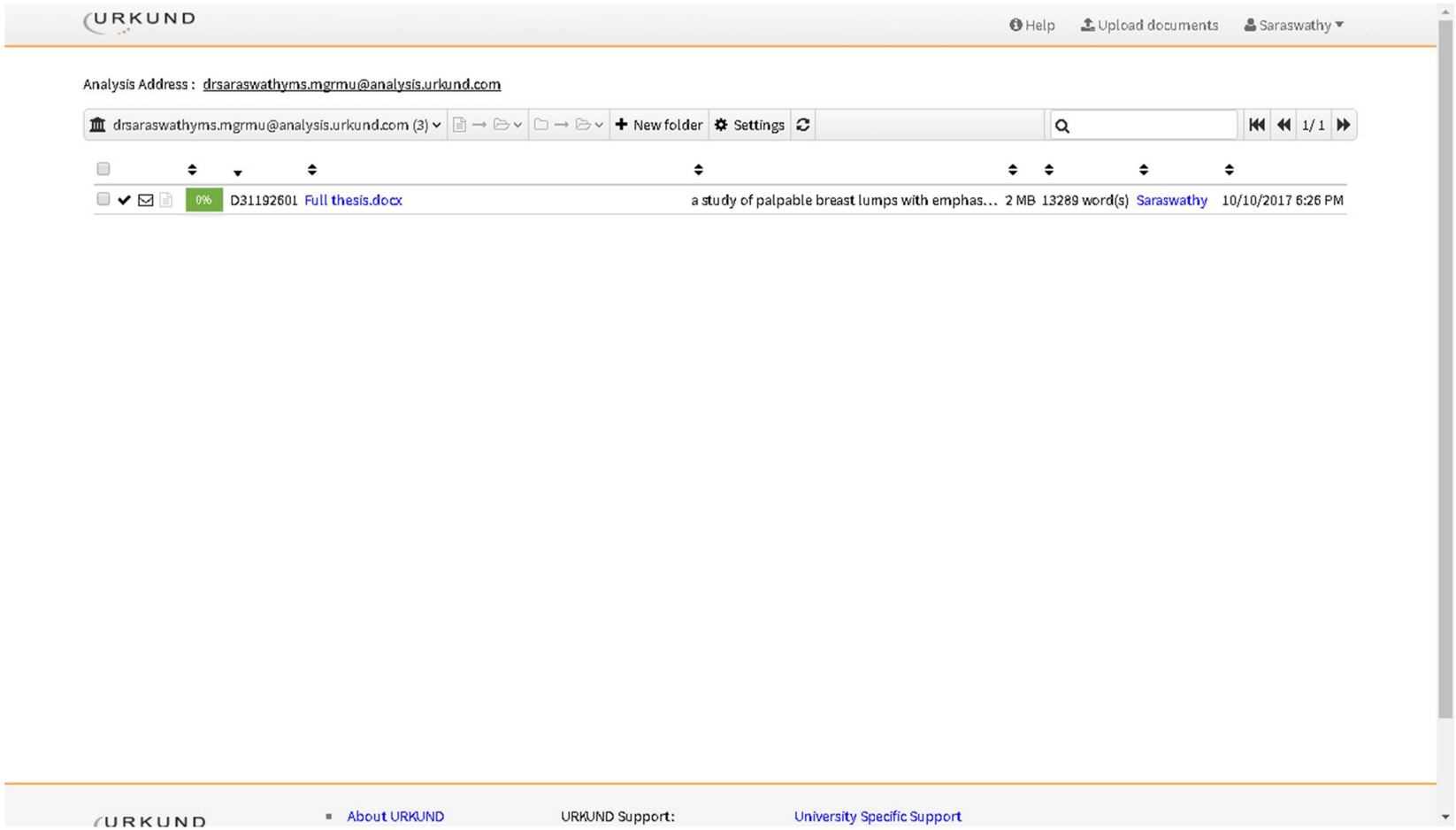
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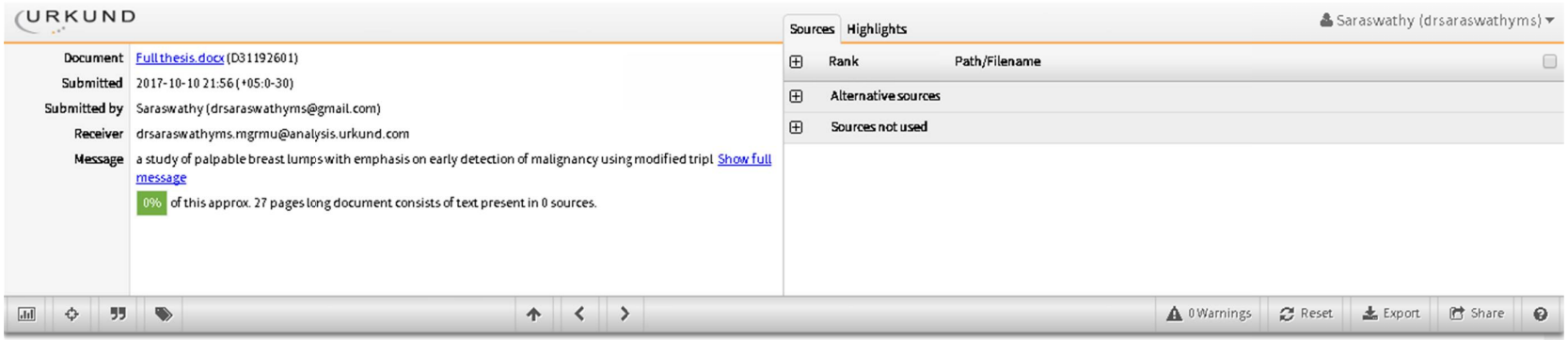

INTRODUCTION Breast lumps are one of the common problems encountered in women. These lumps are frequently seen in younger to middle aged women and often they go undetected for various reasons. These lumps have different etiologic causes and can be either benign of malignant. In India breasts are considered as symbol of womanhood and fertility and there is a taboo surrounding discussion about breast lumps and hence the women come to the hospitals for examination only later in the course of the disease. Mostly these lumps are benign, but breast malignancy is the most common form of cancer and is the second leading cause of malignancy deaths in women, next only to lung cancer in Asian and black women but is the leading cause of death in Hispanic women. Hence early recognition of malignancy plays a vital role for improving survival. Fibro adenoma is the most common benign breast mass and invasive ductal carcinoma is the most common malignancy. In recent studies it has been shown that there is a significant rise in incidence of breast masses in women younger than the age of forty. Only less than half of the women with breast cancer are alive and disease free after ten years of diagnosis. So the need of the hour is a system to detect malignancy earlier and minimize the time needed for the detection of malignant lumps. The approach to diagnosis is multi pronged and should include clinical examination, imaging, cytological tests and histopathological examination.

AIM AND OBJECTIVES

This study is done to determine the clinical characteristics of palpable breast lumps and with the objective of detecting malignancy earlier in patients presenting with palpable breast lumps using a modified triple test which includes a complete clinical examination of the Breast lump, Ultrasonography of the Breast, and Fine Needle Aspiration Cytology of the Breast lump.

REVIEW OF LITERATURE

ANATOMY 1, 2 The mammary gland or breast is a modified sweat gland and is one of the accessory reproductive female organs. It is situated in the chest wall in the superficial fascial layer of the pectoral region a part of the breast enters the axillary region by piercing the deep fascia and it is called as the Axillary tail of Spence. The extent of the breast varies from person to person and it usually extends vertically from the second rib to the

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PLACE: **Dr. M.SARASWATHY**

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INTRODUCTION

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Mostly these lumps are benign, but breast malignancy is the most common form of cancer and is the second leading cause of malignancy deaths in women, next only to lung cancer in Asian and black women but is the leading cause of death in Hispanic women. Hence early recognition of malignancy plays a vital role for improving survival. Fibro adenoma is the most common benign breast mass and invasive ductal carcinoma is the most common malignancy. In recent studies it has been shown that there is a significant rise in incidence of breast masses in women younger than the age of forty. Only less than half of the women with breast cancer are alive and disease free after ten years of diagnosis.

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It is situated in the chest wall in the superficial fascial layer of the pectoral region a part of the breast enters the axillary region by piercing the deep fascia and it is called as the Axillary tail of Spence.

The extent of the breast varies from person to person and it usually extends vertically from the second rib to the sixth rib and horizontally from the sternum to the mid axillary line.

Deeper to the breast are the deep fascia of pectoralis major and beyond this are the muscles, the Pectoral muscles, the Serratus Anterior and the External oblique muscle.

The main breast tissue is separated from the deeper structures by loose areolar tissue.

1. SKIN

It envelops the mammary gland. A cone shaped projection called nipple is present at the centre of the gland at the level of fourth intercostal space. Fifteen to twenty lactiferous ducts pierce the nipple and communicate with exterior. The nipple can be made flat or stiff using circular and longitudinal muscle fibers; the skin around the nipple is pigmented for a short distance from the center which is called as the areola.

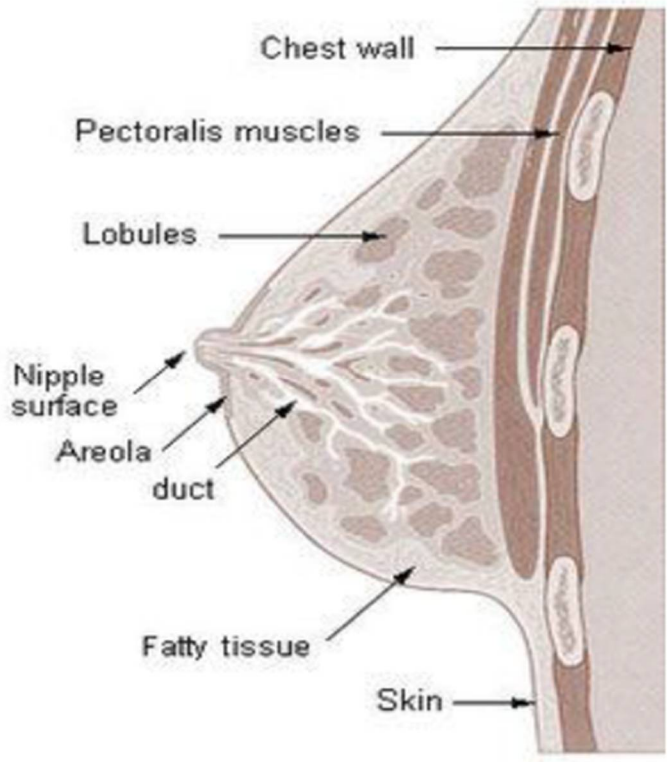


FIGURE 1- ANATOMY OF THE BREAST

2. THE PARENCHYMA

The parenchyma of the breast is composed of fifteen to twenty lobes; each lobe is composed of several lobules. A bunch of alveoli form a lobe and each lobe is drained by a lactiferous duct. The lactiferous ducts reach the tip of the nipple and open through it, the lactiferous sinus is a dilatation in the lactiferous duct near its termination.

3. STROMA

The main bulk of the gland is formed by the fatty stroma, the fibrous bands traverse through the fatty stroma and is called as the suspensory ligament of Cooper, these structures insert into the dermis perpendicularly which gives structural support to the breast.

BLOOD SUPPLY OF BREAST[1]

The breast is a highly vascular organ and the principal arteries supplying the breast are

1. Internal mammary artery, a branch of the subclavian artery through its perforators.
2. The lateral thoracic, superior thoracic and pectoral branches of acromiothoracic artery which are branches of the axillary artery.
3. Posterior intercostal arteries through its lateral branches.

VEINS OF THE BREAST[1]

The breast veins follow the arterial course and drain into the axillary region. The three groups of veins are 1. perforating branches of internal thoracic vein 2. Perforating branches of posterior intercostal veins and 3. The tributaries of the axillary veins, these veins communicate with a plexus of veins which extends from the skull base to the sacrum, known as the Batson's venous plexus which might serve as a route through which carcinoma of the breast tissue might metastasize to the vertebral bones, skull, pelvic bones and the CNS.

NERVE SUPPLY OF THE BREAST[1]

Sensory innervation of the breast and the anterolateral chest wall is through the lateral cutaneous branches of the third to sixth intercostal nerves and anterior branches of the supraclavicular nerve supply the upper portion of the breast. The intercosto brachial nerve which is a branch of second intercostal nerve may be encountered during axillary dissection and injury causes loss of sensation over the medial portion of the upper arm.

LYMPHATIC DRAINAGE OF THE BREAST[1]

Lymphatic drainage of the mammary gland is of great importance to the surgeon, since breast malignancy spreads usually along lymphatics to the regional lymph nodes.

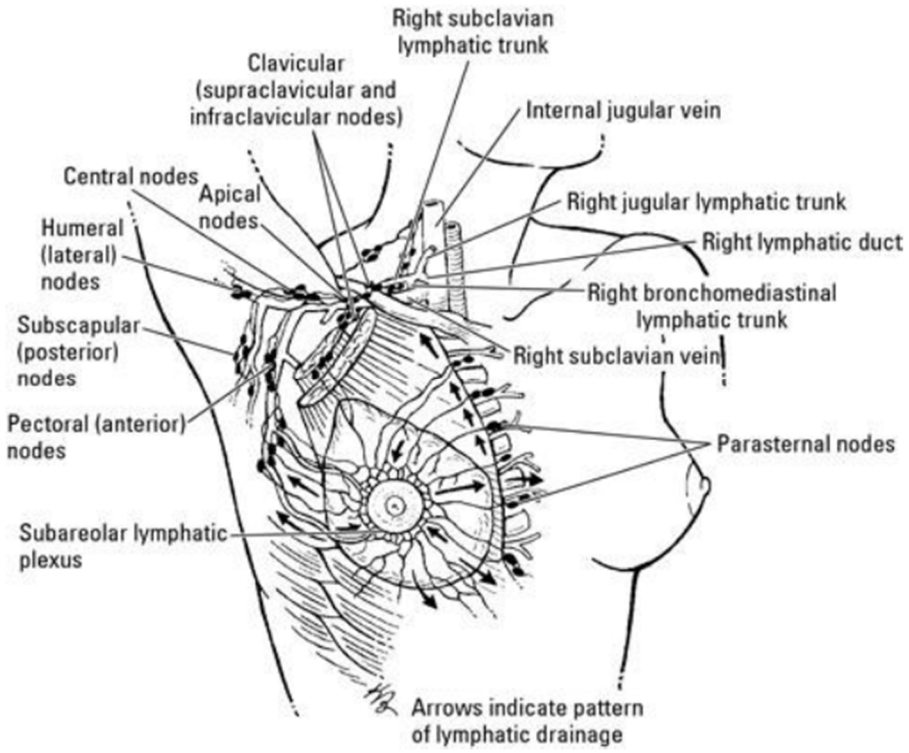


FIGURE 2 - REPRESENTING LYMPHATIC DRAINAGE OF THE BREAST

LYMPH NODES

The lymphatic drainage of the breast is through the following group of nodes,

1. The axillary node groups, mainly the anterior (or pectoral) group. The posterior (or subscapular),axillary vein (or lateral), central and apical(or subclavicular) groups of nodes also receive lymphatic drainage from the breast tissue either indirectly or directly.

2. The internal mammary nodes also called as the parasternal nodes lie besides the internal thoracic vessels.
3. Few lymphatics from the breast also communicate with the supraclavicular , the deltopectoral node, the posterior intercostal groups and the infradiaphragmatic and subperitoneal lymphatic plexuses.

The skin of the breast with the exception of nipple and areola is drained by the superficial lymphatics , these lymphatics travel in a radial fashion from the centre and ultimately drain into the axillary, internal thoracic, supraclavicular and the cephalic lymph node groups.

The parenchyma of the breast, the nipple and areola are drained by the deep lymphatics.

Some interesting points about the lymphatics of the breast are as follows,

1. Axillary group of lymph nodes receives more than 75% of the lymphatics from the breast tissue and about 20% drain into the internal mammary node groups; and remaining 5% drain into the posterior intercostal lymph nodes. The anterior axillary group of lymph node receives most of the lymphatics from the breast and apical and posterior group receive only a small part.

2. The parasternal nodes receive the lymphatics not only from the medial region of the breast, but also from the lateral region of the breast.
3. A lymphatic plexus called the subareolar plexus of Sappy is present beneath the areola and this plexus drains into the anterior or pectoral group of lymph nodes.
4. The deep lymphatics of the breast finally reach the apical and internal mammary group of lymph nodes after traversing through the pectoral muscle and its fascia.
5. The infradiaphragmatic and subperitoneal plexuses receive some lymphatics from the lower and medial quadrants of the breast.

LEVELS OF LYMPH NODES[1, 2]

The lymphatic groups are allotted levels according to their relationship to pectoralis minor muscle as follows,

Level 1 nodes: situated lateral to the inferior border of the muscle, which include anterior, posterior and lateral groups.

Level 2 nodes: located deep to the muscle which consists of central nodes and Rotter's (or interpectoral nodes) nodes.

Level 3 nodes: located medial to the superior border of the muscle which include subclavicular nodes.

PHYSIOLOGY AND DEVELOPMENT OF THE BREAST[3, 4, 5]

The development of breast starts in the fifth week of intrauterine life but is completed fully only after the first full term pregnancy. The milk line which is an ectodermal thickening extending from the axilla to groin is formed during the 5th week of intrauterine life, in the subsequent weeks the portion of the milk line in the mammary region forms the mammary crest and the remainder of the milk line involutes. The primary nipple bud formed from the ectoderm grows into the mesenchyme and forms about 20 secondary buds, these later on form the lactiferous ducts and their ramifications.

The breast remains dormant until puberty in the female, at puberty the hormonal changes lead to its development and fat deposition, but the development is complete only during pregnancy, when terminal ductal differentiation occurs and gets ready for milk secretion. Later involution of the breast occurs, which is pronounced during menopause when the acini decrease in number and size, the connective tissue replaces the stroma and finally fat deposition increases and epithelial elements decreases.

TUMOURS OF THE BREAST[1, 2]

Most of the breast problems are benign conditions and about 30 % of women will seek treatment for a benign breast condition in their lifetime, pain and lump in the breast are the most common clinical features, so it becomes the need of the hour to exclude malignancy.

BENIGN BREAST CONDITIONS

Aberrations of Normal Development and Involution (ANDI) is a terminology used to describe the disturbance in physiology and cytology of the breast and ranges from normal to disorder to disease.

It consists of essentially 4 features

Formation of Cyst – variable in size and found universally

Fibrosis – elastic and fat tissues are replaced by fibrous tissue with interspersed chronic inflammatory cells.

Hyperplasia – proliferation of acinar and ductal epithelia with or without cellular atypical changes.

Papillomatosis – extensive epithelial hyperplasia resulting in papillomatous changes.

Clinical features

Include lump with or without pain.

Fibroadenoma

Fibrodenoma is the commonest cause of benign breast lump; it is a non proliferative disorder of breast occurs in the age group of 15 to 25 years but occasionally seen in much elder women. They have plenty of stroma where cellular elements are histologically normal, similar to normal lobules of breast. They are hormonal dependent, fibroadenomas lactate during pregnancy and involute after menopause, so it is a self limiting condition. Ultrasonogram of breast will reveal pathognomonic features of fibroadenaoma. In fibroadenomas of size less than 3 cm excision may be avoided, Fibrodenomas of size more than 3 cm are best managed by surgical excision.

Periductal mastitis, duct ectasia and breast cysts are other important non proliferative disorders.

Fibrocystic disease

Fibrocystic disease can present with lump and or pain it may be confused with carcinoma breast at times and usually resolves after menopause.

Breast Macrocysts

These are involution disorders that usually occur in the later stages of reproductive life. Breast cysts of often multiple, bilateral and can mimic carcinoma; diagnosis is usually confirmed by ultra sonogram and aspiration. If the cyst is a complex one or the aspirated fluid is blood stained or residual mass is present after aspiration we have to suspect malignancy, which is confirmed by cytology or tissue biopsy.

Intraductal papilloma

It is a proliferative breast disorder arising from major ducts it usually occurs in premenopausal women usually presents with nipple discharge, malignant transformation is rare unless there is atypia.

Multiple intraducatal papilloma usually occurs in younger age group and may undergo malignant transformation.

Phyllodes tumour

It usually occurs in fourth decade of life, cystosarcoma phyllodes tumors are classified as

1. Benign phyllodes tumours.
2. Borderline phyllodes tumours.
3. Malignant phyllodes tumors

These tumors are large and massive at times and the surface of the tumors are unevenly bosselated, main bulk of the phyllodes tumor are composed of connective tissues mixture of cystic, solid and gelatinous areas. Infarction and necrosis at certain sites forms cystic areas.

Leaflike appearance (phyllodes means leaf like) which is a classical feature of phyllodes tumour is due to this gross morphological alteration , small tumours are treated by wide local excision and large tumours may need mastectomy , borderline and malignant phyllodes tumours are highly recurrent.

Breast abscess

The most common organism causing lactational infection is Staph aureus. Duct ectasia and periductal mastitis are polymicrobial , here a series of infections results in scarring which may lead to inversion and retraction of the nipple and palpable mass in the subareolar region , so it is challenging to exclude malignancy here.

Sclerosing adenosis

Increase in number of small distal ductules with stromal tissue proliferation produces sclerosing adenosis it is difficult to differentiate from carcinoma both grossly and histologically.

Fat necrosis

Fat necrosis may occur following any trauma or previous surgical procedure or exposure to radiation, characteristic feature is calcifications which can be visualized by ultra sonogram.

BREAST CANCER

Breast carcinoma is the commonest site specific carcinoma in women; it is a leading cause of mortality from malignancy for females in the age group of 20 to 60 years. 29 % of all newly detected malignancy in female population are breast cancers, it accounts for 14% of the malignancy related mortality in females. There is gross variation in the incidence of carcinoma breast among various countries.

Worldwide, Cyprus and Malta account for the highest age adjusted mortality for carcinoma breast and Haiti accounts for the lowest age adjusted mortality. There is increase in incidence in China and East Asia up to 3 to 4% annually. Breast carcinoma burden has well defined differences by regional lifestyle, geography and ethnic background. Asian and African women have a lower incidence of breast cancer occurrence and mortality.

The highest burden of disease is seen in European and North American women. Due to absence of effective screening programmes for earlier detection of malignancy and lack of accessibility to multidisciplinary treatment programmes underdeveloped countries have disproportionate mortality risk.

DIAGNOSIS OF A BREAST LUMP

Early detection of breast pathology forms is very important and in this regard self examination of breast plays a great role. The 2013 NCCN guidelines states that in addition to frequent breast self examination a clinical examination of breast by medical personnel is recommended once in a year.

Usually breast disease presents as a painless lump in the mammary gland, discharge or erosion of the nipple, puckering or retraction of the skin over the breast or swelling in the axillary region.

In order to arrive at a clinical diagnosis of breast lump and to detect whether it is a benign or malignant lesion several modalities are used they include detailed clinical examination of the breast , imaging tests like mammography or ultra sonogram and thermography or tissue or cytology based tests like excision biopsy , core needle biopsy or fine needle aspiration cytology.

If these tests if used alone the diagnostic yield is not much , hence nowadays a combination of several tests are used for screening the patients who have a breast lump for the earlier detection of a malignant condition, this combination improves the sensitivity and specificity thereby cutting down time and cost in diagnosis.

In India carcinoma Breast is the most common malignancy in females and worldwide it is the foremost cause of malignancy related death among women. Hence the diagnosis of a breast lump assumes utmost importance both for the clinician and the patient, a dominant breast mass by definition is a cystic or solid mass that is present in the substance of the breast throughout the menstrual cycle.

Clinical assessment of breast masses

The Clinician is the person responsible for the diagnosis of a breast mass, most of the breast lumps are benign, but diagnosis of malignancy poses a great challenge and in most of the cases a history and clinical examination however meticulously performed, will be inadequate to arrive at definite diagnosis.

The breast has a lobular architecture and the identification of smaller lumps amongst this lobularity is a great challenge and hence adjunctive imaging modalities form an integral part of the examination of breast.

The imaging studies of breast dates back to as early as 1913 when a German pathologist Salomon used X-rays to examine the amputated specimens of the female breast , the demonstration of micro-calcification and heterogeneity in X-ray in cases of malignancy still holds good[6] . This investigation has stood the test of time and evolved as mammography which is still being used as a screening test for breast malignancy.

Since mammography involves radiation and studies have proven that patients subjected to mammography are at a slightly increased risk of development of malignancy in situ, the use of other economically viable and safe imaging modalities was considered.

ULTRASONOGRAPHY OF BREAST

The examination of breast tissue by ultrasound was proposed as early as 1950 but could be put into clinical practice only after the development of grayscale examination by Swedish scientists and then tissues could be clearly examined. In recent era the advances in ultrasound technology has made it into a safe economical and reliable method for the examination of superficial and moderately deeply situated soft tissue lesions, and the examination can give more information than differentiating cysts from solid tumours and can also guide in planning FNAC or core biopsy.

TISSUE DIAGNOSIS

The gold standard for the detection of malignancy remains the demonstration of malignant cells in the tissue specimen and FNAC and excision biopsy are used for this.

In 1912 FNAC was used for the examination of cause of lymph node enlargement and gradually it percolated to other fields for neoplasia evaluation and in 1962 Ellis and Martin used FNAC for the evaluation of breast masses[7], FNAC interpretation is operator dependent and it requires years of experience to master this technique and experienced operators can distinguish benign and malignant lesions with good accuracy.

CLINICAL EXAMINATION

Inspection and palpation of breast masses are important and in order to become palpable the mass should be large enough to be distinct from the tissues surrounding it. But it might be detected earlier on imaging modalities, Since the breast mass is lobular with varying contents of glandular tissue, adipose tissue and fibrous tissue, the exact identification of breast masses might pose a difficulty to the examiner.

But true breast masses stand out from the surrounding tissues with a different consistency and are asymmetric when both breasts are compared and have a three dimensional demarcation from surrounding tissues.

Of the breast diseases, benign breast diseases predominate but the fear that a breast disease creates is enormous and a plan should be devised for the rapid detection and treatment of malignancy, of this first are history and physical examination.

A detailed history includes the following points:

- Age at presentation
- Menstrual history
- Family history and reproductive history
- History of pregnancy and lactation
- Exposure to radiation especially the upper body
- H/o benign breast disease

PHYSICAL EXAMINATION OF BREAST

A private examination cubicle with proper lighting with adequate warmth and comfort are essential for breast examination, the room should be properly illuminated and the patient is stripped up to the waist to enable a complete examination.

General examination

- Built and Nourishment
- Colour of skin
- Mucous membranes
- Palms and soles

Inspection of breast

First examine the patient from bed end with arms by side and then with arms elevated.

The symmetry of breasts and nipples are first assessed

The next points for inspection are

a. Abnormalities of the nipple and areola
b. Prominent vessels and scars
c. Prominence or dimpling of the skin
d. Skin Tethering

e. Peau d' orange appearance

f. Nodules over the surface

g. Skin or Nipple Ulceration

Palpation of breast is done in an orderly fashion, the following is the schema

1. Palpation of both Supraclavicular fossa
2. Breasts:
    a. Initially light palpation is done, followed by
    b. Deep palpation extending systematically from the areola and moving concentrically outwards to the axilla including the axillary tail.
3. Examination of Axilla:
    a. Examine the axilla from front and behind
    b. The forearm of the patient is supported by the examiner
4. Abdomen is examined for ascites, organomegaly or abnormal masses.

Particularly valuable in practice are

- Inspection with arms firstly kept by the side, then arms raised.
- First light palpation over the breasts followed by deep palpation in concentric rings, travelling outwards.
- Examination of the both axillae performed from front and back of the patient.

Malignant tumours are usually firm or hard and tend to have ill-defined margins and attachments to the overlying skin or fascia with puckering or retraction of the nipple and areola. Benign lesions are well defined and have clear borders and are mobile without definite attachments to superficial or deeper tissues.

Solid lesions and cystic lesions can be differentiated by palpation to a certain extent but the sensitivity of palpation is only around 58 to 66% as reported by Rosner et al, so significant difference in diagnosis can be present even among seasoned examiners[8] , In a study done by Boyd et al involving patients with breast masses which had experienced surgeons doing physical examination the need for biopsy was agreed upon only in 73% of patients with malignancy.

In another study, Somers et al studied certain palpable abnormalities which were defined as areas of thickening, tenderness without an associated dominant mass on clinical examination, no suspicious mammography findings and firm, rubbery, cystic soft mass, needle sensation by FNA. The malignancy incidence in this group was less than 1%, so it was concluded that these palpable lesions did not require open biopsy.

Sometimes in the earlier stages of malignancy benign features and malignant features may overlap and without the use of FNAC or imaging modality certain malignant lesions may be classified as benign by physical examination causing a delay in treatment, So in order to arrive at an early definitive diagnosis an imaging modality is required to complement the findings of physical examination and for the examination of the opposite breast and look for multi-centricity. In the contrary a negative imaging finding in a highly suspicious looking lesion also should be interpreted with caution.

ULTRASONOGRAPHY OF BREAST

Ultrasound Examination of breast has been in vogue since 1950s but the resolution and technology was inadequate for a comprehensive examination in the earlier phases, hence physicians were not able to utilize the investigative potential, later the development of grayscale ultrasound

technique by Korasakoff obviated this difficulty and ultrasound began to be used in a widespread fashion.

The ultrasound transducers were initially quite crude devices that operated with low frequencies.[30]

Low frequency waves have good penetration but the image resolution is not adequate hence initial ultrasonography had a low sensitivity to differentiate between tissue types.

Later generation transducers were improved with design changes that allowed use of a range of frequencies and higher frequency transducers were used for examination of breast, thyroid and testis.

Even with modern ultrasound technology, ultrasound examination is operator dependent and adequate training is essential for the correct interpretation of findings.

Skilled Sonography interpreters follow three golden rules, they are

1. A single image is never used for making an interpretation but a mental 3 dimensional image is imagined with the acquired images; superimpose the ultrasonic images mentally to formulate a 3 dimensional image of the scanned tissues and to ensure that the displayed feature is concordant with the mental image.

2. Rule out artifacts; don't always think that all which is displayed in the image is real.
3. Look for the invisible things, things which are not seen in a field of imaging can be seen in other planes.

Initially ultrasound could differentiate only between solid and cystic masses but later generations of Ultrasound devises are capable of characterizing the density of tissues and can be used to differentiate between benign, malignant and equivocal masses.[70]

ULTRASONOGRAPHY OF THE BREAST

First task is to confirm the side of breast, site and position of the lesion which is to be evaluated; this can be done by referring the clinician's notes and the diagrams provided by the examining physician

For Breast USG, a 7.5 to 10 Mhz linear- small parts high definition transducer is used.

The Region of interest (ROI) is first evaluated and the side and Site are confirmed to be in concurrence with request given and USG findings are correlated with clinical findings.

Position of the patient

A pillow is placed under the shoulder of the side to be examined, the patient is made to lie in an oblique position with the degree of obliquity depending on the position of the breast, this aims to bring the corresponding breast to the centre of the examination field, the arm is raised above the patients head for even distribution of the breast tissue, but not very much as to cause breast retraction. Better positioning eases examination and provides clear images.

a. Lesions that are felt better in the upright position may be scanned in the same position.

b. Confirmation of fluid in cysts can be done by changing from upright to decubitus position.

The Ultrasound transducer is placed directly over the lesion after trapping the region of interest with the examiners fingers.

Examination should be done in radial/antiradial planes to avoid mistaking fat islands as solid masses and determine the relation of the lump to the ducts.

Shape, nature of margins and surrounding tissue can be determined by evaluating the lesion in entirety including the periphery, in multiple planes.

Artifacts can be eliminated by slightly compressing the breast tissue with transducer which will make the breast tissue to spread evenly over the chest wall.

The breast is examined from the periphery to centre and finally the areola and nipple are imaged and the retroareolar tissue is also imaged in multiple planes by angling the transducer.[30]

LESION LABELING

- The position lesion is labeled on a clock face.
- The distance of the lesion from nipple is given in centimeters.
- The longest diameter is measured.
- Height width ratio of the lesion is obtained.

NORMAL APPEARANCE OF THE BREAST

Knowledge about breast architecture and its normal variations are important for the accurate detection of the abnormalities of breast.[30]

SKIN

The skin appears as an echogenic layer with a thickness of 3mm or less by ultrasound and most of the times a hypo echoic central line is seen, if the skin is diffusely thickened it is difficult to recognize it without comparing the Region of Interest to the opposite breast or to a normal area within the same breast. To detect subtle abnormalities a standoff pad may be used.

SUBCUTANEOUS TISSUE

The subcutaneous fat layer is present beneath the skin as a hypo echoic layer sandwiched between the skin line and the parenchyma of the breast. The ligaments of Cooper are seen as curvilinear lines extending from the breast parenchyma to the superficial fascial layer thereby producing a scalloped appearance. Cancer breast does not arise in the subcutaneous plane but it might involve it by direct extension.

Focal increase in echo texture is seen in Malignancy, inflammatory lesions, fat necrosis, edema, or biopsy scar.

Diffuse increased reflectivity of breast tissue is seen in edema of any cause (e.g., Congestive Cardiac failure), diffuse form of Carcinoma breast, inflammatory breast cancer, inflammatory mastitis, or radiotherapy to breast.

Sebaceous cysts, epidermoid cysts, hemangiomas, and rarely smooth muscle and fibrous tissue tumors are the indigenious to this plane.

NIPPLE AND AREOLA

The Nipple and areola are imaged after compressing the area slightly with the transducer and imaging is done in multiple planes angled towards the subareolar region, application of light pressure with the transducer prevents air trapping between the skin and the transducer thereby eliminating artefacts , The lactiferous ducts are visualized in this area and they are traced into the breast tissue , usually echogenic masses represent debris collected within, but the presence of a dilated duct along with a mass lesion may indicate carcinoma , papilloma or other solid lesions.

BREAST PARENCHYMAL LAYER

The breast parenchymal tissue has varying proportions of ductal, lobular and fibrous tissue. In younger age the breast tissue is dense and

uniform, as age advances the breast become more lobular, but age and parity do not exactly correlate with the ultrasound appearance of breast.

The normal breast can range from almost completely fatty with only a few ehogenic fibroglandular tissue in one spectrum to presence of more amount of fibroglandular tissue with little or no fat on the other.

The normal fibroglandular tissue appears to be arranged in multiple layers parallel to the chest wall without distortion and should not have a pulled or swirled appearance.

Most benign and malignant lesions are imaged as hypoechoic nodules in comparison with the paraenchyma and are easily visualized the in homogenously echogenic breast tissue, which does not deform with compression. Moreover, the most useful maneuver in imaging of the breast is to image in multiple planes, which helps to demonstrate the fat island continuity with other areas of fat.

RETROMAMMARY AREA

It is present deeper to the echogenic plane of glandular tissue, and visualization by ultrasound is difficult, it is a hypoechoic plane containing fat.

LYMPHNODES, ARTERIES, AND VEINS

Lymphnodes are seen within the axillary region as round to oval nodules with an hilum which is more echogenic and a peripheral rim of less echogenic tissue.

Benign nodes are large in size but morphology is preserved but malignant nodes appear as hypoechoiec lobulated nodules. Ultrasound can only detect gross abnormalities and not minor variations in lymph nodes.

Arteries and veins appear as tubular anechoic structures within the breast tissue. Arteries have a pulsatile appearance on the examination of the breast; Colour Doppler ultrasound can clearly demonstrate the vascular structures.

BREAST MASS CHARACTERIZATION [31]

CYSTS

The characterization of breast mass starts with solid and cyst differentiation, the accuracy of USG approaches 100% for the diagnosis of cystic breast masses when all the diagnostic criteria for cysts are met.

These are the criteria

a. Oval, lobulated or round shape

b. Anechoic

c. Clearly defined posterior border

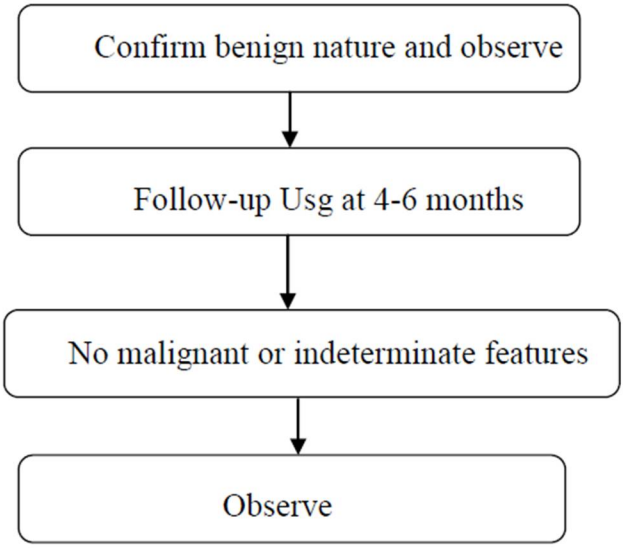
d. Increased through and through transmission

e. Surrounding parenchyma shows no alteration.

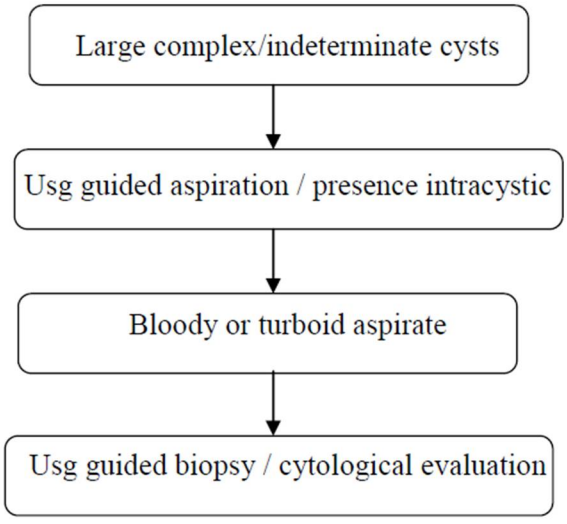
But in real life situations all cysts do not display these criteria. Cysts of size up to 5mm can be diagnosed with USG with an accuracy approaching 100%. The common difficulty in the differentiation of cysts from solids is when internal echoes are present. Internal echoes may be seen in cysts due to presence of calcium or cholesterol, hemorrhage within the cyst or infection.

FOLLOW UP OF CYSTS [32]

SIMPLE CYSTS



COMPLEX CYSTS



SOLID MASSES

Solid masses have the following signs by USG

Primary signs – changes produced by the mass per se.

Secondary signs – changes in the surrounding tissues due to the mass.

BENIGN FEATURES OF SOLID MASSES

USG has less specificity in differentiating benign masses from each other.

There is overlap of findings between fibroadenomas, tubular adenoma, focal fibrocystic changes and other solid benign nodules.

Features of solid benign lesions are

1. Shape is round or oval with few lobulations.
2. Presence of a thin echogenic pseudocapsule with sharply defined margins.
3. A depth/width ratio of less than 1.
4. Surrounding tissues clear of disease.
5. Absence of malignant characteristics, by Ultrasound guided aspiration or biopsy.
6. Presence of homogenous low level internal echoes.

FIBROADENOMAS

Fibroadenomas are the most common benign solid nodules. Fibroadenomas are seen in young females and their ultrasound features are determined by the varying amounts of epithelial and fibrous components.

The features of Fibroadenomas are

a. Enhanced through and through transmission.

b. Posterior attenuation in relation to the fibrous component.

c. Degenerating fibroadenomas have shadowing in USG due to coarse calcifications.

d. Lactating and juvenile types of fibroadenomas exhibit tubular structures.

e. Differentiated from fat lobules by their non compressible nature.

LIPOMAS AND FIBROADENOMYOLIPOMA

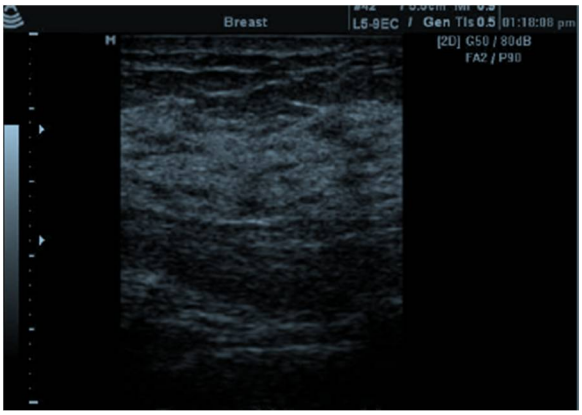
1. Lobulated masses with no distortion of surrounding tissues.

2. Presence of internal echoes due to fat content.

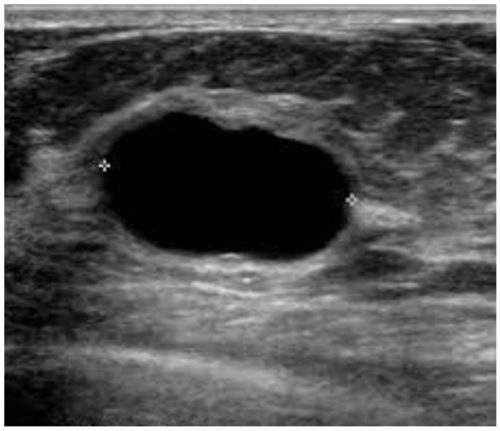
FAT NECROSIS

Fat necrosis is seen as a hyperechoic nodule with a central lucency.

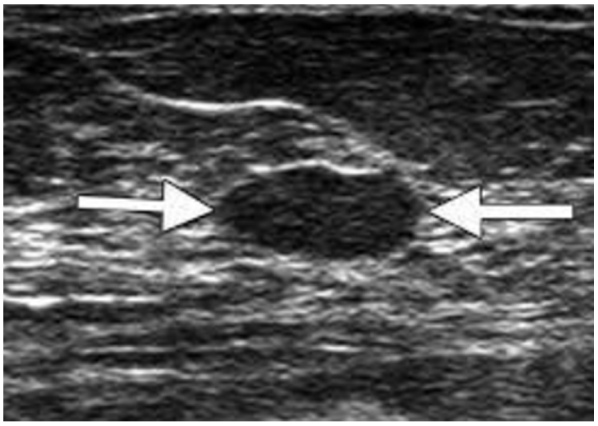
ULTRASOUND IMAGES



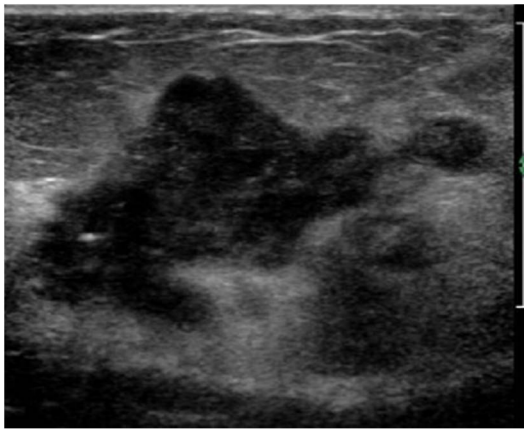
NORMAL BREAST



BREAST CYST



BENIGN LESION



MALIGNANCY

MALIGNANT FEATURES OF BREAST LESIONS

1. Stellate lesions
2. Circumscribed lesions
3. Presence of diffuse edema
4. Presence of calcifications

STELLATE MASSES

The normal parallel arrangement of soft tissue planes in malignant tumours is lost and the desmoplastic reaction in and around the lesion pulls the breast tissues towards the mass resulting in a stellate appearance.

The centre of the lesion is irregular and hypoechoic and there is peripheral distortion producing a star like appearance and the features are

- Normal trabecular architecture is disrupted.
- Extension of disease along the plane of the ducts.
- Posterior acoustic shadowing is seen.
- Subcutaneous tissue has increased reflectivity.

Differential diagnosis of stellate lesions

- Carcinoma (commonest)
- Radial scar
- Sclerosing adenosis
- Post operative scarring

INDICATIONS FOR BREAST ULTRASOUND

1. To evaluate a breast lump that is detected by mammography.
2. To confirm the nature and the presence of a lesion.
3. Used as a single imaging method in pregnant or lactating women who present with breast symptoms and in outpatient setups.
4. To delineate solid from cystic lesions.
5. Used to guide biopsy /aspiration for pathological diagnosis.
6. Used for localization of lesions in preoperative stages and to aid surgical excision.

7. Follow up of post surgical breast tissue.

8. Post breast augmentation surgery follow up to investigate the contour of prosthesis or to find out extra capsular rupture.

9. Follow up of benign lesions that have not been subjected biopsy.

10. As a screening test for Carcinoma breast adjunctive to mammography.

THE ADVANTAGES OF ULTRASONOGRAM

1. Absence of Radiation and its complications.
2. Can evaluate the lesion and describe details of size, shape, echogenicity and relation to surrounding tissues as against mammography that gives a result of a density which has less specificity.
3. Ultrasound guided biopsy was found to be more accurate in studies than conventional methods and since the biopsy needle is seen through the lesion it aids in accurate sample and boosts confidence of the operator.

4. In preoperative stages mammography is more time consuming and the positioning is cumbersome and the results are less accurate, hence ultrasonography is better for immediate preoperative guidance.
5. USG gives findings in surgically altered breasts compared to mammography.
6. USG is superior for the imaging of extra capsular rupture of prosthesis which cannot be diagnosed by mammography.
7. In follow-up of benign nodules which are not excised, mammography is associated with risk of radiation and malignant transformation; hence USG is the investigation of choice.

LIMITATIONS OF ULTRASOUND

1. Less accurate in larger and dense breasts, but highly sensitive in compare to mammography.
2. Less accurate in small (< 1cm) lesions.
3. Cannot be used as routine for postoperative cases.
4. Has less sensitivity for the detection of non palpable malignant lesions.

5. Microcalcifications are not clearly detected as in mammography.
6. Has high false positive rates compared to mammography, it classifies many benign lesions as malignant

CYTOPATHOLOGICAL DIAGNOSIS

Fine Needle Aspiration Cytology

The development of the needle aspiration technique for diagnosis was reported as early as 1847 when Kun described a novel method for diagnosis of tumors. In 1883 Leydon aspirated and isolated pneumonic organisms using needle aspiration, later in 1904 cervical lymph nodes were subjected to needle aspiration by Greig and Gray for the identification of trypanosomiasis[13].

Initially larger bore needles were used for aspiration from a variety of lesions of lymph nodes; breast, thyroid and prostate, as time passed by smaller needles were used, in the recent times needles of 1mm or thinner are used for FNAC.[14, 15]

FNAC did not gain much importance till the 1960s and remained a controversial topic; only after 1960s it gradually gained the confidence of surgeons.[10, 16]

European scientists in the Stockholm Karolinska institute in 1960s pioneered the use of fine needle aspiration techniques and developed protocols for diagnosis and interpretation criteria.[10, 16]

Recent developments in FNAC technique and cytological diagnosis have propelled its use in multiple sectors and it has developed to be as accurate as excision biopsy.

The advantages of FNAC are that it is an outpatient procedure, does not require anesthesia, cost effective and helps adequate preoperative planning.

FNAC technique

Definition: FNAC is defined as the study of cells obtained using a thin bore or fine needle with negative pressure. The needle aspirate specimen contains a minimal quantity of tissue along with fluid. FNAC can be used for both superficial and deep masses.[17]

FNAC Personnel

In western countries the surgeon experienced in doing FNAC does the aspiration and the Pathologist interprets it, in our country both aspiration and interpretation are done by the pathologists. Adequate skill is necessary for both sample acquisition and interpretation.[18]

Equipment required

The equipments required are 1. Needles-23 G disposable needles. 2. Syringes –Disposable BD plastic regular 10 ml syringes. 3. Slides-2 or 3 labeled clean non contaminated sterile slides for smear preparation. 4. Alcohol 95% as fixative. 5. Stains- Hematoxylin and Eosin stain, Special stains as required by pathologists.[19]

Technique

FNAC is usually a painless procedure, after proper explanation to patients, the lesion is held firmly in between the fingers of the examiner and the skin is stretched and made taut, the area is properly sterilized and wiped clear.[68,69]

The needle is attached to the syringe with the plunger in fully closed position without air inside the barrel and the needle is introduced into the

skin overlying the lesion, the needle is inserted as to feel the anterior edge of the lump and after entering it firm negative pressure is applied to the piston using a syringe holder or the thumb.

Several passes are made through the lesion in different angles and rotation of the syringe without withdrawing it fully until a small amount of fluid is seen in the hub of the syringe. Negative pressure is then released and needle withdrawn.

If the aspirate is more than expected or hemorrhagic is advisable to interrupt the procedure and try it from a different angle or do it in another session. If tissue is not obtained adequately due to needle blockage the needles can be changed and re aspiration done. Breast lumps are usually deeper than they appear and sometimes longer needles may be necessary.

After this slides are smeared with aspirate, fixed with 95% alcohol and stained with hematoxylin and eosin stain.[20]

FNAC CYTODIAGNOSTIC CRITERIA [12]

There are 4 categories of breast FNAC cytology[19, 20, 21]

1. Inadequate or Unsatisfactory cytology- Here the cell elements are inadequate or absent. There has not been a standard criteria established for a diagnostic FNAC aspirate, but each field should contain 3 to 6 epithelial cells and should not be obscured by blood or other cells. Unsatisfactory smears are due to air drying artifacts or due to minimal cellularity of lesion.
2. No Malignant cells seen –No malignant cells seen, only benign cells seen. Benign cells of breast are duct epithelium, apocrine cells, RBCs, adipocytes and degenerative nuclei. The nature of benign lesion may also be qualified.
3. Malignant cells present- The report is given as malignancy positive only when cells confirmatory of malignancy are undoubtedly present and it also should provide information on the degree of differentiation and the type of malignancy, but it cannot provide details of invasion of surrounding tissues.
4. Presence of suspicious cells but not diagnostic of malignancy- further histopathological biopsy is to be planned in this group.

Differences between benign and malignant cytology[22, 23]

Benign	Malignant
Cell size – Normal	Cell size – Varying usually large
Adhesion of cells good	Loss of adhesiveness
Uniformity of cells present	Cells are pleomorhic
Regular but coarse cells	Finer appearance , pale cells, large nucleoli with intranuclear edema
Cellularity is low	Cellularity is high
Stripped nuclei are seen	Lack of stripped nuclei
Nuclear membrane is smooth	Nuclear membrane irregular
Sentinel cells seen	Absence of sentinel cells

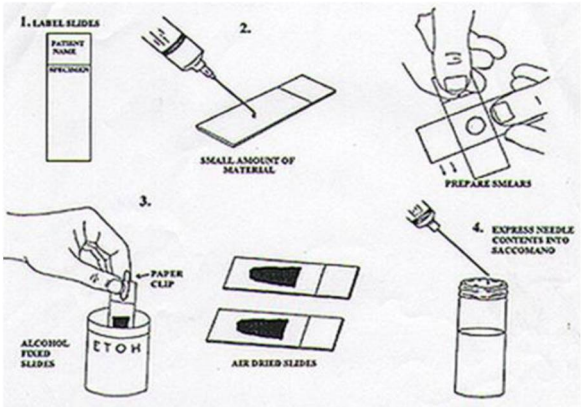
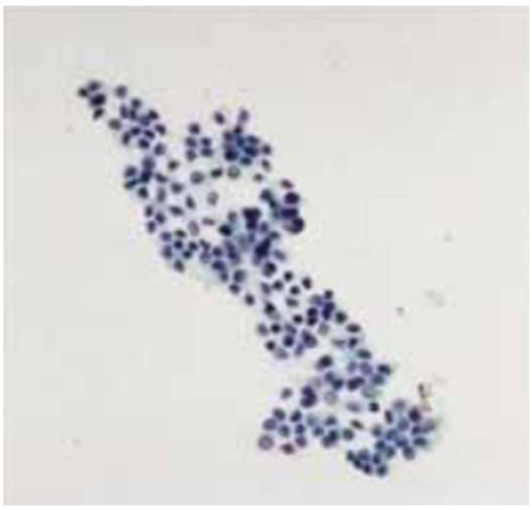
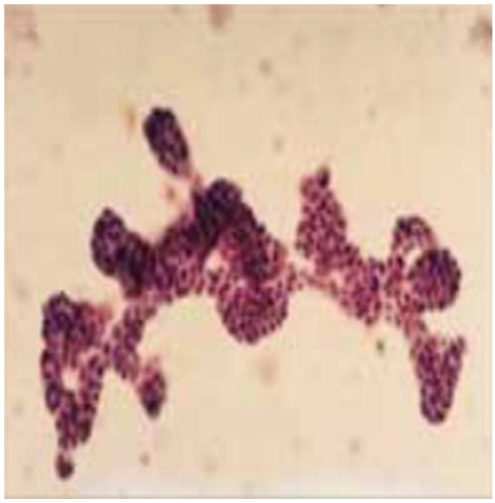


Figure 3 - FNAC TECHNIQUE

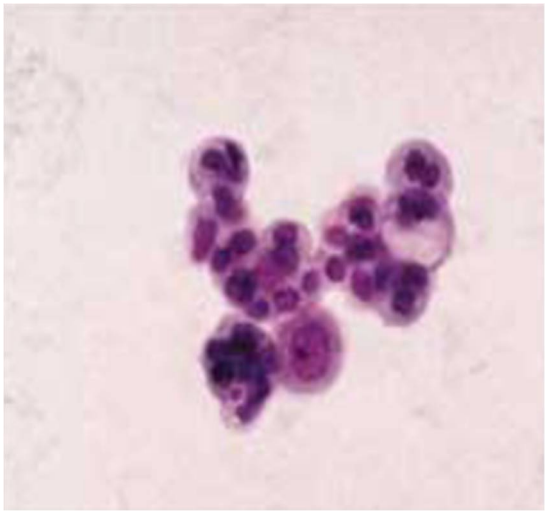
FNAC - CYTOLOGY IMAGES



BENIGN

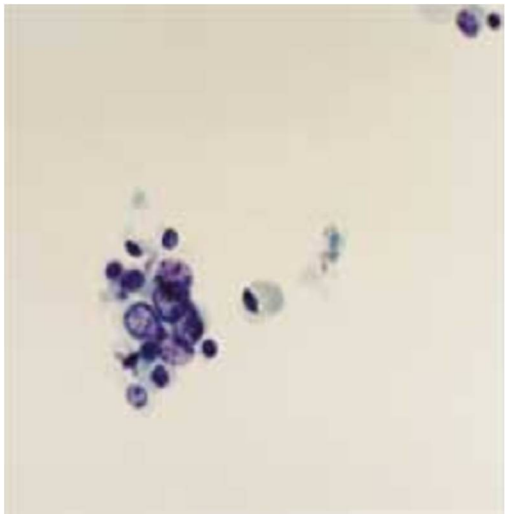


MILDLY ATYPICAL



MARKEDLY ATYPICAL

(SUSPICIOUS)



MALIGNANT

HISTOPATHOLOGICAL DIAGNOSIS

Biopsy of breast lump

"Bio" is life and "Opsis" is vision so biopsy means visualization of the surgically excised specimen both macroscopically and microscopically.

Ernest Henri Besnier a French dermatologist coined the word biopsy in 1879.Even earlier Rudolph Virchow had explained the fundamentals of this procedure and now it has become in indispensable tool in surgical practice[9].Biopsy and the Histopathology is the ultimate gold standard truth for the surgeon, and treatments of lesions either benign or malignant greatly rely upon histopathological diagnosis.[40]

In this context excision biopsy of breast lesions and its histopathology remains gold standard for the diagnosis of malignancy.[40]. Aspiration cytology provides cytopathological diagnosis, whereas biopsy provides histopathological diagnosis[10].

Different types of biopsy are available they are

- Incision biopsy
- Excision biopsy

- Trucut biopsy
- Intra ductal biopsy
- Slide biopsy smears of nipple secretion
- Superficial biopsy of lesions of the nipple

Incision biopsy

Incising the lesion and sending a small amount of tissue is preferred by some surgeons for detection of malignancy, it is usually carried out as a preliminary procedure before definitive surgery; Incision biopsy and frozen section have good accuracy for the detection of malignancy except papillary carcinoma of the breast which may be mistaken for papilloma.

Incision biopsy is usually used to remove a portion of tissue from large tumours in which needle biopsy is inadequate.

Excision Biopsy

Excision biopsy involves excising the whole tumour in an operating room under anaesthesia , if performed adequately with good clearance of margins it is both a therapeutic and diagnostic modality.

Excision biopsy and histopathology is the ultimate gold standard for breast mass evaluation, it is usually done when imaging or tissue investigations are inconclusive or equivocal.

With advances in FNAC techniques and combination triple investigation, the use of excision biopsy is on the decline.

Trocar or Trucut biopsy

Small cores of tissue are removed from the breast lesions using small hollow trephines or trocars , it helps to obtain tissue for histopathology.

This technique was first used by Vim Silverman in 1938 and a good trocar or trephine biopsy should provide an adequate representational specimen

But the disadvantages are that they provide only a minimal amount of tissue, it cannot provide details about margins and invasiveness of tumour and they may miss small lesions.

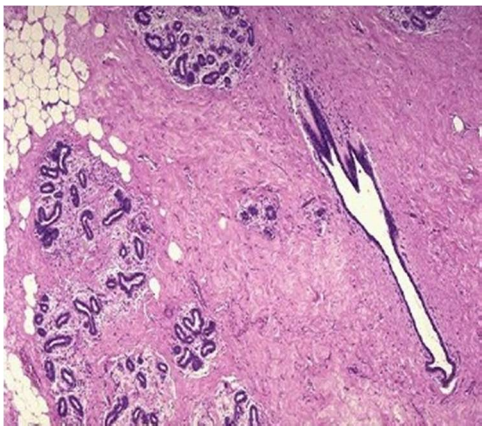
In recent era Ultrasonographic guided trocar biopsy has improved the accuracy of this test.

Intraductal biopsy

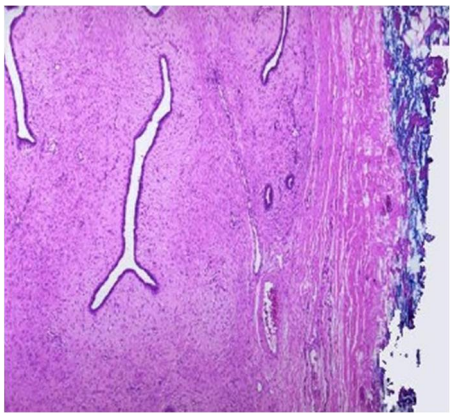
Dilators, small loops and curettes are used to dilate the ducts and obtain biopsy specimen from the breast[11].

Biopsies may also be obtained from Nipple smears and surface of nipple[12].

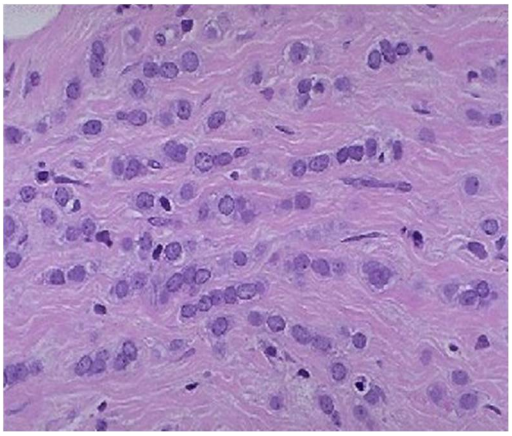
HISTOPATHOLOGY SLIDES



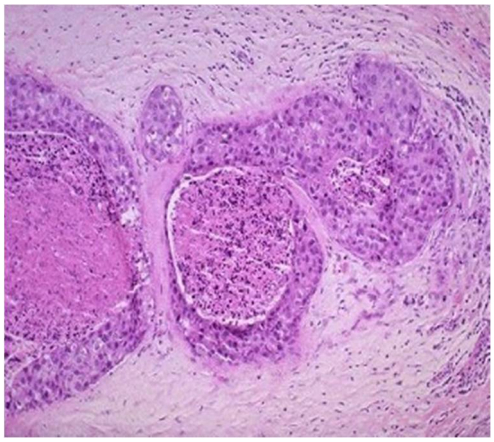
NORMAL BREAST



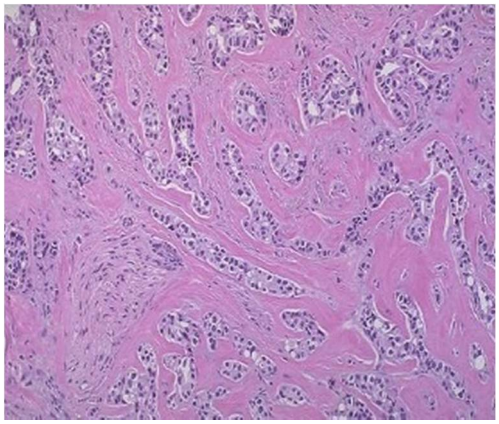
FIBROADENOMA



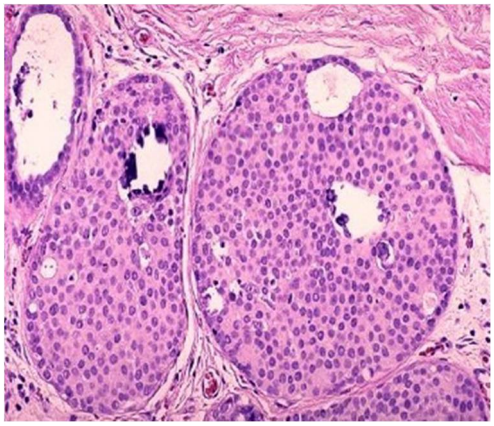
LOBULAR CARCINOMA



COMEDOCARCINOMA



SCHIRROUS CARCINOMA



DUCTAL CARCINOMA

THE MODIFIED TRIPLE TEST

Previously in the early era of diagnosis open biopsy was done for the detection of malignancy, in mid 1970's a triple test consisting of clinical examination, mammography and FNAC was introduced which improved diagnosis of breast cancer, later mammography was substituted by ultrasonogram of the breast and this was called as the modified triple test, if these three modalities had a similar correlation then the accuracy of diagnosis was about 99%. Even in lesions that are not palpable the diagnostic yield is similar to palpable lesion when the triple test is used.[33, 34]

Few years ago frozen section after excision was used to confirm the diagnosis of breast carcinoma but now preoperative detection of malignancy has been facilitated by using cytological tests such as testing the nipple discharge or using fine needle aspiration cytology tests from the lumps.

Making a definitive preoperative diagnosis is very vital because it helps to plan surgical decisions. It can avoid unnecessary radical dissections. If malignancy is detected by triple test, curative surgery can be planned earlier thereby avoiding two surgeries, one for biopsy and other for curative treatment.[67]

In recent days treatment of Carcinoma breast is patient centric and patient themselves are involved in the process of deciding about the mode of surgery and this needs earlier planning so the detection of metastasis and the type of lesion become very important.

Few years ago it was stated in medical literature that every breast lump should be excised but this has now been emphasized as every breast lump should be assessed and clarified, so assessment includes the triple test and its variants, so this test assumes a vital proportion in workup for cancer breast.[66]

Origin of triple test

In his 1987 article Hermansen et al used the term triple test in breast cancer which includes physical examination, mammography and Fine needle aspiration of breast mass , about 650 women with breast tumors were studied and the conclusion given was triple test had a accuracy of diagnosis similar to that of histological examination. [24]

In another study done by Hardy et al 143 patient with breast masses where assessed by several modalities which included mammography, ultrasound examination of breast , Magnetic resonance imaging of the breast and Fine needle cytology and the conclusion was that the combination of

cytology and ultrasound imaging of the breast had the most accurate diagnosing power for malignant lesions.[25]

In another study done by Lawrence N Bassett et al about 1016 women of age 35 years or less presenting with a palpable breast lump were studied over a eight year period, in this study it was shown that mammography was less sensitive when compared to sonography in the detection of breast masses and the benefit of ultrasound was to avoid unwanted biopsy procedures , so ultrasound of breast was found to be a preferable mode of examination of younger women with breast lumps, but ultrasound was less sensitive in detecting very small lumps and could not differentiate benign from malignant in smaller lesions.[26]

A study done by Vetto et al included fifty five young women with palpable breast mass and the value of the Triple test was appreciated, it had a negative predictive value and a specificity of 100 % for the detection of malignant lesion in younger women when compared to conventional excision biopsy, thereby reducing the economic burden on the healthcare system and the patient.[27]

In another study done by Purasri et al used four tests instead of three and included physical examination, FNAC, mammography and ultrasonography of breast in 603 young women with palpable breast lumps

and put forth a novel scoring system which had an accuracy of 98% in detecting malignant lesions.[26]

In a study done by Hatada et al biopsy specimens of 114 malignant breast lumps were examined and retrospective analysis of the method of cytological analysis was made, in this they found out that USG guided FNAC was more accurate (86%) than plain FNAC (65%) in the diagnosis of malignant breast lumps, and the results were more pronounced in smaller lesions of size <2cm.[28]

In a office based ultrasound study done in 660 women by Heiken et al brought to light that about 75% of the suspicious lesions detected by USG were found to be malignant and only 5% of the lesions described as fibroadenaoma turned out to be malignant, this study shows that USG of the breast is a valuable screening tool for detection of malignancy.[19]

In other study, women with age of less than 35 years presenting with a high risk history, breast symptoms and indeterminate findings on mammography were studied by Jill S Montrey et al and Ultrasound examination of breast was found to have accurate diagnostic power for the detection of malignancy.[29]

MATERIALS AND METHODS

TYPE OF STUDY

Prospective observational study.

STUDY CENTRE

Department of General Surgery, Coimbatore Medical College Hospital, Coimbatore.

PERIOD OF STUDY

From July 2016 to June 2017 – 1 Year.

PATIENT POPULATION

103 consecutive patients presenting to the outpatient and Inpatient department of the Department of General surgery, Coimbatore Medical College with complaints of a palpable breast mass were included in this study.

INCLUSION CRITERIA

1. Female patients with age of > 20 years with palpable Breast lump
2. Patient willing for lump excision

EXCLUSION CRITERIA

1. Patients who are below 20 years.
2. Male patients
3. Female patients with advanced disease which makes the diagnosis obvious
4. Patients not willing for lump excision

The study was conducted after obtaining permission from the Institutional Ethics Committee. The patients were clearly explained about the nature of study and its implications and an informed written consent was obtained from the patients after explaining the procedure in their vernacular language.

COLLECTION AND ACCUMULATION OF DATA

The patients were enrolled in the study after applying the inclusion and the exclusion criteria. A detailed History regarding the complaints, the mode of presentation, site of lump and associated symptoms was obtained, a complete physical examination and examination of the breast and the mass was made. Each patient underwent a modified triple test which included a complete clinical examination, next was the ultrasound examination of the breast mass and finally Fine Needle aspiration of the breast lump was made.

Based on each test the palpable breast lumps were classified as benign, malignant or inconclusive.

Malignant lesions

These lesions are ill defined. These are hard in consistency with angulated and abrupt borders and microcalcification seen in Ultrasound examination.

Benign Lesions

These lesions may be cystic lesions or solid lesions.

Cysts are oval or round with clearly defined margins and they are not echogenic, these cysts may be simple cysts with through and through transmission of echoes or may be abscesses with septations and internal echogenicity.

Solid benign lesions may be fibroadenomas which may be lobulated with single to several lobulations, rounded or oval in shape and covered by a pseudo capsule and has uniform homogenous echo pattern in Ultrasound.

Fibrodenosis is a condition in which there is increase in fibrous and glandular elements of the breast not confined to any area sometimes there

may be certain cystic areas with increased echogenicity and the architecture of the breast is maintained.

Breast Examination included examination of the breast, the axilla on both sides, both supraclavicular fossa and all lymph node areas were examined to rule out generalized lymphadenopathy.

Ultrasound examination of breast

Ultrasound examination of the breast was done using a high frequency linear transducer (7.5 to 10 megahertz) in the department of Radiology, Coimbatore Medical College Hospital, Coimbatore by an experienced radiologist well versed with radiological examination of the breast and the patients were examined in supine position and scanning of the breast was done horizontally and vertically, Ultrasound examination of both breasts, axillary region and supraclavicular lymph nodes was also done.

Fine needle aspiration cytology

FNAC was done by a pathologist and aspiration was done using a 22-23 gauge needle attached to a 10 ml syringe with the patient in supine position and the ipsilateral upper limb raised beside the head, the lesion was fixed with one hand and the biopsy needle was inserted into the lump and moved back and forth into the mass several times , while constant negative

suction was maintained until aspirate was seen at the hub of the needle , then suction was released and the needle withdrawn and the material was spread on three slides, then taken up for cytological examination after fixation and staining.

The results were reported as benign, malignant or indeterminate.

Histopathological examination

All the patients had some form of surgery based on the result of the modified triple test, patients with benign lesions had excision biopsy and malignant lesions had Modified Radical Mastectomy, the surgical specimens were examined in the pathology department and the results were classified as benign or malignant.

Analysis and interpretation of data

The particulars in the pro forma were tabulated in Microsoft excel program and statistical analysis was done using SPSS software system and appropriate statistical tests were used as necessary and various parameters were analyzed and result of the modified triple test were analyzed individually and collectively, finally the result was compared to Histopathological diagnosis.

Fine Needle aspiration Cytology was reported and tabulated as follows:

a. Inadequate material - The aspirate had poor cellular content and was not sufficient for cell type assessment.

b. Benign cytology – Adequate aspirate with benign appearing cells indicating the diagnosis of fibrocystic disease of breast or a Fibroadenoma.

c. Atypical cell cytology – Minimal atypia; which was interpreted as benign breast lesion.

d. Suspicious cytology - Malignancy – suspect cells with features of malignancy and non interpretable cytology.

The interpretation of results was done as follows

- Repeat cytology
- Benign lesion
- Malignant lesion
- Inconclusive test

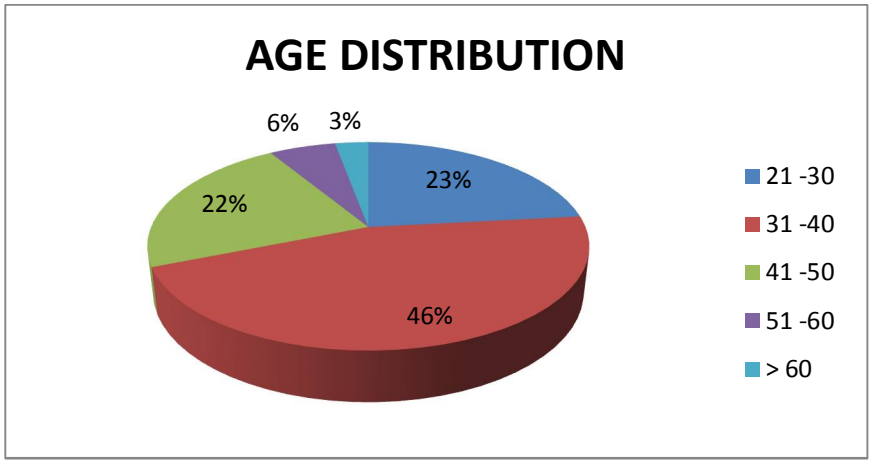
The patients with benign and inconclusive lesions underwent an excision biopsy and the patients with report as malignancy were subjected to modified radical mastectomy, the excision biopsy and mastectomy specimens were subjected to histopathology examination and the results were recorded and compared to the results of the Modified triple test.

RESULTS AND OBSERVATIONS

After application of inclusion and exclusion criteria 103 female patients were included for the study.

AGE DISTRIBUTION

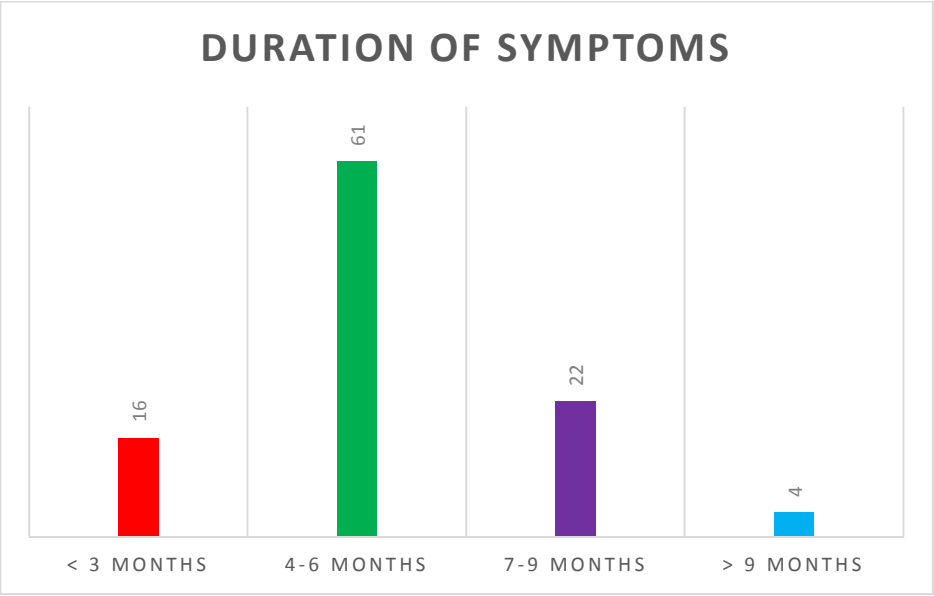
AGE (IN YEARS)	NO OF PATIENTS	PERCENTAGE
21-30	24	23.20%
31-40	47	45.60%
41-50	23	22.30%
51-60	6	5.80%
>60	3	3.10%



Out of the 103 patients 24 patients were between the age group of 21 to 30 years (23.20%), 47 patients were in the age group of 31 to 40 years (45.60%), 23 patients were in the age group of 41 to 50 years (22.30%), 6 patients were in the age group of 51 to 60 years (5.8%), 3 patients were above the age of 60 years (3.10%).

DURATION OF SYMPTOMS

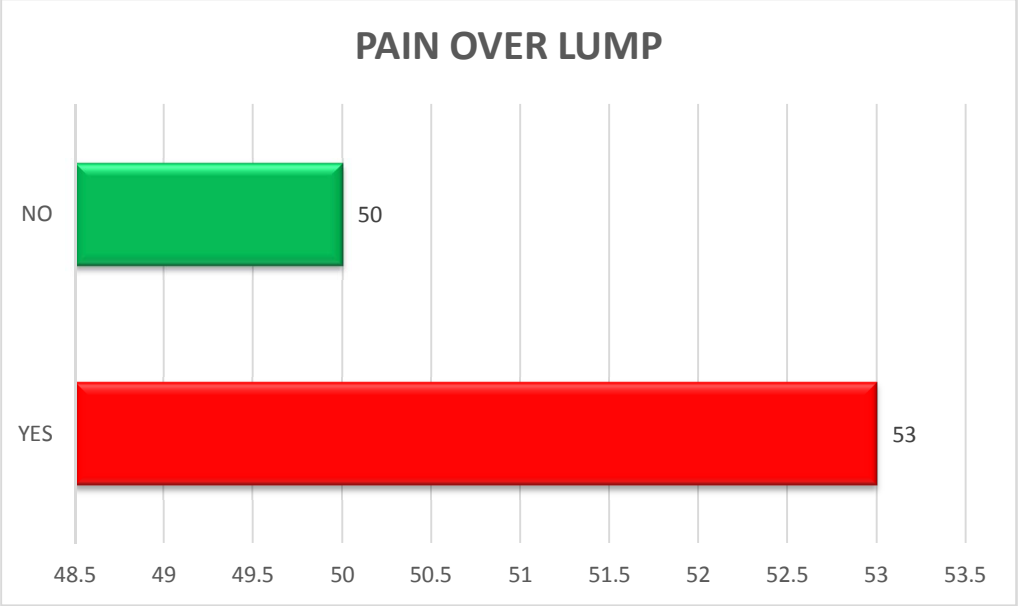
DURATION OF SYMPTOMS	NO OF PATIENTS	PERCENTAGE
< 3 MONTHS	16	15.50%
4-6 MONTHS	61	59.20%
7-9 MONTHS	22	21.40%
> 9 MONTHS	4	3.90%



Most of the patients 61 out of 103 patients (59.2%) had symptoms for the duration of 4 to 9 months, and only 4 patients out of 103 had symptoms for more than 9 months (3.9%).

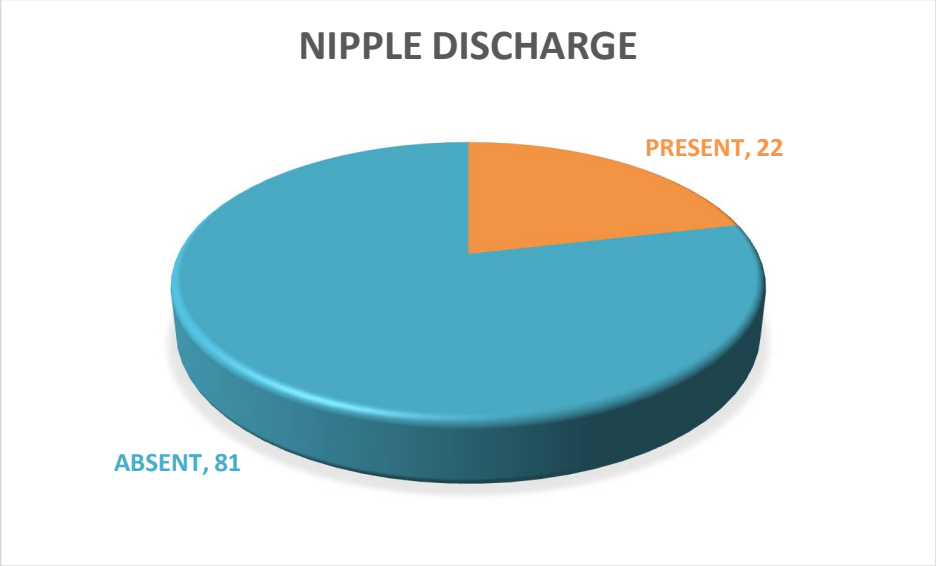
PAIN OVER LUMP

PAIN OVER LUMP	NO OF PATIENTS	PERCENTAGE
YES	53	51.50%
NO	50	48.50%



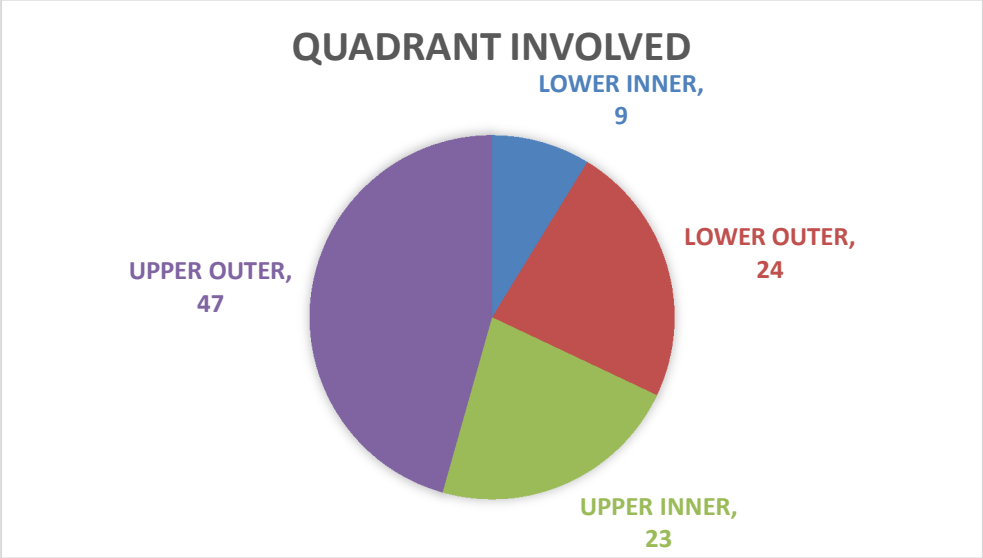
NIPPLE DISCHARGE

NIPPLE DISCHARGE	NO OF PATIENTS	PERCENTAGE
PRESENT	22	21.30%
ABSENT	81	78.70%



QUADRANT INVOLVED

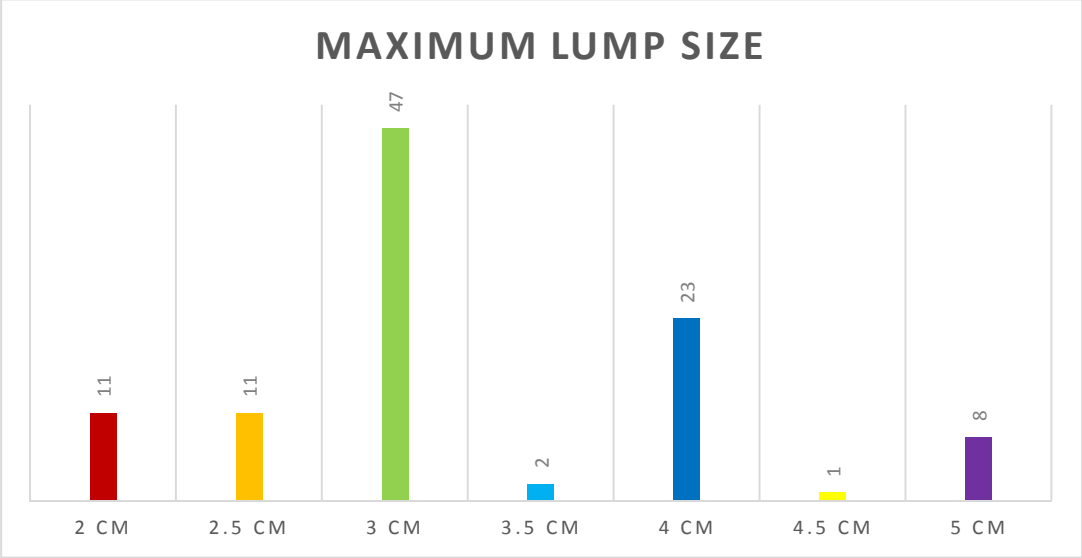
QUADRANT INVOLVED	NO OF PATIENTS	PERCENTAGE
LOWER INNER	9	8.70%
LOWER OUTER	24	23.30%
UPPER INNER	23	22.40%
UPPER OUTER	47	45.60%



Upper outer quadrant of the breast was found to be most commonly involved with tumor, 47 out of 103 patients (45.6%) with least involvement seen in the lower inner quadrant, 9 out of 103 patients (8.7%).

LUMP SIZE

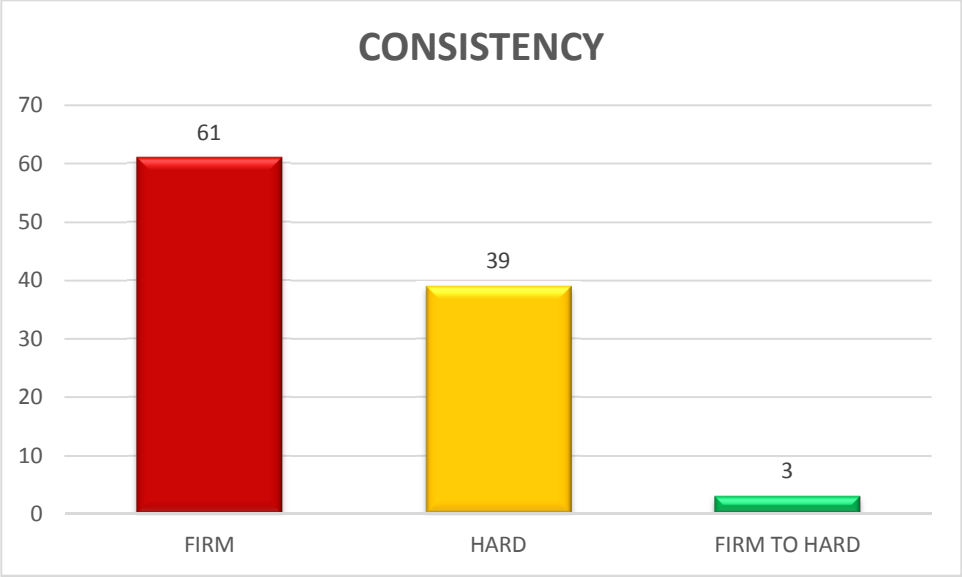
MAXIMUM LUMP SIZE	NO OF PATIENTS	PERCENTAGE
2 CM	11	10.70%
2.5 CM	11	10.70%
3 CM	47	45.60%
3.5 CM	2	1.94%
4 CM	23	22.40%
4.5 CM	1	0.97%
5 CM	8	7.69%



A lump size of 3 to 4 cm in maximal diameter was found in 72 out of 103 patients (69%).

CONSISTENCY

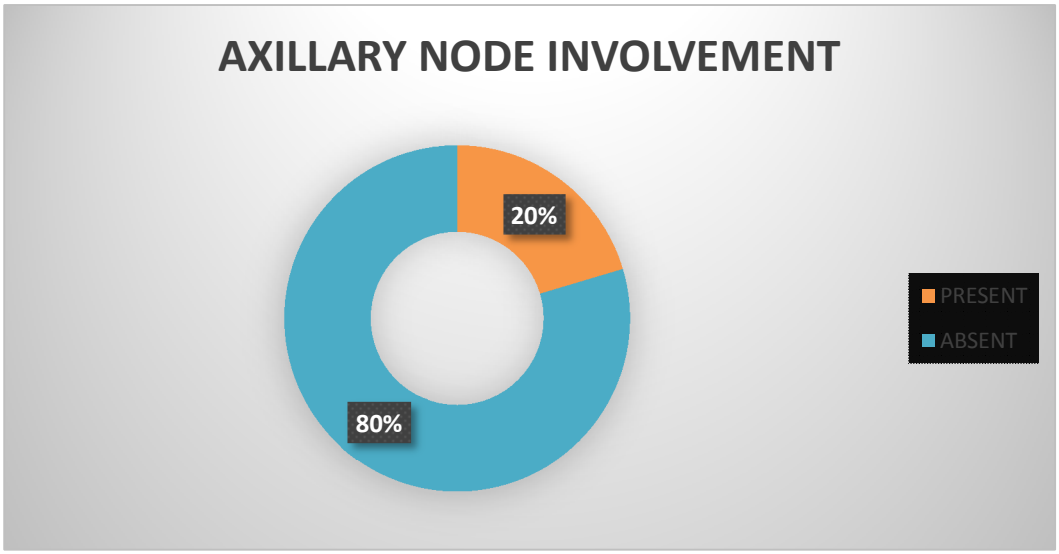
CONSISTENCY	NO OF PATIENTS	PERCENTAGE
FIRM	61	59.20%
HARD	39	37.90%
FIRM TO HARD	3	2.90%



61 out of 103 patients had lumps which were firm in consistency (59.2%) and 39 out of 103 patients had lesions which were hard in consistency.

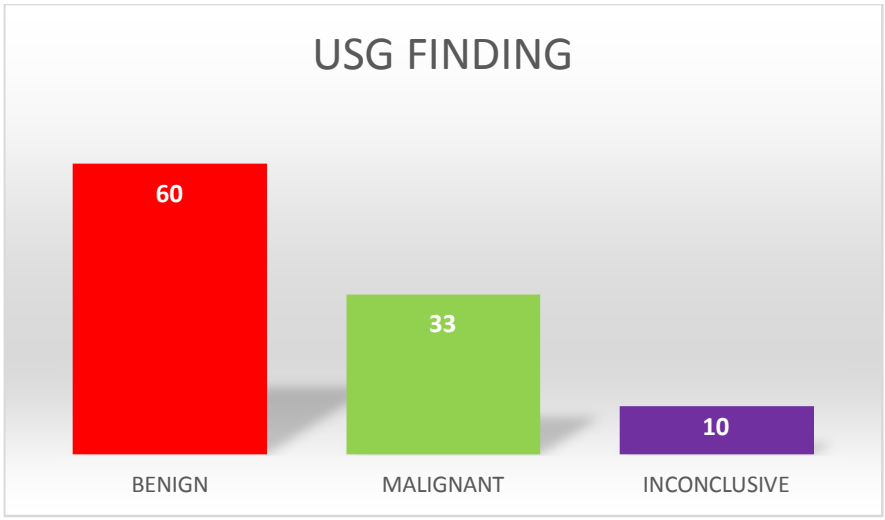
AXILLARY NODAL STATUS

AXILLARY NODE INVOLVEMENT	NO OF PATIENTS	PERCENTAGE
PRESENT	21	20.40%
ABSENT	82	79.60%



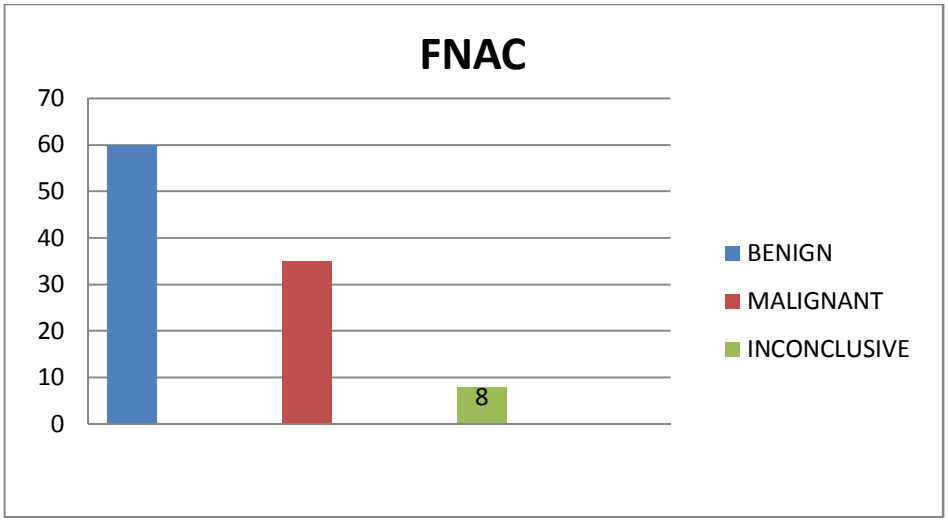
USG FINDINGS

USG FINDING	NO OF PATIENTS	PERCENTAGE
BENIGN	60	58.20%
MALIGNANT	33	32%
INCONCLUSIVE	10	9.80%



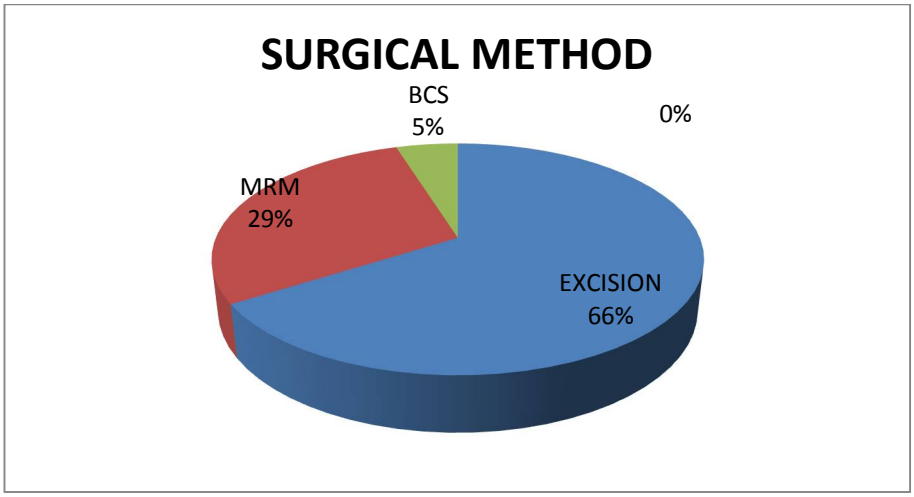
FNAC

FNAC	NO OF PATIENTS	PERCENTAGE
BENIGN	60	58.20%
MALIGNANT	35	34%
INCONCLUSIVE	8	7.80%



SURGICAL METHOD

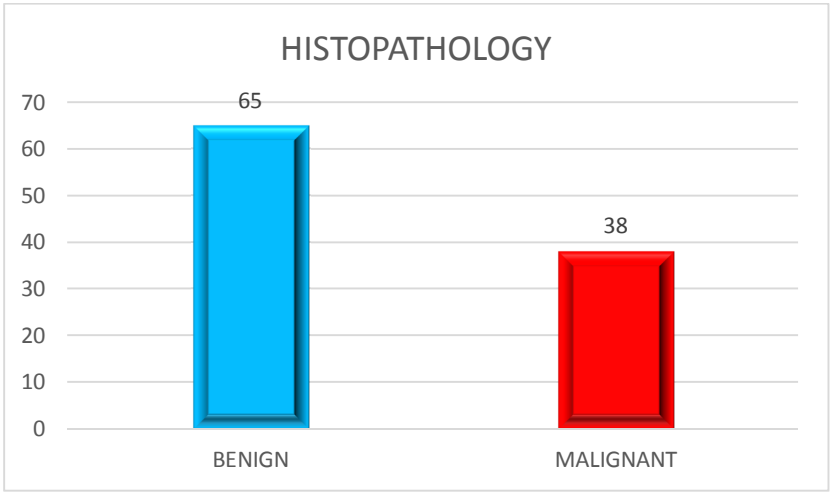
SURGICAL METHOD	NO OF PATIENTS	PERCENTAGE
EXCISION	68	66%
MRM	30	29.10%
BCS	5	4.90%



All the 103 patients included in study were subjected to some form of surgery like Excision biopsy, Breast conservation surgery (BCS), or Modified Radical Mastectomy (MRM). 68 patients were subjected to Excision biopsy. 5 patients (4.90%) were treated with BCS as they were eligible for the same. 30 patients (29.10%) underwent Modified Radical Mastectomy.

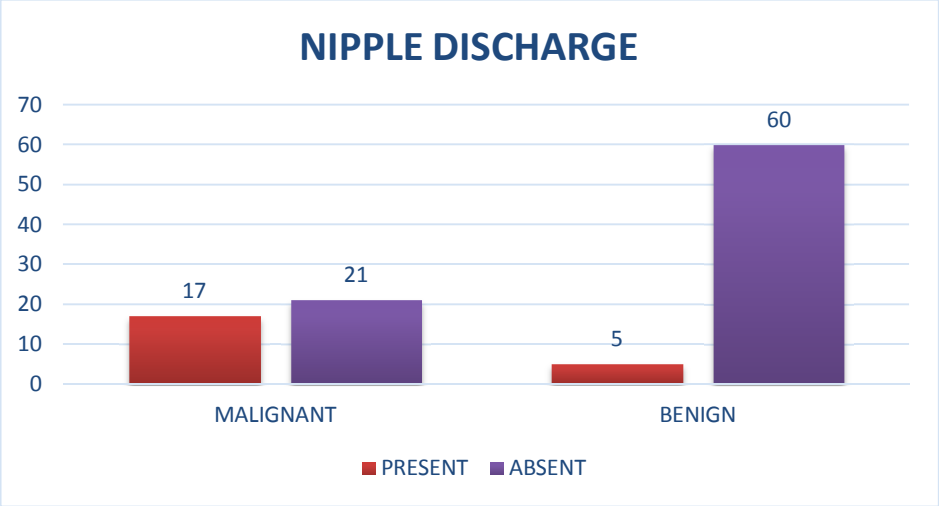
HISTOPATHOLOGY

HISTOPATHOLOGY	NO OF PATIENTS	PERCENTAGE
BENIGN	65	63.10%
MALIGNANT	38	36.90%



NIPPLE DISCHARGE

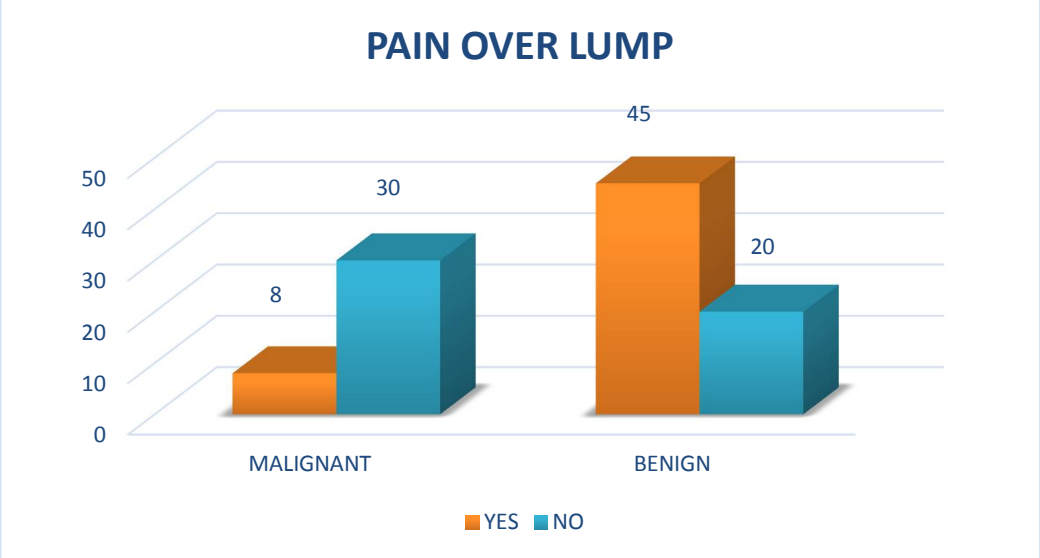
	HISTOPATHOLOGY	
NIPPLE DISCHARGE	**MALIGNANT**	**BENIGN**
PRESENT	17	5
ABSENT	21	60
P VALUE - 0.001		
SIGNIFICANT		
CHI SQUARE TEST		



22 patients out of the total 103 patients presented with nipple discharge (21.3%), of them 17 were found to have malignancy (77%).

PAIN OVER LUMP

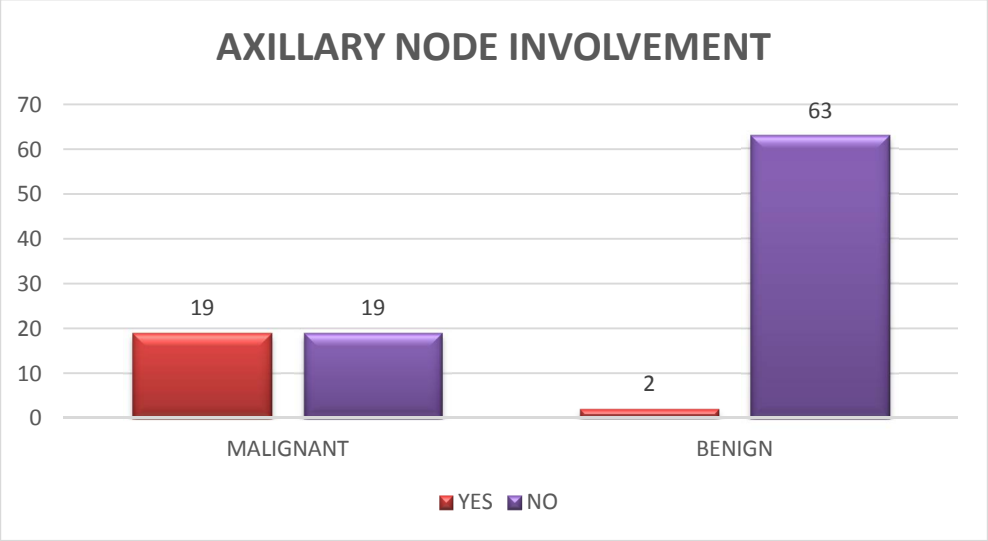
	HISTOPATHOLOGY	
PAIN OVER LUMP	**MALIGNANT**	**BENIGN**
YES	8	45
NO	30	20
P VALUE - 0.002		
SIGNIFICANT		
CHI SQUARE TEST		



53 out of the 103 patients had pain over the lump , of them 8 patients(15%) were found to have malignant disease , 30 patients out of 50 patients (60%) patients with painless lump had malignancies.

AXILLARY NODE INVOLVEMENT

	HISTOPATHOLOGY	
AXILLARY NODE INVOLVEMENT	**MALIGNANT**	**BENIGN**
YES	19	2
NO	19	63
P VALUE - 0.001		
SIGNIFICANT		
CHI SQUARE TEST		



21 out of 103 patients (20.4%) had axillary node involvement, out of the 21 patients 19 had biopsy proven malignancy (90%).

INCIDENCE OF MALIGNANT DISEASES

MALIGNANT	NO OF PATIENTS	PERCENTAGE (N = 103)	PERCENTAGE (N=38)
INVASIVE DUCTAL CARCINOMA	29	28.10%	76.30%
DUCTAL CARCINOMA IN SITU	3	2.90%	7.80%
INVASIVE LOBULAR CARCINOMA	1	0.97%	2.65%
INFLAMMATORY BREAST CA	1	0.97%	2.65%
INVASIVE PAPILLARY NEOPLASM	2	1.94%	5.30%
MUCINOUS CARCINOMA	2	1.94%	5.30%

38 patients out of 103 had biopsy proven malignancy. Of the malignancies proven by histopathology (38 patients) , 29 patients had invasive ductal carcinoma (76.3%), 3 patients(7.8%) had ductal carcinoma insitu ,2 patients(5.3%) had invasive papillary neoplasm, 2 patients (5.3%)had mucinous carcinoma, 1 patient (2.65%) had invasive lobular carcinoma, 1 patient(2.65%) had inflammatory carcinoma of breast.

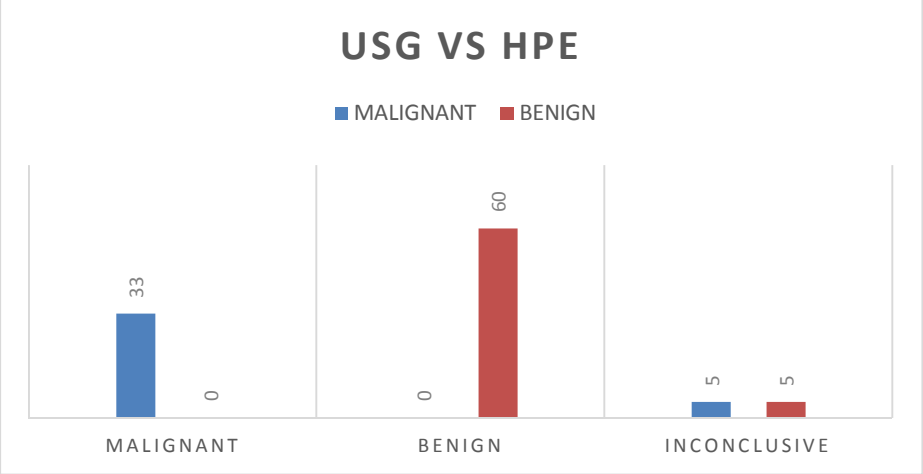
INCIDENCE OF BENIGN DISEASES

BENIGN(N=65)	NO OF PATIENTS	PERCENTAGE (N=103)	PERCENTAGE (N=65)
FIBROADENOMA	35	33.90%	53.80%
BREAST ABCESS	2	1.94%	3%
BENIGN PHYLLOIDES	7	6.80%	10.80%
FIBROCYSTIC DISEASE	17	16.50%	26.40%
INTRADUCTAL PAPILLOMA	1	0.97%	1.50%
MULTIPLE INTRADUCTAL PAPILLOMA	2	1.94%	3%
TUBULAR ADENOSIS	1	0.97%	1.50%

65 out of 103 patients had benign lesions as seen by histopathology. Fibroadenoma was the most common benign breast tumour, seen in 35 out of 65 patients (53.8%), next common benign lesion was fibrocystic disease which was seen in 17 out of the 65 patients (26.4%).7 patients (10.8%) patients had benign phyllodes tumour,multiple intraductal papilloma was seen in 2 patients(3%).Breast abscess was found in 2 patients(3%).Solitary intraductal papilloma was seen in 1 patient (1.5%).Tubular adenosis was seen in 1 patient(1.5%).

ULTRASONOGRAM

	HPE	
USG FINDING	**MALIGNANT**	**BENIGN**
MALIGNANT	33	0
BENIGN	0	60
INCONCLUSIVE	5	5
P VALUE - 0.001		
SIGNIFICANT		



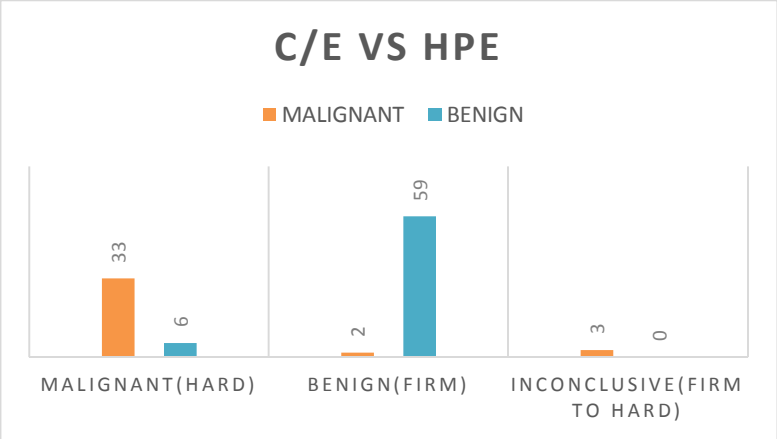
USG FINDING	
SENSITIVITY	86.84%
SPECIFICITY	100%
POSITIVE PREDICTIVE VALUE	100%
NEGATIVE PREDICTIVE VALUE	92.86%

60 patients out of 103 (58.2%) had Ultrasound features suggestive of Benign breast lumps and 33 out of 103(32%) had features of malignancy, 10 (9.8%) patients out of 103 had inconclusive features. Of the ultrasonographically suggested benign disease all of them had benign disease by histopathology and all the Ultrasonographically suspected malignant lesions were proven by biopsy to be malignant, of the remaining 10 inconclusive lesions by ultrasound 50% were found to have malignant disease.

Sensitivity and specificity of ultra sonogram for the detection of Malignancy was 86.84 % and 100 % respectively.Positive predictive value for detection of malignancy was 100%, Negative predictive value to rule out malignancy was 92.86%.

CLINICAL EXAMINATION

	HPE	
CLINICAL EXAMINATION	**MALIGNANT**	**BENIGN**
MALIGNANT(HARD)	33	6
BENIGN(FIRM)	2	59
INCONCLUSIVE(FIRM TO HARD)	3	0
P VALUE - 0.001		
SIGNIFICANT		

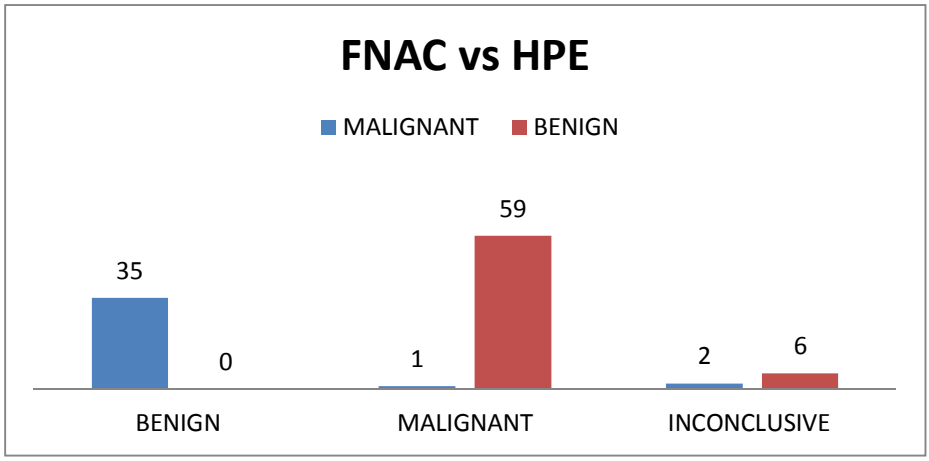


CLINICAL EXAMINATION FINDING	
SENSITIVITY	86.34%
SPECIFICITY	91%
POSITIVE PREDICTIVE VALUE	85%
NEGATIVE PREDICTIVE VALUE	92.19%

33 out of 39 (85%) patients with hard lumps which were clinically suggested as malignant turned out to be malignant, whereas 6 patients with hard lumps had benign disease (15%), 61 patients out of 103 had lumps with firm consistency suggestive of benign lesions of them 2 had malignancy (3.2%).3 patients had lumps with firm to hard in consistency of which all of them were malignant.Clinical examination had a sensitivity of 86.34 % and specificity of 91% for the detection of malignancy. Positive predictive value of Clinical examination was 85% and Negative predictive value was 92.19%.

FINE NEEDLE ASPIRATION CYTOLOGY

	HPE	
FNAC	**MALIGNANT**	**BENIGN**
MALIGNANT	35	0
BENIGN	1	59
INCONCLUSIVE	2	6
P VALUE - 0.001		
SIGNIFICANT		



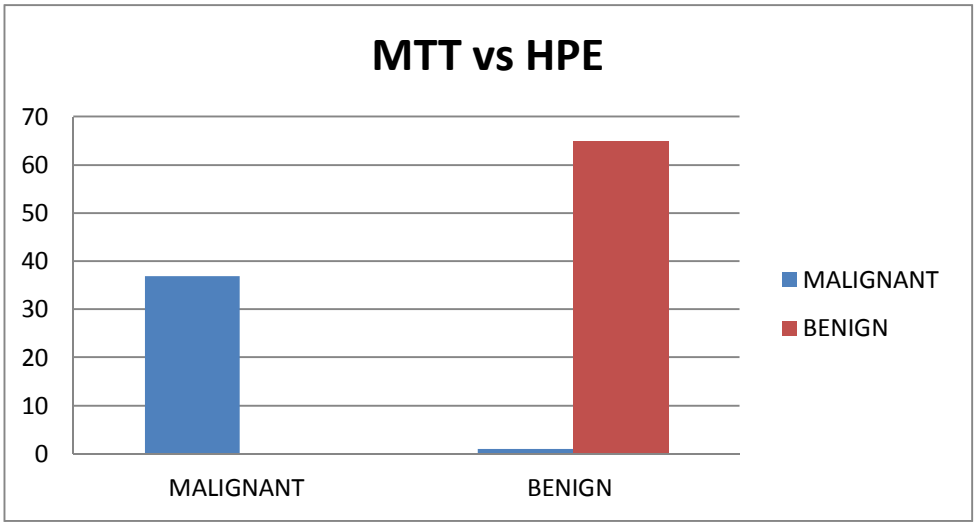
FNAC FINDING	
SENSITIVITY	92.10%
SPECIFICITY	100%
POSITIVE PREDICTIVE VALUE	100%
NEGATIVE PREDICTIVE VALUE	95.58%

According to Fine Needle Aspiration Cytology report, 60 patients out of 103 (58.2%) were diagnosed to have benign breast disease, whereas 35 patients (34%) were diagnosed to have malignant disease. 8 (7.8%) patients had inconclusive reports.All patients with FNAC report suggestive of malignancy were biopsy proven to have carcinoma. But 1 out of 60 patients (1.6%) who were reported to have benign disease had malignant disease. Here the FNAC report was fibrocystic disease of breast and the biopsy report turned out to have invasive papillary carcinoma.2 patients out of 8(25%) who had inconclusive FNAC reports had malignancy in biopsy specimen. Of them 1 patient's FNAC report was proliferative breast disease with atypia and other one's was atypical ductal hyperplasia. Both of them had invasive ductal carcinoma.

Sensitivity and specificity of Fine Needle Aspiration Cytology to detect malignancy were 92.10% and 100% respectively. Positive predictive value was 100% and Negative predictive value was 95.58%.

MODIFIED TRIPLE TEST

	HPE	
MTT	**MALIGNANT**	**BENIGN**
MALIGNANT	37	0
BENIGN	1	65
P VALUE - 0.001		
SIGNIFICANT		



MTT FINDING	
SENSITIVITY	97.36%
SPECIFICITY	100%
POSITIVE PREDICTIVE VALUE	100%
NEGATIVE PREDICTIVE VALUE	98.48%

All 103 patients included in the study were subjected to Modified Triple Test (MTT) and of them 37 patients (36%) had features suggestive of

malignant disease and 66 patients (64%) were suspected to have benign breast disease. All 37 patients suspected to have malignancy on Modified Triple Test were biopsy proven to have malignant breast disease, where as 1 out of 66(1.5%) patients assigned to have benign disease on Modified Triple Test turned out to be malignant.

The sensitivity of modified triple test for the detection of malignancy was 97.36% and the specificity for the detection of malignancy was 100%.The positive predictive value of the Modified triple test was 100% and the Negative predictive value was 98.4%.Thus Modified Triple test was demonstrated to be a very efficient screening test for the detection of breast malignancies in palpable lumps.

COMPARISON OF ALL METHODS

	C/E	USG	FNAC	MTT
SENSITIVITY	86.34%	86.84%	92.10%	97.36%
SPECIFICITY	91%	100%	100%	100%
POSITIVE PREDICTIVE VALUE	85%	100%	100%	100%
NEGATIVE PREDICTIVE VALUE	84.42%	92.86%	95.58%	98.48%

DISCUSSION

Breast lumps are one of the commonest findings in women attending surgical clinics, presence of a lump invokes a sense of fear and insecurity among these women and all the lumps are believed to be malignant, since breast malignancy is very much amenable to curative treatment when detected early, so it becomes essential that malignancy is detected at earlier stages to allay fear and institute early treatment.

Multimodal investigations are therefore used for the preoperative detection of malignancy.[65]

Of these tests the triple test consisting of Clinical examination, mammography and Fine needle aspiration cytology has been used with fairly accurate results and the modification of this test using ultra sonogram of breast instead of mammogram has been used for the early detection of malignancy and is evaluated in our study.

The primary aim of this modified triple test is to make an accurate preoperative diagnosis, thereby avoiding unnecessary surgeries in case of a benign breast lump.

Our study tries to evaluate the efficiency of the modified triple test (i.e. Clinical Breast examination, Ultrasound of breast and FNAC) as isolated tests and as a combination for the detection of malignancy, in this study Histopathological examination of the breast lump was used as the reference standard for comparison.

In a retrospective study done by Gobler et al 207 patients with palpable breast masses were examined and it was concluded that if the result of combined evaluation consisting of a triple test of clinical examination, mammography and cytology were concordant, a diagnostic accuracy was 100 % and with discordant results 75% of masses were malignant. Gobler arrived at a conclusion that preliminary surgical biopsy and frozen section of the lesion may not be all that necessary when the triple test unequivocally identifies malignancy.[35]

In a systematic review of 15 studies in which the triple test was used for the diagnosis of palpable breast lumps, a combination of the three tests is consistently more sensitive than a single test, and the capability of identifying malignancy approaches 95 to 100 % when at least one component of the triple test is positive. When all the components of the triple test are in agreement, the probability that the diagnosis is right is approximately 99% whether it is positive or negative diagnosis.[36]

This has given us an information that the triple test and its modifications is a dependable, feasible and accurate test for the diagnosis and treatment of palpable breast lumps, and its efficiency is equivalent to open biopsy and it has the advantages of less cost and time and single visit, it also helps us to prevent unnecessary surgical procedures thereby reducing morbidity.

The triple test is an accurate test if done by experienced operators and if the results are assessed correctly.

In a prospective study involving 200 women with palpable breast tumours using the triple test done by Crone et al clinical examination, mammography and FNAC was done and the results were analyzed alone and in combinations, all the tumours were subjected to excision biopsy, out of the 200 lesions 38 lesions were found to be malignant. In this test even though the triple test was found to be accurate there was a statistical possibility of overlooking a few malignant lesions , so it was concluded that all the palpable breast lumps should be excised.[37]

The same point was emphasized by Donegan and Dennis who believed that a solid breast mass always requires a firm diagnosis and should be excised for histological diagnosis.[38, 39]

Jin Young Kwak, et al in a 2006 study investigated the application of the Breast Imaging Reporting and Data System Final Assessment System in Sonography of Palpable Breast Lesions and Reconsideration of the Modified Triple Test in this study they followed up 160 palpable breast lesions and subjected the lesions to palpation-guided FNAC, targeted sonography, and then histopathologic confirmation was done. It was shown in this study that Ultrasonography of breast was as accurate as palpation guided Fine needle aspiration for not missing the diagnosis of malignancy.[41]

In a study done in 55 young women with palpable breast lumps done by Vetto et al, the Modified triple test was used and it was shown to have a high diagnostic accuracy for the detection and differentiation of malignancy. Thereby it suggested that the modified triple test helps to avoid unwanted surgery and also is cost effective. [42]

A large multicenter study supported by the Avon Foundation and the National Institutes of Health was created through the American College of Radiology Imaging Network. In this project, a protocol to assess the efficacy of screening breast ultrasound was implemented in 14 imaging centers to better define the role of US in breast cancer screening. The study reported higher cancer detection in high-risk women that underwent annual

ultrasound screening in addition to mammography compared to those that underwent mammography alone. [43]

The first ultrasound system was approved in 2012 by the US FDA for the screening of breast cancer in conjunction with mammography, especially for women with dense breast tissue and was also indicated in women with a negative mammogram, no symptoms of cancer breast and with no prior history of biopsy or breast surgery.

Stavros et al put forth a scheme for classification of breast nodules as benign, indeterminate or malignant using Ultrasound findings.[44]

In the light of the above information we discuss the results of our study, our study was an observational study and 103 patients were subjected to the study. In our study breast lumps were commonly seen in the age group of 31 to 40 years (45.6%) and least commonly seen after the age of 60 years, this is similar to the distribution seen in other studies. Younger aged women have more education standards and awareness that lead them to present earlier in the course of disease.

About 59.2% of all the patients had symptoms for 4 to 9 months which was similar to that seen in few studies but some studies reported shorter duration of symptoms of mean of 3 months (Afsar A Bhatti et al 2010).[45]

Pain over the lump was an important symptom and 60% of patients with painless lumps had malignancy on histopathological examination (30 out of 50) in contrast to 15 % of the patients with painful breast lumps (8 out 53).Similar findings were also seen in a study conducted by Kaire innos et al (BMC public health 2013) and the usual mode of presentation of malignancy was a painless palpable lump.[46]

Of the clinical examination findings nipple discharge was also found to be an important finding. Of the patients with nipple discharge 77 % (17 out of 22) were found to have malignancy on final histopathological diagnosis, so nipple discharge might serve as an important clue to the diagnosis of malignancy, but many studies have shown that nipple discharge is usually benign and 10 to 15% of the patients with nipple discharge tend to have malignancy.(Van Zee K J et al Cancer 1998), probably study with a larger sample size would iron out the skewed results seen in our study.[47]

In our study the upper outer quadrant was commonly involved with tumor (45.6%) this was also consistent with the findings with a study done by Khemka et al., Hussain et al., and Khoda et al (JMS 2015).It has been demonstrated that the upper outer quadrant of the breast has more amount of epithelial tissue compared to other quadrants leading to more incidence of tumors.[48, 49, 50]

Axillary lymph node involvement was seen in 20.4 % (21 out of 103) of patients presenting with breast lumps and out of the patients who had axillary nodes 90%(19 out of 21) had biopsy proven malignancy, so axillary node involvement is a strong predictor that the tumor is malignant, this has also been recorded by Voss M et al (J Surg Oncol. 1999). It has been concluded in the study that patients with stage 3 breast cancer have a higher incidence of axillary metastasis and well differentiated tumors tend to metastasize slowly. So axillary involvement may be a pointer towards advanced or fast growing malignancy and should prompt immediate attention.[51]

When the clinical examination findings were examined as a whole clinical examination had sensitivity of 86.34 % and specificity of 91% for the detection of malignancy. Positive predictive value of Clinical examination was 85% and Negative predictive value was 92.19%.

On analysis of various studies, it has been shown that sensitivity of the Clinical breast examination ranges from 21% to as high as 100% and the specificity ranges from 50% to 97.8%. In the present study, the high sensitivity could be because only patients with confirmed palpable lumps were included for the study. Our results are in concordance with many studies.

ULTRASONOGRAPHY OF BREAST

The triple test used mammography as one of its components and mammogram had a sensitivity of 87% for malignancy detection. Crystal et al (2003), Susan k et al (2005), Corsetti et al (2006) and Sahiner et al (2007) had supported the use of USG in young patients with dense breast tissues and ultrasound was found to have a sensitivity of 89% in detecting symptomatic and palpable breast abnormalities.[52-55]

Though relatively a fresh modality ultrasound has gained widespread popularity due to easy availability of the equipment, it is less expensive and is non invasive and can provide accurate information in tumors more than 2mm. Both USG and mammography have their inherent advantages and disadvantages that have been discussed in literature. But in the current scenario USG has gained the acceptance among the medical fraternity and is included in the screening for malignant lesions of breast as a part of the modified triple test and its results are adequately validated by many studies.

In our study 33 out of 103 patients had ultrasound findings suggestive of malignancy; out of them all had biopsy proven malignancy. Ultrasound had a sensitivity of 86.84% and specificity of 100% for the detection of malignancy, Positive predictive value for detection of malignancy was 100%, Negative predictive value to rule out malignancy was 92.86%.

These findings when compared to available literature shows good correlation and in a study done by Khoda et al, USG sensitivity was 91.6%, specificity was 100%, positive predictive value was 100%, negative predictive value was 97.3%, Similarly in a study done by Pande et al sensitivity, specificity, positive predictive value and negative predictive value for ultrasonography were 95%, 94.1%, 95.5%, and 93.7%, respectively. Another study by Jan et al also yielded similar results. [50, 56, 57]

A sensitivity of 86.84 % means 13.16 malignant lesions would be missed out of 100 malignant lesions, so the diagnosis of a benign lump always does not mean that it is benign and it would need a combination of tests to confirm it, but nonetheless USG of the breast is a valuable and easy tool for the detection of malignancy.

FINE NEEDLE ASPIRATION CYTOLOGY

In our study Fine Needle aspiration classified, 60 patients out of 103 (58.2%) as having benign breast disease, whereas 35 patients (34%) were diagnosed to have malignant disease. 8 (7.8%) patients had inconclusive reports. All patients with FNAC report suggestive of malignancy were biopsy proven to have carcinoma. But 1 out of 60 patients (1.6%) who were reported to have benign disease had malignant disease. Sensitivity and

specificity of Fine Needle Aspiration Cytology to detect malignancy were 92.10% and 100% respectively. Positive predictive value was 100% and Negative predictive value was 95.58%.

FNAC RESULTS IN VARIOUS STUDIES [58-62]

Study	Sensitivity %	Specificity%	Positive predictive value%	Negative predictive value %
Our study	92.10	100	100	95.58
Sankaya & Dongre	88.37	96.42	97.43	84.37
Choi et al	77.70	99.20	97.43	84.37
Mohammed et al	90.62	100	100	95.08
Kim et al	94.59	87.91	79.54	97.03
Park and Ham	76.90	91.60	-	-

It is shown that the results of our study are comparable to various studies and the values closely resemble the results seen by Mohamed et al. So the results indicate that FNAC as an independent variable has adequate diagnostic power and this is further enhanced by combination with other 2 tests.

THE MODIFIED TRIPLE TEST ANALYSIS

Using modified triple test 37 patients (36%) had features suggestive of malignant disease and 66 patients (64%) were suspected to have benign breast disease. All of the 37 patients suspected to have malignancy on

Modified Triple Test were biopsy proven to have malignant breast disease, where as 1 out of 66(1.5%) patients assigned to have benign disease on Modified Triple Test turned out to be malignant. The sensitivity of modified triple test for the detection of malignancy was 97.36% and the specificity for the detection of malignancy was 100%.The positive predictive value of the Modified triple test was 100% and the Negative predictive value was 98.4%.

Comparison of Studies Using Modified Triple Test [50,57,63,64]

Study	Sensitivity %	Specificity%	Positive predictive value%	Negative predictive value %
Our study	97.36	100	100	98.40
Baykara et al	100	92.01	53.16	100
Khoda et all	100	100	100	100
Jan et al	100	99.3	93.3	100
Vaithyanathan et al	100	82	76.9	100

This comparison shows that our results were comparable to the results seen in many studies and it has shown that the modified triple test can be used as a valuable clinical test for the detection of malignant lumps and it helps us to plan the surgical treatment earlier, accurately and helps us save time needed for a definitive diagnosis.

CONCLUSION

Breast cancer is the foremost cause of cancer related death in young females; hence early detection of breast cancer carries much importance.

The modified triple test in our study was an accurate predictor of malignancy, all of the patients who were suspected to have malignancy by Modified triple test had malignancy on histological analysis and specificity was 100%, that proved it as a best initial test for diagnosis of malignancy preoperatively.

The results of the modified test in our study are as accurate as histological diagnosis.

Of the three components of the modified triple test FNAC and Ultrasound of breast had 100% specificity for the diagnosis of malignant lumps.

The modified triple test can be done in an outpatient clinic and the patients are not exposed to ionizing radiation. So it is a suitable diagnostic modality for breast lumps in young women of childbearing age. It has been shown that Ultrasound is as accurate as mammography in detection and differentiation of palpable breast lumps and it can also aid in guiding the site for FNAC and biopsy.

Of the three components of the modified triple test FNAC was the most accurate modality.

Three components of the modified triple test complemented each other and when done with experienced clinicians and Radiologists can reduce the time lag for the detection of malignancy and help us to institute early definitive treatment.

BIBLIOGRAPHY

1.Schwartz's Principles of Surgery, 10th edition by F. Charles Brunicardi, Dana K. Andersen, Timothy R. Billiar, David L. Dunn, John G. Hunter pages 497-557.

2. Sabiston Textbook of Surgery ,20th Edition,The Biological Basis of Modern Surgical Practice.Authors: Courtney Townsend R. Daniel Beauchamp B. Mark Evers Kenneth Mattox.pages 820-64.

3. Gusterson BA, Stein T. Human breast development. Seminars in cell & developmental biology. 2012;23(5):567-73. Epub 2012/03/20.

4. Russo J, Russo IH. Development of the human breast. Maturitas. 2004;49(1):2-15. Epub 2004/09/08.

5. Birkenfeld A, Kase NG. Functional anatomy and physiology of the female breast. Obstetrics and gynecology clinics of North America. 1994;21(3):433-44. Epub 1994/09/01

6. Gold RH. The evolution of mammography. Radiol Clin North Am. 1992;30:1–19

7. Martin HE, Ellis EB. Biopsy by needle puncture and aspiration. Ann Surg. 1930;92:169–81

8. Rosner D, Weiss L, Normal M: Ultrasonography in the diagnosis of breast disease. J Surg Oncol 14:83. 1980

9. Besnier E. E´tudes nouvelles de dermatologie. Gaz hebd de med et chir 1879;16:645.(French)

10. Martin HE, Ellis EB. Biopsy by needle puncture and aspiration. Ann Surg 1930; 92:169-18.

11. Leborgne R. Intraductal biopsy of certain pathologic processes of the breast Surgery 1946;19:47-49.

12. Zuber M. Naib. Exfoliative cytology, Boston, Little, Brown and Company 1996;18:477-495.

13. Webb AJ. Early microscopy: history of fine needle aspiration (FNA) with particular reference to goitres. Cytopatology 2001; 12:1- 7.

14. Frable WJ. Needle aspiration biopsy: past, presnt and future. Hum Pathol 1989; 20:504-517.

15. Ansari NA, Derias NW. Fine needle aspiration cytology. J Clin Pathol 1997; 50:541-543.

16. Stewart FW. The diagnosis of tumour by aspiration. Am J Pathol 1933; 9: 801-812.

17. Ashwin Hebbar. One year prospective study of fine needle aspiration cytology of clinically palpable breast lump with histopathology correlation in KLE Hospital and MRC District Hospital, Belgaum. A dissertation submitted to Rajiv Gandhi University of Health Sciences, Karnataka 2005.

18. Editorial Opinion. The Uniform Approach To Breast Fine Needle Aspiration Biopsy. American Journal Of Surgery 1997; 173:371-383.

19. Arch surgery.1998 May;133(5):504-7; discussion 507-8.

20. Non-operative diagnosis Subgroup of National Coordinating Group for Breast screening Pathology. Guidelines for Non-operative Diagnostic Procedures and Reporting Breast Cancer Screening. Sheffield, NHS Cancer screeningprogramme, 2001 (NHSBSP NO. 50).

21. Safneck JR, Kutryk E, Chrobak A, Harper R, Ravinsky E. Fixation techniques for fine needle aspiration biopsy smears prepared off site. Acta cytol.2001 May-jun; 45(3): 365-71.

22. Parson C A. Diagnosis of breast diseases, Singapore, Churchill Livingstone 1990;1:201-203.

23. Silverberg Delvillis Frable. Principle in Practice And Surgical Pathology And Cytopathology, Singapore, Churchill Livingstone 1997, 3rd edition volume; 578-584.

24. Hermansen C, Skovgaard Poulsen H, Jensen J, Langfeldt B,Steenoskov V, Frederiksen P, Myhre Jensen O: Palpable breast tumors: "triple diagnosis" and operative strategy: Results of a prospective study. Acta Chir Scand. 150(8): 625-8, 1984.

25. How many tests are required in the diagnosis of palpable breast abnormalities? Hardy JR[1], Powles TJ, Judson I, Heron C, Williams M, Cherryman G, Husband J, Cosgrove D, Blaszcyzyk M, Sinnett HD, et al. Clinical oncology,volume 2, issue 3, may 1990,148-152.

26. Bassett LW, Ysrael M, Gold RH, Ysrael C. Usefulness of mammography and sonography in women less than 35 years of age. *Radiology*. Sep 1991;180(3):831-5.

27. Vetto J: Diagnosis of palpable breast lesion in younger women by modified triple test scores: accurate and cost benefit. Archive of Surgery 12(9): 967-972, 1996.

28. Hatada T, Aoki I, Okada K, et al. Usefulness of ultrasound-guided, fine-needle aspiration biopsy for palpable breast tumors. Archives of Surgery 1996;131:1095-1098.

29. Jill S. Montrey et al. Wire Fragments After Needle Localisation. American journal of Radiology 167:1267-1269,1996.

30.Howlett DC, Marchbank NDP, Allan SM. Sonographic assessment of symptomatic breast – a pictorial review. J Diagnostic Radiography & Imaging. 2003;5:3–12.

31.Maniero MB, Goldkamp A, Lazarus E, Livingston L, Koelikker SL, Schepps B, Mayo-Smith WW. Characterization of Breast Masses with Sonography. J Ultrasound Med. 2005;24:161–7.

32.D.J. Doshi, D.E. March, G.M. Crisi, B.F. CoughlinComplex cystic breast masses: diagnostic approach and imaging-pathologic correlation. Radiographics, 27 (Suppl. 1) (2007), pp. S53-S6424.

33.Morris KT, Vetto JT, Petty JK, Lum SS, Schmidt WA, Toth-Fejel S, et al. A new score for the evaluation of palpable breast masses in women under age 40. Am J Surg. 2002;184:346–7.

34. Morris K T, Pommier R F, Morris A et al. Usefulness of the triple test score for palpable breast masses. Arch Surg 2001;136(9):1008-13.

35. Gobler SP, du Toit RS, Brink C, Divall PD, Middlecote BD, Nel CJ: Pre-operative evaluation of palpable breast tumours. S Afr J Surg 28(4):128-32, 1990 (Dec).

36. Nuffield Institute for health /University of Leeds, NHS Centre for reviews and dissemination, University of York/Bulletin on the effectiveness of health service interventions for decision makers/effective health care, the management of primary breast cancer. 2(6): 1-16, 1996.

37.Crone P, Hertz J, Nilsson T, Junge J, Hoier-Madsen K, Kennedy M, Bojsen-Moller J, et al: The predictive value of three diagnostic procedures in the evaluation of palpable breast tumours. Ann Chir Gynaecol 73(5): 273-6, 1984.

38.Donegan WL: Evaluation of a palpable breast mass. N Engl J Med 24; 327(13): 937-42, 1992.

39.Dennis M: Breast biopsy avoidance; the value of normal mammography and ultrasonography in detecting the palpable breast lump. Radiology 121(1): 186-191, 2001.

40.John A. Butler, Herman Vargas, Nancy Worthen, Samuel Wilson. Accuracy of combined clinical – mammographic – cytologic diagnosis of dominant breast masses.A prospective study. Archives Surgery July 1990; 125:893-896.

41.Kwak JY, Kim EK, Park HL, Kim JY, Oh KK. Application of the breast imaging reporting and data system final assessment system in sonography of palpable breast lesions and reconsideration of the modified triple test. J Ultrasound Med. 2006 Oct;25(10):1255-61.

42.Vetto J, Pommier R, Schmidt W, Wachtel M, DuBois P, Jones M, et al. Use of the "triple test" for palpable breast lesions yields high diagnostic accuracy and cost savings. Am J Surg 1995; 169: 519-22.

43.Berg WA, Blume JD, Cormack JB, Mendelson EB. Training the ACRIN 6666 Investigators and Effects of Feedback on Breast Ultrasound Interpretive Performance and Agreement in BI-RADS Ultrasound Feature Analysis. AJR American journal of roentgenology. 2012;199(1):224-235.

44.Stavros AT, Thickman D, Rapp CL, et al. Solid breast nodules: use of sonography to distinguish between benign and malignant lesions. Radiology. Jul 1995;196(1):123-34.

45.Afsar A Bhatti, Muhammad M Gilani, Muhammad Tanveer Anwar, Sikander H Gondal, Zia Ullah.Role of Modified Triple Test Scoring System for Evaluation of Palpable Breast Masses in Women Under Age 40.A.P.M.C July-December 2010.: 4(2):128-132.

46.Innos K, Padrik P, Valvere V, Eelma E, Kütner R, Lehtsaar J, Tekkel MIdentifying women at risk for delayed presentation of breast cancer: a cross-sectional study in Estonia. BMC Public Health. 2013 Oct 9;13:947.

47.Van Zee KJ, Ortega Pérez G, Minnard E, Cohen MA.Preoperative galactography increases the diagnostic yield of major duct excision for nipple discharge. Cancer. 1998 May 15;82(10):1874-80.

48.Khemka A, Chakrabati N, Shah S, Patel V. Palpable breast lumps: Fine-needle aspiration cytology versus histopathology: A correlation of diagnostic accuracy. Internet J Surg 2009;18.

49. Hussain MT. Comparison of fine needle aspiration cytology with excisional biopsy of breast lump. J Coll Physicians Surg Pak 2005;15:211-4.

50. Khoda, et al.: Evaluation of modified triple test in the diagnosis of palpable breast lumps. Journal of Medical Society. Jan-Apr 2015 - Vol 29 . Issue 1-29.

51.Voss M, Schneider JW, Apffelstaedt J. Axillary lymph node involvement in stage III breast cancer: treatment implications. J Surg Oncol. 1999 Jul;71(3):162-6.

52. Crystal P, Strano SD, Shcharynski S, Koretz MJ: Using sonography to screen women with mammographically dense breast. Am J Roentgenol. 2004: 182(1): 259-60.

53. Susan Klein, Am Fam Physician. 2005 May 1;71(9):1731-1738.

54. Corsetti V, Ferrari A, Ghirardi M, et al. Role of ultrasonography in detecting mammographically occult breast carcinoma in women with dense breasts. Radiol Med 2006; 111:440–448

55. Sahiner B, Chan HP, Roubidoux MA, et al. Computer-aided diagnosis of malignant and benign breast masses in 3D ultrasound volumes: effect on radiologists' accuracy. Radiology 2007; 242:716–724.

56.Pande AR, Lohani B, Sayami P, Pradhan S. Predictive value of ultrasonography in the diagnosis of palpable breast lump. Kathmandu Univ Med J (KUMJ) 2003;1:78-84.

57. Jan M, Matto JA, Salroo NA, Ahangar S. Triple assessment in the diagnosis of breast cancer in Kashmir. Indian J Surg 2010;72:97-103.

58. Sankaye. S, Dongre.S, Indian Journal of Medical and Paediatric Oncology, Apr-Jun 2014, Vol 35, Issue 2. 159-164.

59. Park IA, Ham EK. Fine needle aspiration cytology of palpable breast lesions. Histologic subtype in false negative cases. Acta Cytol 1997;41:1131-8.

60.Kim A, Lee J, Choi JS, Won NH, Koo BH. Fine needle aspiration cytology of the breast. Experience at an outpatient breast clinic. Acta Cytol 2000;44:361-7.

61. Choi YD, Choi YH, Lee JH, Nam JH, Juhng SW, Choi C. Analysis of fine needle aspiration cytology of the breast: A review of 1,297 cases and correlation with histologic diagnoses. Acta Cytol 2004;48:801-6.

62. Mohammed AZ, Edino ST, Ochicha O, Alhassan SU. Value of fine needle aspiration biopsy in preoperative diagnosis of palpable breast lumps in resource-poor countries: A Nigerian experience. Ann Afr Med 2005;4:

63. Murat Baykara, Zeynep Ozkan, Yeliz Gul1, Ozgen Aslan, Leyla Gungor. Effectiveness of the Triple Test and Its Alternatives for Breast Mass Evaluation. J Breast Health 2013; 9: 195-9.

64. Vaithianathan R, Sundaresan V, Santhanam R. Vlaue of modified triple test in the diagnosis of palpable breast lumps. Int J Cur Res Rev 2013;5:125-34.

65. Smith BL. The breast. In: Ryan KJ, Kistner RW. Kistner‘s Gynecology and women‘s health. 7th ed. St. Louis: Mosby, 1999:197–202.

66. Crowe JP Jr, Rim A, Patrick R, Rybicki L, Grundfest S, Kim J, et al. A prospective review of the decline of excisional breast biopsy. Am J Surg. 2002;184:353–5.

67. Edward Scalon. The case for and against two-step procedure for the surgical treatment of breast cancer. Cancer 1984;53(3): 677-680.

68. Lamb J, Anderson TJ, Dixon MJ, Levack P. Role of fi ne needle aspiration cytology in breast cancer screening. Journal of Clinical Pathology 1987, 40: 705–709.

69. Trott and Randal. Fine needle aspiration cytology. Lancet 1979;2:253.

70. Tresserra F, Feu J, Grases PJ, Navarro B, Alegret X, Frenadez Cid A. Assessment of breast cancer size. Sonographic and pathologic correlation. J Clin Ultrasound 1999; 27: 485-91.

PROFORMA

NAME: AGE: SEX:

IP NO: OCCUPATION:

D.O.A: D.O.D:

CHIEF COMPLAINTS				
LUMP	PAIN	NIPPLE DISCHARGE	NIPPLE RETRACTION	OTHERS

HISTORY OF PRESENTING ILLNESS:	
PAIN	
Duration	
Time and mode of onset	
Site of pain	
Character of pain	
Radiation	
Aggravating factors	
Relieving factors	
NIPPLE DISCHARGE	
Colour	
Quantity	

PAST HISTORY	
H/O Similar Complaints	
Duration	
Treatment taken	
Previous surgeries	
SHT /DM/TB	

PERSONAL HISTORY:

Diet	
Habits	
Bladder & Bowel	
Sleep	

FAMILY HISTORY:

Marital status	
Similar illness in family	

MENSTRUAL HISTORY:

GENERAL EXAMINATION:

1. General survey	
2. Body build and nourishment	
3. Appearance	
4. Attitude	Restless/ Quiet
5. Dehydration	Mild/ Moderate/ Severe/ Nil
6. Anaemia/ Jaundice/ Clubbing/ Cyanosis/ Lymphadenopathy/ Pedal oedema	
7. Pulse	
8. Temperature	
9. Respiratory rate	
10. Blood pressure	

LOCAL EXAMINATION

1.INSPECTION

BREAST

Position

Size and shape

Any puckering or dimpling Skin over the breast

NIPPLE

Position

Size and shape

Surface Discharge

AREOLA

ARM AND THORAX

AXILLA AND SUPRACLAVICULAR FOSSA

2. PALPATION

Local rise of temperature

Tenderness

Situation Size and shape

Surface and margin

Consistency

Fluctuation

Fixity to the skin

Fixity to the breast tissue

Fixity to the underlying fascia and muscles

Fixity to the chest wall

Palpation of the nipple

EXAMINATION OF LYMPH NODES

Pectoral group

Brachial group

Subscapular group

Central group

Apical group Cervical

RECTAL EXAMINATION :

VAGINAL EXAMINATION :

SYSTEMIC EXAMINATION :

- Cardiovascular system
- Respiratory system
- Central nervous system
- Genito-urinary system
- Abdominal examination

INVESTIGATIONS

BLOOD INVESTIGATIONS

Hb	
TC	
DC	
ESR	
BT	
CT	
BLOOD GROUP & Rh type	
Sugar	
Urea	
Creatinine	

URINE

Albumin	
Sugar	
Microscopy	

Chest x-ray

SEROLOGY

HIV	
HBSAg	
HCV	

DIAGNOSIS:

MANAGEMENT & SURGICAL NOTES:

CONSENT FORM

I, , do hereby volunteer and consent to participate in this study being conducted by Dr.M.SARASWATHY on **" A STUDY OF PALPABLE BREAST LUMPS WITH EMPHASIS ON EARLY DETECTION OF MALIGNANCY USING A MODIFIED TRIPLE TEST "**I have read and understood the consent form or it has been read and explained to me in my own language. The study has been fully explained to me and I may ask questions at any time.

Signature / Left Thumb Impression of the Volunteer Date:

Place:

Signature and Name of witness Date:

Place:

Signature of the investigator:

Name of the investigator:

சுய ஒப்புதல் படிவம்

<u>ஆய்வு செய்யப்படும் தலைப்பு</u>

<u>மார்பக கட்டி குறித்து மாறுபட்ட மும்முனை பரிசோதனை மற்றும் ஆரம்ப கட்ட புற்று நோய் கண்டறிதல் பரிசோதனை</u>

<u>ஆராய்ச்சி நிலையம்</u>: அறுவை சிகிச்சை துறை

கோவை மருத்துவக்கல்லூரி மருத்துவமனை,

கோவை 18

பங்கு பெறுபவரின் பெயர்: **உறவு முறை:**

பங்கு பெறுபவரின் எண்:

பங்கு பெறுபவர் இதனை (√) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களைக் கேட்கவும், அதற்கான தகுந்த விளக்கங்களைப் பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

நான் இவ்வாய்வில் தன்னிச்சையாகத்தான் பங்கேற்கிறேன். எந்தக் காரணத்தினாலோ எந்தக் கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகிக் கொள்ளலாம் என்றும் அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்மந்தமாகவும், மேலும் இது சார்ந்தஆய்வு மேற்கொள்ளும்போதும், இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளைப் பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்துகொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக் கொள்ளவும், அதைப் பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கிறேன். ☐

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்குக் கொடுக்கப்பட்ட அறிவுரைகளின் படி நடந்துகொள்வதுடன், இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்றும் உறுதியளிக்கிறேன். என் உடல் நலம் பாதிக்கப்பட்டாலோ அல்லது எதிர்பாராத வழக்கத்திற்கு மாறாக நோய்க்குறி தென்பட்டாலோ உடனே அதை மருத்துவ அணியிடம் தெரிவிப்பேன் என உறுதி அளிக்கிறேன். ☐

இந்த ஆய்வில் எனக்கு மருத்துவப் பரிசோதனை, இரத்தப் பரிசோதனை மற்றும் மார்பக பரிசோதனை மற்றும் கட்டி அகற்றி பரிசோதனை செய்து கொள்ள நான் முழு மனதுடன் சம்மதிக்கிறேன். ☐

பங்கேற்பவரின் கையொப்பம் ..... இடம் ..... தேதி .....

கட்டைவிரல் ரேகை:

பங்கேற்பவரின் பெயர் மற்றும் விலாசம் .....

ஆய்வாளரின் கையொப்பம் ..... இடம் .....தேதி .....

ஆய்வாளரின் பெயர் .....

KEY TO MASTER CHART

USG	-	ULTRASONOGRAM
FNAC	-	FINE NEEDLE ASPIRATION CYTOLOGY
HPE	-	HISTO PATHOLOGICAL EXAMINATION
L	-	LEFT
R	-	RIGHT
Y	-	YES
N	-	NO
UI	-	UPPER INNER
UO	-	UPPER OUTER
LO	-	LOWER OUTER
LI	-	LOWER INNER
F	-	FIRM
H	-	HARD
B	-	BENIGN
M	-	MALIGNANT
MRM	-	MODIFIED RADICAL MASTECTOMY
BCS	-	BREAST CONSERVATION SURGERY
FA	-	FIBRO ADENOMA
MIDP	-	MULTIPLE INTRADUCTAL PAPILLOMA
FCD	-	FIBRO CYSTIC DISEASE
IDC	-	INVASIVE DUCTAL CARCINOMA

IPN	-	INVASIVE PAPILLARY NEOPLASM
PHY	-	PHYLLODES
TUB ADE	-	TUBULAR ADENOSIS
DCIS	-	DUCTAL CARCINOMA INSITU
MUC CA	-	MUCINOUS CARCINOMA
BA	-	BREAST ABSCESS
IDP	-	INTRA DUCTAL PAPILLOMA

S.No	Name	Age	Duration of symptoms in months	Side of breast	Pain over the lump	Nipple discharge	Quadrant involved	Max lump size in cm	Consistency	Axillary node involvement	USG report	FNAC Report	Surgery performed	HPE Report	HPE
1	Padmini	38	3	R	Y	N	UI	3	F	N	B	B	EXCISION	B	FA
2	Jothilakshmi	40	5	L	N	Y	UO	4	F	N	B	B	EXCISION	B	MIDP
3	Vanithamani	24	6	L	N	N	UO	3	F	N	B	B	EXCISION	B	FA
4	Meena	30	5	R	Y	N	LO	3	F	N	B	B	EXCISION	B	FA
5	Eswari	46	3	L	Y	N	UI	4	F	N	B	B	EXCISION	B	FA
6	Gayathri	29	7	L	Y	N	UO	3	F	N	B	B	EXCISION	B	FA
7	Mahalakshmi	29	4	R	Y	N	UO	2.5	F	N	B	B	EXCISION	B	FA
8	Jaya	39	6	L	Y	N	UI	5	F	N	B	B	EXCISION	B	FCD
9	Eswari	34	5	L	Y	N	UO	3	F TO H	N	IC	M	MRM	M	IDC
10	Jaya	43	3	R	N	Y	UO	3	F TO H	N	M	M	MRM	M	IDC
11	Rangammal	40	4	R	N	N	LO	2.5	H	N	M	B	EXCISION	M	IPN
12	Revathi	40	6	R	Y	N	UO	3	H	N	IC	M	MRM	M	IDC
13	Kowsalya	32	8	R	Y	Y	UI	3.5	F	N	B	B	EXCISION	B	FA
14	Vishalakshi	32	6	L	N	N	UI	4	F	N	B	B	EXCISION	B	B PHY
15	Mallika	48	7	R	N	N	UO	5	F	N	B	B	EXCISION	B	FA
16	Selvi	35	9	L	N	N	UO	5	H	N	B	B	EXCISION	B	B PHY
17	Revathy	31	7	R	N	N	LO	3	F	N	B	IC	EXCISION	B	FA
18	Nandhini	23	3	R	Y	N	UO	2	F	N	B	B	EXCISION	B	FA
19	Jothimani	42	2	R	Y	N	UI	4	H	N	M	M	MRM	M	INF DC
20	Sangeetha	30	6	L	Y	Y	UO	5	H	Y	M	M	MRM	M	IDC
21	Sairabanu	40	8	L	N	N	UI	4	H	Y	M	M	MRM	M	IDC
22	Ruba	35	6	L	Y	N	LI	3	F	N	B	B	EXCISION	B	FA
23	Lakshmi	42	8	L	N	N	LO	4	F	N	B	B	EXCISION	B	FA
24	Jothi	36	4	L	N	Y	UO	5	H	Y	M	M	MRM	M	IDC
25	Nalini	24	3	R	N	N	UI	3	F	N	B	B	EXCISION	B	FA
26	Poongodi	38	6	L	Y	N	UI	3	F	N	B	B	EXCISION	B	FA
27	Thajnisha	45	7	L	Y	N	LO	4	F	N	B	IC	EXCISION	B	FCD
28	Kaliammal	43	7	R	Y	N	LO	5	F	N	IC	B	EXCISION	B	B PHY
29	Bommi	30	6	R	N	N	UI	3	F	N	B	B	EXCISION	B	FA
30	Nagavalli	40	5	R	N	Y	UO	4	H	Y	M	M	MRM	M	IDC
31	Kunjamalu	39	5	L	Y	N	UI	3	F	N	B	B	EXCISION	B	FCD
32	Vasantha	35	4	R	Y	N	UI	4	F	N	B	IC	EXCISION	B	B PHY
33	Nagamani	21	3	R	Y	N	UO	3	F	N	B	B	EXCISION	B	B PHY
34	Ranjitham	26	4	R	Y	N	UO	2	F	N	B	B	EXCISION	B	FA
35	Jainabegum	30	2	L	N	Y	UO	3	H	N	M	M	BCS	M	IDC
36	Vijayalakshmi	28	8	R	N	N	LI	3	F	N	B	B	EXCISION	B	TUB ADE
37	Shanthi	43	6	R	N	Y	LO	4	H	Y	M	M	MRM	M	IDC
38	Kannammal	45	4	L	N	N	UO	3	F	N	M	M	MRM	M	IDC
39	Revathi	26	5	L	N	N	UO	2.5	F	N	B	B	EXCISION	B	FA
40	Tamilarasi	44	6	L	N	N	UO	4	H	Y	M	M	MRM	M	DCIS
41	Suseela	43	6	R	N	N	LO	3	F	N	B	B	EXCISION	B	FCD
42	Vasanthi	46	3	L	N	N	UO	3	H	N	B	B	EXCISION	B	FCD
43	Latha	29	4	L	Y	N	LO	3	F	N	IC	B	EXCISION	B	B PHY
44	Bharathi	38	4	R	Y	Y	UI	4	F	N	B	IC	EXCISION	B	MIDP
45	Pappal	40	3	R	N	Y	UO	3	H	Y	M	M	MRM	M	IDC
46	Kumutha	23	6	L	Y	N	LO	3	F	N	B	B	EXCISION	B	FA
47	Shakilabanu	40	4	L	N	N	LO	4	H	N	M	M	EXCISION	M	IDC
48	Saradha	39	6	L	Y	Y	UO	3	H	N	M	IC	EXCISION	M	IDC
49	Sundari	36	8	R	N	N	LI	3	F	N	B	B	EXCISION	B	FA
50	Manickam	44	6	R	N	N	UO	3	H	N	IC	M	MRM	M	IDC
51	Rani	35	4	R	Y	Y	UI	2	F	N	B	B	EXCISION	B	FCD

52	Sandhya	50	6	L	N	N	UI	2	F	N	B	B	EXCISION	B	FA
53	Gowsalya	21	4	L	Y	N	LO	2.5	F	N	B	B	EXCISION	B	FA
54	Mangai	40	5	R	N	Y	UO	4	H	Y	M	M	MRM	M	IDC
55	Anjali	24	4	R	Y	N	UI	2.5	F	N	B	B	EXCISION	B	FA
56	Tamilselvi	38	6	L	Y	N	LI	3	F	N	B	B	EXCISION	B	FCD
57	Kanimozhi	27	4	L	N	N	UI	3.5	F	N	B	B	EXCISION	B	FA
58	Lalitha	33	4	L	N	Y	UO	2	H	N	M	M	BCS	M	DCIS
59	Lakshmi	45	8	L	Y	N	LO	3	F	N	B	B	EXCISION	B	FCD
60	Radhamani	33	9	R	Y	N	LO	2.5	F	N	B	B	EXCISION	B	FA
61	Selvi	35	6	R	N	Y	UO	3	H	Y	M	M	MRM	M	IDC
62	Premalatha	31	10	R	Y	N	LI	2	F	N	B	B	EXCISION	B	FA
63	Mariyammal	38	4	L	N	N	LO	4	H	Y	M	M	MRM	M	IDC
64	Mugambigai	22	9	R	Y	N	LO	2.5	F	N	B	B	EXCISION	B	FA
65	Nagajothi	30	11	L	Y	N	UI	2	F	N	B	B	EXCISION	B	FA
66	Kala	36	4	L	Y	N	UO	3	H	N	IC	IC	EXCISION	B	FA
67	Sivagami	43	6	L	Y	N	UO	4	F	N	B	B	EXCISION	B	B PHY
68	Rajammal	42	4	R	N	Y	UO	4	H	Y	M	M	MRM	M	IDC
69	Karuppammal	56	5	R	N	Y	UI	5	H	N	M	IC	MRM	M	IDC
70	Lingammal	76	2	R	N	N	LO	3	H	N	IC	M	MRM	M	MUC CA
71	Marathal	42	3	L	Y	N	LO	2	F	N	B	B	EXCISION	B	FA
72	Sumathi	31	6	L	Y	N	UO	3	F	N	B	B	EXCISION	B	FCD
73	Jothi	38	6	L	N	N	UO	4	F	N	B	B	EXCISION	B	FCD
74	Gowri	44	4	R	N	N	LI	3	H	N	M	M	MRM	M	IDC
75	Ambika	23	6	R	Y	N	UO	2	F	N	B	B	EXCISION	B	FA
76	Bakyam	51	3	L	N	Y	UO	3	H	Y	M	M	MRM	M	IDC
77	Veni	34	9	L	Y	N	UO	2.5	F	N	B	B	EXCISION	B	FCD
78	Kala	40	10	R	Y	N	UI	3	F	N	B	B	EXCISION	B	FCD
79	Dhanam	46	6	L	N	N	UO	4	H	Y	M	M	MRM	M	IDC
80	Maheswari	53	4	R	N	Y	UO	3	H	Y	M	M	MRM	M	IDC
81	Fathima	31	8	L	Y	N	UO	3	F	N	B	B	EXCISION	B	FA
82	Latha	38	6	L	Y	N	LO	4	F	N	B	B	EXCISION	B	FCD
83	Malathi	30	7	R	Y	N	UO	5	F	N	B	B	EXCISION	B	BA
84	Ramuthai	48	4	L	N	Y	LO	4	H	Y	M	M	MRM	M	IDC
85	Sarasammal	54	5	R	Y	N	UO	3	H	Y	M	M	MRM	M	IDC
86	Selveswari	43	4	R	Y	N	UO	4	H	Y	M	M	MRM	M	ILC
87	Radha	37	3	L	N	N	LI	3	H	Y	B	B	EXCISION	B	FCD
88	Tamilarasi	33	5	L	N	N	UO	4	H	N	M	M	BCS	M	IDC
89	Ayyammal	68	4	L	Y	N	UO	3	H	N	M	M	MRM	M	MUC CA
90	Seetha	28	9	L	Y	N	LI	3	F	N	B	B	EXCISION	B	FA
91	Rajeswari	39	7	L	Y	N	LO	2.5	F	N	B	B	EXCISION	B	FA
92	Latha	36	5	R	N	N	UO	3	F	N	M	M	BCS	M	IDC
93	Marithai	56	3	L	N	N	UI	2.5	H	N	M	M	MRM	M	IDC
94	Sarojini	42	6	R	Y	N	LI	3	F	N	B	B	EXCISION	B	FCD
95	Kuruvammal	62	4	R	N	N	UI	3	H	Y	M	M	MRM	M	IPC
96	Kavitha	32	1	R	Y	N	UO	4.5	H	Y	IC	IC	EXCISION	B	BA
97	Lakshmi	38	6	L	N	N	AT	3	F	N	B	B	EXCISION	B	FA
98	Banumathi	33	9	R	Y	N	LO	2	F	N	B	B	EXCISION	B	FA
99	Nallammal	51	5	R	N	N	UO	3	F TO H	Y	M	M	MRM	M	IDC
100	Dhanalakshmi	29	10	R	Y	N	LO	2.5	F	N	B	B	EXCISION	B	FCD
101	Nazhrima	37	5	L	N	Y	LO	2	H	N	IC	M	BCS	M	DCIS
102	Thamilselvi	39	7	R	N	N	UO	3	H	N	IC	B	EXCISION	B	FCD
103	Usha	32	8	R	Y	Y	UI	3	F	N	B	B	EXCISION	B	IDP