“A COMPARATIVE STUDY OF PALPATORY VERSUS IMAGE GUIDED CORE NEEDLE BIOPSY IN BREAST MASSES”. MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJI HOSPITAL, MADURAI.

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CHENNAI

BONAFIDE CERTIFICATE

This is to certify that the dissertation entitled "**A COMPARATIVE STUDY OF PALPATORY VERSUS IMAGE GUIDED CORE NEEDLE BIOPY IN BREAST MASSES"** conducted in **MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJIHOSPITAL, MADURAI** submitted by **Dr.A.KANMANI** to the Tamil Nadu Dr. M.G.R. Medical University, Chennai in partial fulfilment of the requirement for the award of M.S. Degree Branch I (General Surgery) is a bonafide research work was carried out by her under my direct supervision & guidance.

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This is to certify that the dissertation entitled "**A COMPARATIVE STUDY OF PALPATORY VERSUS IMAGE GUIEDED CORE NEEDLE BIOPSY IN BREAST MASSES" IN MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJI HOSPITAL, MADURAI** is a bonafide research work done by **Dr.A.KANMANI,** Post Graduate Student, Department of General Surgery, MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJI HOSPITAL, MADURAI, under the guidance and supervision of **Dr.K.SARAVANAN, M.S,** Professor Department of General Surgery, MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJI HOSPITAL, MADURAI.

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DECLARATION

I, **Dr.A.KANMANI** declare that, I carried out this work on, "**A COMPARATIVE STUDY OF PALPATORY VERSUS IMAGE GUIDED CORE NEEDLE BIOPSY IN BREAST MASSES" IN MADURAI MEDICAL COLLEGE AND GOVERNMENT RAJAJI HOSPITAL, MADURAI**, At the Department of General Surgery, Govt. Rajaji Hospital during the period of **September 2018 to September 2019.** I also declare that this bonafide work or a part of this work was not submitted by me or any others for any award, degree, diploma to any other University, Board either in India or abroad. This is submitted to The Tamilnadu Dr.M.G.R. Medical University, Chennai in partial fulfillment of the rules and regulations for the M.S. degree examination in General Surgery.

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Dr.A.KANMANI.

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INTRODUCTION

Fine-needle aspiration biopsy(FNAB)was utilized for many years to investigate the breast tissue in the attempt to avoid surgical biopsy(gold standard).With the arrival of core needle biopsy, a better specimen quality could be obtained and it became possible to differentiate carcinomas *insitu* from invasive carcinomas. Meanwhile core needle biopsy results in lower sensitivity when done by means of palpation. Over the last decades, imaging-guided core needle biopsy has become very reliable options for histological diagnosis.

AIMS AND OBJECTIVES OF THE STUDY

The aim of study is to compare palpatory method versus image guided core needle biopsy in breast masses. This study to verify the superiority and determine the size of beneficial effect of image guided biopsy over palpation guided biopsy.

REVIEW OF LITERATURE

USG guided core needle biopsy was first described by Parker et al.in the early 1990's,now it has become one of the main diagnostic methods for neoplastic breast diseases and for lesions that are sono-graphically visible. The sensitivity of US-guided CB of breast was reviewed by Youket al.in eight studies involving a total of 1,518 patients, obtaining a mean rate of 96%, similar to the rate obtained with surgical biopsy. Schueller et al. have also found similar sensitivity (95.8%) in 1,352 cases. Some factors *increase the sensitivity* of the samples and should be taken into consideration:

- five as minimum number of specimens which ideally should be intact, homogeneous, predominantly white, and sinks as soon as it is put in the formaldehyde solution and obtained by a CB device with appropriate depth range (>15mm), so the sensitivity is directly proportional to the volume of specimens.
- Some studies suggest that the real-time visualization of the needle within the lesion may help in reducing the number of false-negatives.

The most *consistent indications* for US- guided CB of breast are listed: BI-RADS category of images in mammography/ultrasound/MRI BI-RADS 5

BI-RADS 4

BI-RADS 3

- Patient’s and/or assisting physician will
- Psychological factors
- Short-interval follow-up difficulties
- Patients with multiple risk factors for breast cancer
- Need for diagnostic anticipation

Advantages of US guided core needle biopsy:

– Evaluation of tumour grade and hormone receptors

– Real time image

– Accessibility to all areas of the breast

– Absence of ionizing radiation

– Low incidence of complications and discomfort for the patient

– Procedure swiftness (about 20 minutes)

– Wide availability of the utilized equipment

– One-half to one-fourth of the cost of surgical biopsy.

Technical limitations

– Difficulty in visualizing:Cystic lesions and nodule <5mm

– Breast implants

Limitations related to the patient

– Cooperation incapacity

– Haemorrhagic diathesis

– Use of oral anticoagulant medications

– Allergy to the anaesthetic agent

Over the past 20 years, the present technique has demonstrated to be very safe, with rare severe **complications**. Parker et al. reported only six cases (0.2%) in the follow-up of 3,765 where the development of three *hematomas* and *three abscesses* observed, requiring surgical drainage. No case of *pneumothorax* was observed in that study, despite the existence of some risk, which is higher in the cases of small breasts with axillary or medial lesions. *Fistulas* may occur during pregnancy or lactation, particularly in central and deep regions of the breast. Minor complications such as *pain, oedema, psychologicaltrauma, small haemorrhages and vasovagal reactions* are frequently observed. Haemorrhages are more frequent in hypertensive women and in breasts submitted to radiotherapy, whose vessels are more friable.Whenever possible, biopsies should be avoided in the peri-menstrual period, where the breasts are more sensitive.

The rate of ***repeated biopsies*** reaches up to 18% of cases. According to Libermanetal., nodules <5mm may occasionally be completely removed during the biopsy procedure in 4% to 9% of cases, impairing the surgical marking. In such cases, the placement of a metal clip is suggested, to serve as a marker for later surgery. Memarsadeghi et al. have reported a 0.4% overall rate of false-

negatives in a series of 3,380 biopsies. Among the factors which increase the *false-negatives rate*, the following factors were associated:

- Poor needle visualization,
- Mobile lesion,
- Deep lesions,
- Central lesions in large breasts,
- Dense breast with fibrosis,
- Nodules less than5mm,
- Lesions obscured by blood accumulation.

In other study, the false-negative rate was1.1%, and more than 20% of the biopsied lesions measured up to 10 mm. Fornage et al. have reported that any lesion clearly visualized at US can be submitted to core needle biopsy.

Despite the in numerable advantages, some lesions are not visible by this the method, and in such cases the utilization of stereotactic biopsy is preferable. Patients with suspicious micro-calcifications or with breast implants may benefit from vacuum-assisted biopsy, because of the higher number of calcifications in the specimens and lower risk for implant rupture.

PRE-REQUIREMENTS:

- Because of the low incidence of complications and contra indications, *generally no laboratory* test is required, except for those patients with a history of coagulopathy or under anticoagulant ion therapy.

- Routine prophylactic *antibiotics are not indicated*, but the sterile technique should be used, minimizing post-biopsy infections.
- Bugbee et al. have evaluated the effects of pre-biopsy *oral anxiolytic* medication and found a significant reduction in the anxiety levels in the women group that utilized 0.25–0.5 mg alprazolam 15 minutes before the procedure.
- *The room* must be appropriate for the performance of the procedure, with adjustable lighting and circulation area at both sides of the table, in order to facilitate the assistant's movements and access to all regions of the breast and axilla.
- *The transducer* must be of high-frequency (ideally higher than 10 MHz) linear type and must be cleaned with antiseptics or be involved by a cover or a sterile glove. Sterile gel or the antiseptic itself will serve as ultrasound conductive agent.
- An *automated biopsy device* equipped with a long needle (reaching 23 mm) is preferable over the short needle (reaching 15mm).There commended needle caliber for CB is 14-gauge, which has demonstrated greater sensitivity, without increasing complications or costs.
- The *professional* must be experienced in manipulating the CB device and in order to avoid transfixion of the chest wall.

- The patient must be duly explained on there as on for the biopsy, the technique that will be utilized, the risks and benefits, and on the existence of alternative techniques. A term of free and *informed consent* should then be signed by the patient.
- *Previous images* should be reviewed, and then an US scan should be performed *to document* the lesion. The lesion documentation will be useful for follow-up and comparison purposes.
- Orthogonal*measurements*andlocalizationofthelesionmustbeperformedthe clock position system is recommended and the distance between the lesion and the nipple should be measured and recorded.
- At that point, the physician should establish the *best pathway* to reach the lesion, and decide which hand he will use to hold the transducer. The choice must lie on the one which will provide greater comfort and effectiveness for the procedure, and may vary according to the lesion site and to the dominant hand of the professional.
- The patient is usually positioned in dorsal decubitus, with the upper limb ipsi-lateral to the lesion being rested behind her head. The anterior oblique position may be beneficial in patients with large breasts or extreme lateral lesion location. Lesions located in the outer quadrant are usually better approached with the professional positioned at the side of the ipsi-lateral breast, while in lesions located in the inner quadrant the

professional should be positioned at the side of the contralateral breast.

- A sterile *surgical drape* should be placed on a portable table and the materials should be positioned over that drape.
- The physician puts on the *sterile gloves* and couples the biopsy needle to the CB device. He then performs a *triggering test*, informing the patient that the clicking sound will be heard each time a sample is obtained. In cases of very dense breasts, the physician should pay special attention to the clicking sound, as when it sounds differently than expected, this may mean that the sample is in appropriate.
- Subsequently, the *anesthetic agent* is aspirated into a syringe with 5–10 ml of lidocaine 1%.

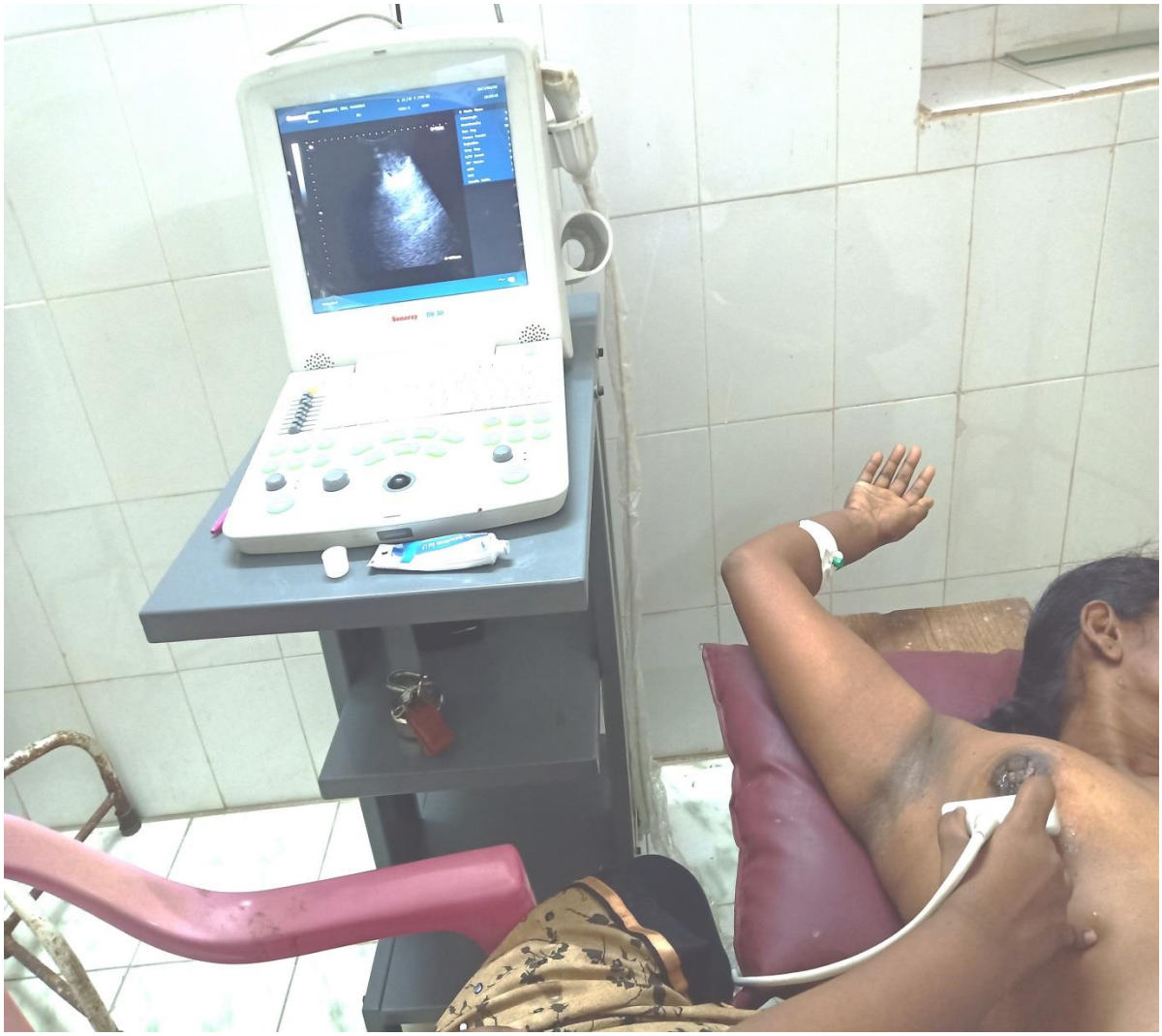
BIOPSY

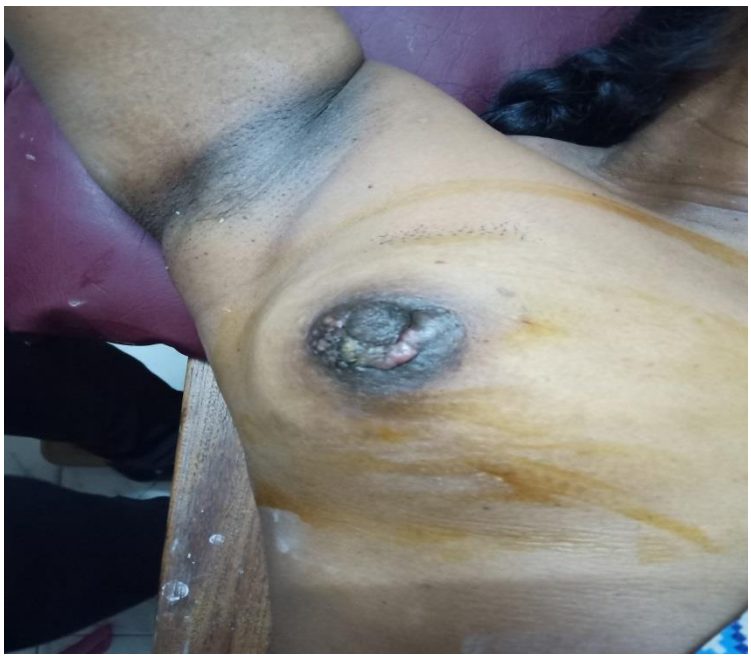
The preferred biopsy technique is the "*freehand*" technique based on the description by Parker et al. where the radiologist manipulates the transducer with one hand and the CB device with the other. Initially, the antisepsis of the exposed area is performed by means of sterile gauze pad and antiseptic solution (povidone iodine). The lesion to be biopsied is identified with the transducer and it is recommended that with the palm of the same hand, the fourth and fifth fingers resting on the field without exerting pressure on the breast the physician avoids the motion of the breast. By keeping the area of interest farther from the

needle insertion point, it is possible to observe its entire trajectory, from the skin surface up to the lesion. The recommended access area is the peripheral curvature of the breast, positioning the needle at 2 to 3cm away from the edge of the transducer, in parallel to the chest wall and perpendicularly to the transducer, allowing a better US visualization of the needle and reducing the risk for pneumothorax. The access through the nipple-areolar complex should be avoided. In cases of very deep or centrally and superficially located lesions, the oblique needle access may be necessary, which may impair its visualization at US. In such cases, the transducer should be angled at approximately 90°.Under US guidance, the anaesthetic agent is in filtrated along the path way of the needle up to the lesion. In cases of mobile lesions, the infiltration can be performed in the lesions' circumjacent areas, which will reduce its mobility. Deep lesions may benefit from posterior anaesthetic infiltration, in an attempt to displace the nodule anteriorly.

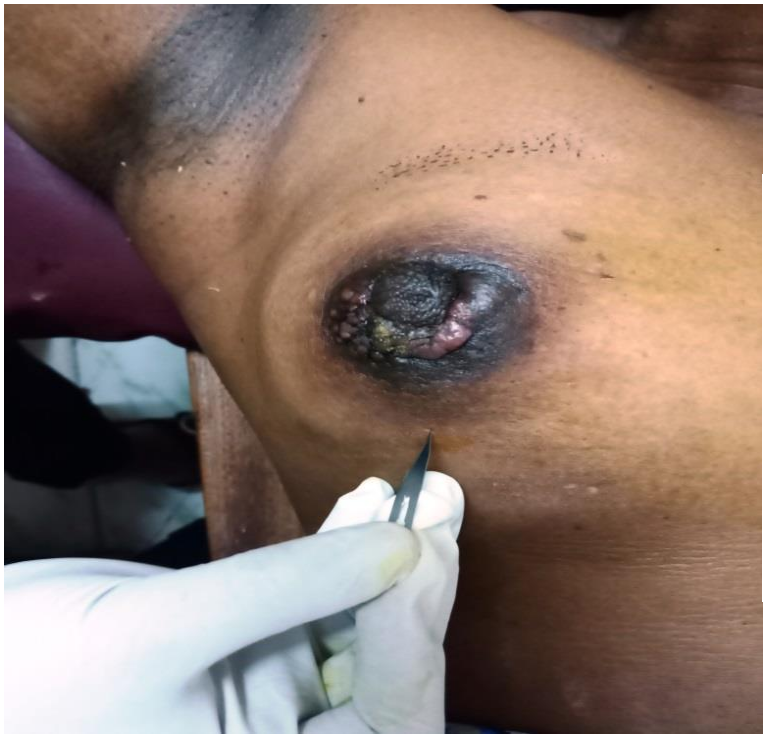
With a scalpel blade, a 2–3 mm incision is made on the numbed skin. Gauze pads are to be left in the incision proximity, in order to facilitate breast compression and cleaning of blood. Though the incision location, the biopsy needle is advanced towards the lesion's margin, through the same pathway utilized for anaesthesia. The needle is positioned parallel to the nodule, the patient is warned that the sample is about to be collected, and the CB device is triggered.

In cases of mobile lesions, with the same hand that holds the transducer, pressure can be exerted against the nodule, thus decreasing the possibility of the needle pushing the nodule backwards as the device is triggered, so the collected sample is inappropriate. It is also possible to push the tip of needle into the nodule prior to triggering the CB device. In cases, breast fibrosis may impair the progression of the needle and repeating the trajectory after each triggering represents an important limitation. Thus the technique with coaxial needle should be utilized, allowing for different areas to be biopsied by just changing the angle of the trocar.



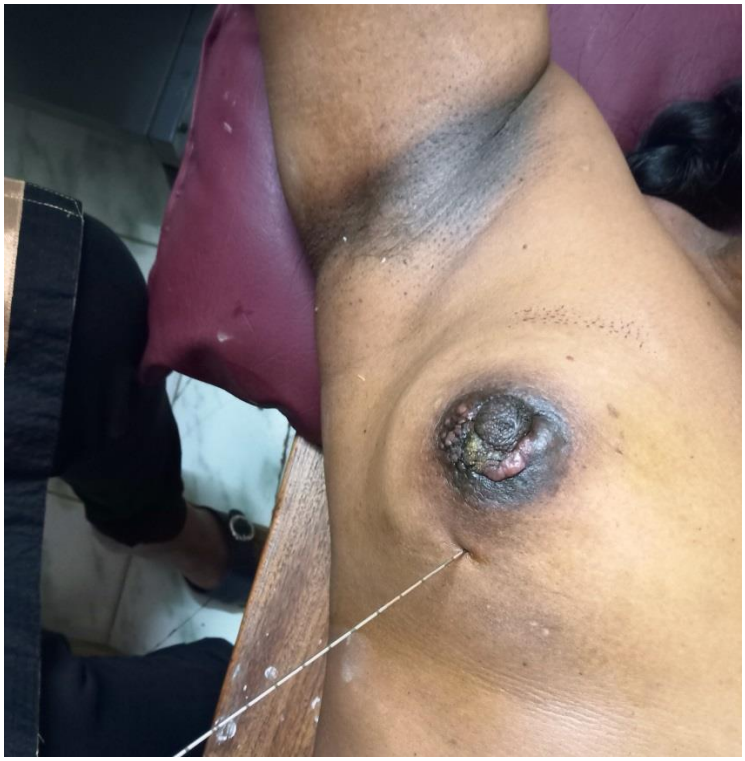


AREA TO BE BIOPISED IS PAINTED WITH ANTISEPTIC SOLUTION

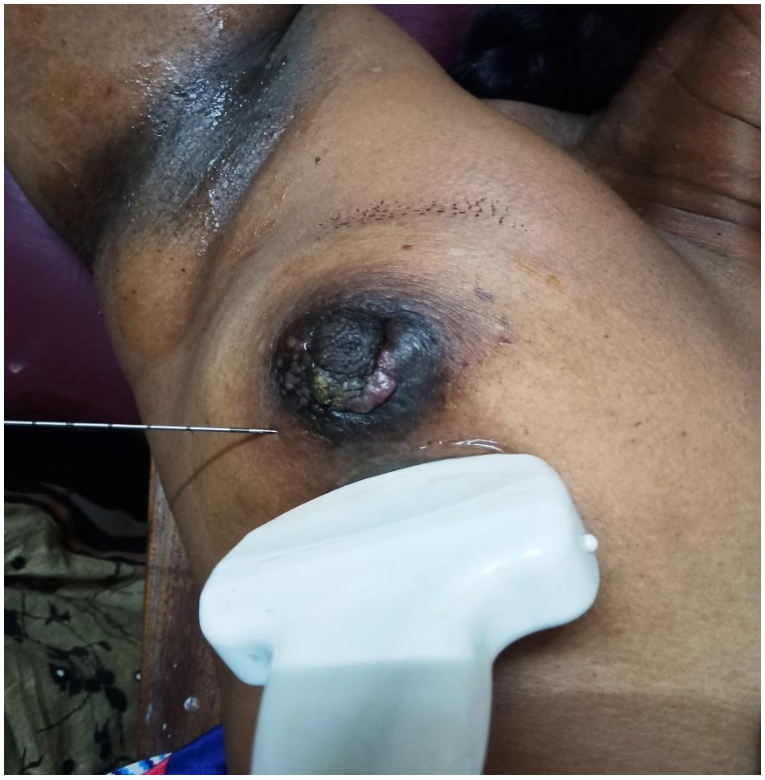


MARK SITE OF BIOPSY TO BE TAKEN.

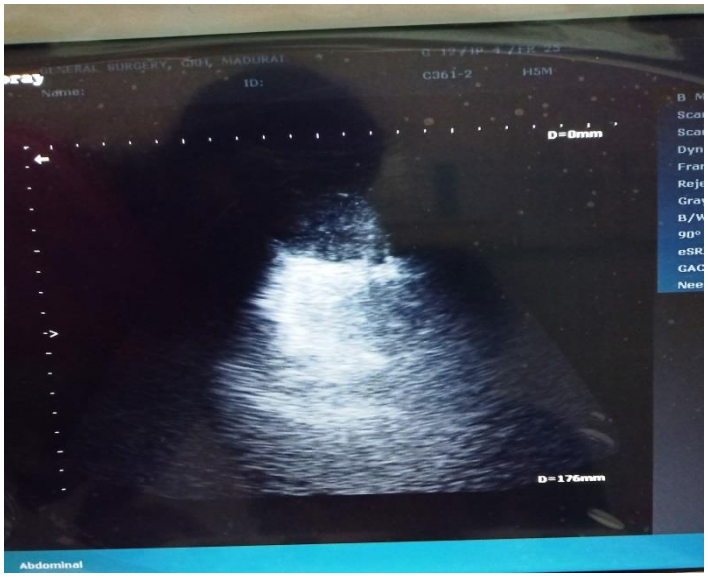
INCISION ABOUT 2MM-5MM MADE OVER THE SITE WITH 11’BLADE



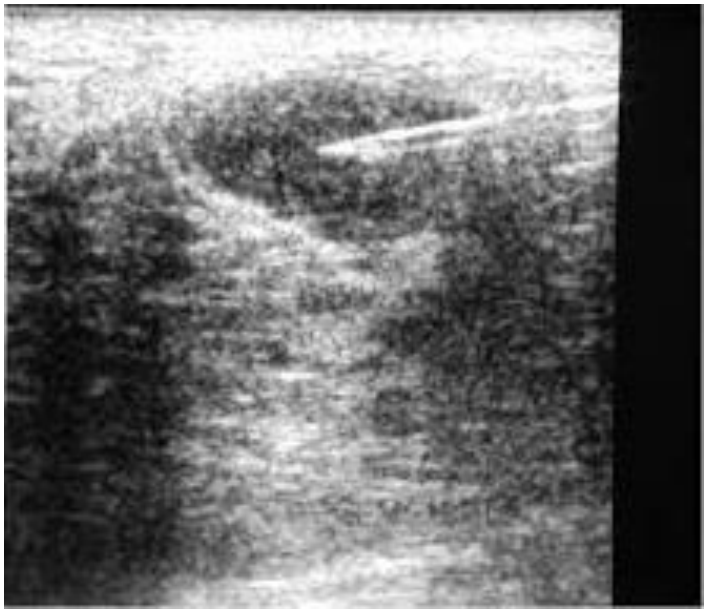
IN PALPATORY METHOD, CORE NEEDLE BIOPSY GUN NEEDLE PLACED PARALLEL TO NODULE AND BIOPSY TAKEN.



IN ULTRASOUND GUIDED BIOPSY, TRANSDUCER PLACE PERPENDICULAR TO NEEDLE AND NEEDLE PLACED PARALLEL TO CHEST WALL,TRIGGERING DONE.



VISUALISATION OF MASS



VISUALISATION OF NEEDLE INTO LESIONBEFORE TRIGGERING THE BIOPSY GUN.

Once the device is triggered, the operator must sonographically confirm whether the needle is inside the nodule, by analysing the needle in the two planes (crosssectional and longitudinal). Frequently during the biopsy, air enters through the needle and is visualized as a hyper echoic line in the triggering trajectory. Such artefact may be useful in the determination of lesion locations yet to be biopsied.

The lesion sample must be retrieved from the core needle and be briefly analysed with respect to the characteristics which classify such sample as appropriate. The anaesthetic needle or the scalpel may be utilized to retrieve the sample, and place it in a vial containing 10% formalin. Samples should be obtained from different areas of the lesion, usually from the centre and close to the borders at the 3, 6, 9 and 12 o'clock positions. Between each and other consecutive sample retrieval, the physician or the assistant must compress the

breast with gauze pads in order to reduce the risk for hematomas. Tissue sent for histo-pathological analysis.

POST-BIOPSY PROCEDURES

Once the samples are obtained, the areas of the incision and of the nodule are compressed for atleast five minutes, and a dressing is then applied. The utilization of ice on the biopsy site may also help in haemostasis. The patient is requested to avoid more intense physical exertion for at least two days. Pain relieving and anti-inflammatory medications are prescribed as necessary, avoiding the utilization of acetyl-salicylic acid for seven days after the procedure. The professional then issues a procedure report and fills out a histo-pathological analysis request with a detailed report on the lesion, specifying radiological category, location, number of collected samples, presence of lymph node enlargement and occurrence of possible complications. Any patient's doubts should be clarified, and a return should be scheduled upon availability of the histo-pathological result. Main reasons for re-biopsy were histology results demonstrating benign lesions and/or high risk lesions requiring surgical intervention (3% to 5%), followed by results in disagreement with clinico-radiological findings (2% to7.7% of the total) and in appropriate samples (0.4% to 2% of the total of biopsies).

Ultrasonography-guided core biopsy of breast has become the method of choice for all alterations visualized at the method, with sensitivity rates which are very close to those of surgical biopsy.

EMBRYOLOGY

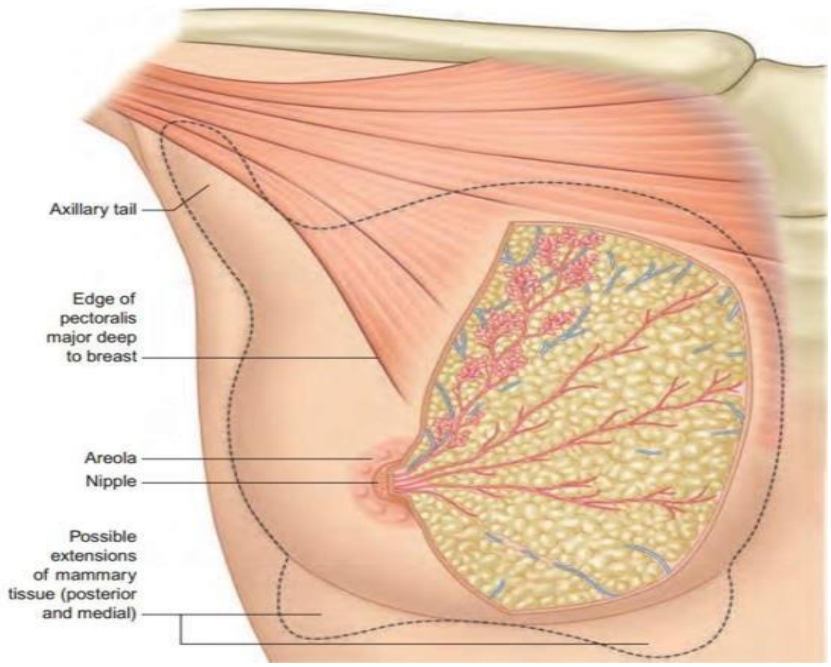
During the 5th - 6th week of fetal life, the two bands of thickened ectoderm referred as primitive milk streak develop between the axilla and the groin. This remains in the thorax to become the mammary ridge, whereas the remainder regresses in the human development.

SEQUENCE OFDEVELOPMENT:

GESTATIONAL AGE(WEEKS)	BREAST DEVELOPMENT
5-6	Primitive milk streak develops from the ectoderm
7-8	Thickening of the mammary anlage; Invagination into the mesoderm; Growth of breast buds
12-16	Mesenchymal cells differentiate into the smooth muscle of the nipple-areola Secondary breast buds develop and branch
16-20	Tips of breast buds become the secretory alveoli, Secondary mammary anlage differentiates into hair follicles and sebaceous and sweat gland elements.
20-32	Breast buds canalize and become lactiferous ducts. Parenchymal differentiation; lobules/alveoli develop
32-40	Proliferation of mesenchyme forms nipple areola complex, Pigmentation of nipple areola complex.

ANATOMY OF THE BREAST:

The adult female breast extends vertically between the second and sixthribs and horizontally from the lateral border of sternum medially to anterior-axillary line laterally.2/3rd of breast rests upon pectoralis major and 1/3rd upon serratousanterior, lower medial quadrant on external oblique Aponeurosis. *Axillary tail of spencer*: prolongation from outer part of gland into axilla through a defect in deep fascia called foramen of langerwhere it is in direct contact with main anterior axillary node.



COMPONENTS OF BREAST:

Skin – the skin is the most superficial layer of the breast.

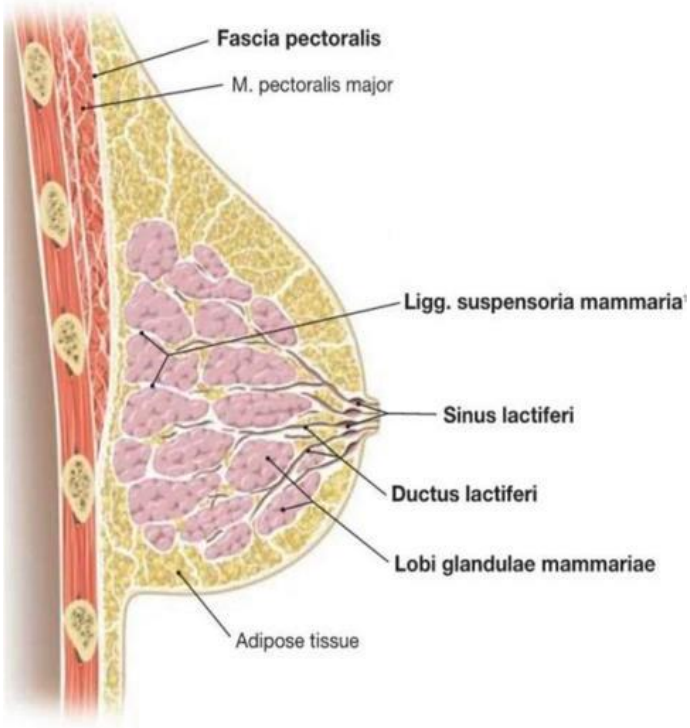
Superficial fascia – this layer lies just beneath the skin. Itis continuous with the superficial abdominal and cervical fascia. Along with the deep fascia, it envelops the breast parenchyma.

Breast parenchyma –Lobule is basic structural unit of mammary glands.The size and number varyfrom 10-100 lobules empty via ductules into lactiferous duct,about 15-20.Each lactiferous duct is lined with myo-epithelial cells and provided with terminal ampulla.

Ligaments of cooper- These ligaments are fibrous bands of connective tissue that travel through the breast and insert into the dermis and provides contour to breast.

The remainder of the breast is composed of adipose tissue.

Nipple-areola complex -The areola comprises a combination of sebaceous, sweat, and accessory glands that form the Montgomery tubercles. They secrete oily lubricant to nipple areola and do not contain hair or fat beneath it.Smooth muscle fibres are arranged concentrically and longitudinally in the areola and extend into the nipple and these fibres are responsible for nipple erection. Erection is stimulated by the sensory nerve endings and Meissner's corpuscles, which are located within the dermis of the nipple.

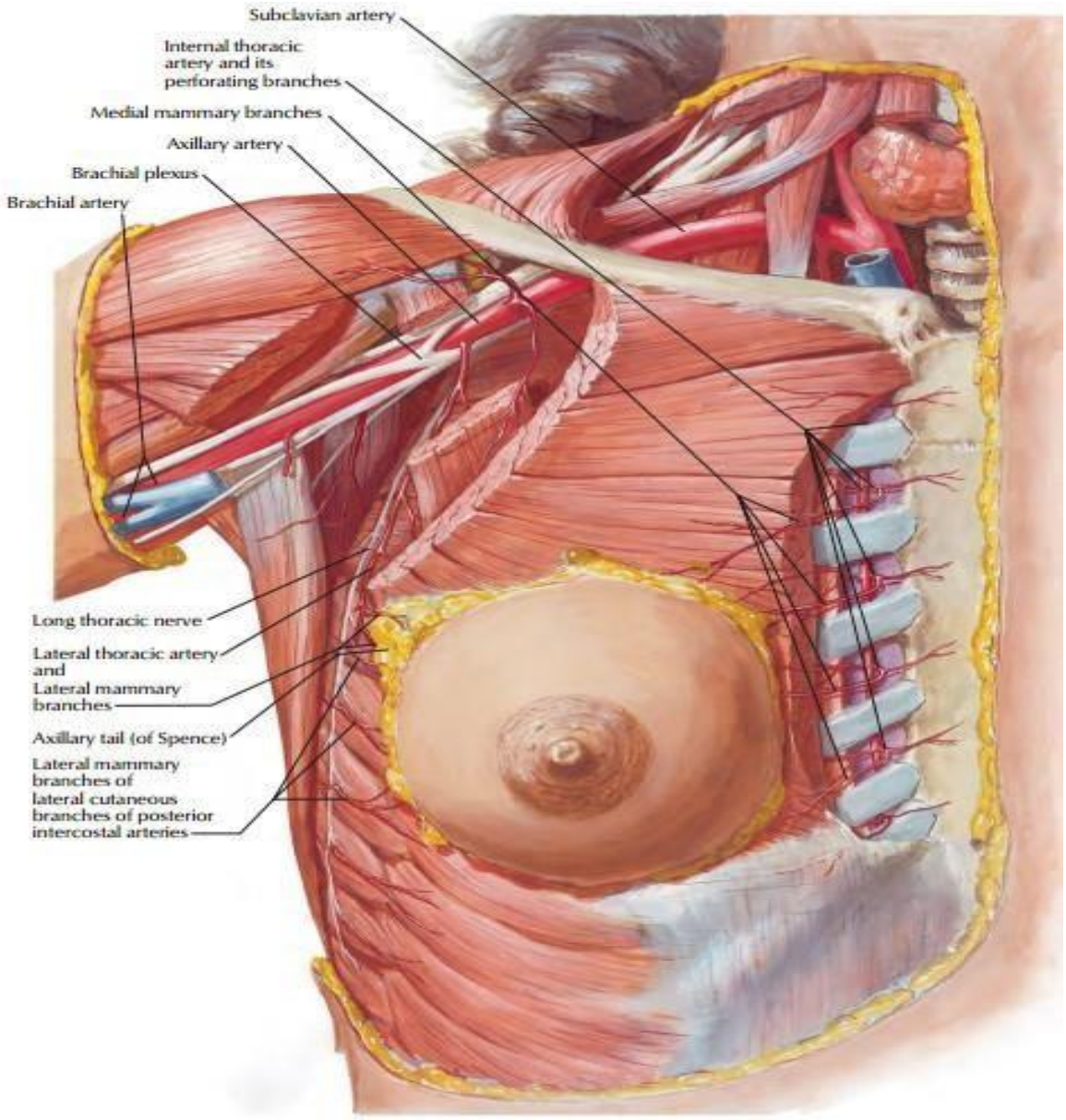


SAGITAL VIEW -BREAST

Deep fascia – This layer is deep to the breast parenchymaand envelops the pectoralis major. It is continuous with clavicle above todeep abdominal fascia below and spans from the sternum to the axilla laterally.

Retro-mammary bursa space between deep layer of superficial fascia and pectoral fascia allowing free mobility of breast over chest wall.

Arterial supply: (1) anterior perforators of the internal mammary artery (responsible for approximately 60% of the breast, mostly medial and central); (2) branches from the axillary artery, such as the highest and lateral thoracic, and the thoraco-acromial artery and (3) lateral branches of the intercostal arteries.



Venous drainage:

Venous drainage typically mimics the arterial supply.

(1) internal mammary veins, (2) tributaries of the axillary vein, and (3) branches of the intercostal veins.

Posterior intercostal vein communicate with Batson plexus responsible for vertebral metastasis in carcinoma breast.

Nervous innervations:

The sensory nerve supply to the breast is principally derived from anterior and lateral cutaneous branches from third through sixth intercostal nerves. Thenipple-areola complex is innervated by the fourth intercostal nerve.

Lymphatics of breast:

Drains predominantly into axillary and internal-mammary lymph nodes.

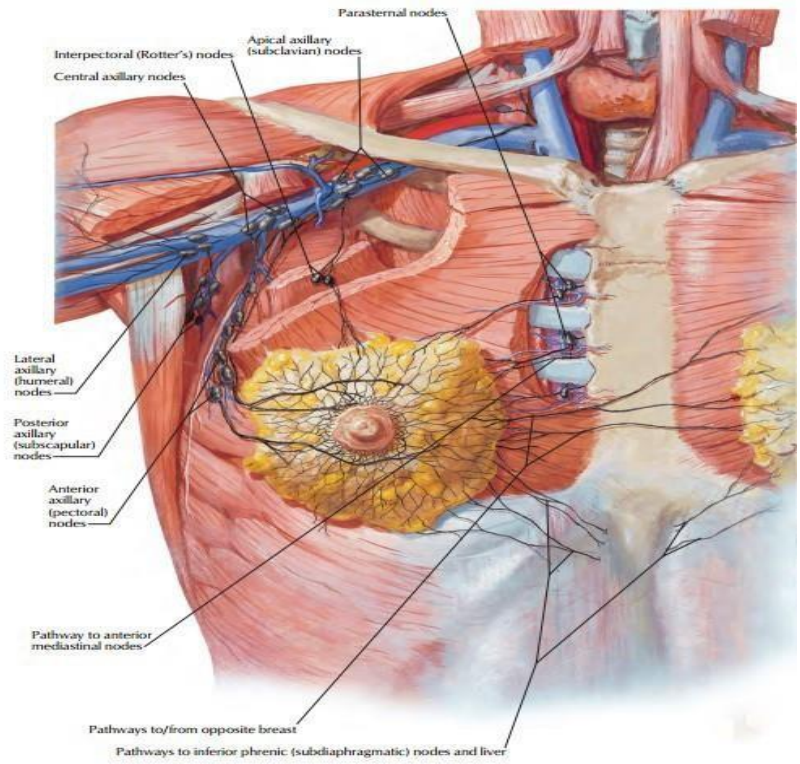
AXILLARY LYMPH NODE: they receive approximately 85% and arranged in following groups:

Lateral nodes along axillay vein,Anterior group of nodes along lateral thoracic vessels, Posterior group along scapular vessels, Central group embedded in fat, Inter-pectoral nodes between pectoralis major and minor,Apical group above pectoralis minor tendon

Apical is continuity with supra-clavicular node drain into subclavian lymph trunk which enters into jugular trunk via thoracic duct.

INTERNAL MAMMARY NODES: few in number which lie along internal mammary vessels between first and sixth intercostal spaces along the sternalborder , drain posterior third of breast.

SAPPEY`s PLEXUS:The superficial lymphatic plexus that drains the skin of the breast and the nipple-areola complex is often referred to *as Sappey's plexus*.



LYMPHATICS-BREAST

Lymph flows from the skin to the sub-areolar plexus and then into the interconnected deep lymphatic plexus that drains the breast parenchyma via the lymphatic vessels associated with the lactiferous ducts.

Physiological Breast Development: Breast development is stimulated by various hormones. Estrogen stimulates ductaldevelopment; progesterone stimulates lobular development and epithelial differentiation.At the onset of puberty, the hypothalamic-pituitary axis becomes less sensitive to the negative feedback of estrogen. This desensitization leads to an increase in gonadotropin releasing hormone (GnRH) from the hypothalamus. This increase in GnRH stimulates the release of luteinizing hormone (LH) and follicle-stimulating

hormone (FSH) from the anterior pituitary, which in turn leads to an increase in estrogen and progesterone release, thus stimulating breast development.During pregnancy and lactation, prolactin is primarily responsible for up-regulating hormone receptors and stimulating epithelial development and lactogenesis in the breast

CLINICAL FEATURES OF BREAST DISEASE:

Breast lump: common presentation of breast diseases. Lump with long history with slow growth is a benign condition-fibroadenosis or fibroadenoma. Lump with short history and fast growth probably a carcinoma,though atrophic scirrhous carcinoma is slow growing tumour.

Breast pain: Lump which is painless and incidentally noticed during washing may be carcinoma.Pain more complaint in acute mastitis which is throbbingin naturewhen pus is formed.Fibroadenosis also present with cyclical pain in young age. In case of fibroadenosis affecting women after menopause due to peri-mastitis.

Nipple discharge: fresh blood seen in duct papilloma or carcinoma. Pus noted in mammary abscess. Milk discharged during lactation,galactocele or mammary fistula due to chronic sub-areolar abscess.Serous or greenish discharge in fibroadenosis or mammary duct ectasia.

Nippleretraction : recent onset of retraction is important usually with underlying carcinoma.

DIFFERENTITIAL DIAGNOSIS OF BREAST MASSES:

1.Fibroadenoma:

Fibroadenomas are benign breast tumors that are composed of epithelial and stromal elements arising from the terminal duct lobular unit in young females.These masses varies from sub-centimeter to >4 cm. Fibroadenomas that are larger than 5 cm are termed giant fibroadenomas and juvenile giant fibroadenomas, specifically, when found in younger women.

Clinical Presentation: Mostly asymptomatic; common presentation is a painless firm, mobile mass that does not adhere to the chest wall or the skin of the breast. Medical attention if pain, rapid growth, cosmetic deformity, and fear of malignancy.

Radiological Findings:

Ultrasound as it occurs in young patients shows round, oval, or lobular well-circumscribed hypoechoic mass.

For women who have personal history or family history of breast cancer, are over the age of 35, or have symptoms that are not clinically congruent with a fibroadenoma, a bilateral baseline *mammogram* should be considered as an adjunctive test that sometimes shows calcifications.

Core needle biopsy should be obtained when the diagnosis is uncertain due to suspicious features on imaging or there is change in clinical findings (e.g., rapid growth) that may affect surgical planning.

Pathology: The gross examination reveals a firm, smooth, tan-whitish, lobulated mass that is well-marginated and distinct from the surrounding breast tissue. C/Sdemonstrates a homogeneous mass that can have a "bulging" appearance.

Microscopically, fibro-adenomas have epithelial and stromal elements with smooth, well-circumscribed borders that can exhibit one of the two growth patterns, peri-canalicular or intra-canalicular, which pertain to the architecture of the ductal elements. When there is evidence of sclerosingadenosis, metaplasia, or hyperplasia, they are termed complex fibro adenomas.

Special types of rare fibro-adenomas are classified based upon histological features. *Tubular adenomas* or pure adenomas have prominent adenosis and very little stromal elements. *Lactational adenomas* exhibitlactational changes in secretory glands in fibro-adenomas of pregnant or breastfeeding women.

Management

Simple fibro-adenomas that are asymptomatic and <3 cm, without evidence of growth, in a patient who has no personal or family risk factors for breast cancer can be safely observed. The incidence of malignant transformation is extremely low, and there is no increased lifetime risk of breast cancer.

Excision should be considered in patients who have evidence of growth, indeterminate histo-pathological findings (frequently reported as fibroepithelial lesions), complex fibroadenomas, symptoms such as pain or issues with cosmesis, or patient desire.

2.Intraductal Papilloma:

Intraductalpapillomas are benign breast neoplasms that develop within a mammary duct and are composed of breast epithelium supported by underlying stroma and a branching fibrovascular core. They are so named due to their microscopic appearance, and exhibit papillary architecture.Incidence of 2–3% in women aged 30–55.

Clinical Presentation

Intraductalpapillomas are located in either the central or peripheral portion of the breast. They may be solitary or numerous.

- *centralpapillomas* is single-duct, spontaneous nipple discharge, which may be serous, greenish, or bloody. Less frequently, they may present as a palpable mass.
- *peripheralpapillomas* are very frequently asymptomatic and detected incidentally on breast imaging. When they are multiple or with atypia, more likely to be associated with malignancy .

Imaging

- Central papillomas :The ultrasound appearance of an intraductal mass or complex cystic lesion and is often associated with a dilated duct. When a ductogram is performed, cannulation of the duct shows discharge. The findings are either a completely obstructed duct, duct expansion and distortion, intraductal filling defects, duct ectasia, or wall irregularity.
- In peripheral papillomasmammamographyappear as architectural distortions, nodular densities, breast masses with or without calcification.

Pathology

*gross examination*appear as a mass growing into the duct. *Microscopically*, peripheral and central papillomas are composed of a stalk with a fibrovascular core and overlying myoepithelial and ductal epithelial cells. The ductal epithelium can also exhibit the same proliferative changes observed elsewhere in the breast sometimes associated with ductal epithelial hyperplasia, atypical ductal hyperplasia, or ductal carcinoma in situ.

Management: Observation with surveillance imaging.

3.Lipoma:

Benign mass consisting of adipose tissue and is the most common soft tissue tumor in the body.

Clinical Presentation:

Breast lipomas are typically small, soft, and doughy or semi- firm, painless, mobile masses that are frequently well circumscribed. The term “giant” lipoma , mass that has grown to at least 10 cm in size.

Radiological Findings

Mammography shows a mass with a density similar to that of the surrounding breast fat with a very thin surrounding capsule. Occasionally, benign-appearing calcifications observed within the mass and may represent fat necrosis.

Ultrasound findings reveal an isoechoic or slightly hyperechoic mass with a thin surrounding echogenic capsule. There is also typically no posterior acoustic enhancement or shadowing .

Pathology

On *gross examination*an encapsulated, smooth, fatty mass that may have lobulations is usually observed. Histologically, the specimen is composed of mature adipocytes.

Management

Surgical excision for lipomasis curative although rarely necessary except for symptom control due to large size, diagnostic uncertainty, radiological pathological discordance, or patient desire.

4.Hamartoma

Definition: well-circumscribed mass of benign breast tissue admixed with stromal tissue and fat that is without structural organization. Hamartomas are considered rare breast tumors that encompass fibroadenolipomas, adenolipomas, chondro-lipomas, and myoidhamartomas.

Clinical Presentation:a well-- circumscribed, mobile, soft, and non-tender breast mass.

Imaging:

- *Mammographic findings* may include architectural distortions, asymmetric masses with mixed densities and pseudo-capsules, or well-circumscribed nodules. Because hamartomas are masses of disorganized breast tissue with various stromal elements, they will typically have a density similar to that of the surrounding tissue and sometimes have been referred to as "breast-in-breast" lesions.
- *ultrasonographic* findings specifically demonstrate a hypoechoic, homogenous mass with distinct borders and no posterior acoustic shadowing. Similarly, they may also demonstrate heterogeneous internal echo patterns due to the differential amounts of breast and stromal tissue present in the tumor.
- MRI exhibits a gradual enhancement pattern on time-signal intensity

curves that differentiates them from malignant processes, which have more rapid enhancement patterns, particularly on dynamic contrast-enhanced MRIs

Pathology

The gross appearance of a hamartoma is a smooth, lobulated mass with variable amounts of fat and fibrous tissue on sectioning.

Hamartomas can be further classified by their cellular composition. *Adenolipomas* will have disorganized benign glandular, adipose, and stromal elements that form a mass with a pseudocapsule or compressed tissue at the borders. *Chondrolipomas* will contain benign hyaline cartilage admixed with breast lobules and adipose tissue. *Myoidhamartomas* have an additional smooth muscle component.

Management

Complete surgical excision is curative. Pure breast hamartomas do not increase a patient's lifetime risk of breast cancer

5.GRANULAR CELL TUMOUR: Benign neoplasm of neural originderived from Schwann cells. Incidence in breast about 5-8%

Clinical presentation:It mimic a malignancy, occur in medial quadrant of the breast as a hard, non--tender, mobile mass due to their perineural origin along the path of the supraclavicular nerve in female around 40-50 years.

Imaging: The *mammographic* appearance include smooth, rounded, or lobulated opacities suggestive of a benign process or an indistinct spiculated mass more suspicious of malignancy.

Ultrasonographically, granular cell tumors can appear as homogeneous or heterogeneously hypoechoic masses with indistinct borders and posterior acoustic shadowing or as anechoic lesions

Pathology

Gross examination reveals smooth-surfaced occasionally lobulated firm masses that are gray- white or tan in color. Lesions are generally less than 3 cm but grow up to 6 cm in size.

The *histological* characteristics of granular cell tumors explain the theories behind the perineural origin of the tumor due to its microscopic similarities to Schwann cells, specifically its positive cytoplasmic and nuclear staining for S-100 protein .

Malignant granular cell tumors are rare, occurring in 1–2%. The histological criteria for malignant granular cell tumors include tumors>5 cm, areas of necrosis within the tumor, high mitotic activity, and nuclear pleomorphism.

Management: Wide local excision recommended to exclude co-existing malignant pathology.

6.Radial Scar

A radial scar is a benign breast lesion of unknown origin .The lesion as consisting of a “hyalinized sclerotic center containing abundant elastic and elastoid masses. These radiate into the periphery and enclose lobuli which reveal epithelial proliferation varying from simple hyperplasia with epithelial villi to the rather rare true papillomas

The term radial scar conventionally denotes pathological size and is used for lesions measuring up to 9 mm, whereas larger lesions are called complex sclerosinglesions .the incidence of radial scars as 7–28% .

Clinical Presentation: present as a painless, firm breast mass once it reaches a considerable size. Radial scars can occur anywhere in the breast, radial scars on their larger counterpart,called as complex sclerosing lesions.

Imaging:

The *mammographic* appearance of architectural distortion with a central lucency, radiating, long thin spicules that vary in appearance on different projections in the absence of a palpable clinical finding suggests a radial scar. The absence of microcalcifications has also been noted as a feature of radial scars.

Ultrasoundshows hypoechoic masses or parenchymal distortion.

*MRI*for distinguishing radial scars from malignancy.

Pathology:

Gross examination shows firm lesion with a pale core, irregular edges, and yellowish radiating streaks that appear to be infiltrating the surrounding normal breast tissue , consistent with carcinomas finding of surrounding microcysts, which may be present in radial scars but are not seen in invasive disease .

Histologically, radial scars exhibit a fibroelastotic core with entrapped ducts and radiating ducts and lobules at varying levels of proliferation. These will resemble the spokes in a wheel and are best appreciated on low-power magnification.also associated with calcifications , atypical lesions, lobular neoplasia, and in situ or invasive carcinomas.

*Immunohistochemical*staining for myoepithelial markers such as smooth muscle actin, calponin, smooth myosin heavy chain, or p63 can help distinguish it from carcinoma.

Management

Surgical excision justified becauseno imaging modality has been proven to guarantee the benign nature of such lesions.

CARCINOMA BREAST:

cancer forms in either the lobules or the ducts /fatty tissue/fibrous connective tissue of the breast.

CLINICAL FEATURES:

In its early stages, breast cancer may not cause any symptoms.

- breast lump ,breast pain, pitted skin over your entire breast
- bloody discharge from your nipple
- peeling, scaling, or flaking of skin on your nipple or breast
- a sudden, unexplained change in the shape or size of your breast
- inverted nipple,a lump or swelling under your arm

TYPES OF BREAST CANCER:

- **Ductal carcinoma in situ.**
- **Lobular carcinoma in situ.**
- **Invasive ductal carcinoma.**
- **Invasive lobular carcinoma.**
- **Paget disease of the nipple**
- **Phyllodestumor.**
- **Angiosarcoma.**

INVESTIGATION: mammogram, usg, mri,and biopsy from lump.

TREATMENT: Surgery, chemotherapy ,radiotherapy, hormonal therapy, targeted therapy.

BREAST IMAGING:

M**ammography:**

Mammography is specialized imaging that uses a low-dose x-ray system to see inside the breasts.

Screening Mammography

Current guidelines from the American College of Radiology (ACR) and the National Comprehensive Cancer Network (NCCN) recommend screening mammography every year for women, beginning at age 40 that lead to early detection of breast cancers, when they are most curable and breast-conservation therapies are available.

The ACR and the National Cancer Institute (NCI) also suggest that women who have had breast cancer, and those who are at increased risk due to a family history of breast or ovarian cancer, should begin screening before age 40 and may need breast MRI in addition to your annual mammogram.

Diagnostic mammography: Diagnostic mammography is used to evaluate a patient with abnormal clinical findings—such as a breast lump or nipple discharge—that have been found by the woman or doctor/after an abnormal screening mammogram in order to evaluate the area of concern on the screening exam.

Three recent advances in mammography include

1.digital mammography 2.computer-aided detection and 3.breast tomo-synthesis.

1.Digital mammography, also called full-field digital mammography (FFDM), is a mammography system in which the x-ray film is replaced by electronics that convert x-rays into mammographic pictures of the breast. This enables to see structures with a lower radiation dose. These images of the breast are transferred to a computer for review by the radiologist and for long term storage. The patient's experience during a digital mammogram is similar to having a conventional film mammogram.

2.Computer-aided detection (CAD) systems search digitized mammographic images for abnormal areas of density, mass, or calcification that may indicate the presence of cancer. The CAD system highlights these areas on the images, alerting the radiologist to carefully assess this area.

3.Breast tomosynthesis, also called 3-D mammography and digital breast tomosynthesis (DBT), is an advanced form of breast imaging where multiple images of the breast from different angles are captured and reconstructed ("synthesized") into a three-dimensional image set. In this way, 3-D breast imaging is similar to computed tomography (CT) imaging in which a series of thin "slices" are assembled together to create a 3-D reconstruction of the body.

Although the radiation dose for some breast tomosynthesis systems is slightly higher than the dosage used in standard mammography, it remains within the

FDA-approved safe levels for radiation from mammograms. Breast tomosynthesis may also result in:

- earlier detection of small breast cancers that may be hidden on a conventional mammogram
- Avoiding few unnecessary biopsies or additional tests
- greater likelihood of detecting multiple breast tumors
- clearer images of abnormalities within dense breast tissue
- greater accuracy in pinpointing the size, shape and location of breast abnormalities

Preparation: The best time for a mammogram is one week following your period.

The ACS also recommends you:

- Do not wear deodorant, talcum powder or lotion under your arms or on your breasts on the day of the exam. These can appear on the mammogram as calcium spots.
- Describe any breast symptoms and family history/drug exposure history to the technologist.
- Obtain your prior mammograms and make them available to the radiologist if they were done at a different location. This is needed for comparison with your current exam and can often beobtained on a CD.

- M**ammography equipment:**
- A mammography unit is a rectangular box that houses the tube in which x-rays are produced. The unit is used exclusively for x-ray exams of the breast, with special accessories that allow only the breast to be exposed to the x-rays. Attached to the unit is a device that holds and compresses the breast and positions it so images can be obtained at different angles.

Breast tomosynthesis is performed using digital mammography units, but not all digital mammography machines are equipped to perform tomosynthesis imaging.

Mechanism :

X-rays are a form of radiation like light or radio waves. Once it is carefully aimed at the part of the body being examined, an x-ray machine produces a small burst of radiation that passes through the body, recording an image on photographic film or a special detector.

Different parts of the body absorb the x-rays in varying degrees. Dense bone absorbs much of the radiation while soft tissue, such as muscle, fat and organs, allow more of the x-rays to pass through them. As a result, bones appear white on the x-ray, soft tissue shows up in shades of gray and air appears black.Most x-ray images are digital files that are stored electronically. These stored images are easily accessible for diagnosis and disease management.

In conventional film and digital mammography, a stationery x-ray tube captures an image from the side and an image from above the compressed breast. In breast tomosynthesis, the x-ray tube moves in an arc over the breast, capturing multiple images from different angles.

Procedure:

Mammography is performed on an outpatient basis.

During mammography, a specially qualified radiologic technologist will position your breast in the mammography unit. Your breast will be placed on a special platform and compressed with a clear plastic paddle. The technologist will gradually compress your breast.

Breast compression is necessary in order to:

- Even out the breast thickness so that all of the tissue can be visualized.
- Spread out the tissue so that small abnormalities are less likely to be hidden by overlying breast tissue.
- Allow the use of a lower x-ray dose since a thinner amount of breast tissue is being imaged.

- Hold the breast still in order to minimize blurring of the image caused by motion.
- Reduce x-ray scatter to increase sharpness of picture.

The routine views are a top-to-bottom view and an angled side view. The process will be repeated for the other breast. Compression is still necessary for tomosynthesis imaging in order to minimize motion, which degrades the images. During screening breast tomosynthesis, two-dimensional images are also obtained or created from the synthesized 3-D images.

You must hold very still and may be asked to keep from breathing for a few seconds while the x-ray picture is taken to reduce the possibility of a blurred image.

Merits:

- Screening mammography reduces the risk of death due to breast cancer. It is useful for detecting all types of breast cancer, including invasive ductal and invasive lobular cancer.
- Screening mammography improves a physician's ability to detect small tumors.
- No radiation remains in a patient's body after an x-ray examination.

Demerits:

- There is always a slight chance of cancer from excessive exposure to radiation. However, the benefit of an accurate diagnosis far outweighs the risk.

- FalsePositive results of about 5-15% in screening mammograms, that require further studies.
- False negativity : negative result does not exclude carcinoma breast which needs further study.
- Interpretations of mammograms can be difficult because a normal breast looks different for each woman.
- Increased breast density makes it difficult to see a cancer on mammography.

Ultrasound :

Ultrasound imaging of the breast uses sound waves to produce pictures of the internal structures of the breast.It is safe, noninvasive and does not use radiation and does not require special preparation. Leave jewellry at home and wear loose, comfortable clothing. You will be asked to undress from the waist up and to wear a gown during the procedure**.**

Ultrasound Imaging technique:

It uses a small probe called a transducer and gel placed directly on the skin. High-frequency sound waves travel from the probe through the gel into the body. The probe collects the sounds that bounce back. A computer uses those sound waves to create an image. Ultrasound exams do not use radiation (as used in X-rays). Because images are captured in real-time, they can show the structure and movement of the body's internal organs.

Dopplerultrasound is a special ultrasound technique that evaluates movement of materials in the body. It allows the doctor to see and evaluate blood flow through arteries and veins.

ADVANTAGE OVER MAMMOGRAM:

- **Determining the Nature of a Breast Abnormality**
  Ultrasound imaging can help to determine if an abnormality is solid or cystic. Doppler ultrasound is used to assess blood supply in breast lesions.

- **Supplemental Breast Cancer Screening**
  Some breast lesions and abnormalities are not visible are difficult to interpret on mammograms.
- *pregnant* should not be exposed to x-rays (which are necessary for a mammogram).
- Young female have increased breast density mammography low sensitivity in detecting abnormality.

- Ultra sound guided breast biopy: When an ultrasound examination reveals a suspicious breast abnormality, a physician may choose to perform an ultrasound-guided biopsy.

  Preparation:You will be asked to undress from the waist up and to wear a gown during the examination.

Positioning: You will lie on your back on the examining table and may be asked to raise your arm above your head

Ultra sound machine and mechanism:

Ultrasound scanners consist of a computer console, video display screen and an attached transducer. The transducer is a small hand-held device that resembles a microphone. The transducer sends out inaudible, high-frequency sound waves into the body and then listens for the returning echoes.

The technologist applies a small amount of gel to the area under examination and places the transducer there. The gel allows sound waves to travel back and forth between the transducer and the area under examination. The ultrasound image is immediately visible on a video display screen that looks like a computer monitor. The computer creates the image based on the loudness (amplitude), pitch (frequency) and time it takes for the ultrasound signal to return to the transducer.

Mechanism:

Ultrasound imaging is based on the same principles involved in the sonar used by bats and fishermen. When a sound wave strikes an object, it bounces back, or echoes. By measuring these echo waves, it is possible to determine how far away the object is as well as the object's size, shape and consistency. This includes whether the object is solid or filled with fluid.

In an ultrasound exam, a transducer both sends the sound waves and records the echoing waves. When the transducer is pressed against the skin, it sends small pulses of inaudible, high-frequency sound waves into the body. As the sound waves bounce off internal organs, fluids and tissues, the sensitive receiver in the transducer records tiny changes in the sound's pitch and direction. These signature waves are instantly measured and displayed by a computer, which in turn creates a real-time picture on the monitor. One or more frames of the moving pictures are typically captured as still images. Short video loops of the images may also be saved.

Doppler ultrasound, a special ultrasound technique, measures the direction and speed of blood cells as they move through vessels. The movement of blood cells causes a change in pitch of the reflected sound waves (called the Doppler effect). A computer collects and processes the sounds and creates graphs or color pictures that represent the flow of blood through the blood vessels.

There is usually no discomfort from pressure as the transducer is pressed against the area being examined. However, if scanning is performed over an area of tenderness, you may feel pressure or minor pain from the transducer.Dopplersonography is performed using the same transducer.

Once the imaging is complete, the clear ultrasound gel will be wiped off your skin. Any portions that are not wiped off will dry quickly. The ultrasound gel does not usually stain or discolor clothing.

Benefits

- Most ultrasound scanning is noninvasive (no needles or injections).
- may be temporarily uncomfortable, but it is not be painful.
- widely available, easy-to-use and less expensive than most other imaging methods.
- Ultrasound imaging is extremely safe and does not use radiation.
- Ultrasound scanning gives a clear picture of soft tissues that do not show up well on x-ray images.
- Ultrasound provides real-time imaging, making it a good tool for guiding minimallyinvasive procedures such as needlebiopsies and fluid aspiration.

What are the limitations of Ultrasound Imaging of the Breast?

- It does not replace annual mammography.
- Calcifications seen on mammography cannot be seen on ultrasound. Some early breast cancers only show up as calcifications on mammography. MRI findings that are due to cancer are not always seen with ultrasound.

- Biopsy may be recommended to determine if a suspicious abnormality is cancer or not.Most suspicious findings on ultrasound that require biopsy are not cancer.

Mammography Lexicon			
Breast composition	A. entirely fatty B. scattered areas of fibroglandular density C. heterogeneously dense, which may obscure masses D. extremely dense, which lowers sensitivity		
Mass	**shape**	oval - round - irregular	
	margin	circumscribed - obscured - microlobulated - indistinct - spiculated	
	density	fat - low - equal - high	
Asymmetry	asymmetry - global - focal - developing		
Architectural distortion	distorted parenchyma with no visible mass		
Calcifications	**morpho-logy**	typically benign	
		suspi-cious	1. amorphous 2. coarse heterogeneous 3. fine pleiomorphic 4. fine linear or fine linear branching
	distribu-tion	diffuse - regional - grouped - linear - segmental	
Associated features	skin retraction - nipple retraction - skin thickening - trabecular thickening - axillary adenopathy - architectural distortion - calcifications		

Ultrasound Lexicon		
Breast composition	a. homogeneous - fat b. homogeneous - fibroglandular c. heterogeneous	
Mass	**shape**	oval - round - irregular
	margin	Circumscribed **or** Not-circumscribed: indistinct, angular, microlobulated, spiculated
	orienta-tion	parallel - not parallel
	echo pattern	anechoic - hyperechoic - complex cystic/solid hypoechoic - isoechoic - heterogeneous
	posterior features	no features - enhancement - shadowing - combined pattern
Calcifications	in mass - outside mass - intraductal	
Associated features	architectural distortion - duct changes - skin thickening - skin retraction - edema - vascularity (absent, internal, rim) - elasticity	
Special cases *(cases with a unique diagnosis)*	simple cyst - clustered microcysts - complicated cyst - mass in or on skin - foreign body (including implants) - intramammary lymph node - AVM - Mondor disease - postsurgical fluid collection - fat necrosis	

Magnetic Resonance Imaging (MRI) – Breast

- Magnetic resonance imaging (MRI) of the breast uses a powerful magnetic field, radio waves and a computer to produce detailed pictures of the structures within the breast. It is primarily used as a supplemental tool to breast screening with mammography or ultrasound. It may be used to screen women at high risk for breast cancer.

MRI of the Breast

- Magnetic resonance imaging (MRI) is a noninvasive test used to diagnose medical conditions.
- MRI uses a powerful magnetic field, radio waves and a computer to produce detailed pictures of internal body structures. MRI does not use radiation (x-rays).
- Detailed MR images allow doctors to examine the body and detect disease. The images can be reviewed on a computer monitor. They may also be sent electronically, printed or copied to a CD, or uploaded to a digital cloud server.MRI of the breast offers valuable information about many breast conditions that cannot be obtained by other imaging modalities, such as mammography or ultrasound.

Common uses of the procedure:

- MRI of the breast is not a replacement for mammography or ultrasound imaging but rather a supplemental tool that has many important uses, including:
- Screening in women at high risk for breast cancer

  For women at high risk for breast cancer, typically because of a strong family history, MRI may be an appropriate tool to screen for breast cancer. A strong family history is usually a mother or sister who has had breast cancer before age 50.
- Determining the extent of cancer after diagnosis: how large the cancer is and whether it involves the underlying muscle;Unsuspected lesion in the opposite breast; any abnormally large lymph nodes in the armpit, which can be a sign the cancer has spread to that site.MRI can be used to definitively determine if the abnormality needs biopsy or can safely be left alone.
- Evaluating lumpectomy sites in the years following breast cancer treatment

  Scarring and recurrent cancer can look identical on mammography and ultrasound. If a change in a lumpectomy scar is detected by either mammography or a physical exam, MRI can help determine whether the change is normal maturation of the scar or a recurrence of the cancer.

- Following chemotherapy treatment in patients receiving neoadjuvant chemotherapy. MRI is often used to monitor how well the chemotherapy is working and to reevaluate the amount of tumor still present before the surgery is performed.
- Evaluating breast implants:MRI is the best test for determining whether silicone implants have ruptured.

Preparation:

- You may need to wear a hospital gown. Or, you may be allowed to wear your own clothing if it is loose-fitting and has no metal fasteners.
- Some MRI exams use an injection of contrast material.MRI exams commonly use a contrast material called gadolinium. Gadolinium can be used in patients with iodine contrast allergy. A patient is much less likely to be allergic to gadolinium contrast than to iodine contrast. However, even if the patient has a known allergy to gadolinium, it may be possible to use it after appropriate pre-medication.

    - Some conditions, such as severe kidney disease, may require the use of specific types of gadolinium contrast that are considered safe for patients with kidney disease. You may need a blood test to determine whether your kidneys are functioning normally.

- Women should always tell their doctor and technologist if there is a chance they are pregnant. Therefore, pregnant women should not have an MRI in the first trimester unless the benefit of the exam clearly outweighs any potential risks. Pregnant women should not receive gadolinium contrast unless absolutely necessary..
- If you have claustrophobia (fear of enclosed spaces) or anxiety, you may want to ask your doctor to prescribe a mild sedative prior to your exam.
- Leave all jewelry and other accessories at home or remove them prior to the MRI scan. Metal and electronic items can interfere with the magnetic field..
- In most cases, an MRI exam is safe for patients with metal implants, except for a few types. People with the following implants may not be scanned and should not enter the MRI scanning area without first being evaluated for safety
- Machine and mechanism:
- The traditional MRI unit is a large cylinder-shaped tube surrounded by a circular magnet. You will lie on a table that slides into the center of the magnet.Some MRI units, called short-bore systems, are designed so that the magnet does not completely surround you. Some newer MRI machines have a larger diameter bore, which can be more comfortable for larger patients or those with claustrophobia.

- radio waves re-align hydrogen atoms that naturally exist within the body. This does not cause any chemical changes in the tissues. As the hydrogen atoms return to their usual alignment, they emit different amounts of energy depending on the type of body tissue they are in. The scanner captures this energy and creates a picture using this information.In most MRI units, the magnetic field is produced by passing an electric coils are located in the machine placed around the part of the body being imaged. These coils send and receive radio waves, producing signals that are detected by the machine. The electric current does not come in contact with the patient.A computer processes the signals and creates a series of images, each of which shows a thin slice of the body. These images can be studied from different angles by the radiologist.
- MRI exams may be done on an outpatient basis.
- You will be positioned on the moveable exam table. Straps and bolsters may be used to help you stay still and maintain your position.
- For an MRI of the breast, you will lie face down on a platform specially designed for the procedure. The platform has openings to accommodate your breasts and allow them to be imaged without compression. The electronics needed to capture the MRI image are actually built into the platform. It is important to remain very still throughout the exam. This is best accomplished by making sure you are comfortable and can relax rather than trying to actively hold still tensing your muscles. Be sure to let

the technologist know if something is uncomfortable, since discomfort increases the chance that you will feel the need to move during the exam.

- you will need to have a contrast material injected intravenously. MRI of the breast *without* contrast material is inadequate for identifying breast cancers.
- You will be placed into the magnet of the MRI unit. The technologist will perform the exam while working at a computer outside of the room.
- If a contrast material is used during the exam, it will be injected into the intravenous line (IV) after an initial series of scans. The imaging session lasts between 30 minutes and one hour and the total examination is usually completed within an hour and a half

Benefits

- MRI is a noninvasive imaging technique that does not involve exposure to radiation.
- MRI has proven valuable in detecting and staging breast cancer, particularly when other imaging studies (mammography, ultrasound, etc.) fail to provide adequate information.
- MRI as an addition to mammography has been shown to be useful in evaluating women at high risk for breast cancer.
- MRI can successfully image the dense breast tissue common in younger women, and it can successfully image breast implants.

- If a suspicious lesion is seen with MRI only, MRI can provide guidance for biopsy.
- The MRI gadolinium contrast material is less likely to cause an allergic reaction than the iodine-based contrast materials used for x-rays and CT scanning.

Risks:

- The strong magnetic field is not harmful. However, it may cause implanted medical devices to malfunction or cause distortion of the images.
- Nephrogenic systemic fibrosis is a recognized, but rare, complication related to injection of gadolinium contrast. There is a very slight risk of an allergic reaction if contrast material is used.IV contrast manufacturers indicate mothers should not breastfeed their babies for 24-48 hours after contrast material is given.

Limitations of MRI of the Breast:

- High-quality images depend on your ability to remain perfectly still and follow breath-holding instructions while the images are being recorded. If you are anxious, confused or in severe pain, you may find it difficult to lie still during imaging.

- A person who is very large may not fit into certain types of MRI machines. There are weight limits on the scanners.
- Implants and other metallic objects can make it difficult to obtain clear images. Patient movement can have the same effect.
- A very irregular heartbeat may affect the quality of images. This is because some techniques time the imaging based on the electrical activity of the heart.
- MRI may not always distinguish between cancer tissue and fluid, known as edema.
- MRI typically costs more and may take more time to perform than other imaging methods.
- Sometimes a benign (non-cancerous) piece of tissue in the breast can take up the contrast material and show up as a bright spot on the image.

BIRADS

- The American College of Radiology (ACR) has established the Breast Imaging Reporting and Data System (BI-RADS) to guide the breast cancer screening and diagnostic routine.
- The BI-RADS atlas provides a standardized system for performing breast imaging examinations, interpreting the findings, reporting the results, communicating recommendations to patients and providers, and auditing

statistical performance. Guide radiologists and referring physicians in the breast cancer decision-making process that facilitates patient care.

- The goal of the radiologist is to determine whether the findings are normal, benign, or suspicious enough to warrant tissue sampling.

Final Assessment Categories			
	Category	Management	Likelihood of cancer
0	Need additional imaging or prior examinations	Recall for additional imaging and/or await prior examinations	n/a
1	Negative	Routine screening	Essentially 0%
2	Benign	Routine screening	Essentially 0%
3	Probably Benign	Short interval-follow-up (6 month) or continued	>0 % but ≤ 2%
4	Suspicious	Tissue diagnosis	4a. low suspicion for malignancy (>2% to ≤ 10%) 4b. moderate suspicion for malignancy (>10% to ≤ 50%) 4c. high suspicion for malignancy (>50% to <95%)
5	Highly suggestive of malignancy	Tissue diagnosis	≥95%
6	Known biopsy-proven	Surgical excision when clinical appropriate	n/a

DIAGNOSTIC BIOPSY

Aspiration

- Simple cysts diagnosed with ultrasound need not be aspirated unless the cyst causes the patient pain or anxiety regarding the finding. If the fluid aspirated is greenish or yellow-brown and the mass resolves sonographically, a benign diagnosis can be virtually confirmed and the

fluid may be discarded. Follow-up is necessary within 4 to 6 weeks to ensure that the cyst has not recurred. Biopsy may be indicated if the cyst recurs. If the fluid aspirated is bloody, cytologic analysis should be performed to rule out malignancy, which occurs in a very small percentage of cases. Cysts that yield bloody fluid should not be aspirated completely as the cyst may be difficult to localize either by physical examination or by imaging localization as histologic sampling is usually required in this situation.

- Complicated cysts, as defined by thin septations, debris within the cyst, rim enhancement or a cluster of microcysts may require short-term follow-up or aspiration for cytology or histologic biopsy as indicated. A solid component may indicate a papillary lesion and a cystic-solid lesion should undergo tissue diagnosis with biopsy. If that does not resolve with aspiration necessitates tissue diagnosis as well.

Fine Needle Aspiration Biopsy

Cytologic analysis of a solid mass by fine needle aspiration (FNA) biopsy can be obtained rapidly, and often the patient can be informed of the results the same day. The technique can be performed using imaging guidance or by palpation. The diagnostic accuracy of FNA biopsy of breast masses approximates 80%. When the specimen is properly prepared and reviewed by an experienced cytopathologist, the false positive result is rare. False-negative results occur in approximately 15% of cases and thus a lesion that is suspicious

clinically or by imaging must be further investigated with core biopsy. When physical examination, imaging, and FNA yield benign concordant results, the probability of a lesion being benign approaches 95%. Suspicious axillary lymph nodes may also be assessed with FNA during a breast cancer staging evaluation.

Core Needle Biopsy

Core biopsy is the preferred method of evaluating an indeterminate or suspicious solid mass. Core biopsy obtains several tissue specimens for histologic evaluation. This can be performed using a variety of image guided techniques or by palpation. The value of a core biopsy over an FNA is the ability to obtain hormone receptor and HER2 status, which is essential for personalized medicine.

Stereotactic Core Biopsy

Stereotactic mammographic devices use the principle of triangulation, which allows the precise location of a breast lesion to be determined in three dimensions. The procedure consists of placing the patient sitting upright or prone on the stereotactic table with the breast suspended through an opening in the table. The breast is compressed within the mammographic unit. A scout image is obtained and subsequently, two images are obtained and displayed on a digital monitor. The views obtained are taken at +15-degree and −15-degree angles from the plane perpendicular to the image receptor. These views are evaluated by the radiologist and the lesion is marked in both views. The needle is calibrated to the coordinates determined by the computer. The skin of the

breast is sterilized, and the skin and underlying soft tissue are anesthetized with local anesthesia. A small incision is made in the skin using an 11-blade scalpel. A vacuum-assisted device is used to obtain several cores of breast tissue. Stereotactic biopsies performed for calcifications should be evaluated with a specimen radiograph of the cores obtained to confirm the presence of the calcification within the sampled tissue . A biopsy clip is then placed at the biopsy site via a hollow biopsy needle to facilitate locating the area should all of the imaging abnormality be removed with the biopsy. A postprocedure mammogram should be obtained to document clip placement and satisfactory sampling of the targeted lesion. Pathology results should be reviewed to determine concordance and appropriate follow-up. Patients who cannot lie prone or cannot tolerate breast compression may not be candidates for stereotactic breast biopsy. In addition, if the breast compresses to less than 3.5 cm, as in women with very thin breasts, stereotactic biopsy may not be technically feasible due to the possibility of piercing the opposite edge of the breast with the needle. The complication rate is low and most patients tolerate the procedure quite well. Most procedures can be completed within 30 minutes.

Ultrasound-Guided Biopsy

Ultrasound-directed biopsy is performed for those lesions that are identified with ultrasound. Ultrasound-guided core biopsy is technically easier than stereotactic-guided biopsy as real-time imaging allows the surgeon or

radiologist to visualize the biopsy as it occurs. Using sterile technique and local anesthesia, a small skin incision is made with an 11- blade scalpel and the needle is inserted into or abutting the lesion parallel to the chest wall. The position of the needle is visualized by ultrasound. Once again, a handheld 11- or 8-gauge vacuum-assisted needle or an 18- to 14-gauge spring-loaded automated large-core biopsy gun is used to remove several cores of tissue and in some instances completely remove the lesion. A biopsy clip is then placed at the biopsy site to facilitate locating the area should all of the visible abnormality be removed with the biopsy.

MRI-Guided Biopsy

MRI-guided biopsies are performed when a lesion can only be identified on the MR examination. The computer system used for evaluation of enhancement patterns typically also has an adjunct system to aid in performing percutaneous biopsy. However, MRI biopsy is challenging because the lesion identified for sampling may be more difficult to identify when the patient's breast is compressed by the grid required for immobilization and localization. The patient must remain in this position after the initial post-contrast images, during imaging to visualize the position of the introducer relative to the lesion, and during subsequent sampling with a vacuum-assisted biopsy device, clip placement, and post-biopsy imaging. After the procedure is completed, the

patient is transferred from the MRI suite to the mammography suite to confirm clip placement.

If the core biopsy result is benign and is concordant with imaging findings, continued surveillance is acceptable. If the result is indeterminate or image-discordant, surgical excision is indicated to rule out malignancy. In addition, surgical excision is indicated for a core biopsy that demonstrates certain high-risk lesions including atypical hyperplasia (and some advocate for lobular carcinoma in situ as well) as the incidence ofcoexisting ductal carcinoma in situ or invasive carcinoma may be as highas 50% because of potential undersampling. Additional lesions requiringexcisional biopsy also include atypical papillary lesions, mucocele-likelesions to exclude mucinous carcinoma, and cellular fibroepithelial lesionsto exclude phyllodestumor.

Needle Localization Biopsy

The aim of these methods is to facilitate complete removal of the lesion at first attempt excision while simultaneously minimizing the size of the resected specimen and shortening the duration of anesthesia. Radiologically guided, invasive preoperative localization of nonpalpable lesions is a safe, simple, and established procedure that allows for accurate and expeditious biopsy or excision. A specimen radiograph is mandatory to document the removal of the suspected area and to facilitate histologic examination because often these lesions remain nonpalpable even upon examination of the resected specimen. The self-retaining wire localization was first described by Frank, Hall, and

Steer. This technique utilizes a flexible, hooked wire within the localizing needle. The hook lodges, ideally, within or adjacent to the suspicious lesion. The hook prevents dislodgement of wire within the breast prior to excision. The wire may be placed in most circumstances using mammography or ultrasound guidance, although MR-guided wire localization can also be performed. Mammographic images are obtained with the wire in place and are transported with the patient to the operating room for surgical excision. Incisions should be cosmetically placed using the natural skin lines, or Langer lines. Utilizing the mammographic images, the surgeon begins the dissection. Some wires are labeled with regard to length or possess a change in caliber to direct the excision. The direction of the dissection and dimensions of the specimen are determined by the lesion size and the relative proximity of the wire to the lesion. If the incision does not pass though the entry site of the wire, it is necessary to identify the shaft of the wire proximal to the lesion and retract it into the wound. Once the specimen is removed, it should be oriented for the pathologist. A variety of orienting techniques can be used, including sutures or indelible ink (paint). The specimen is then sent for specimen radiograph to conclusively confirm full excision of the suspicious/malignant lesion. The presence of the lesion within the specimen is documented mammographically and immediately relayed to the surgeon .The specimen should then be sent for pathologic analysis.

Radioactive Seed Localization

Radioactive seed localization (RSL) is an alternative for guiding surgical excision of nonpalpable breast lesions. The RSL uses radioactive seeds previously approved for the treatment of other cancers. Typically, iodine-125 and palladium-103 seeds between 200 and 300 μCi/seed are implanted into the breast lesion using a standard 18-gauge needle. The seeds can be implanted using mammography or ultrasound guidance, but seeds are not MRI compatible. The seeds are then surgically removed between 1 and 5days post implantation. In the operating room, radioactive seeds are located with appropriate instrumentation and removed with similar techniques surgeons use for sentinel lymph node biopsy. The advantages of RSL over wire implantation includes the bracketing of lesions and the postlocalization of mammograms is not impeded by wires, and procedure can be performed up to 5 days before surgery, minimizing schedule conflicts. The amount of radiation is similar to a screening mammogram.

Punch Biopsy

While the diagnosis of inflammatory breast cancer is made largely clinically, histologic confirmation of cancer cells within the dermal lymphatics is pathognomonic for inflammatory breast cancer. In patients who present with skin changes, including erythema and/or peau d’ orange,a 3- to 5-mm punch biopsy can be performed in the office using localanesthesia. The biopsy should

be full thickness through the most suspicious area. Most inflammatory breast cancers do not present with apalpable mass, but if present, a core biopsy can then be obtained through the punch biopsy site to provide more tissue for receptor assays.

METHODOLOGY

SOURCE OF DATA

This is a prospective study comprising 60 patients with breast masses over a period of one year from September 2018 to September 2019. In this present study, the clinical material consists of adult female patients attending out-patient department with breast masses in the Department of General Surgery, at Government Rajaji Hospital, Madurai.

METHOD OF COLLECTION OF DATA

Sample size

The size of sample work is 60 cases .Patient where randomly divided into two groups .In group A patient underwent image guided of core needle biopsy and in group B patient underwent palpatory method of core needle biopsy.

Inclusion criteria

- All the patients presenting with breast masses belonging to BI-RADS 4,5 and 6
- BI-RADS 3 with risk factors like family history, patient anxiety, difficult for follow up are included in study.

Exclusion criteria:

- Patients with breast masses with radiological BI-RADS 1,2,3 .
- patients with silicone implants.
- Patientsnot consented for inclusion in the study

The data will be collected in prescribed PROFORMA where in it contains, particulars of the patient,size of mass,duration of mass,pain over mass,menstrual history, TNM staging, radiological finding, histo-pathological report.

Ethical clearance has been obtained from ethical committee of Government Rajaji Hospital, Madurai, prior to conducting the study.

POPULATION DEMOGRAPHY:

Table – 1. Age at Presentation

Age group (in years)	No of Patients	Group A n=30	Group B n=30
20-29	12	10	2
30-39	7	4	3
40-49	17	10	7
>50	24	6	18

In group A (palpatory guided biopsy) population is equally distributed 20-29 years and 40-49 years of age, while in group B(image guided biopsy population is widely seen at the age more than 50 years.

Graph 1: age distribution in both groups

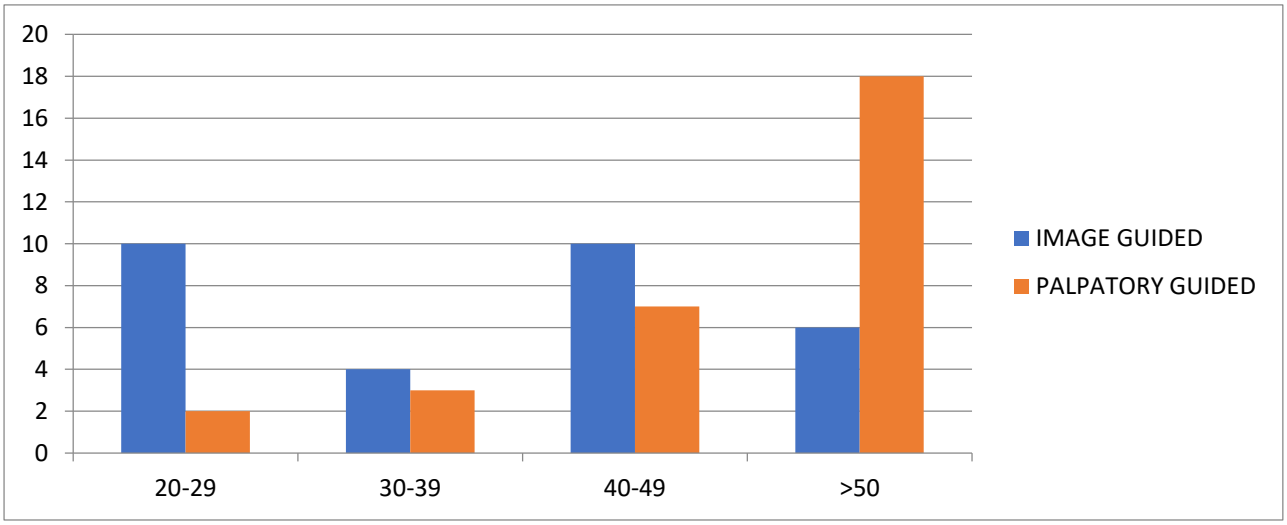
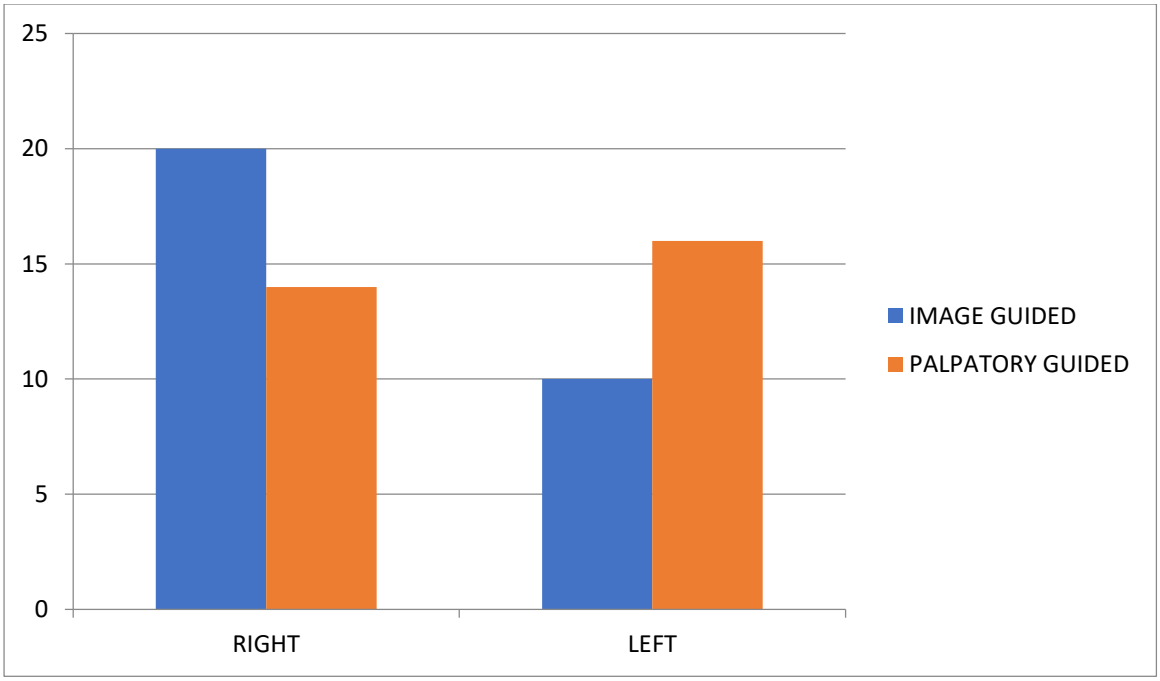


Table – 2. Location of the Tumor

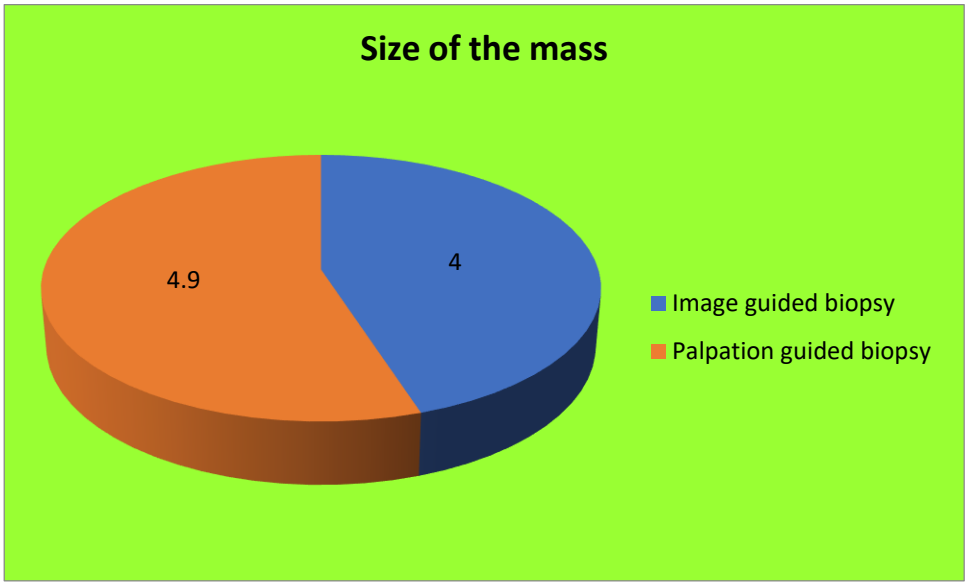
Side	No of Patients		TOTAL
	Image guided	Palpatory guided	
Right	20(66.7%)	14(46.7%)	34(56.7%)
Left	10(33.3%)	16(53.3%)	26(43.3%)

Overall breast mass commonly seen in right side of breast.

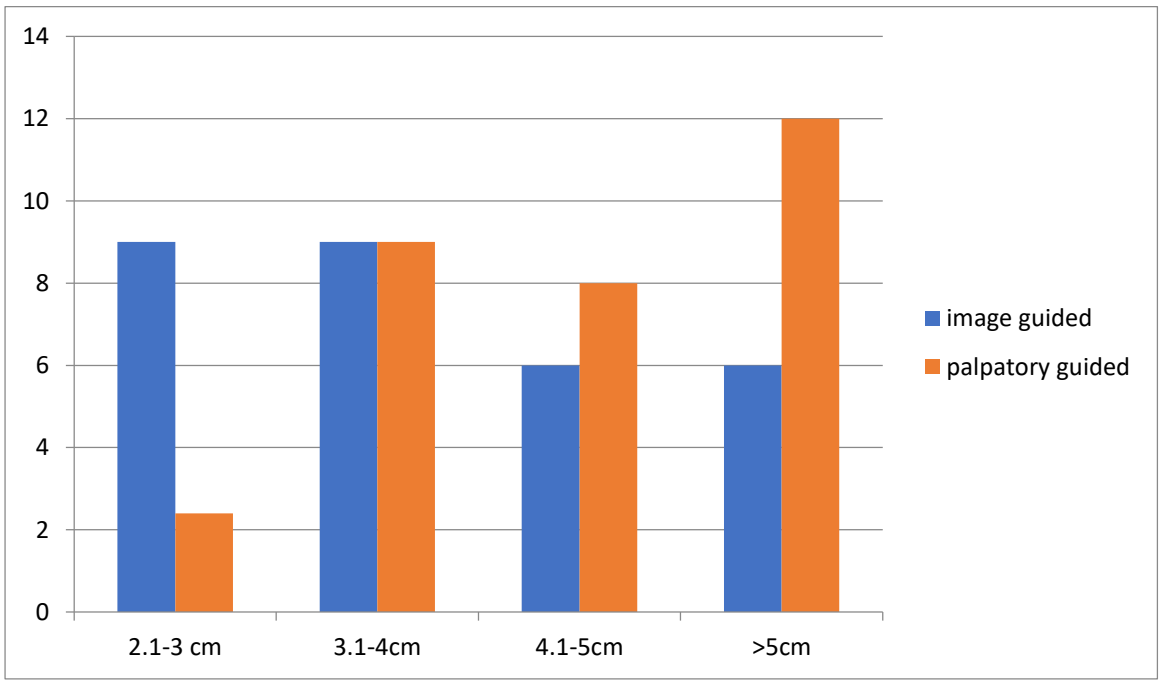
Graph – 2. Location of Tumor



SIZE OF MASS:



Mean diameter of lump undergoing image guided biopsy was 4cm and those undergoing palpatory guided biopsy was 4.9cm .

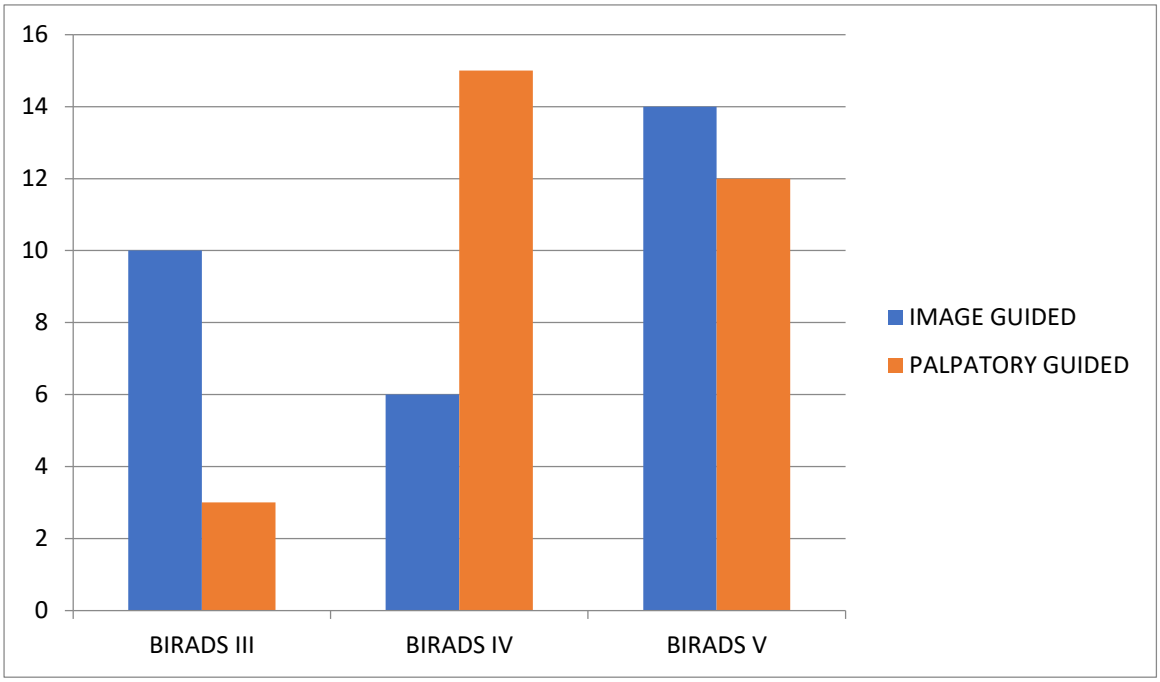


Graph 3: size distribution of study group

BIRADS DISTRIBUTION:

BIRADS	IMAGE GUIDED	PALPATORY GUIDED	TOTAL
III	10	3	13
IV	6	15	20
V	14	12	26
	30	30	60

In group A BIRADS 5 is widely distributed, while in group B BIRADS 4 .



Graph 4: Bi-rads distribution of study groups

This study was conducted in the department of general surgery at Madurai medical college,over period of September 2018 to September 2019 for 12months.Patients with palpable breast masses on examination and on radiological investigation mammography / usg showing BIRADS 4, 5 and patient with BIRADS 3 with high risk,difficult to follow or patient anxious are included in the study. During this period 60 female patient,who met inclusion criteria,agreed to participate in study and gave informed consent. The study protocol was approved by ethical committee of Madurai medical college,Madurai.

21 patients reported as Birads IV,26 patients reported as Birads V,13 patients with BiradsIII who satisfy inclusion criteria are taken to study. Patients are randomised into two arms 30 each to image guided and palpatory guided biopsy with ratio of 1:1.

Biopsyare performed under local anaesthesia using 14 G automated core needle biopsy guns.Ultrasound broad based multi-frequency probe used in all procedures.On ultrasound guided biopsy, visualisation of needle tip in mass in orthogonal plane is mandatory before taking biopsy. The adequacy of core is assessed visually on size and consistency of the samples. Complete un-fragmented core that sink in formalin jar are considered adequate.

Results of biopsy are related with imaging findings to establish imaging – histologic concordance.Those with concordant malignant diagnosis were

offered definitive treatment. Repeat biopsy was performed if the biopsy results were inconclusive, suspicious or showed imaging-histologic discordance.Final diagnosis was based on surgical histopathology in operated patients andon six month clinical and imaging follow up in others.

Cancers diagnosed on the basis of core needle biopsy and confirmed on surgical excision were considered true-positive (TP). Cancers for which the core needle biopsy did not show cancer but that resulted in repeat biopsy/surgical excision because of questionable pathologic findings or imaging- histologic discordance were considered false-negative (FN). Benign diagnoses on core needle biopsy were considered true-negative (TN) if they were confirmed by surgical excision or remained stable at six month follow up imaging. A cancer diagnosed on the basisof core needle biopsy, not confirmed on surgical excision was considered false-positive(FP).

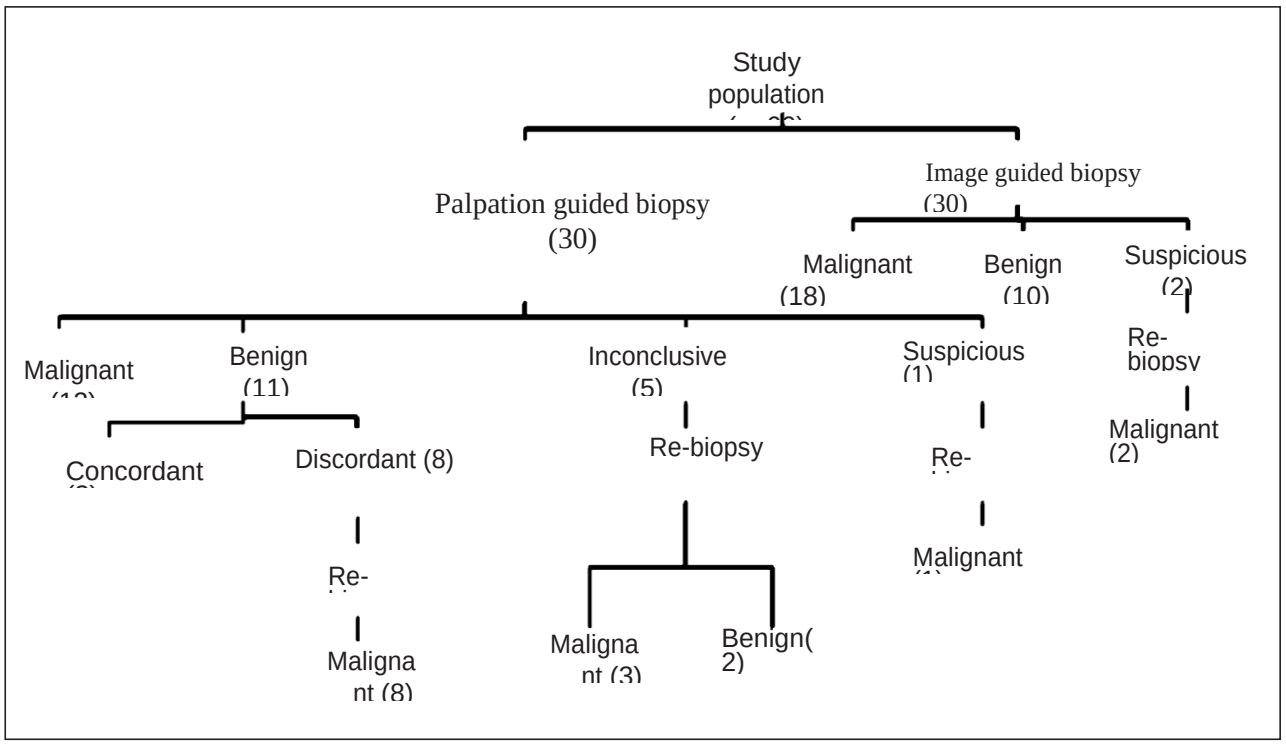
STATISTICAL ANALYSIS:

Data analysis was performed using commercially available software (SPSS for windows version 17, Inc., Chicago, USA). Technical success, sensitivity, specificity, false positive rate and false negative rate of core biopsy were determined for each arm. Diagnostic accuracy for correct diagnosis (benign as well as malignant) was calculated in both the palpation and image guided groups as a proportion of correctly classified lesions (TP+TN) among all subjects(TP+TN+FP+FN).

RESULTS

Mean diameter of lumps undergoing image guided biopsy was 4 cm and of those undergoingpalpationguidedbiopsywas4.8cm. Three benign lesions were operated because of patients ‘preferences. Ten malignant lesions were subjected to neoadjuvant chemotherapy and hence, biopsy diagnosis was considered as final diagnosis in them. Ten lesions with a benign result on biopsy were stable on atleast six month followup imaging; this was taken as confirmation of their benign nature.

FLOW CHART SHOWING INCLUSION OF PATIENTS IN STUDY



Palpation guided biopsy:

Twenty three out of the 30 patients had definitive histopathological diagnosis; malignancy in 12 patients and benign results in 11 patients. Biopsy results were inconclusive in 5 patients; 1 was reported as suspicious. Eight out of 11 benign results were discordant with their highly suspicious imaging.

All 13 patients with inconclusive ordiscordant palpation guided biopsy results were subjected to ultrasound guided re-biopsy. Malignancywas diagnosed in 11 patients with imaging-histologic discordance.Among5inconclusive results, three proved to be malignant and two were benign on re-biopsy. onesuspicious results werealsoconfirmedasmalignant.

*Image guided biopsy***:**

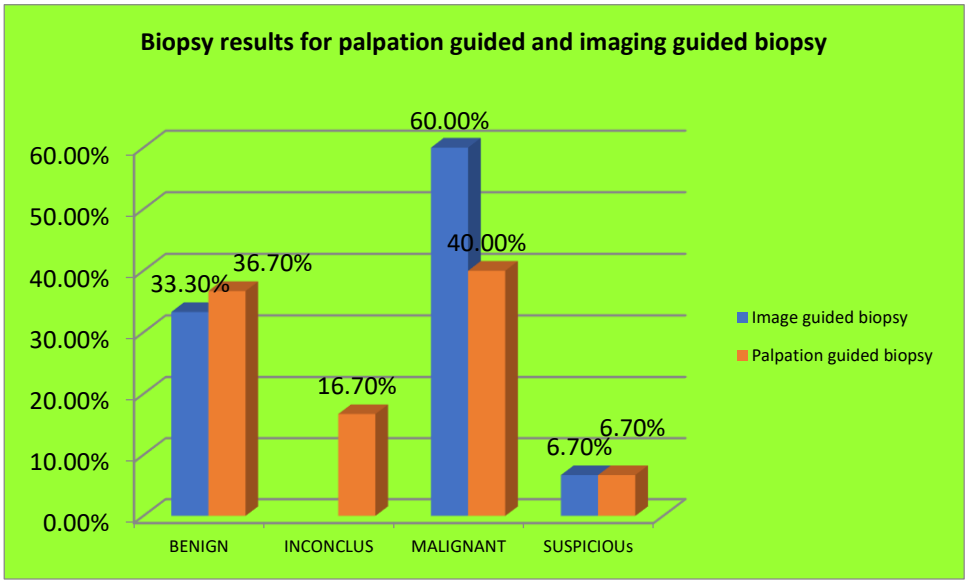
Definitive histopathological diagnosis was made in all but two of the 30 patients reported suspicous; 18malignant and 10 benign.Thistwo suspicious patient subsequentlyunderwent excision biopsy which confirmed the malignancy.

BIOPSY REPORT:

BIOPSY REPORT	IMAGE GUIDED	PALPATORY GUIDED	TOTAL
BENIGN	33.3%(10)	36.7%(11)	35.0%(21)
MALIGNANT	60.0%(18)	40.0%(12)	50.0%(30)
SUSPICIOUS	6.7%(2)	6.7%(2)	6.6%(4)
INCONCLUSIVE	-	16.7%(4)	8.3%(4)

In both groups two cases reported as suspicious each while four cases reported as inconclusive in group B.

TABLE :BIOPSY REPORT OF BOTH GROUPS.



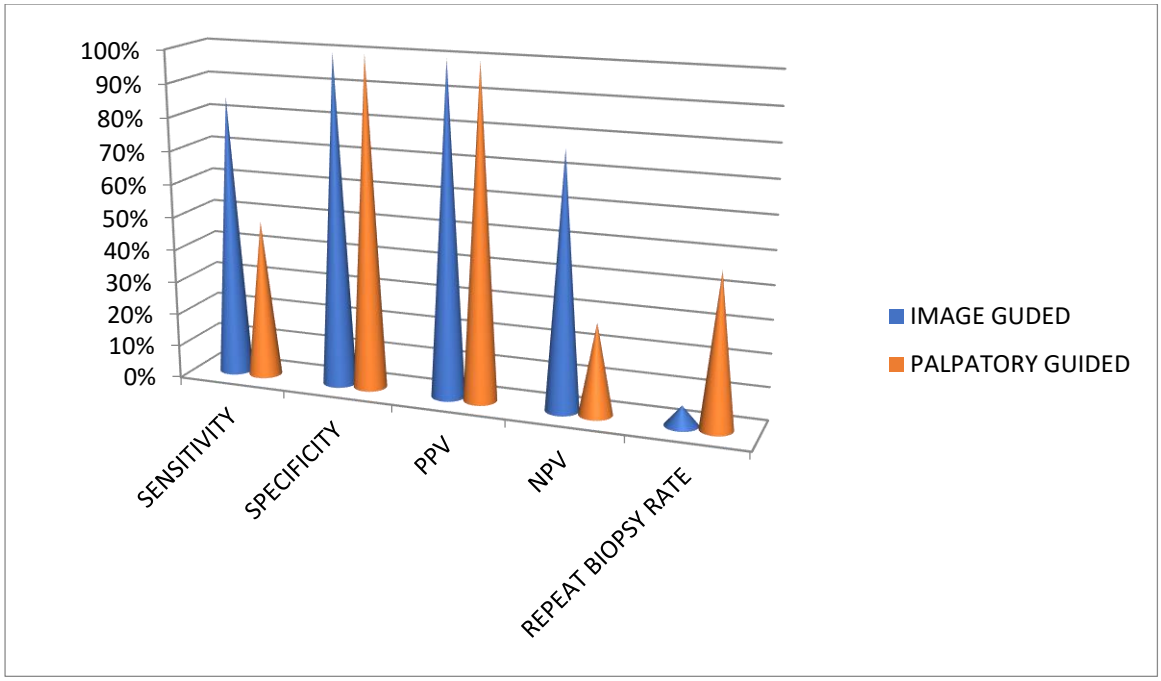
Comparison of diagnostic performance of biopsy methods:

Diagnostic performance of image guided biopsy was superior than the palpation guided biopsy . The sensitivity of image guided biopsy for diagnosing a malignant lesion was 85 per cent. Palpation guided biopsy group yielded sensitivity of 48 per cent . Specificity as well as positive predictive value in both the groups was 100 per cent for diagnosis of malignancy. There was a significant (P<0.001) difference in the negative predictive value between both the groups for diagnosis of malignancy; 76.9 per cent in the image guided biopsy group as against 27.8 per cent in the palpation guided biopsy group.

Diagnostic assessment of palpation guided and imaging guided biopsies for correct diagnosis of malignancy

	Image guided biopsy	Palpatory guided biopsy
Sensitivity(%)	85	48
Specificity (%)	100	100
PPV (%)	100	100
NPV (%)	76.9	27.8
Youdenindex (TPR+TNR-1)	0.85	0.48

Palpation guided biopsy group had a high repeat biopsy rate(duet inconclusive(5of 14), suspicious (1 of 14) pathological findings or imaging-histologic discordance (8 of 14) as well as a high false negative rate (12 out of 30) .On the other hand, there was only two repeat biopsy in the image guided biopsy group, which was due to suspicious pathological findings. There were no inconclusive biopsy samples or reports showing imaging-histologic discordance in image guided. This group also had a very low false negative rate (2 of 30). Image guided biopsy gave correct definitive diagnosis in 28 out of 30lesions yielding a higher diagnostic accuracy of 97 per cent than that of palpation guided biopsy 49 percentage which was accurate in diagnosing 15 of 30lesions.


100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
SENSITIVITY
SPECIFICITY
PPV
NPV
REPEAT BIOPSY RATE
IMAGE GUDED
PALPATORY GUIDED

CONCLUSION

Our results showed that in palpable breast masses, image guided biopsy was superior to palpation guided biopsy in terms of sensitivity, false negative rate and repeat biopsy rates. Image guided core needle biopsy found to be more accurate than palpation guided biopsy in female presenting with palpable breast masses. Palpation can miss or delay diagnosis in significant number of patients. Hence image guided biopsy should be preferred for sampling even if it is palpable**.**

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PROFORMA

- **NAME :**
- **IP NO:**
- **AGE :**
- **SIZE OF MASS:**
- **DURATION OF MASS:**
- **PAIN OVER MASS: YES /NO**
- **MENSTRUAL HISTORY: PREMENOPAUSAL / POST MENOPAUSAL**
- **TNM STAGING:**
- **PICTORIAL REPRESENTATION:**
- **RADIOLOGICAL FINDING:**
- **HISTOPATHOLOGICAL REPORT:**
- **POST OPERATIVE DAIGNOSIS:**

MASTER CHART

Study group of image guided core needle biopsy

S.NO	NAME	AGE/SEX	IP.NO	SIDE OF MASS	SIZE OF MASS	BIRADS	IMAGE GUIDED BIOPSY REPORT	POST SURGICAL REPORT
1	SAROJA	58/F	36842	RIGHT	3.8CM	IV	MALIGNANT	MALIGNANT
2	MARY TAMILSELVI	61/F	67559	RIGHT	5CM	V	MALIGNANT	MALIGNANT
3	LAKSHMI	25/F	70952	LEFT	3CM	III	BENIGN	BENIGN
4	MARIYAMMAL	20/F	5959	RIGHT	5CM	III	BENIGN	BENIGN
5	SELVAM	40/F	92318	RIGHT	4CM	V	MALIGNANT	MALIGNANT
6	TAMILSELVI	24/F	62786	RIGHT	2.8CM	III	BENIGN	BENIGN
7	KALPANA	23/F	103253	RIGHT	2.5CM	III	BENIGN	BENIGN
8	KALPANA	33/F	9533	RIGHT	3.5CM	IV	MALIGNANT	MALIGNANT
9	PANCHU	40/F	9928	RIGHT	6CM	V	MALIGNANT	MALIGNANT
10	MARIYAMMAL	45/F	34251	RIGHT	2.8CM	V	MALIGNANT	MALIGNANT
11	PANCHAMMAL	24/F	38630	RIGHT	2.7CM	V	MALIGNANT	MALIGNANT
12	TULASI PADMAVATHI	32/F	11434	RIGHT	4CM	IV	MALIGNANT	MALIGNANT
13	SRIDEVI	20/F	71415	LEFT	4.5CM	III	BENIGN	BENIGN
14	PANCHAVARAM	47/F	72424	LEFT	5CM	IV	SUSPICOUS	MALIGNANT
15	SHANTHI	47/F	76788	RIGHT	4.2CM	V	MALIGNANT	MALIGNANT
16	CHINNAMAL	40/F	77264	RIGHT	2.8CM	V	MALIGNANT	MALIGNANT
17	THULASIYAMMAL	30/F	2636	LEFT	3CM	III	BENIGN	BENIGN

18	JEYALAKSHMI	42/F	7339	LEFT	3.5CM	V	MALIGNANT	MALIGNANT
19	SELVI	40/F	10386	RIGHT	3.8CM	III	BENIGN	BENIGN
20	JEYALAKSHMI	42/F	7539	LEFT	4CM	V	MALIGNANT	MALIGNANT
21	NAGALAKSHMI	28/F	18519	LEFT	5CM	III	BENIGN	BENIGN
22	KALIYAMMAL	50/F	19897	RIGHT	5.2CM	V	MALIGNANT	MALIGNANT
23	ILAYARANI	40/F	19897	LEFT	5.6CM	V	MALIGNANT	MALIGNANT
24	DEVIKA	58/F	41091	RIGHT	2.5CM	IV	SUSPICOUS	MALIGNANT
25	VINNARASI	19/F	49064	RIGHT	2.8CM	V	MALIGNANT	MALIGNANT
26	KARPAGAVALLI	21/F	48627	RIGHT	3.5CM	V	MALIGNANT	MALIGNANT
27	RAMAYEEAMMAL	26/F	48609	LEFT	3.8CM	III	BENIGN	BENIGN
28	THERESA	30/F	49496	LEFT	5.8CM	III	BENIGN	BENIGN
29	MANJU	18/F	51505	RIGHT	5.5CM	V	MALIGNANT	MALIGNANT
30	LOGANAYAGI	52/F	53447	RIGHT	6CM	VI	MALIGNANT	MALIGNANT

Study group of palpatory guided core needle biopsy

S.NO	NAME	AGE	IP.NO	SIDE OF MASS	SIZE OF MASS	BIRADS	PALPATORY GUIDED BIOPSY REPORT	POST SURGICAL BIOPSY
1	LAKSHMI	60/F	654	RIGHT	5CM	V	MALIGNANT	MALIGNANT
2	PARVATHY	80/F	25821	RIGHT	5.8CM	V	MALIGNANT	MALIGNANT
3	YASOTHAI	26/F	9614	LEFT	4.5CM	III	BENIGN	BENIGN
4	MUTHULAKSHMI	50/F	15125	RIGHT	3.8CM	IV	SUSPICIOUS	MALIGNANT
5	THILLAIYAMMAL	34/F	15127	RIGHT	3.5CM	III	BENIGN	BENIGN
6	TAMILSELVI	50/F	14981	RIGHT	2.8CM	IV	BENIGN	MALIGNANT
7	KANGAVALLI	35/F	36206	LEFT	4.8CM	IV	BENIGN	MALIGNANT
8	RAJAMMAL	78/F	46137	LEFT	3.5CM	V	MALIGNANT	MALIGNANT
9	SHENBAGAVALLI	57/F	48403	RIGHT	4CM	V	MALIGNANT	MALIGNANT
10	KOODMMAL	46/F	49763	LEFT	4.5CM	IV	MALIGNANT	MALIGNANT
11	SEBASTIN FRACHANA	61/F	52706	LEFT	6.5CM	IV	MALIGNANT	MALIGNANT
12	RAJATHI	47/F	59205	RIGHT	7CM	V	MALIGNANT	MALIGNANT
13	MUTHUMARI	40/F	7710	LEFT	6.8CM	V	MALIGNANT	MALIGNANT
14	MARIYAMMAL	40/F	57573	LEFT	6.5CM	IV	BENIGN	MALIGNANT
15	PARVATHY	52/F	57615	RIGHT	3.5CM	IV	INCONCLUSIVE	MALIGNANT
16	MARIYAMMAL	40/F	50507	LEFT	3.8CM	V	INCONCLUSIVE	BENIGN
17	MUTHU SUMATHI	40/F	62465	LEFT	4.1CM	IV	INCONCLUSIVE	BENIGN
18	AMUTHA	40/F	69806	LEFT	5.2CM	IV	BENIGN	MALIGNANT

19	PANDIYAMMAL	58/F	66237	LEFT	6CM	IV	BENIGN	MALIGNANT
20	LAKSHMI	51/F	67529	LEFT	4.5CM	IV	INCONCLUSIVE	MALIGNANT
21	FOUSIA BANU	38/F	111716	LEFT	3.5CM	V	MALIGNANT	MALIGNANT
22	INDIRANI	27/F	1E+06	RIGHT	3.8CM	III	BENIGN	BENIGN
23	NALLAMMAL	65/F	69555	RIGHT	4.8CM	IV	INCONCLUSIVE	MALIGNANT
24	PRIYA	50/F	65041	RIGHT	5CM	IV	BENIGN	MALIGNANT
25	MOHANA		52571	RIGHT	3.5CM	V	MALIGNANT	MALIGNANT
26	SUBASHRI	65/F	64321	LEFT	6.5CM	V	MALIGNANT	MALIGNANT
27	INDRIA	60/F	58571	LEFT	8CM	V	SUSPICIOUS	MALIGNANT
28	PREMA	65/F	96025	RIGHT	5.8CM	IV	BENIGN	MALIGNANT
29	RANI	52/F	70256	RIGHT	5.5CM	IV	BENIGN	MALIGNANT
30	SUGUNA	62/F	58542	LEFT	6CM	V	MALIGNANT	MALIGNANT

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ETHICS COMMITTEE CERTIFICATE

Name of the Candidate	:	Dr.A.Kanmani
Course	:	PG in MS., General Surgery
Course of Study	:	2017-2020
College	:	MADURAI MEDICAL COLLEGE
Research Topic	:	Comparative study of palpatory versus image guided core needle biopsy in breast masses.
Ethical Committee as on	:	25.09.2018

The Ethics Committee, Madurai Medical College has decided to inform that your Research proposal is accepted.

Member Secretary | Chairman | Dean / Convenor

Prof Dr V Nagaraajan
M.D., MNAMS, D.M., Dsc.,(Neuro), Dsc (Hon)
CHAIRMAN
IEC - Madurai Medical College
Madurai

DEAN
MADURAI MEDICAL COLLEGE
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25 SEP 2018

URKUND

Urkund Analysis Result

Analysed Document:	PLAGARISM 1111.docx (D57138912)
Submitted:	10/16/2019 8:13:00 PM
Submitted By:	dr.kanmani.anbarasan@gmail.com
Significance:	6 %

Sources included in the report:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4989833/
https://www.researchgate.net/publication/305823861_Image_guided_versus_palpation_guided_core_needle_biopsy_of_palpable_breast_masses_A_prospective_study

Instances where selected sources appear:

10

CERTIFICATE

This is to certify that this dissertation titled "**"A COMPARATIVE STUDY OF PALPATORY VERSUS IMAGE GUIDED CORE NEEDLE BIOPSY IN BREAST MASSES"** of the candidate **Dr.A. KANMANI** with registration number **221711109** for the award of M.S degree 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 from introduction to conclusion pages and result shows 6% percentage of plagiarism in the dissertation.

Guide and supervisor sign and seal