A Dissertation on

"COMPARATIVE STUDY BETWEEN FINE NEEDLE ASPIRATION CYTOLOGY AND TRU-CUT BIOPSY IN THE DIAGNOSTIC ACCURACY OF BREAST CANCER IN COIMBATORE MEDICAL COLLEGE HOSPITAL"

Dissertation Submitted to

THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY

CHENNAI - 600 032

with partial fulfillment of the regulations

for the award of the degree of

MASTER OF SURGERY IN GENERAL SURGERY

COIMBATORE MEDICAL COLLEGE,
COIMBATORE

APRIL 2015

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She has shown keen interest in preparing this dissertation under my guidance, supervision and to my satisfaction. I have great pleasure in forwarding this to The Tamil Nadu Dr. M.G.R. Medical University, Chennai, Tamil Nadu

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Period of Study : 2013 - 2016

College : Coimbatore Medical college

Dissertation Topic : Comparative study between fine needle aspiration cytology and tru-cut biopsy in the diagnostic accuracy of breast cancer.

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Page count:	99
Word count:	13,280
Character count:	73,697
Submission date:	05-Oct-2015 05:38PM
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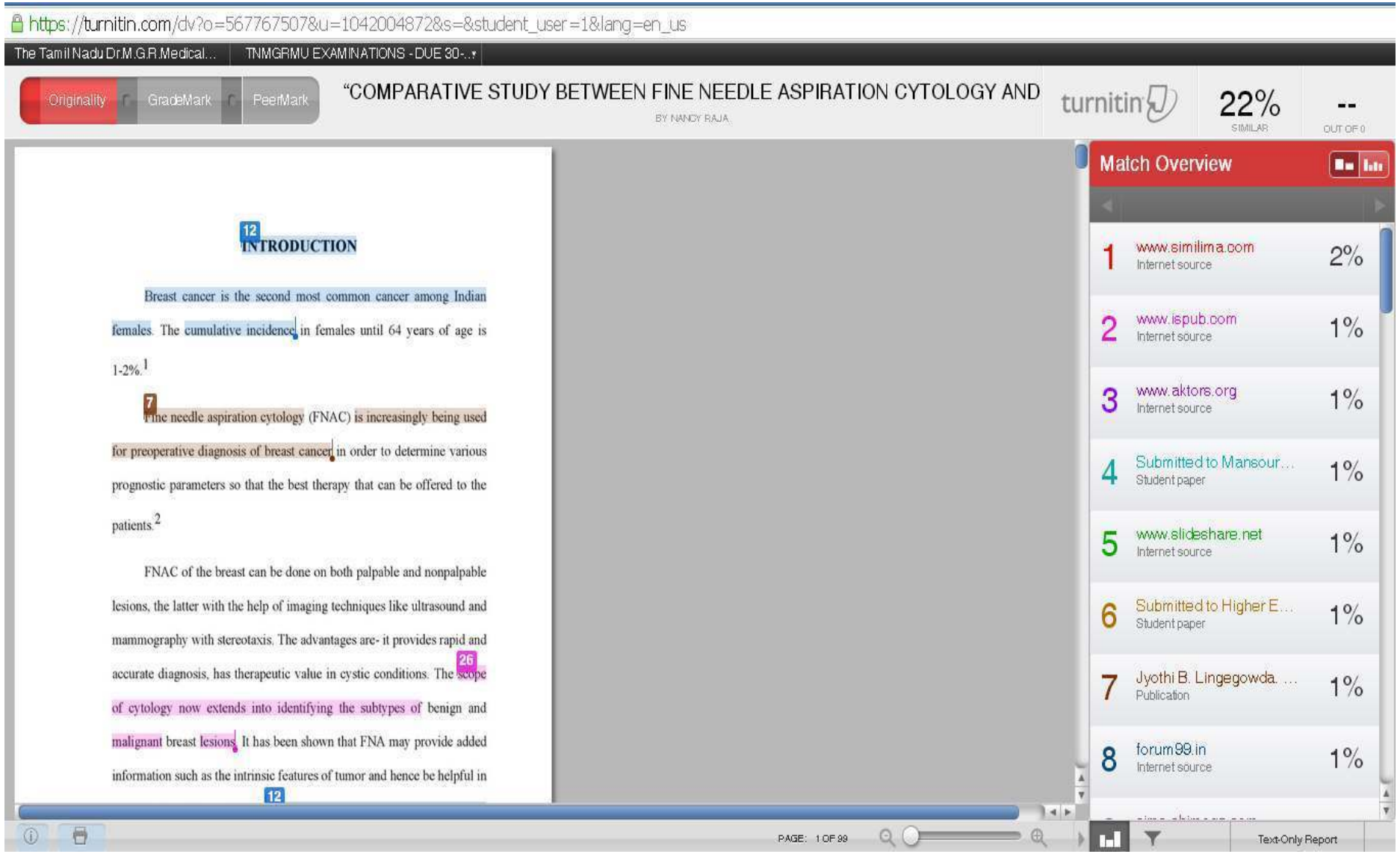
INTRODUCTION

Breast cancer is the second most common cancer among Indian females. The cumulative incidence in females until 64 years of age is 1.28%.[1]

Fine needle aspiration cytology (FNAC) is increasingly being used for preoperative diagnosis of breast cancer in order to determine various prognostic parameters so that the best therapy that can be offered to the patient.[2]

FNAC of the breast can be done on both palpable and nonpalpable lesions, the latter with the help of imaging techniques like ultrasound and mammography with stereotaxis. The advantages are- it provides a rapid and accurate diagnosis, less therapeutic value to cystic conditions. The scope of cytology now extends over identifying the subtypes of benign and malignant breast lesions. It has been shown that FNA may provide added information such as the intrinsic features of tumor and hence be helpful in prognostication of the tumor factors like nuclear grading, nuclear index and DNA contents.[3] Thus, it plays a major role as an important preoperative assessment procedure along with clinical examination and imaging which are referred to as the "Triple test."[4]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ACKNOWLEDGEMENT

I take this opportunity to express my most humble and sincere gratitude to my guide and teacher **Dr. SARADHA S. M.S., F.A.I.S,** Professor of Department of General Surgery, Coimbatore Medical College Hospital, Coimbatore for her invaluable advice, constant guidance and motivation during this dissertation work and in pursuit of my post graduate studies. I am obliged to her for her patience, co-operation, encouragement and interest which she had generously showed during the preparation of this work.

I convey my special thanks to **Dr.Radhika, Dr. Umamaheshwari, Dr. Mohankumar and Dr. Umashankar** for their encouragement, valuable guidance and moral support throughout the course of this study.

I am thankful to all my senior teachers and my colleagues and our staff members for their valuable guidance and for helping me at various stages in completing the present study.

Last but not the least; I am also grateful to all the women included in the present study, for their participation and cooperation without which my study would not have been possible.

Dr. NANCY RAJA

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

%	-	Percentage
FNAC	-	Fine Needle Aspiration Cytology
TCB	-	Tru-cut Biopsy
FA	-	Fibroadenoma
PT	-	Phyllodes tumor
FCD	-	Fibrocystic disease
ICD	-	Infiltrating ductal carcinoma
ILC	-	Infiltrating lobular carcinoma
NHSBSP	-	National Health Service Breast Screening Programme
NC ratio	-	Nuclear cytoplasmic ratio
H & E	-	Hematoxylin and eosin

ABSTRACT

Background:

A method of definitive diagnosis is essential for the patients who present with palpable breast lump at the outpatient department. The method must be accurate, easy to perform and acceptable to the patient, safe, can be carried out in a busy clinic setting and must not require too much preparation or expensive equipment.[1,2] A study, to compare the diagnostic accuracy of Fine Needle Aspiration Cytology (FNAC) and Tru-cut Biopsy, was conducted to differentiate between benign & malignant lesions of palpable lump in breast and to evaluate the validity of FNAC in arriving at a diagnosis with histopathological correlation.

Objectives:

1) To compare the diagnostic accuracy of fine needle aspiration cytology and tru-cut biopsy in differentiating benign and malignant lesion of palpable lump in breast with cytological and histopathological correlation.

2) To analyze the sensitivity, specificity, positive and negative predictive values and the efficacy of fine needle aspiration cytology and tru-cut biopsy

3) To compare the cytological grade with histological grade in surgical specimens.

4) How an OP procedure of FNAC can be effective in arriving at diagnosis in carcinoma breast as treatment

Methods:

A prospective study on breast aspirates and biopsy was done over a 12- month period from September 2014 to September 2015. All patients presenting with palpable breast lesions to the Department of General Surgery, Coimbatore Medical College Hospital were subjected to FNAC procedure after a detailed history, general physical and local examination and the results of 76 cases were categorized into 5 groups C1 through C5 as per the National Health Service Breast Screening Program (NHSBSP) criteria. Where C5 category diagnosis was made, the cytomorphology of the malignant lesion was graded using Robinson's criteria.

Subsequent to the reporting, the patients are subjected to tru-cut biopsy with histopathological correlation. Cytology reporting was compared with histopathological report to determine its diagnostic accuracy. Using the Scarff Bloom Richardson grading system, histological grading was done.

Results

The results showed 0 case in the C1 category, 44 cases in the C2 category, 2 cases in the C3 category, 1 case in the C4 category, and 29 cases in the C5 category.

In the C2 category of benign cases, fibroadenoma was the commonest lesion. In the C5 category of malignant cases, invasive ductal carcinoma was the most common lesion.

The accuracy rate of diagnosing a palpable lump in breast by fine needle aspiration cytology (FNAC) as a benign lesion – 100%, as malignant lesion- 94.73%, having a false negative rate of 9.3%, having false positive rate of 2.2%.

In this study, the sensitivity of FNAC in detecting a malignant breast lesion was 90.62%, and specificity was 97.72%, with a positive predictive value of 96.66% and a negative predictive value of 93.47%, with an inadequate sampling rate of 3.9%.

The accuracy rate of diagnosing a palpable breast lump by tru-cut biopsy as benign lesion was 100% and as a malignant lesion 97.36%, having a false negative rate of 6% and with a false positive rate of zero.

In this study, the sensitivity of tru-cut biopsy in detecting a malignant lesion was 93.93%, specificity was 100%, with a positive predictive value of 100% and a negative predictive value of 95.55%. Inadequate sampling rate was 2.6% in our study.

Based on Robinson grading system the cases were classified into grade I (14%), grade II (52%) and grade III (34%). Based on Scarff Bloom Richardson grading method the cases were classified into grade I (6%), grade II (55%) and grade III (39%). Spearman's correlation coefficient of 0.5 was calculated which indicated positive correlation between the two grading systems.

Conclusion

The diagnostic efficacy, sensitivity and specificity observed in this study by FNAC were comparable to that observed in Tru-cut biopsy and those given in other texts. Hence FNAC stands as an effective and valid tool as the first line diagnostic modality in the preoperative diagnosis of both benign and malignant lesions.

A positive correlation was also observed between Robinson cytological grading system and Scarff Bloom Richardson histological grading system. Discordance between cytologic grading and histologic grading was seen only in few cases.

INTRODUCTION

Breast cancer is the second most common cancer among Indian females. The cumulative incidence in females until 64 years of age is 1-2%.[1]

Fine needle aspiration cytology (FNAC) is increasingly being used for preoperative diagnosis of breast cancer in order to determine various prognostic parameters so that the best therapy that can be offered to the patients.[2]

FNAC of the breast can be done on both palpable and nonpalpable lesions, the latter with the help of imaging techniques like ultrasound and mammography with stereotaxis. The advantages are- it provides rapid and accurate diagnosis, has therapeutic value in cystic conditions. The scope of cytology now extends into identifying the subtypes of benign and malignant breast lesions. It has been shown that FNA may provide added information such as the intrinsic features of tumor and hence be helpful in prognostication of the tumor factors like nuclear grading, mitotic index and DNA contents.[4] Thus, it plays a major role as an important preoperative assessment procedure along with clinical correlation and imaging which are referred to as the "Triple test."[3]

Histologic type and nuclear grade are two vital morphologic prognostic factors of breast cancer.[6]

Cytologic grading has shown a positive correlation with the histological grade and hence cytograde is important in predicting the histopathologic grade preoperatively. Cytologic grade would thus provide relevant information on the tumor biologic behavior and could be a useful parameter to take into consideration when selecting neoadjuvant therapy.[3]

According to the National Cancer Institute Bethesda, grade of tumor in the FNA tissue should be included in FNAC report for purpose of prognostification. Also importance was laid on the cytological grading system which would correspond closely to the grading system used in histological material.[2]

FNAC has been used extensively for the diagnosis of breast lesions over the past 25 years. More recently, Tru-cut biopsy has been introduced for the diagnosis of breast malignancies. This is perhaps due to the fact that grading of tumors and an ER and PR receptor status can easily be performed on a Tru-cut biopsy as compared to FNAC and this knowledge is used by the treating clinician who wants to use chemotherapy as the first line of treatment for breast cancers.[2]

The principal aim of Tru-cut biopsy is to provide a valid preoperative diagnosis of a breast lesion and avoid the need for an open surgical biopsy. Despite its advantages it is still used as an additional investigation tool when FNAC fails to produce a diagnosis.[4] Certain types of lesions present diagnostic difficulty even with Tru-cut biopsy and require excision of the mass. These are spindle cell lesions, fibroepithelial lesions with cellular stroma, phyllodes tumors, papillary lesions, mucinous lesions, radial scar, atypical proliferative lesions including atypical ductal hyperplasia, fibroepithelial atypia, and lobular neoplasm.[4]

Hence this study was performed to analyze the extent to which a preliminary diagnosis by FNAC from breast lump correlates with final histopathological report.

AIMS & OBJECTIVES

1. To compare the diagnostic accuracy of fine needle aspiration cytology and tru-cut biopsy in differentiating benign and malignant lesions of palpable lump in breast cytological and histopathological correlation.

2. To analyze sensitivity, specificity, positive and negative predictive values and the efficacy of fine needle aspiration cytology and tru-cut biopsy.

3. To compare the cytological grade with histological grade in surgical specimens.

4. How an OP procedure of FNAC can be effective in arriving at diagnosis in carcinoma breast as treatment.

REVIEW OF LITERATURE

Embryology

By 4th week, a pair of epidermal thickenings called the mammary ridges develops along either side of the body from the area of future axilla to the future inguinal region. These ridges normally disappear except for the central 1/3rd where the breast develops. This remnant of the mammary ridge produces the primary bud in the 5th week that grows down into the underlying dermis. By 10th week, the primary bud begins to branch and by 12th week several secondary buds have formed. These buds lengthen and branch throughout the remainder of gestation. By birth about 15 – 25 lactiferous ducts open onto a small superficial depression called mammary pit. Proliferation of underlying mesoderm converts the pit to an elevated nipple within few weeks of birth 68.

ANATOMY OF THE BREAST[10]

The breast or mammary gland, a modified sweat gland, is a vital accessory organ of female reproductive system.

Situation

The breast lies in the superficial fascia of the pectoral region. A small extension called the axillary tail of Spence, pierces the deep fascia and lies in the axilla.

Extent

Vertically, it extends from the second to the sixth rib and horizontally, it extends from the lateral border of the sternum to the mid-axillary line.

Deep relations

1) The breast lies on the deep fascia covering the pectoralis major.

2) Still deeper there are the parts of three muscles, namely the pectoralis major, the serratus anterior, and the external oblique muscle of the abdomen.

3) The breast is separated from deep fascia by loose areolar tissue.

The Skin

It covers the gland. A conical projection called the nipple is present just below the centre of the breast at the level of fourth intercostal space. The nipple is pierced by 15 to 20 lactiferous ducts. It contains circular and longitudinal smooth muscle fibers which can make the nipple stiff or flatten it, respectively. The skin surrounding the base of the nipple is pigmented and forms a circular area called the areola.

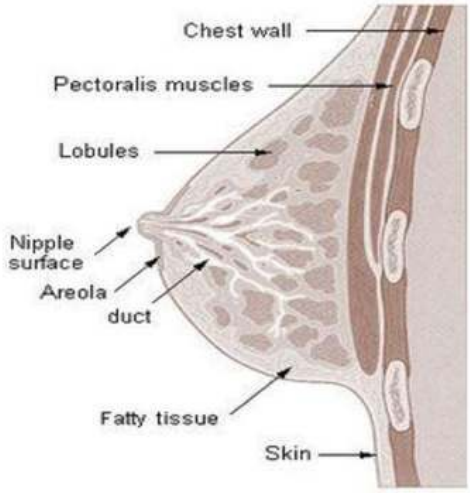

Figure A : Normal structure of breast.

The Parenchyma

It is made up of glandular tissue; the gland consists of 15 to 20 lobes. Each lobe is a cluster of alveoli and it is drained by lactiferous duct. The lactiferous ducts converge towards the nipple and open on it. Near its termination each duct has a dilatation called a lactiferous sinus.

The Stroma

The fibrous stroma forms septa known as the suspensory ligaments (of Cooper) and the fatty stroma forms the main bulk of the gland.

Blood supply

The mammary gland is extremely vascular. It is supplied by branches of the following arteries.

1. Internal thoracic artery, a branch of the subclavian artery.
2. The lateral thoracic, superior thoracic and acromiothoracic branches of the axillary artery.
3. Lateral branches of the posterior intercostals arteries.
4. The veins follow the arteries. The superficial veins drain into the internal thoracic vein and into the superficial veins of the lower part of the neck. The deep veins drain into the internal thoracic, axillary and posterior intercostals veins.

Nerve supply

The breast is supplied by the anterior and lateral cutaneous branches of the 4^{th} to 6^{th} intercostals nerves. The nerves convey sensory fibers to the skin, and autonomic fibers to smooth muscle and to blood vessels.

LYMPHATIC DRAINAGE OF THE BREAST[10]

Lymphatic drainage of the breast assumes great importance to the surgeon because, carcinoma of the breast spreads mostly along lymphatics to the regional lymph nodes.

Lymph Nodes

Lymph from the breast drains in to the following lymph nodes.

- ➢The axillary lymph nodes, chiefly the anterior (or pectoral) group, the posterior, lateral, central and apical groups of nodes also receive lymph from the breast either directly or indirectly.
- ➢The internal mammary (parasternal) nodes which lie along the internal thoracic vessels.
- ➢Some lymph from the breast also reaches the supraclavicular nodes, the cephalic (deltopectoral) node, the posterior intercostals nodes (lying in the front of the heads of the ribs), subdiaphragmatic and subperitoneal lymph plexuses. The lymphatics pass radially to the surrounding lymph nodes (axillary, internal mammary, supraclavicular and cephalic).
- The deep lymphatics drain the parenchyma of the breast. They also drain the nipple and areola.

AXILLARY LYMPH NODES[8]

ANTERIOR group:

Lies along the lateral thoracic vein under anterior axillary fold mainly along the third rib. It lies in contact with axillary tail of Spence and hence carcinoma located at this site is likely to ne misdiagnosed as lymphadenopathy. The anterior axillary nodes may be involved by direct continuity of tissue.

POSTERIOR group:

Lie along the subscapular vessels in relation to the posterior axillary fold.

LATERAL group:

Lies in relation to axillary vein along upper part of humerus.

CENTRAL group:

Located in the fat of the upper part of the axilla. The intercostobrachial nerve passes outwards amongst these nodes. Enlargement of these nodes, may cause pressure on the nerve, causing pain in the distribution of the nerve along the inner border of the arm.

APICAL group:

Also known as “infraclavicular lymph nodes” are important lymph nodes lying below by the 1st intercostal space, behind by the axillary vein, in front by the costocoracoid membrane. These nodes lie very deeply, but can be palpated by pushing the fingers of one hand into the axillary apex from below and the fingers of the other hand behind the clavicle from above.

They are of great importance because they receive one vessel directly from the upper part of the breast and ultimately most of the lymph from the breast.

A single trunk leaves the apical group on each side of the subclavian trunk, and enters the junction of the jugular and subclavian veins, or may join the thoracic duct on the left.

LYMPHATIC DRAINAGE [8]

The breast is drained by two sets of lymphatics:

1. The lymphatics of the skin over the breast.

2. The lymphatics of the parenchyma of the breast.

LYMPHATIC OF THE OVERLYING SKIN:

These drain the integument over the breast, but not the skin of the areola and nipple. They pass in a radial direction and end in the surrounding nodes. Those from the outer side go to the axillary nodes. The skin of the upper part drains by vessels that go to the supraclavicular nodes (members of the lower deep cervical nodes). Certain of these vessels may end in the cephalic node, which lies in relation to the vein of the same name in the deltopectoral triangle. The vessels from the skin over the inner part of the breast drain to the internal mammary nodes, which lie in relation to the veins of that name. These nodes lie in the upper four or five intercostal spaces or behind the related coastal cartilages.

The lymphatics of the skin over the breast communicate across the middle line, and a unilateral disease may become bilateral by this route. Mammary cancer may spread along these superficial lymphatic vessels to produce nodules in the skin.

LYMPHATICS OF THE PARENCHYMA OF THE BREAST:

The subareolar lymph plexus of Sappey is a collection of large lymph vessels situated under the areola. Though the subareolar plexus communicates with the lymphatics of the breast tissue, it is not a collecting zone for the breast lymph The axillary nodes receive about 75 per cent of lymph draining the breast tissue. Lymphatics arising in the lobules pass directly outwards in the substance of the breast, receive tributaries on the way, and pass though the axillary tail to the axilla. Most to the anterior group of nodes; a few pass to the posterior group, and from there they run to central and apical group.

Lymphatics form the deep surface of the breast pass through the great pectoral muscle on their way to the axillary or internal mammary nodes.The lymphatic plexus of the deep fascia consists of fine vessels, which do not act as a normal pathway for lymph from the breast to the regional nodes.

The internal mammary nodes receive lymph from both the medial and lateral portions of the breast. Lymph enters the thorax along the anterior perforating branches of the internal mammary artery and along the lateral perforating branches of the intercostals vessels. Most of this lymph goes to the internal mammary chain, but a small amount may pass to the posterior intercostal nodes lying near the head of the ribs.

At the level of the first interspace, fine lymphatics connect the right and left internal mammary chains behind the manubrium sterni, and nodes may be found there. Even in apparently early breast cancer, tumors of the outer half of the breast may metastasize to the internal mammary nodes without involvement of the axilllarynodes.

An efficient and accurate evaluation can maximize cancer detection and minimize unnecessary testing and procedures. For effective management, multidisciplinary approach is essential.[13]

HISTOLOGY

The human breast consists of 6- 10 major ductal system. At the orifice of the nipple, keratinizing squamous epithelium changes into two-layered cuboidal epithelium lining ducts. The larger ducts successively branches and ends as terminal lobular duct unit. In some women the ducts extend into the axilla and chest wall. There are 2 types of cells which line the lobules and duct. The myoepithelial contractile cells line the basement membrane, and help in ejection of milk at the time of lactation and support lobules. Overlying the myoepithelial cells are the luminal cells which produce milk. There are two types of breast stroma. The interlobar stroma consists of dense fibrous connective tissue admixed with adipose tissue. The intralobular stroma envelopes the acini of lobules and consists of breast specific hormonally responsive fibroblasts like cells admixed with lymphocytes.[69]

Changes in the breasts are most dynamic and profound during reproductive years. Just as the endometriun grows and ebbs with each menstrual cycle, so does the breast.

During first half of menstrual cycle, lobules are relatively quiescent. After ovulation ,under the influence of estrogen and progesterone, cell proliferation increases, as does the acini per lobule. The intralobular stroma becomes markedly edematous. Upon menstruation.the fall in progesterone and estrogen levels induces the regression of lobules and the disappearance of stromal edema. After the third decade, long before menopause, lobules and there specialized stroma start to involute. Lobular atrophy may be complete in elderly females. The radiodense fibrous tissue of young female is progressively replaced by radiolucent adipose tissue.[70]

SYMPTOMATOLOGY

Most common symptoms reported by women are pain, nipple discharge and palpable mass.[71]

- Pain (mastalgia) is the most common breast symptom. It can be caused by a ruptured cyst, area of prior injury / infection. But most often, no specific lesion is identified.[72]
- Nipple discharge is a less common presenting symptom but of concern when it is spontaneous and unilateral. A discharge produced by manipulating the breast is normal and unlikely to be associated with a pathologic lesion. Serous discharge is most commonly associated with benign lesions but rarely can be due to malignancy. Palpable mass is a fairly common breast symptom. A breast lesion usually does not become palpable until it is about 2 cms diameter. The most commonly encountered lesions are fibroadenoma, cysts and invasive breast cancer. The likelihood that a palpable mass is malignant increases with age. Cancer of the breast is a common human neoplasm accounting for approximately 1/4th of all cancers in females. Approximately 50% of cancers arise in upper outer quadrant, 10% in each of remaining quadrant and about 20% in central / subareolar region. Early detection and advances in treatment have begun to reduce mortality rates[72].

Detection and diagnosis of breast lump

Education of the public about the fundamental facts of cancer and self- examination of the breast represents an important factor in the early detection of breast disease. The clinical signs of primary breast neoplasm are few. In the over whelming majority of cases, there is a painless breast mass and less frequently nipple discharge of erosion, skin retraction, or an axillary mass.[2]

Physical examination, mammography, ultrasonography, core needle biopsy, open excision biopsy, thermography, fine needle aspiration cytology are important diagnostic modalities which have greater or lesser degrees of contribution in the detection of palpable lump in breast. To increase the sensitivity and specificity of the approaches, studies have been made on the various combinations of these diagnostic modalities.[38]

Many diagnostic tools are used in cases of suspected breast cancer as the famous triple assessment described in 1975[14], which has dramatically reduced the use of open biopsy.[14,15]

It was used principally for evaluating palpable breast lumps. Triple approach has achieved the highest level of diagnostic accuracy in which the results of clinical examination, imaging and fine needle aspiration cytology and/or tru-cut biopsy are combined.[16,17] Hence a diagnostic accuracy exceeding 99% is achieved with the result of the three modalities.[18,76] Interestingly diagnostic accuracy of comparable levels have been achieved with impalpable lesions in which, clinical examination is not much contributory.[19]

The role of cytopathology in the diagnosis of breast disease is concerned with the examination of cells seen in the nipple discharges and those aspirated from solid and cystic lesions using a fine needle. The former is a well-established diagnostic test for carcinoma of the larger ducts, with or without Paget's disease of the nipple, presenting with a blood stained discharge, but aspiration cytology is a newer technique, which is now finding its place in the breast surgeon's diagnostic armamentarium.[9]

In recent years the place of the rapid frozen section in the diagnosis of breast cancer has become diminished in importance and has been replaced by increasing emphasis on preoperative diagnosis using a combination of clinical examination, mammography and either biopsy,

using a wide bore cutting needle or aspiration cytology using a narrow hypodermic needle with rather than attempt to combine tissue diagnosis and mastectomy at one operation.[13]

With realization that perhaps less radical surgery will give equal or improved survival as well as less postoperative morbidity, development of more reliable tests for metastatic disease there by making extensive surgery unnecessary, and finally the increasing tendency to involve the patient herself in the decision about the best method of treatment thus making accurate preoperative diagnosis very important.[6]

Clinicians should distinguish between the two techniques, and it is recommended that the term biopsy be reserved for that which provides a histopathological diagnosis and "aspiration cytology" for that which provides cytopathological diagnosis. [32]

CYTOPATHOLOGICAL DIAGNOSIS

Fine needle aspiration cytology (FNAC)

The History of FNAC

Kun in 1847 had described a “new technique for the diagnosis of tumors”, which was the first report of using a needle method for harvesting tissue for microscopic examination. Random reports of this procedure were subsequently published.[6]

FNAC was hardly recognized until the mid 1950s when awareness of this technique arose by Dr. Martin and Dr. Stewart (Head and Neck Surgeons, New York’s Memorial Hospital) and European pioneer workers from Stockholm Karolinska Radiumhemmet Hospital in Sweden. In contrast to Martin and Stewart who used thicker caliber (18 gauge) needles, the European workers popularized the technique of employing thin needles (22 gauge and higher) with an external diameter of 0.6mm or less for aspiration at different sites ranging through lymph nodes, prostate and breast.

Soderstrom and Franzen in Sweden and Lopes Cardozo in Holland became major proponents of FNAC studying thousands of cases each year[5].

These developments have contributed to a great extent resulting in the procedure today know as “fine needle aspiration cytology” (FNAC).

The perfect volume, histopathological correlation, follow-up details with informative publications allowed for an ethos within the medical field for free reign of the procedure. Hence such a practice led to a new specialty called ‘clinical cytologist’ who examines the patient, and aspirates from the lesion, and subsequently prepares, reads the slide. The cytologist then arranges for onward referral. Therefore they served as a model for FNAC services for the whole world so that FNAC can be an active part of all sophisticated pathology departments.[29,30]

IN THE PRESENT ERA

Fine needle aspiration cytology (FNAC) of the palpable breast masses has recently become a well accepted diagnostic technique, and has mostly replaced excision breast biopsy due to the following advantages. It provides a sensitive, expedient and economical method of obtaining cytological material for examination. It can be done during an office visit without the need of anesthesia thus eliminating the cost of outpatient surgery. It also allows discussion with the patient of various treatment plans for the malignant mass on the same visit. It is most commonly used in combination with physical examination and mammography in the so-called "triple test" diagnostic triad, which is a highly accurate method of evaluating the breast masses. The recent renewed interest in this technique is also due to the fact that this procedure is safe, nontraumatic and repeatable.

FNAC is carried out by cytotechnician and reported by the cytologist and no skill or expertise is needed and has no big learning curve to do the procedure. It can be repeated when necessary with ease.

Table 1: National Health Service Breast Screening Programme-Cytological Grading:

Grade	Result
0	No epithelial cells present
1	Scanty benign cells
2	Benign cells
3	Atypical cells present
4	Highly Suspicious of malignancy
5	Definitely Malignant

Table 2: Robinson Grading System

CRITERIA	SCORE		
	1	**2**	**3**
A) Cell dissociation	Mostly in clusters	Mixture of single cells & cells in clusters	Mostly single cells
B) Cell size	1 – 2 x RBC size	3 – 4 x RBC size	≥ 5 x RBC size
C) Cell uniformity	Monomorphic	Mildely pleomorphic	Pleomorphic
D) Nucleoli	Indistinct	Noticeable	Prominent or pleomorphic
E) Nuclear margin	Smooth	Folds	Buds/Clefts
F) Chromatin	Vesicular	Granular	Clumped & cleared

Grade I: Score: 06–11

Grade II: Score: 12–14

Grade III: Score: 15 – 18

Cytology in different conditions[36]

Benign mammary dysplasia

When this lesion is aspirated one expects to see a few tight groups of duct cells, some adipose tissue and few stripped nuclei. Apocrine cells and foam cells are often seen, particularly when cysts are present.

Fibroadenoma

This lesion produces very cellular specimen. Duct cells are seen in large groups and sheets in honey coomb appearance surrounded by many stripped nuclei. Some nuclear pleomorphism of the duct cells usually present. The high cellularity and mild to moderate pleomorphism of fibroadenoma may lead to false diagnosis of malignancy. This is the tumour most likely lead to false positive diagnosis.

Phyllodes tumour

Variable cellularity, biphasic pattern similar to that of fibroadenoma. Cellular stomal component with spindle cells of various sizes and shapes. Variable cytological atypia and mitotic activity of stomal elements may be present.

Pregnancy and lactation

Under hormonal stimulation the duct cells enlarge, round up, loose their adhesion and show prominent nucleoli. It helps in distinguishing these specimens from malignancy to note that the cells usually have little or no cytoplasm and that there is a protinaceous blue staining back ground in that numerous vacuoles appear, probably due to lipid droplets.

Fat necrosis

Aspirates show a ―messy mixture of degenerate fat cells, polymorphs, histiocytes and often a few giant cells. These are embedded in a blue staining background containing frequent holes, which are presumably dissolved lipid.

Inflammatory conditions

Acute inflammation (like mastitis and breast abscess) produces sheets of degenerate pus cells and other leucocytes usually with histiocytes scattered throughout. Duct cells, when present shows inflamatory changes like nuclear enlargement and cells degeneration.

Granulomatous mastitis is characterized by a cellular aspirate demonstrating conspicuous numbers of lymphocytes, plasma cells and granulomas with epithelioid and multinucleated giant cells. Isolated

clusters of fibroblast and reactive ductal epithelial cells are also present. Occasionally necrosis may be seen. The cellular material from such aspirates should be carefully examined for the presence of acid-fast bacilli, fungi and parasites. Sarcoidosis shows no evidence of necrosis and cat scratch disease typically demonstrates micro abscess formation. Occasionally distinction between atypical mononuclear epithelioid histiocytes in granulomatous mastitis and neoplastic mammary epithelial cells may be difficult.

Papilloma versus papillary carcinoma

Histology and morphological distinction between the carcinoma and benign papillary lesions of the breast is difficult. It is recommended that definitive diagnosis be deferred to the histology unless there are unmistakable features of malignancy.

Carcinoma of the breast

A false diagnosis of breast carcinoma is unacceptable and it is to be avoided at all costs. It is much better to issue a false negative report and proceed to frozen section.

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

1) Structural alterations in the cells.

2) Changes in inter relationship of cells in cell clusters.

3) Indirect criteria.

Structural modifications:

Alterations of nuclear cytoplasmic ratio with disproportionate enlargement of nuclei. Hyperchromasia due to increased chromosomal content, aberrant chromatin pattern. Increased number of nucleoli beyond the normal.

Multinucleation with nuclear atypia, abnormal mitotic figures.

Marked thickening of nuclear membrane.

Cytoplasmic changes enhanced by staining, such as pronounced basophilia/acidophilia. Presence of cytoplasmic inclusions like pigment granules, leukocytes and cellular debris. Atypical vacuolation especially in adenocarcinoma.

Well-differentiated carcinoma of the breast

Diagnosis depends mainly upon the nuclear chromatin, which is finer and smoother than in benign duct cells, together with loss of adhesion of the cells. Other helpful factors are the greater cellularity of the specimens and the lack of stripped nuclei. These tumour cells are difficult to identify without experience.

Moderately and poorly differentiated carcinoma of the breast

These cases rarely present diagnostic difficulty. They show varying degrees of nuclear enlargement, loss of adhesions, pleomorphism abnormal nuclear chromatin and often- prominent nucleoli. Needle aspiration and/or scrapings from the Paget's disease of the nipple show large single malignant cells with clear cytoplasm (Paget cells). Usually there is a dirty back ground with inflammatory cells.

Other malignant tumours of the breast

Colloid carcinoma

It is suggested by the presence of sheets or columns and clusters of large tumour cells having compressed, crescent shaped nuclei with prominent nucleoli molded by one or two large cytoplasmic vacuoles (signet ring cells).

Epidermoid carcinoma (squamous)

It is rare tumour that may originate from the metaplastic epithelium of the duct lining or from the skin covering the nipple. The cytology will show orange keratinised malignant cells with abnormal nuclei similar to ones described for squamous carcinoma of other sites.

Medullary carcinoma

In medullary carcinoma (brain like) aspirations may produce an abundance of large, ovoid or polygonal cells with adequate, vesicular, slightly basophilic cytoplasm and round or oval large nuclei with prominent, single nucleoli. Large number of lymphocytes may also be present. Breast sarcoma

Breast angiosarcoma (lymphangiosarcoma and hemangiosarcoma)

It is very rare; usually develop following radiotherapy to the breast. It is very difficult to differentiate by fine needle aspiration cytology. The lesion is composed of numerous slit like, irregular dilated vascular channels dissecting between the collagen bundles lined by atypical endothelial cells.

PITFALLS IN FNAC

There are various drawbacks in FNAC which may take place in a variety of cases. Some of the drawbacks are due to sampling technique, while others are due to the unusual microarchitecture features or due to the stromal or cellular elements related to the lesion. Diagnostic errors may result in over-treatment or delay in the diagnosis and management.[40] In 1933, Stewart stated "until the pathologist has familiarized himself with the various pitfalls, errors are certain to occur" and "it must not be inferred that the diagnosis is always simple and that no errors have been made".[41] Hence interpretation of FNAC should always be accompanied by clinical and radiological opinion as the triple approach.

National Health Service Breast Screening Programme (NHSBSP) Cytology Guidelines also state that "under no circumstances should a cytological opinion of malignancy in the absence of mammographic and / or clinical evidence of malignancy be taken as authority for therapeutic surgery".[34]

Certain extrinsic factors may lead to error in diagnosis and hence influence the report of FNAC. These factors include: misleading history or clinical evidence, samples that are not representative, samples

contaminated by non-target tissue, artifacts due to poor processing of samples and dependence on and procedure failure of ancillary tests.[39]

Numerous neoplastic and non-neoplastic conditions at various sites can cause difference in the general cytodiagnostic criteria which in turn can contribute to false negative and false positive reports adding to the causes of diagnostic pitfall. The discrepancy could be due to microarchitechture pattern, stromal or cellular component of target tissues.

Hence pitfalls form unavoidable part of fine needle aspiration cytology. However its incidence can be reduced by taking necessary efforts in the diagnosis and by appropriately correlating cytology report with clinical evidence and radiological finding. Twice checking by 2 different pathologists and numerous sampling when indicated with experience acquired by repeated practice of the procedure can help to minimize the occurrence of pitfalls by FNAC diagnosis.[12]

As fine-needle aspiration cytology has become an important component in the investigation of palpable breast masses; false-negative results have become a major issue, requiring reconsideration of the specimen adequacy. The false-negative cases are commonly due to poor sampling technique, poor tumor localization, and the presence of a well-

differentiated histology of the tumor. Small tumor size and non-palpable breast lesions are also commonly associated with false-negative and aspirate inadequacy.[42]

False positive

Fortunately a false positive diagnosis is rare and when clinically not supportive, it is advisable to go for tru-cut biopsy before the definitive treatment.[12]

Inadequate sampling

Inadequate sampling is another pitfall in the diagnosis of breast tumor by FNAC. In those with report as inadequate sampling, repeat aspiration has shown to increase the diagnostic accuracy of FNAC in diagnosing a breast lump.[12]

HISTOPATHOLOGICAL DIAGNOSIS

Biopsy of the breast Lesion

The term "biopsy" (bios-life + opsis-vision) implies an examination of the tissue removed surgically. It includes not only the taking of the tissue but also its microscopic examination. The word biopsy appears to have been coined by the French dermatologist Ernest Henri Besnier in 1879. Even earlier, however Virchow has emphasized the fundamentals of biopsy and it's value in the diagnosis of malignant tumors. Since then the histological study of tissue and other materials removed for the diagnostic purposes has become a cornerstone of many phases of medical practice.[12]

The truth is that the only kind of evidence upon which a surgeon can wholly rely today is pathologic. The surgeon must have proof of the nature of the disease because his therapy is so different for different lesions. Benign lesions, in general require only harmless limited local excision, where as carcinoma requires a formidable and mutilating radical operation. Biopsy and microscopic study of the lesion, is necessary to prove the diagnosis for all lesions of the breast. The only question is what form of the biopsy should take. A number of different methods of obtaining tissue biopsy are in use.[20]

Clinicians should distinguish between the two techniques, and it is recommended that the term biopsy be reserved for that which provides a histopathological diagnosis and "aspiration cytology" for that which provides cytopathological diagnosis.[32]

Methods of biopsy

- Tru-cut biopsy
- Intraductal biopsy
- Smears of nipple secretion
- Incision biopsy
- Excision biopsy
- Biopsy of lesions of the nipple.

Tru-cut biopsy

Surgeons have devised a variety of trocars and trephines for bringing out small cores of tissue from breast lesions. With them it is possible to obtain, tissue specimen that can be fixed embedded, and cut in the usual way. In 1938, Silverman introduced the needle that bears his name and it has come to be widely used for biopsy. Ackermann, at Delafied hospital has advised a good trocar with which a small core of tissue can be obtained. Another needle that is commonly used is the tru-

cut needle. All these techniques have the disadvantage that they provide only a comparatively small specimen of the lesion, in which the architecture is not well shown and question such as invasion remain doubtful. The microscopic evidence is just not good enough. Trocar and trephine biopsy face the objection that they miss the lesion if very small.[12]

Intraductal biopsy

Leborgne in Montevideo has devised a set of small instruments, dilators and loops curettes, which he inserts through the nipple ducts to reach the lesions and to secure small fragments of them. These fragments are sectioned and stained in the usual way.[21]

Smears of nipple secretion

The microscopic examination of nipple discharge smears shows a variety of cells including those from the duct epithelium, inflammatory cells and red blood cells. The best technique for collecting the fluid is to gently squeeze the nipple, noting the position of the nipple of the discharging duct and to place the one end of the microscopic slide on the nipple and make a thin film by smearing the discharge along the slide. The number of cells obtained is usually small and they dry quickly to enable good quality staining by the Romanowasky technique.

When several clusters of large duct cells are seen in a nipple discharge smear the presence of a papilloma or papillary carcinoma should be considered. There is no doubt that the smear technique is not a reliable method of diagnosis. Smears often fail to reveal carcinoma when it is present in the breast and they may give false positive diagnosis of carcinoma when it is not present. Secondly every kind of manipulation of a breast suspected of containing disease should be avoided for the fear of producing metastasis from possible carcinoma.[22]

Incision biopsy

Some surgeons prefer incision biopsy and frozen section as the method of choice in proving a nature of tumor of the breast. Frozen section provides adequate microscopic evidence except in one type of neoplasm of the breast that requires good paraffin section. That is papillary type of neoplasm. It is difficult to distinguish papillary carcinoma from papilloma microscopically by frozen section. Preliminary biopsy as a separate operative procedure and careful study of paraffin sections should precede any definitive operative procedure.[12]

Excision biopsy

Excision biopsy is carried out in the operation theater under general anesthesia, in which the entire lump is removed in-toto, only when there is high suspicion to support a benign lesion or rules out malignant lesion. It serves both as a diagnostic tool and therapeutic intervention, in which the lump is removed with adequate margins of normal tissue, wherein a further surgical procedure is not needed when diagnosed as benign lesion. Incision biopsy, in which a portion of the lesion is excised, is often reserved for diagnosis of lesion suspicious of malignancy, and in conditions where tru-cut biopsy is inconclusive. Hence, excision biopsy is indicated in patients with clinically suspicious lesions and lesions in which imaging or tissue studies are equivocal.[23-26] The need for excision biopsy as a diagnostic tool has decreased with the increased use of tru-cut biopsy.[27]

Biopsy from lesions of the nipple

Lesions of the nipple epithelium, thickening, reddening, erosion which are not accompanied by a palpable tumor in the breast may quite properly be biopsied in the outpatient department.[12]

Histological grading is an important determinant of prognosis that allows risk stratification. Several histologic grading systems are in use, in which some consider duct and gland differentiation and others the nuclear characteristics. Some grading systems include both. Scarff Bloom Richardson grading combines details of cell morphology with a measurement of differentiation and assessment of proliferation.

Table 3: Scarff Bloom Richardson Grading System

Feature	**Score**
Tubule formation	
Majority of tumor - >75%	1
Moderate degree - 10-75%	2
Little or none - <10%	3
Nuclear pleomorphism	
Small,uniform cells	1
Moderate increase in size/variation	2
Marked variation	3
Mitotic counts-per 10 HPF(40xfields)	
0-5	1
0-6	2
>11	3

Grade 1 (Well differentiated): Score 3-5

Grade 2 (Moderately differentiated): Score 3-5

Grade 3 (Poorly differentiated): Score 3-5

Table 4: Comparison of merits of surgical biopsy and aspiration cytology [43]

1.	Diagnosis	Histopathological	Cytopathological
2.	Diagnostic Facility	Narrow	Broad
3.	Anesthesia	Yes	No
4.	Duration	>5min	<5min
5.	Report Available	1-2 days	1-2 Hours
6.	False Positive	None	Very Rare
7.	False Negative	Few	Some
8.	Cost	High	Low
9.	Specimen Obtained	In operating Theatre	As Out Patient
10.	Trauma and Skin Incision	Yes	Little if any

Complication of breast aspirations

No serious complication or problems are associated with fine needle aspiration cytology. A small hematoma may develop as a rare occurrence at the puncture site. This is more likely to happen with breast cancers than with benign diseases. Another minor complication that can occur with fine needle aspiration cytology is the superficial skin infection at the site of pierce. Although theoretically possible no cases of local recurrence or seeding of tumor by piercing with needle has been documented.[12,38]

MATERIALS AND METHODS

Type of study

It was a prospective study.

Source of Data.

Female patients with palpable lump in breast attending Coimbatore Medical College Hospital, Coimbatore formed the subject of this study.

Period of study

Between September 2014 to September 2015.

Sample size

76 patients.

Inclusion criteria

1. Age between 18 and 70 years.
2. Palpable breast lump of variable duration.

Exclusion criteria

1. Patients with recurrent malignancy
2. Patient with acute and tender breast lump like breast abscess
3. Frank malignant mass with skin ulceration

Ethical clearance

The study protocol was reviewed by The Institutional Ethical Committee of the institution and permitted by it.

Data collection

A patient presenting to the outpatient department with palpable breast lump is subjected to detailed clinical history with physical examination and the information is entered in proforma. After obtained an informed and valid consent from the patient, fine needle aspiration cytology or tru-cut biopsy from the breast lump is performed.

The procedure for obtaining the specimen is explained to the patient. A 10ml syringe bearing a 23-gauge needle (external diameter of 0.6mm) is used. The lump is firmly but gently fixed by the locating hand with slight stretching of the overlying skin. Using an alcohol impregnated swab, the site to be aspirated is cleaned. Then with syringe firmly fixed and plunger closed to remove air from barrel, the needle is made ready for inserting. Patient is informed prior to puncturing the skin. The needle is introduced into skin with no air in the syringe barrel. With the needle at the anterior edge of the lump, negative pressure is applied using the thumb or with help of a syringe holder. Multiple passes are made through

the lesion, at varying angle of entry into the lump, slowly rotating the syringe without withdrawing the needle from skin. This is continued till a small droplet of fluid is visualized at the hub of the needle. The negative pressure is released and then the needle is withdrawn from the skin. The needle is separated from the syringe, and reattached to the syringe filled with air. The specimen is then expressed on a glass slide.

In case of excess bleed from the aspirated site, it is best to interrupt the procedure and apply pressure to avoid hematoma formation. The procedure may be repeated in the same sitting from another angle or after 1 week. Breast lesions are often deeper than they appear. If there is doubt about whether the lesion has been sampled, then re-aspiration using a longer needle may be necessary. If there is no resistance to the needle from a lump that appears clinically not to be a lipoma, then it is likely the lesion has been missed by the needle. Re-aspiration is advised, especially if the spread slide shows oily droplets throughout. Similarly, heavily blood stained aspirates may not be representative of the lesion.

The smear was fixed with 95% alcohol and later stained with hematoxylin and eosin stain. The slides were then observed under microscope and graded accordingly.[6]

The patients were subsequently subjected to Tru-cut biopsy using a tru-cut biopsy "gun" of 14-gauge needle. After administering Local Anesthesia, small incision was made over the breast lump and cannula introduced. The inner trocar is thrust forward approximately 2 cm and at almost the same time the outer cutting cannla is thrust over the inner trocar filling the inside notch with the breast tissue specimen. The specimen is then placed in a container of 10% neutral formalin.

The cytological and tru-cut histological diagnosis was reported to the patient and where a diagnosis of malignancy was made, modified radical mastectomy (MRM) was performed and specimen sent for confirming by histo-pathological report. In addition, where the cytology slide reported as "inadequate", repeat aspiration was performed before excision biopsy.

CYTODIAGNOSTIC CRITERIA

The reports of Fine Needle Aspiration Cytology from breast lump

Reports of the fine needle aspiration cytology from palpable lump in breast falls in 4 categories. [10]

1. Unsatisfactory (inadequate) cytology

Insufficient numbers or absence of epithelial cells. The standard criteria for a “diagnostic aspirate” are not yet well defined. Providing that the cells are well preserve and they are not obscured by blood and/or inflamatory cells. A breast aspirate is considered to be satisfactory when there are more than 3 to 6 epithelial cell groups per slide and cellularity is adequate when there are more than 4-6 well- visualized cell groups. The unsatisfactory or inadequate sampling is due to,

a. Scant cellularity.

b. Air drying or distortion artifact

c. Obscuring blood/inflammation. 4. Others.

d. No malignant cells seen

This may be expanded to include the type of cells present and therefore suggest the type of lesion. For example, the presence of apocrine metaplasia together with foam cells suggests cystic mastopathy. Benign cells aspirated from the breast are duct cells, apocrine cells, foam cell, stripped nuclei, fat cells, lymphocytes and red cells.

3. Malignant cells present

This report must be used only when there is no doubt that the lesion is malignant; as such a report should result in the patient receiving definitive treatment for the breast cancer. It is possible not only to diagnose malignancy but also to report whether the tumour is well, moderately or poorly differentiated and whether or not there is lymphocytes response. It is not possible to determine the presence or absence of invasion cytologically.

4. Cells present that are suspicious but not diagnostic of malignancy.

Data entry and Analysis

Data entry and data analysis were done using MS Excel 2007. Appropriate statistical tests were applied.

RESULTS

Table 5: Distribution of Patients according to their Age

Age Group (in completed years)	Total	
	Frequency	Percentage %
18-30	23	32
30-40	17	24
40-50	18	21
50-60	13	18
>60	5	5
Total	76	100

Table 6: Age wise distribution of patients having Benign and Malignant Breast Lump

Age Group (in completed years)	Benign		Malignant	
	Frequency	**Percentage %**	**Frequency**	**Percentage %**
18-30	23	53	0	0
30-40	12	28	5	15
40-50	8	19	10	30
50-60	0	0	13	40
>60	0	0	5	15
Total	**43**	**100**	**33**	**100**

Table 5 shows that out of 76 women studied, age incidence ranged from 18 years to 70 years and the most common age group having breast lump was 18-30 years.

Table 6 shows that the age prevalence for benign breast lesions range from 18-40 year and for malignant lesions range from 50-70 year. The commonest age for benign lesion was 25-35 year and for malignant lesion was 55-65 year.

Fig. 1: Distribution of patients according to Age

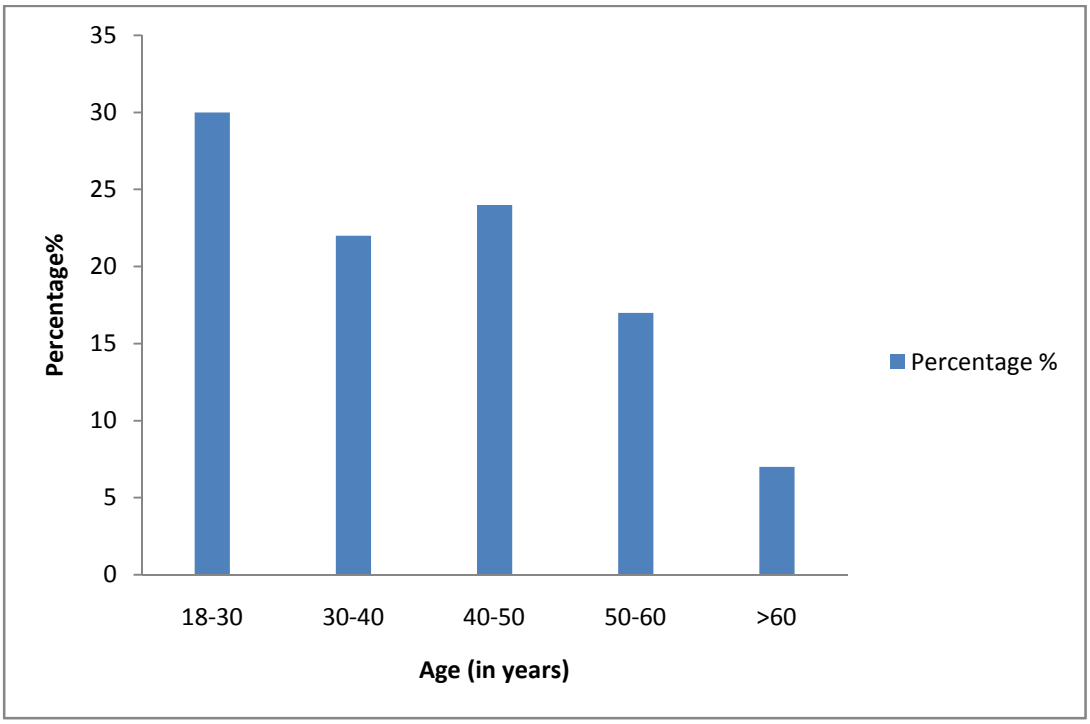

Fig. 2: Age wise distribution of patients having Benign and Malignant Breast Lump

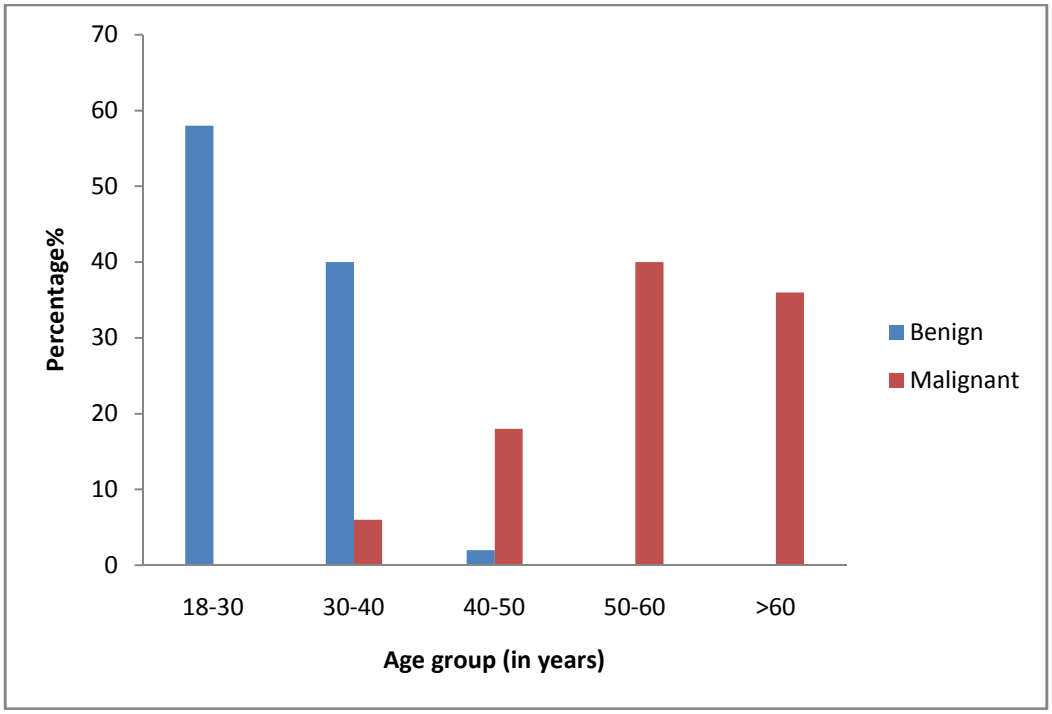

Table 7: The result of Fine Needle Aspiration Cytology

Diagnosis	Benign	Malignant	Suspicious	Total
Frequency	44	29	3	76

Table 8: The result of Tru-cut Biopsy

Diagnosis	Benign	Malignant	Suspicious	Total
Frequency	43	31	2	76

Table 9: The result of Histopathology

Diagnosis	Benign	Malignant	Total
Frequency	43	33	76

Observations and results of benign lumps- FNAC

Out of the 76 patients reported as having benign lesions by FNAC, 43 were confirmed to have benign lesion by histopathology. False negative case was zero and false positive case was 1.

Observations and results of malignant lumps- FNAC

Of the total 33 cases of malignant lesions, FNAC had reported 29 malignant, 1 benign and 3 suspicious lesion. There were 3 false negative cases and 1 false positive case. Inadequate (unsatisfactory) sampling report were observed in three cases, which on repeat fine needle aspiration cytology revealed malignancy, later confirmed by histopathology.

Accuracy rate for diagnosing malignant lesions by FNAC is 94.73%.

Unsatisfactory specimen rate 3.9%

Observations and results of benign lumps- Tru-cut Biopsy

Of the 76 cases of benign report by tru-cut, 43 were confirmed by histopathology. There were zero false negative cases and zero false positive cases.

Observations and results of malignant lumps- Tru-cut Biopsy

Of the total 33 cases of malignant lesions, tru-cut reported 31 as malignant, 2 suspicious lesion and false negative 2 and false positive zero. Two cases were reported as unsatisfactory (inadequate) sampling, which on excision biopsy revealed malignancy.

Accuracy rate for diagnosing malignant lesions by tru-cut biopsy is 97.36%.

Unsatisfactory specimen rate 2.6%

Table 10: Histopathological reports of the Benign Breast Lesions

Diagnosis	**Frequency**
Fibroadenoma	34
Fibrocystic Disease	5
Antibioma	1
Benign Phylloides	1
Duct Ectasia	1
Acute Mastitis	1
Total	**43**

Table 11: Histopathological results of Malignant Breast Lesions

Diagnosis	**Frequency**
Infiltrating Ductal Carcinoma	32
Infiltrating Ductal Carcinoma with neuroendocrine differentiation	1
Total	**33**

Fig. 3: Histopathological reports of the Benign Breast Lesions

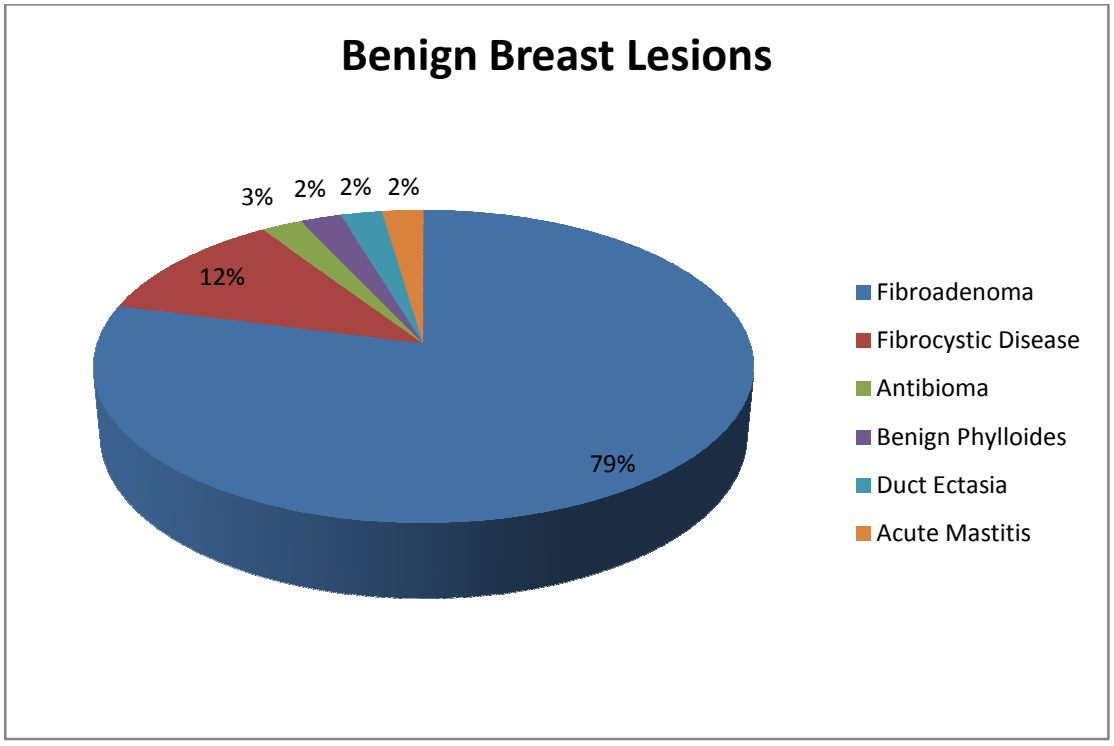

Fig. 4: Histopathological results of Malignant Breast Lesions

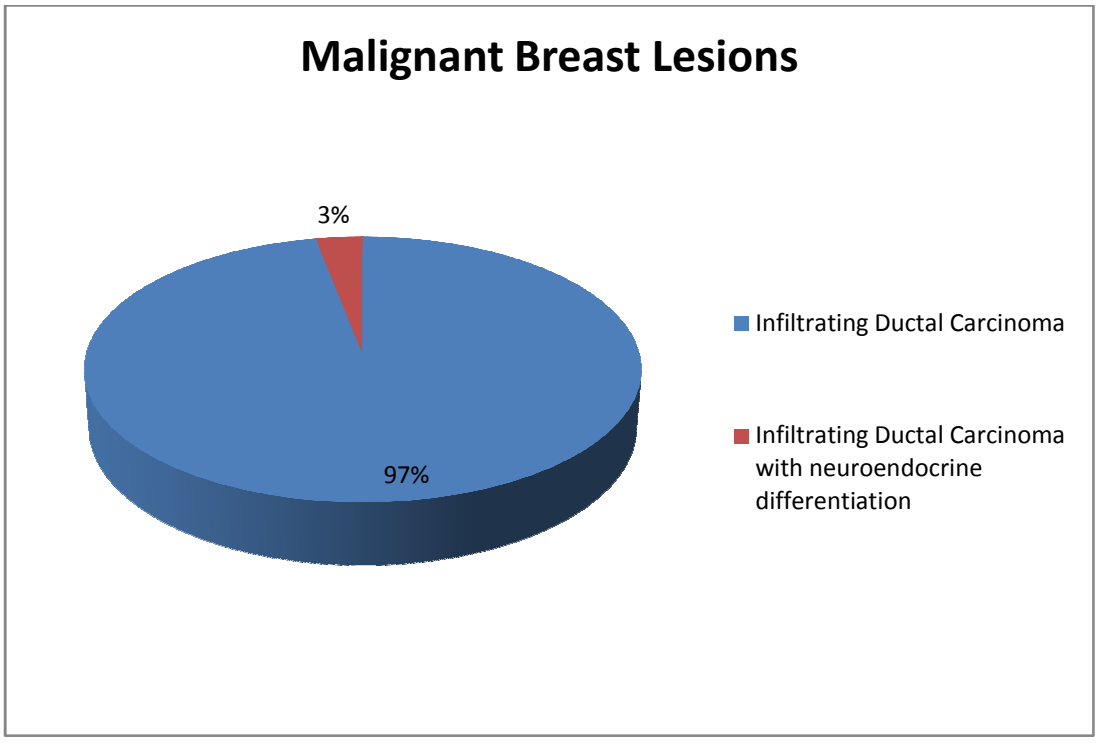

Table 12: The predictive value of FNAC of Palpable Breast Lump

Test Result (FNAC)	Disease (Malignant)	Not Diseased (Benign)	Total
Positive	29	1	30
Negative	3	43	46
Total	**32**	**44**	**76**

Table 13: The predictive value of Tru-cut Biopsy of the palpable breast lump

Test Result (FNAC)	Disease (Malignant)	Not Diseased (Benign)	Total
Positive	31	0	31
Negative	2	43	45
Total	**33**	**43**	**76**

$$1.\ \text{Sensitivity} = \frac{\text{True Positive}}{\text{True Positive + False Positive}} \times 100$$

Sensitivity of FNAC= 90.62%

Sensitivity of Tru-cut Biopsy= 93.93%

$$2.\ \text{Specificity} = \frac{\text{True Negative}}{\text{True Negative + False Positive}} \times 100$$

Specificity of FNAC= 97.72%

Specificity of Tru-cut Biopsy= 100%

$$3.\ \text{Positive Predictive Value} = \frac{\text{True Positive}}{\text{True Positive + False Positive}} \times 100$$

PPV of FNAC= 96.66%

PPV of Tru-cut Biopsy= 100%

$$4.\ \text{Negative Predictive Value} = \frac{\text{True Negative}}{\text{True Positive+ False Negative}} \times 100$$

NPV of FNAC= 93.47%

NPV of Tru-cut Biopsy= 95.55%

Inadequate sampling (Unsatisfactory report)

Of the total 33 cases of malignant lesions inadequate sampling report by FNAC were noted in 3 patients, which on repeat fine needle aspiration cytology revealed malignancy, and later was confirmed by histopathology. Similarly, 2 cases were reported as inadequate sampling by tru –cut biopsy, which on excision biopsy revealed malignancy.

$$5.\ \text{Inadequate sampling rate} = \frac{\text{No. of unsatisfactory report}}{\text{Total No. of cases}} \times 100$$

Inadequate sampling rate of FNAC= 3.9%

Inadequate sampling rate of Tru-cut Biopsy= 2.6%

Table 14: Distribution of cases- Robinson cytological grading system

Grade	No. of Cases	Percentage %
1	4	14
2	15	52
3	10	34
Total	**29**	**100%**

Table 15: Distribution of cases- Scarff Bloom Richardson histological grading method

Grade	No. of Cases	Percentage %
1	2	6
2	18	55
3	13	39
Total	**33**	**100%**

DISCUSSION

Breast lump is a common complaint presented by patients at the surgical outpatient department in all major hospitals, with an anxiety of possible malignancy being extremely common.[4,5] Accurate diagnosis of carcinoma has been a diagnostic dilemma since long. A differential diagnosis of the benign, traumatic and malignant lesions is very essential in early stages of the disease. It is extremely important that unnecessary surgeries or invasive treatment for benign diseases are minimized, and malignant lesions are aggressively managed in early stages. Breast is a common and important site for Fine Needle Aspiration Cytology (FNAC).

There has developed increasing need to prove the diagnosis of carcinoma breast at the initial visit by the patient in the form of needle cytology or biopsy.[3,12] Hence it enables better evaluation and prudent preoperative communication with patient than with frozen section or excision biopsy which validated the physical examination diagnosis.

Enormous and tremendous success has been attained with the expansion of fine needle aspiration and cytology as the primary diagnostic tool in cancer for the past 30 years. Its use in diagnosing the presence of carcinoma prior to the surgical procedure and to direct the appropriate treatment has been well recognized. Moreover many studies have established the value of methodical use of tru-cut biopsy for the detection of carcinoma breast despite of the presence of good quality clinical, radiological, and cytological examinations.[11]

Our current research was performed on 76 female patients having palpable lump in breast. After obtaining informed consent the patient was subjected to fine-needle aspiration cytology followed by tru-cut biopsy from the lump with subsequent surgical procedure as lumpectomy or modified radical mastectomy determined by the result from FNAC and histopathology report. The outcomes from aspiration cytology and the results of tru-cut biopsy were correlated with the final histopathologic report to observe how accurate fine needle aspiration cytology was when compared to tru-cut biopsy in assessing the cytohistologic correlation.

The age range of the 76 women selected in our study was from 18 years to 70 years. While the incidence for benign breast diseases ranged from 18 to 40 yrs, the prevalence of malignant lesions was from 50-70

yrs. The most frequent age group afflicted with benign breast lesions ranged from 25 to 35 years and with malignant lesions ranged from 55 to 60 years.

The most common pathology encountered among the patients in our study was fibroadenoma among (31patients). Subsequently fibrocystic disease was observed in 5 patients, antibioma in 1 patient, benign phylloides in 1 patient, duct ectasia in 1 patient, acute mastitis in 1 patient and malignancy in 33 patients. Fibroadenoma has been regarded as an important cause for false positive diagnosis. We had one case of false positive report in this study.[70]

Our study showed 33 malignant lesions, with ductal infiltrating carcinoma as commonest malignant lesion reported in FNAC and tru-cut biopsy. One case was reported as having infiltrating ductal Carcinoma with neuroendocrine differentiation. Malignant lesions were responsible for 43% of breast lumps (33 out of total 76 cases). While the peak incidence is observed in post menopausal women, it may be seen as early as in the third decade. In cytology it appears as much cellular smear, often with necrotic background, monomorphic cell population with variable cell pattern including conspicuous loss of cellular cohesion, numerous isolated single cells and variable degree of anisonucleosis.[33] In

HPE depending on the grade, the tumor may form glands and tubules and show stromal desmoplasia, and contain round to oval nuclei with mitoses.

In a study by Tiwari et al[56] on 91 patients showed the most common lesion to be fibroadenoma (39.6%). Other benign conditions as fibrocystic disease, galactocele, breast abscess, duct ectasia were responsible for 5.5%-7.7% of cases. In addition invasive ductal cancer was responsible for 6.6% of the 91 cases. In a study by A. Khemka et al.[6], the commonest pathology was found to be fibroadenoma among 29 patients with fibrocystic disease noted in 4 patients followed by malignancy observed in 13 patients. Sumaira Zareef et al[54] and Ashwin[12] also found the fibroadenoma commonest lesion of breast in their study.

As described above, the purpose of our study was to deduce the diagnostic correlation of fine needle aspiration cytology and tru - cut biopsy when compared to the histopathologic result from breast lump. Hence, enabling us to conclude how accurate and reliable FNAC is as compared to Tru-cut biopsy in determining the pathology, which further facilitates in planning a definite surgery without giving objectionable final histology report of the specimen.

Analysis of the cytological reports in various series confirms the high diagnostic accuracy of FNAC. One year prospective study of FNAC and tru-cut biopsy of clinically palpable lump in breast with histopathology report correlation was performed at our hospital. In which FNAC showed benign breast lesion in 44 patients with suspicious observed in 3 patients and malignancy lesion observed in 3 patients and false positive report observed in 1 patient. The accuracy of fine needle aspiration cytology for diagnosing benign lesions was 100%. The overall sensitivity of FNAC in diagnosing a malignant lesion in this study was 90.62%, and specificity was 97.72%,

Analysis of tru-cut biopsy reports revealed higher diagnostic accuracy. Tru-cut biopsy showed benign breast lesions in 43 patients, suspicious in 2 patients and malignant in 31 patients with false negative report observed in 2 patients and false positive result of 0. Accuracy of tru-cut biopsy for benign lesions was 100%. The overall sensitivity of tru-cut in diagnosing a malignant breast lesion in our study was 93.93%, specificity was 100%.

The sensitivity of the concerned investigation is its statistical index. If the particular test result is positive, it certainly indicates that the disease is present. However, if the result is negative, then it doesn’t rule

out possibility of disease. In addition the effectiveness of the investigation to identify the patients not having the disease determines its specificity.

The positive predictive value of a test is the likelihood of the patient with a positive result to have the disease and thus determining the diagnostic power of the test. Meanwhile the negative predictive value of the test determines the possibility of the patient with a negative result not to have the disease.

The positive predictive value of a test indicates the probability of a patient with a positive result to have the disease. Hence, it shows the diagnostic power of the test while the negative predictive value of a test, on the other hand, indicates the probability of a patient with negative result not to have the disease.

The positive predictive value of FNAC to diagnose a malignant breast lesion was 96.66% and negative predictive value was 93.47% in this study.

The positive predictive value of tru-cut biopsy in diagnosing a malignant breast lesion in our study was 96.66% and negative predictive value was 93.47%.

Table 16: Comparison of various studies- Fine needle Aspiration cytology of Palpable breast lump

Name of study	Sensitivity	Specificity
Hussain M T[47]	90.9%,	100.00%
Aziz M et al[48]	85.29%	100.00%
Abdulrahman et al[51]	91.70%	100.00%
O.N. Alema et al[57]	83.3%,	100.00%
Sudarat et al[58]	92.50%	90.20%
Ahmed HG[61]	92.60%	95.20%
A.Khemka et al[6]	96.00%	100.00%
Tiwari et al[56]	83.00%	100.00%
Nggada HA et al[59]	95.70%	98.70%
Muzaffar et al[72]	85.29%	100.00%
Rubin J et al[46]	87.00%	100.00%
Yeoh et al[64]	79.00%	98.00%
Choi et al[74]	77.70%	99.20%

Table 17: Comparison of various studies- Fine needle Aspiration cytology of Palpable breast lump[73]

Name of study	Sensitivity	Specificity
Husain and Rikabi et al	98.10%	100.00%
Lacambra et al	96%	99%
Ahmed et al	94.64%	91.30%
Bdour et al	97%	100%
Brunner et al	95%	100%
Kulkarni et al	97.70%	94.20%
Homesh et al	92.30%	94.80%
Gukas et al	88.90%	96.80%
Our Study	93.93.%	100%

As described above, the positive and negative predictive values of a test are the statistical indices which measure the performance of a test by measuring its "predictive value" which reflects the diagnostic power of the test. It depends on the sensitivity, specificity and disease prevalence. In this regard, Franco et al.[75], in his study of 300 patients on the utility of FNAC, reported a positive predictive value of 100% and a negative predictive value of 92%. A very large study of 1,297 patients was done by Choi et al.[74] on correlation of FNAC with histopathology

reports, and found the positive predictive value to be 98.4% and a negative predictive value of 88%.

Our study had 3 false negative reports. Even though these reports can be considered as sampling error, its effect on treatment could be noticeable. A failed aspiration reported in respect of a breast lump is best regarded as a non-report and repeat biopsy is sensible. Cellular fibroadenoma and papilloma bear a risk in this regard. Numerous other studies have shown a false positive report of 0-10%[36]. Care must be taken to prevent false positive reporting, hence avoiding an incorrect conclusion.

The lesions having possibility of false positive report are papillary lesions, atypical epithelial hyperplasia, atypia of ductal epithelium in a cyst. And the likelihood of a false negative report is present in low grade malignancy, complex proliferative lesion and in tumors with central necrosis, small cell carcinoma. In the context of breast pathologies, the main advantage of FNAC is that there are very few false positives in distinguishing benign and malignant lesions. Silverman et al. also showed in his works that fine needle aspiration cytology in contrast to tru-cut biopsy has higher positive predictive value in detecting carcinoma and locally recurrent disease.[69]

The presences of unsatisfactory and inadequate sampling due to less or no cellular material in the report, lead us to speculate for any error in the method of aspiration. In this study there were three aspirations reporting unsatisfactory, thus resulting in an inadequate sampling rate of 3.9%. The percentage of inadequate sampling rate reported in various studies varied from 9% to 18%.[17]

FNAC is the reliable, fast, cost effective and simple procedure for breast lump diagnosis. It is a valuable method although moderately less sensitive than tru-cut biopsy. FNAC is highly predictive and accurate for breast lesions when used in context of other diagnostic modalities (clinical & radiological = triple test).[13] On the other hand, Yong et al. preferred the FNAC over tru-cut biopsy as it produced less complication, able to perform multidirectional sampling and there was a technical problem of immobilizing the lump while using tru-cut needle. 7,8 Few advantages noted with tru – cut biopsy was that it provided preoperatively the histologic type of tissue and valuable information on prognostic parameters such as expression of oncogenes and anti-oncogenes (c-erbB2 & p53), receptor status, proliferative activity and ploidy. This will enable the oncologist and surgeon to choose the ideal therapeutic measure with appropriate neo - adjuvant chemotherapy.

The tru-cut biopsy of palpable breast lesions based on histological study of tissue specimens has the advantage of providing preoperatively the histological type and information on prognostic parameters (receptor status, proliferative activity, ploidy, and expression of oncogenes and antioncogenes such as c-erbB-2 and p53) which will guide the surgeon and the oncologist for ideal modern therapeutic strategy in surgical decision making.[13] It also permits the eventual use of neoadjuvant therapy.

Hatada et al. stated that combination of FNAC and tru-cut biopsy has higher sensitivity and accuracy in diagnosis of breast lumps. Ibrahim et al. reported that FNAC may sample larger or slightly different areas of breast tissue, while tru-cut biopsy represented only one area of the mass. So combination of the two procedures may decrease the false negative results.

Different authors have followed different cytologic grading systems, some have even tried to compare them and evaluate the most suitable.[30]

Frias et al studied 100 cases of invasive ductal carcinoma, cytologic grading was done using Robinson's method and histological grading was done using SBR method. A statistically significant

association was observed between cytologic and histologic grades and between cytologic grade. Similarly, cell dissociation, cell uniformity and the appearance of nuclear margins all displayed a positive correlation with regional metastasis.[3]

In a study done by Khan et al which included 43 cases of infiltrating carcinomas, cytologic grading was done by Robinson's grading method and histologic grading was done by SBR grading method. Cytologic grading was found to be fairly comparable with histologic grading, difference between the two grading methods was insignificant in all the three of the six parameters studied, cell dissociation, nucleoli and chromatin pattern were the most influencing.[33]

Chhabra et al studied 60 cases of breast carcinoma where Robinson's method was used for grading cytologic smears and SBR grading was used for histologic grading. There was agreement between cytologic grade and histologic grade in 65% of the tumors. The histologic grade correlated positively with cytologic grade. The study also showed that extent of cell dissociation and nucleoli were the most influential features.[24]

CONCLUSION

In our study the accuracy rate of Tru-cut biopsy has reported to be more than the accuracy rate of FNAC. Despite the ability of tru – cut biopsy to provide histologic diagnosis with additional details on the receptor status, tumor grade, and type with lymphovascular invasion, FNAC stands as an effective and valid tool as the first line diagnostic modality in the preoperative diagnosis of both benign and malignant lesions.

Analysis of various cytological reports showed the high diagnostic accuracy of fine needle aspiration cytology. In fine needle aspiration cytology 44 patients had benign breast lesion, suspicious lesion in 3 and malignant lesion in 29 with a false negative result in 3 patients and false positive result in 1 patient. The diagnostic accuracy of FNAC for the benign lesions was 100%. The sensitivity of FNAC in detecting a malignant lesion in this study was 90.62% and with a specificity of 97.72%, a positive predictive value of 96.66% and negative predictive value of 93.47%.

Analysis of Tru-cut biopsy revealed higher diagnostic accuracy. In Tru-cut biopsy 43 patients had benign breast lesion, suspicious in 2 and malignant in 31 patients with a false negative result in 2 patients and a false positive result in 0. The diagnostic accuracy of tru-cut biopsy in benign lesion was also 100%. The overall sensitivity of tru-cut in diagnosing a malignant breast lesion in this study was 93.93%, specificity was 100%, positive predictive value of 100% and negative predictive value of 95.55%.

The sensitivity, specificity, and diagnostic efficacy observed in our data by FNAC were comparable to those observed in Tru-cut biopsy and those given in other texts. The FNAC procedure is easy, reliable, repeatable, and patient friendly. It is also a simple diagnostic test which can be implemented in busy clinic settings and does not call for too much preparation or expensive equipment. A high positive predictive value and a high sensitivity indicate that a positive report of fine needle aspiration cytology confirms the final diagnosis of the disease when correlated to the histologic report. A high negative predictive value and a high specificity reveal the high accuracy rate of FNAC in diagnosing a malignant lesion of the breast.

In addition, Robinson cytological grading system correlates precisely with the histological grade. A positive correlation was observed between Robinson cytological grading system and Scarff Bloom Richardson histological grading system. Discordance between cytologic grading and histologic grading was seen in few cases which may be due to sampling error, the presence of different degrees of atypia within the same tumor and subjective nature of grading process. Cytologic grading allows prognostic evaluation of breast carcinoma along with diagnosis without additional morbidity or expense to the patient. Hence it is recommended that cytological nuclear grade should appear in FNAC reports of ductal breast carcinoma for proper management.

Thus, FNAC is a very important diagnostic tool in palpable breast lumps; its results show a high degree of correlation with the final histopathology report. To conclude, the results obtained by FNAC for a lump in breast especially in suspicion of malignancy clinically, is equal and in par with tru-cut in various aspects and outstands tru-cut biopsy in diagnosing benign diseases, and hence the simple OP procedure of FNAC done with ease by cytotechnician and diagnosed by pathologist is a widely acceptable procedure for diagnosing breast lumps.

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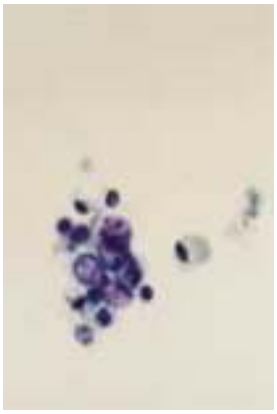
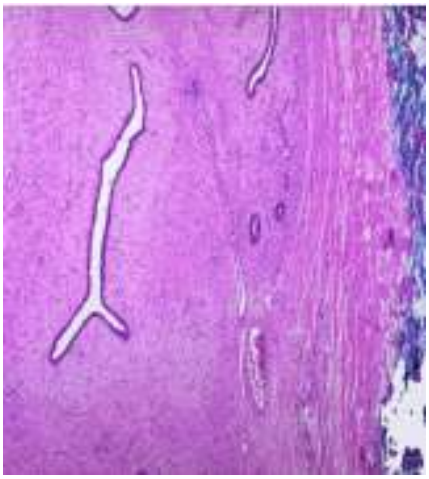
ANNEXURE I

PHOTOGRAPHS

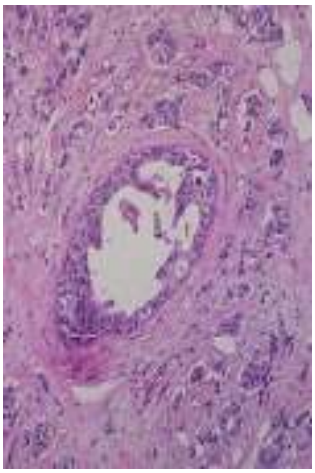
Cytology Result of Benign Lesion



Cytology Result of Malignant Lesion



Histological appearance of Fibroadenoma



Histological appearance of Invasive ductal Carcinoma

ANNEXURE II

FNAC from Breast Lump

Tru-cut Biopsy Needle

PROFORMA FOR COLLECTING THE DATA

Case No.

NAME:

D.O.A

AGE:

D.O.O:

SEX:

D.O.D

OCCUPATION:

ADDRESS:

CHIEF COMPLAINTS:

1) Lump

2) Pain

3) Discharge from nipple

4) Retraction of nipple

5) Other complaints

HISTORY OF PRESENTING ILLNESS:

1) PAIN:

a. Duration

b. Time and mode of onset

c. Site of pain:

d. character of pain

e. radiation of pain

f. Aggravating factors and Reliving factors

PAST HISTORY

1) History of similar complains

2) Duration

3) Treatment taken

4) History of previous surgeries

5) History suggestive of Hypertension/ Diabetes/ Tuberculosis

PERSONAL HISTORY

Diet: Vegetarian/ Mixed

Habits: Smoking/ Alcohol/ Tobacco

Bowel habits and habits Bladder\

Sleep

FAMILY HISTORY

Marital status

Similar illness in other family members

MENSTRUAL HISTORY

Age of menarche

Dysmenorrhea

L. M. P.

Vaginal discharge

GENERAL PHYSICAL EXAMINATION

1. General survey

2. Body build and nourishment

3. Appearance

4. Attitude: Restless/ Quiet

5. Dehydration: Mild/ Moderate/ Severe/ Nil

6. Anaemia/ Jaundice/ Clubbing/ Cyanosis/ Lymphadenopathy/ Pedal oedema

7. Pulse

8. Temperature

9. Respiratory rate

10. Blood pressure

LOCAL EXAMINATION

1. INSPECTION BREAST

Position

Size and shape

Any puckering or dimpling Skin over the breast NIPPLE

Position

Size and shape

Surface

Discharge

AREOLA

ARM AND THORAX

AXILLA AND SUPRACLAVICULAR FOSSA 2. PALPATION

Local rise of temperature Tenderness

Situation

Size and shape

Surface and margin

Consistency

Fluctuation

Fixity to the skin

Fixity to the breast tissue

Fixity to the underlying fascia and muscles Fixity to the chest wall

Palpation of the nipple EXAMINATION OF LYMPH NODES Pectoral group

Brachial group

Subscapular group

Central group

Apical group

cervical

RECTAL EXAMINATION

VAGINAL EXAMINATION

SYSTEMIC EXAMINATION

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

INVESTIGATIONS

1. Blood: Hb %

2. TLC

3. DLC

4. BT

5. CT

6. ESR

7. Blood group and Rh type

8. Urine: Albumin/ Sugar/ Microscopy

9. Chest x-ray

10. HIV & HbsAg

12. Others

DIAGNOSIS MANAGEMENT

SURGICAL

Pre-operative instructions Type of Anaesthesia Type of incision

Post-operative instructions Post-operative period

Post-operative complication management

CONSENT FORM

It has been explained to me in my mother tongue and I completely understand my condition, its related complications and the treatment options available. I have been explained in detail regarding this study **COMPARATIVE STUDY BETWEEN FINE NEEDLE ASPIRATION CYTOLOGY AND TRU-CUT BIOPSY IN THE DIAGNOSTIC ACCURACY OF BREAST CANCER IN COIMBATORE MEDICAL COLLEGE HOSPITAL.** I hereby give my consent to participate in the above mentioned study.

…… ……

Signature / left thumb impression of parent Date:

ஒப்புதல் படிவம்

பெயர் :

வயது :

பாலினம் :

முகவரி :

அரசு கோவை மருத்துவக் கல்லூரியில் பொது மருத்துவ அறுவை சிகிச்சை துறையில் பட்ட மேற்படிப்பு பயிலும் மாணவி **மரு. நான்சி ராஜா** அவர்கள் மேற்கொள்ளும் "**நுண்ணுசி உயிரணுவியல் மற்றும் ட்ரூகட் துல்லியம் - ஒரு ஒப்பீட்டு ஆய்வு**" பற்றிய ஆய்வில் செய்முறை மற்றும் அனைத்து விளக்கங்களையும் கேட்டுக் கொண்டு எனது சந்தேகங்களை தெரிவுபடுத்திக் கொண்டேன் என்பதை தெரிவித்துக் கொள்கிறேன்.

நான் இந்த ஆய்வில் முழு சம்மதத்துடனும், சுய சிந்தனையுடனும் கலந்து கொள்ள சம்மதிக்கிறேன்.

இந்த ஆய்வில் என்னைப் பற்றிய அனைத்து விபரங்கள் பாதுகாக்கப் படுவதுடன் இதன் முடிவுகள் ஆய்விதழில் வெளியிடப்படுவதில் ஆட்சேபணை இல்லை என்பதை தெரிவித்துக் கொள்கிறேன். எந்த நேரத்திலும் இந்த ஆய்வில் இருந்து நான் விலகிக் கொள்ள எனக்கு உரிமை உண்டு என்பதையும் அறிவேன்.

இடம்

தேதி

MASTER CHART

No	Name	Age (years)	FNAC Report	Tru-cut Report	Surgery Performed	Histopathology Report
1	Bhuvaneshwari	20	Benign	Benign	Excision	Fibroadenoma
2	Manju	18	Benign	Benign	Excision	Fibroadenoma
3	Pavithra	20	Benign	Benign	Excision	Benign Phylloides Tumor
4	Thilagavathy	57	Malignant	Malignant	MRM	Invasive Ductal CA
5	Rajalakshmi	32	Benign	Benign	Excision	Fibroadenoma
6	Lakshmi	60	Malignant	Malignant	MRM	Invasive Ductal CA
7	Ruckmani	60	Malignant	Malignant	MRM	Invasive Ductal CA
8	Kaliyammal	70	Malignant	Malignant	MRM	Invasive Ductal CA
9	Umarani	50	Malignant	Malignant	MRM	Invasive Ductal CA
10	Sheela	27	Benign	Benign	Excision	Fibroadenoma
11	Prabhavathy	27	Benign	Benign	Excision	Fibroadenoma
12	Jaibunisha	60	Malignant	Malignant	MRM	Invasive Ductal CA
13	Sakila	45	Malignant	Malignant	MRM	Invasive Ductal CA
14	Palaniyammal	55	Malignant	Malignant	MRM	Invasive Ductal CA
15	Rahana	18	Benign	Benign	Excision	Fibroadenoma
16	Santhi	50	Malignant	Malignant	MRM	Invasive Ductal CA
17	Kulandiyammal	50	Malignant	Malignant	MRM	Invasive Ductal CA
18	Devi*	50	Benign	Fibrous tissue	MRM	Invasive Ductal CA

19	Hayarnisha	43	Malignant	Malignant	MRM	Invasive Ductal CA
20	Savithri	59	Blood components	Malignant	MRM	Invasive Ductal CA
21	Amiritham	50	Benign-Nipple adenoma	Fibrofatty tissue	Excision	Fibroadenoma
22	Priya	24	Benign	Fibrofatty tissue	Excision	Antibioma
23	Revathi	23	Benign	Benign	Excision	Fibroadenosis
24	Rajeshwari	58	Malignancy	Malignant	MRM	Invasive Ductal CA
25	Shanthi	37	Benign	Benign	Excision	Fibroadenoma
26	Maharaj Banu	42	Malignant	Malignant	MRM	Invasive Ductal CA
27	Rathana	36	Malignant	Malignant	MRM	Invasive Ductal CA
28	Ajmunisha	40	Benign	Benign	Excision	Fibroadenoma
29	Sandhiya	30	Benign	Benign	Excision	Fibroepithelial Polyp
30	Saroja	33	Benign	Benign	Excision	Fibroadenoma
31	Jagajothi	43	Benign	Benign	Excision	Fibrocystic disease
32	Palanathal	45	Benign	Benign	Excision	Fibrocystic disease
33	Farina	18	Benign	Benign	Excision	Tubular Adenoma
34	Mohanambal	64	Malignant	Malignant	MRM	Invasive Ductal CA
35	Elizabethrani	47	Benign	Benign	Excision	Fibroadenoma
36	Ayyammal	35	Benign	Benign	Excision	Fibroadenoma
37	Sokammal	26	Benign	Benign	Excision	Fibroadenoma
38	Sumaiya	34	Benign	Benign	Excision	Fibroadenoma
39	Sundhari	46	Benign	Benign	Excision	Ductectasia

40	Niraikalai	30	Benign	Benign	Excision	Fibroadenoma
41	Backiyam	23	Benign	Benign	Excision	Acute Mastitis
42	Preetha	37	Benign	Benign	Excision	Fibroadenoma
43	Ponnammal	45	Malignant	Malignant	MRM	Invasive Ductal CA
44	Ambika	24	Benign	Benign	Excision	Fibroadenoma
45	Nagarathinam	28	Benign	Benign	Excision	Fibroadenoma-complex
46	Jothi	55	Malignant	Malignant	MRM	Invasive Ductal CA
47	Umadevi	62	Malignant	Malignant	MRM	Invasive Ductal CA
48	Savithri	51	Malignant	Malignant	MRM	Invasive Ductal CA
49	Devanai	50	Benign	Benign	Excision	Fibrocystic Disease
50	Karuppammal	40	Malignant	Malignant	MRM	Invasive Ductal CA
51	Chandra	55	Malignant	Malignant	MRM	Invasive Ductal CA
52	Vijayalakshmi	45	Benign	Benign	Excision	Fibrocystic Disease
53	Santhi	29	Benign	Benign	Excision	Fibrocystic Disease
54	Pavithra	23	Benign	Benign	Excision	Fibroadenoma
55	Vijaya	40	Benign	Benign	Excision	Fibroadenoma
56	Sharmila	28	Benign	Benign	Excision	Fibroadenoma
57	Sampoornam	62	Malignant	Malignant	Excision	Invasive Ductal CA
58	Mariyam	40	Benign	Benign	Excision	Fibroadenoma
59	Poorani	57	Malignant	Malignant	MRM	Invasive Ductal CA
60	Papayee	70	Malignant	Malignant	MRM	Invasive Ductal CA

61	Pavithra	21	Benign	Benign	Excision	Fibroadenoma
62	Fathima	45	Malignant	Malignant	MRM	Invasive Ductal CA
63	Angaleshwari	34	Benign	Benign	Excision	Fibroadenoma
64	Rajammal	40	Malignant	Malignant	MRM	Invasive Ductal CA
65	Vijaya	32	Benign	Benign	Excision	Fibroadenoma
66	Malathi	57	Malignant	Malignant	MRM	Invasive Ductal CA
67	Allmelu	43	Malignant	Malignant	MRM	Invasive Ductal CA
68	Suvitha *	36	Benign	Benign	Excision	Invasive Ductal CA
69	Vanitha Banu	40	Malignant	Malignant	MRM	Invasive Ductal CA
70	Sundari	32	Benign	Benign	Excision	Fibroadenoma
71	Bhuvaneshwari	46	Benign	Benign	Excision	Fibroadenoma
72	Amsaveni	20	Benign	Benign	Excision	Fibroadenoma
73	Thangammal	55	Malignant	Malignant	MRM	Invasive Ductal CA
74	Geethalakshmi	30	Benign	Benign	Excision	Fibroadenoma
75	Gomathy	29	Benign	Benign	Excision	Fibroadenoma
76	Bommi	30	Benign	Benign	Excision	Fibroadenoma