A DISSERTATION ON

"A CORRELATIVE STUDY OF FNAC, EXCISION BIOPSY AND FINAL DIAGNOSIS IN BENIGN AND MALIGNANT BREAST LUMPS"

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CERTIFICATE

This is to certify that this dissertation titled **"A CORRELATIVE STUDY OF FNAC, EXCISION BIOPSY AND FINAL DIAGNOSIS IN BENIGN AND MALIGNANT BREAST LUMPS"** is a bonafide work of **Dr. R. SANJEEV PANDIAN**, Post Graduate student in M.S. General Surgery, Department of General Surgery, Tirunelveli Medical College and has been prepared by him under our guidance, in fulfillment of regulations of The Tamilnadu Dr. M.G.R. Medical University, for the award of M.S. degree in General Surgery during the year 2006.

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CONTENTS

INTRODUCTION

Fine-needle aspiration cytology (FNAC) was performed on a large scale at Memorial Hospital, New York, during the 1930s, but during the ensuing years, it did not gain much encouragement in United States. The technique had a resurgence in Scandinavia during the 1950s and 1960s, where it flourished before spreading to other parts of the world. For decades, small samples of tissue have been obtained using a needle to diagnose lesions in many anatomical locations. Breast lesions were identified as particularly suitable for the technique due to their accessibility. The use of smears obtained by aspiration for diagnostic purposes was reported as early as 1933, when Stewart's series of 2,500 specimens included almost 500 breast lesions. The publication of cytology results for a series of 2,111 fine needle aspiration (FNA) samples by Franzen and Zajicek in 1968 established the technique as a vital part of the assessment of breast lesions. FNA cytology and core biopsy were originally used to diagnose palpable breast lesions. Both methods have a high degree of sensitivity and specificity. FNA cytology is an excellent method for diagnosing palpable lesions; its sensitivity has been reported to be between 89% and 98%5 and its specificity between 98% and 100%.

Following the introduction of mammographic screening, FNA cytology is now also used to diagnose impalpable breast lesions.The sensitivity and specificity of stereotactic FNA cytology with impalpable lesions have been reported to be 77–100% and 91–100% respectively.

AIMS AND OBJECTIVES

1. To study the Epidemology of breast disorders in Tirunelveli medical college hospital.
2. To assess the value of FNAC in the preoperative evaluation of patients
3. To correlate the findings of FNAC with that of HPE of the excised speciment after surgery.
4. To determine the incidence of malignancy and other Benign lesions of the Breast.
5. The diagnosis of Carcinoma of Breast.
6. The diagnosis of Fibro Cystic Diseases, Which in most cases can be managed medically without the need for surgery.
7. The avoidance of surgery in Doubtful cases where there is no pressing need for operative intervention based on a firm tissue diagnosis.
8. To recognise early breast cancers where there is scope for breast conservation surgery.
9. To analyse the cost-effectiveness of FNAC.

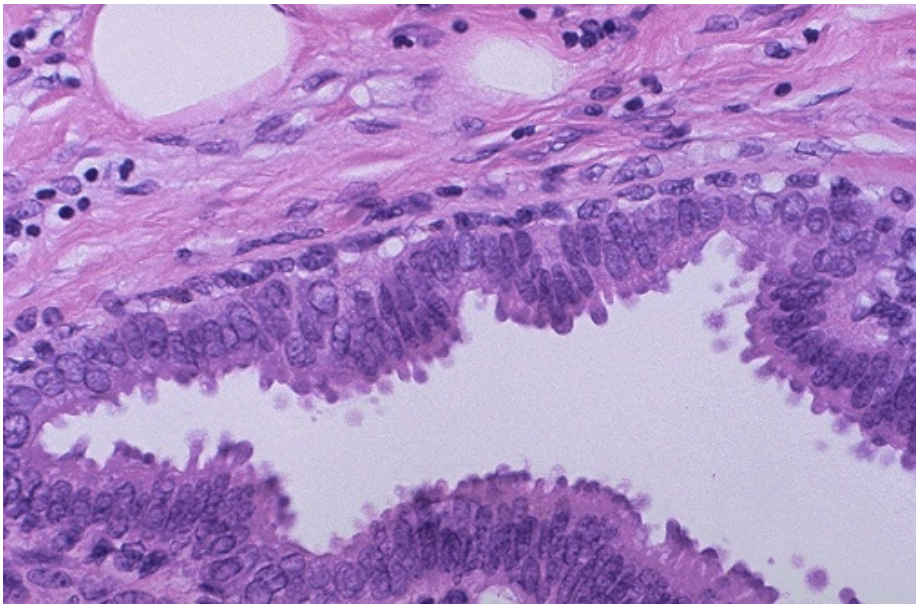
CYTOLOGY OF BREAST

The Breast

The female breasts are modified sweat glands composed of lobes and lobules interspersed with adipose tissue and connective tissue. Ducts drain from each lobule. These converge to form a lactiferous duct that drains from each lobe. The lactiferous ducts merge just beneath the nipple to form a lactiferous sinus.

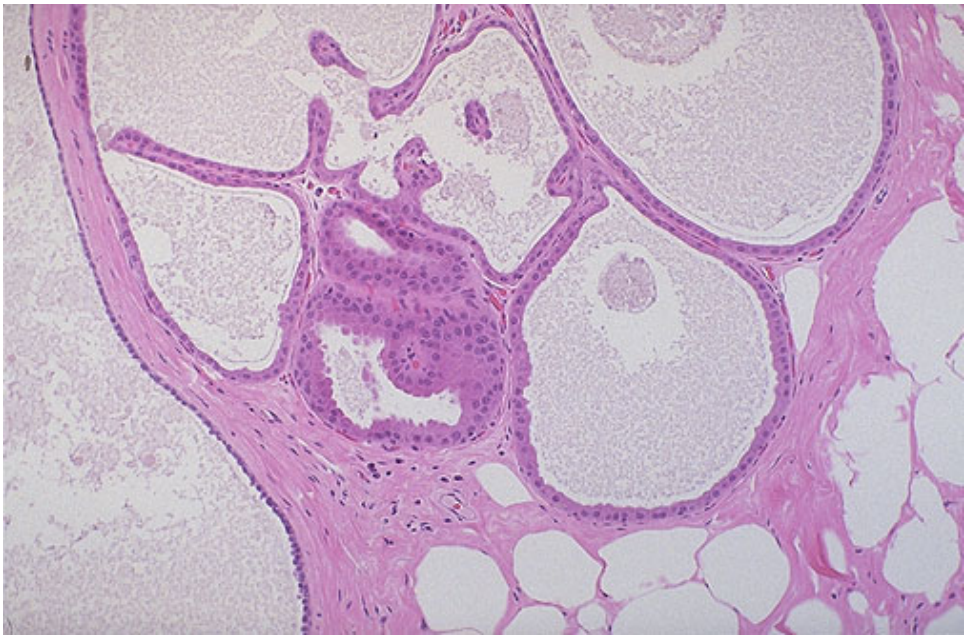
The functional secretory unit in lactation is the terminal duct lobular unit. Here, each duct has a lining epithelium surrounded by a thin myoepithelial cell layer responsive to oxytocin, the hormone that stimulates lactation.

Neoplasms may arise in either the ductular epithelium, lobules, or the stroma. However, the majority of cancers arise in the ducts.

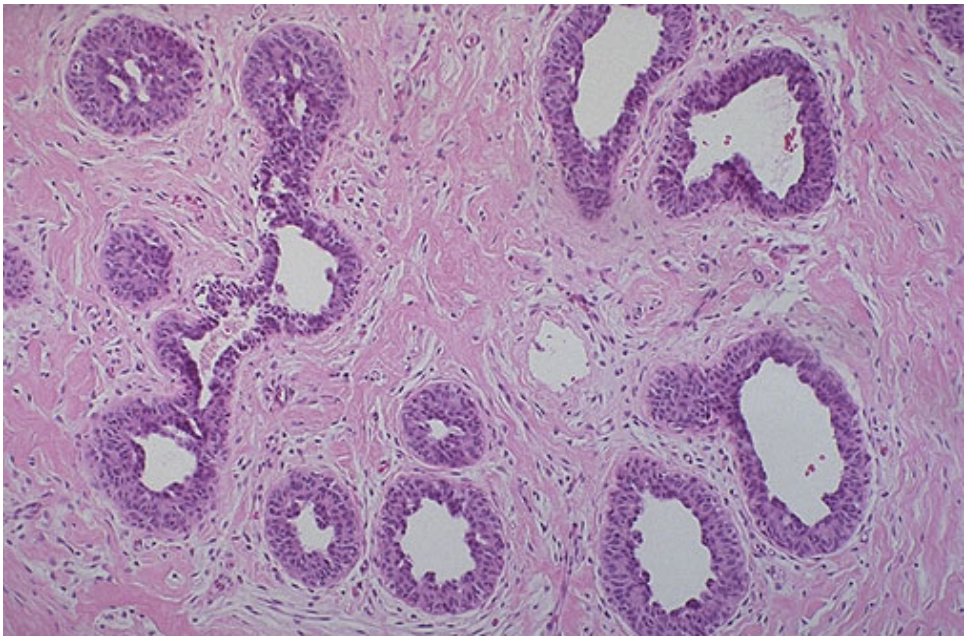


NORMAL BREAST – HIGH POWER VIEW

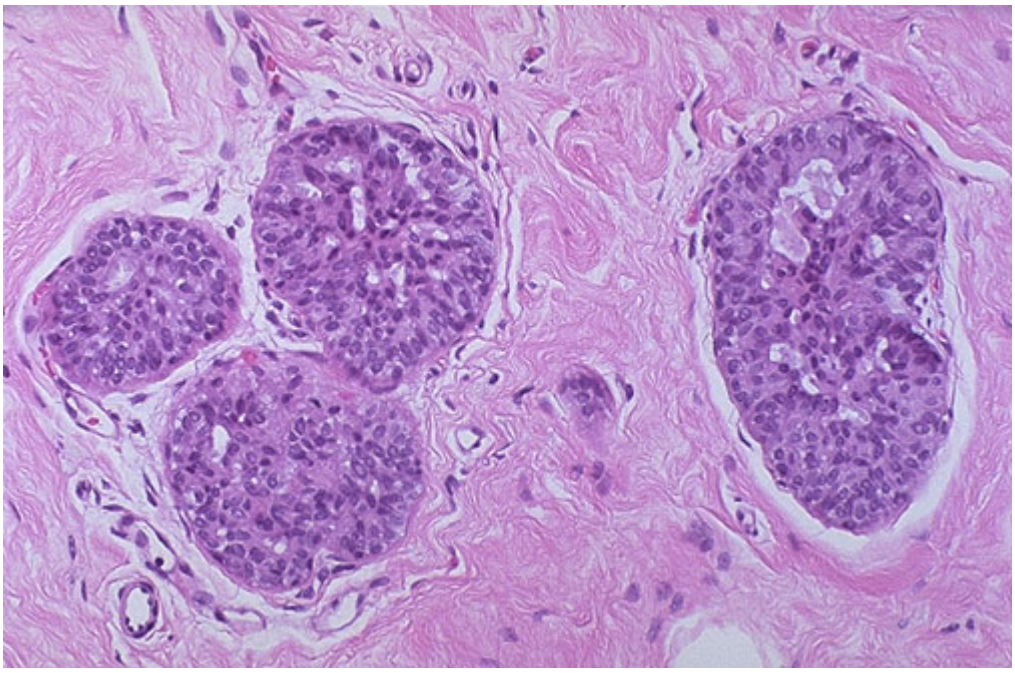
Benign lesion



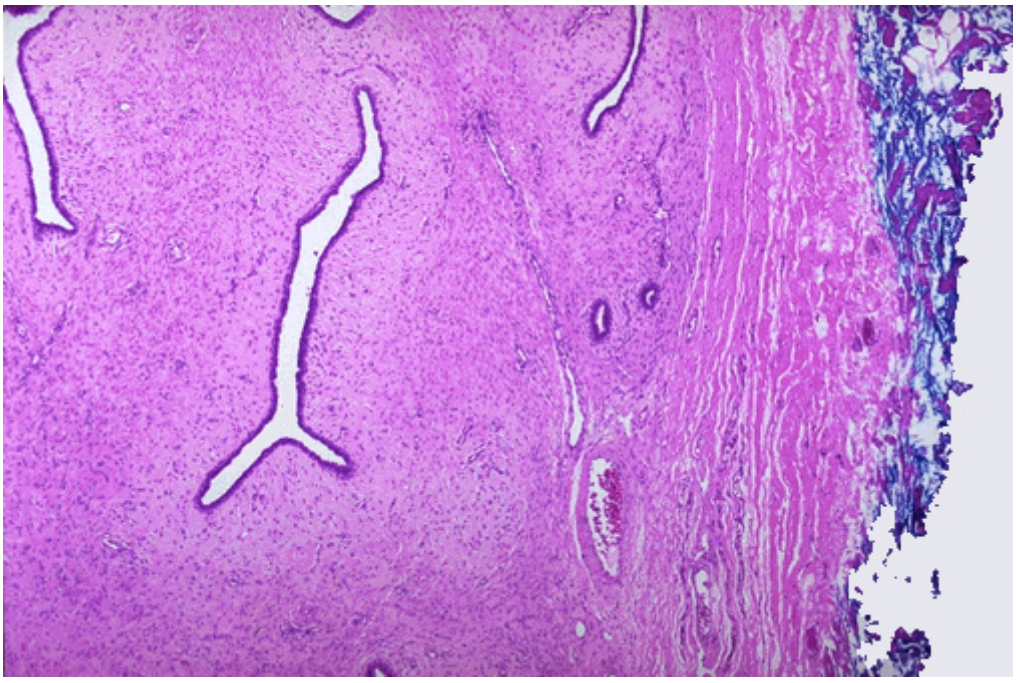
At low power, the prominent cysts of **fibrocystic changes** are shown. The cysts are lined by a single epithelial layer of varying height.



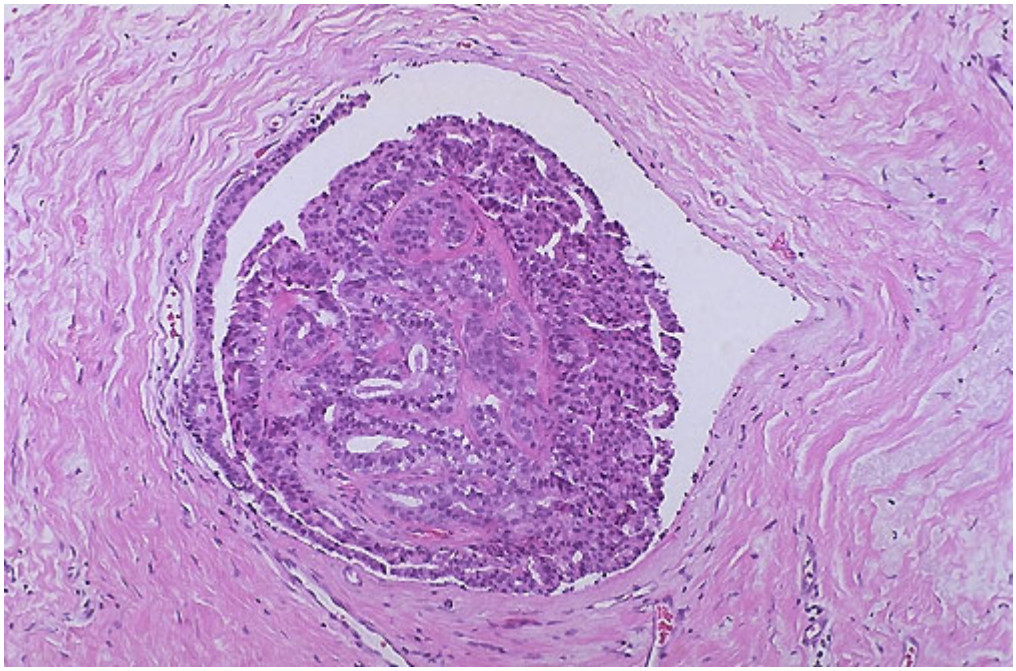
These breast ducts demonstrate **epithelial hyperplasia**. The epithelial cells are multilayered. There is no atypia. Thus, just as with fibrocystic changes such as fibrosis, cysts, and sclerosing adenosis, there is no increased risk for carcinoma.



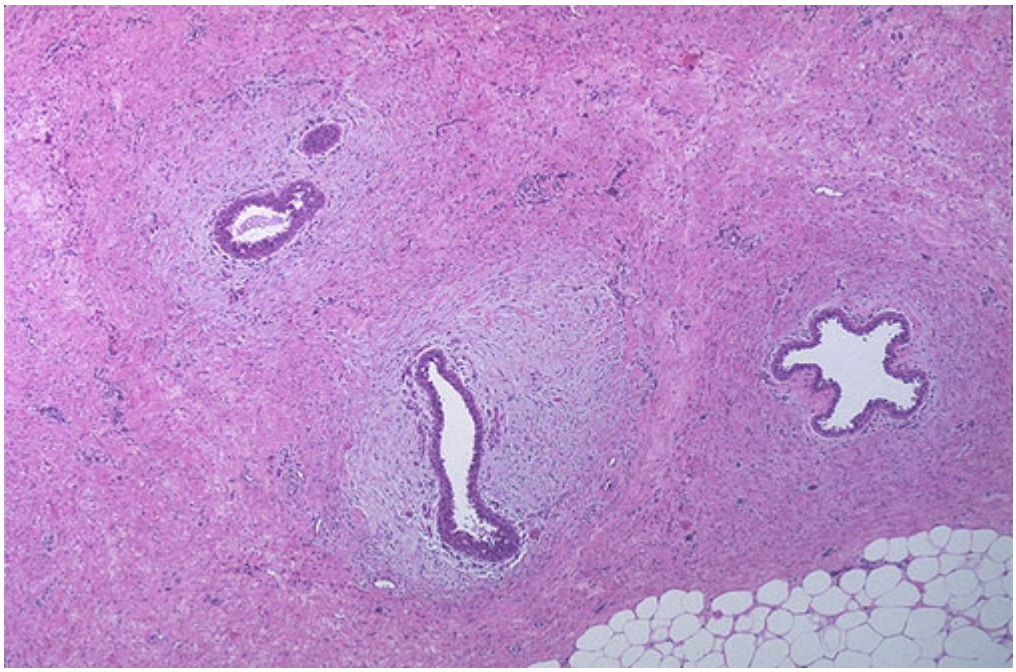
More **florid ductal epithelial hyperplasia** of the breast is shown here. There is a slightly increased risk (1.5 to 2 times normal) for breast carcinoma when such changes are present.



The microscopic appearance of a **fibroadenoma**. To the right is compressed breast connective tissue forming a "capsule" to this mass. The neoplasm itself is composed of a fibroblastic stroma in which are located elongated compressed ducts lined by benign appearing epithelium.

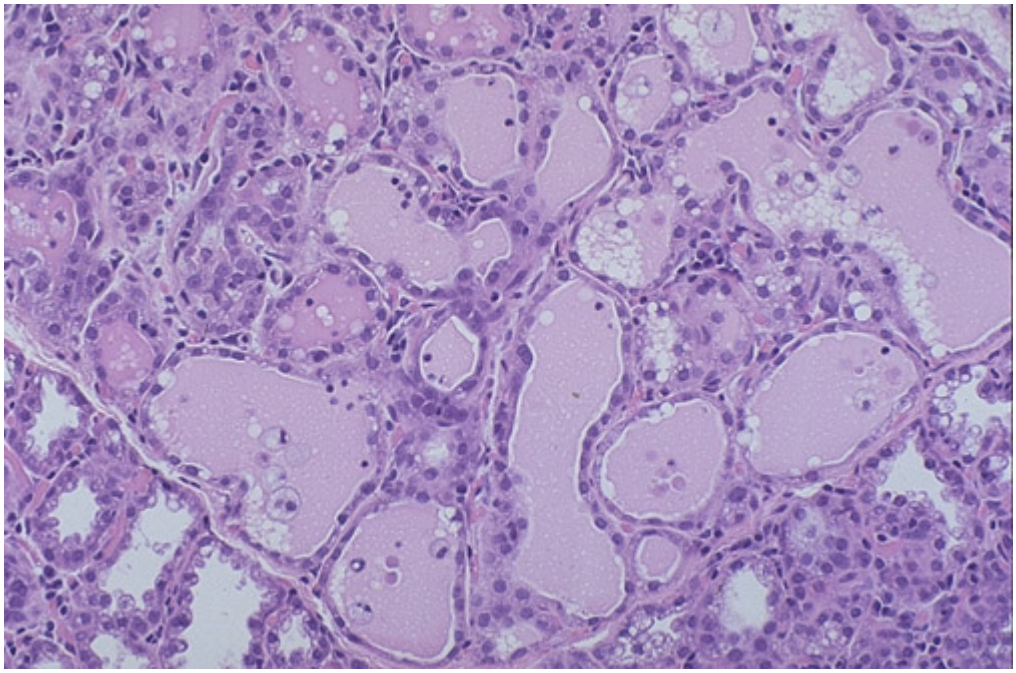


A small **benign intraductal papilloma** appears here in a breast duct, typically in one of the main lactiferous ducts beneath the areola. Note that the epithelial cells show no atypia and that there is a fine pink collagenous stroma within the papilloma. An intraductal papilloma may be associated with a serous or bloody nipple discharge, or it may cause some nipple retraction.



GYNAECOMASTIA

Males have a small amount of breast tissue, but it consists of just a few ducts, without lobules, in a fibrous stroma. It may be unilateral or bilateral. Sometimes it can occur at puberty or sometimes with aging. Gynecomastia may occur with cirrhosis of liver, Leydig cell tumors of testis, or with drugs. There can be ductal epithelial hyperplasia, or prominent periductular edema as seen here.



The **female breast during pregnancy** undergoes lobular hypertrophy so that following birth lactation can occur. Seen here are lobules filled with pink secretions. The breast, which histologically is a modified sweat gland, secretes by budding off of portions of cell cytoplasm.

Incidence of Breast Cancer

Breast cancer is very rare before age 20 and is rarely diagnosed in women younger than age 25. Past that age, the incidence rises steadily to reach a peak around the age of menopause. The rate of increase is lessened after menopause, but older women are still at increasing risk over time.

Risk Factors for Breast Cancer

Although a specific cause for breast cancer has not been identified, there are risk factors that increase the likelihood that a woman will develop a breast cancer. These risks include:

- Maternal relative with breast cancer. Women whose mother or sister or aunt had breast cancer, particularly at a younger age, have a greater risk.

- BRCA1 and BRCA2 genes. The incidence of the BRCA1 gene on chromosome 17 may be 1 in 800 women. The BRCA2 gene on chromosome 13 is less frequent but associated with early onset breast carcinomas. The presence of these genes may explain some of thefamilial cases, and may be the etiology for about 1% of breast cancers overall.

- Longer reproductive span. Women who have an earlier menarche and/or a later menopause, increasing the length of reproductive years, are at greater risk.

- Obesity. Women who are overweight are at increased risk. In addition, increased dietary fat intake is a risk.

- Nulliparity. Women who have never borne children are at greater risk, while women who have been pregnant are at a lower risk.

- Later age at first pregnancy. Women who had their first child over age 30 are at greater risk.

- Atypical epithelial hyperplasia. Although fibrocystic changes that produce benign breast "lumps" are not premalignant, the presence of atypical changes in ductular epithelium does increase the risk.

- Previous breast cancer. Women who have had breast cancer in the opposite breast are at increased risk for cancer in the remaining breast.

- Previous endometrial carcinoma. Women who have had adenocarcinoma of the endometrium are at increased risk for breast cancer.

Aside from the genetic predisposition, the common factor in many of these risks is increased endogenous estrogen exposure over a long time.

Classification of Breast Cancer

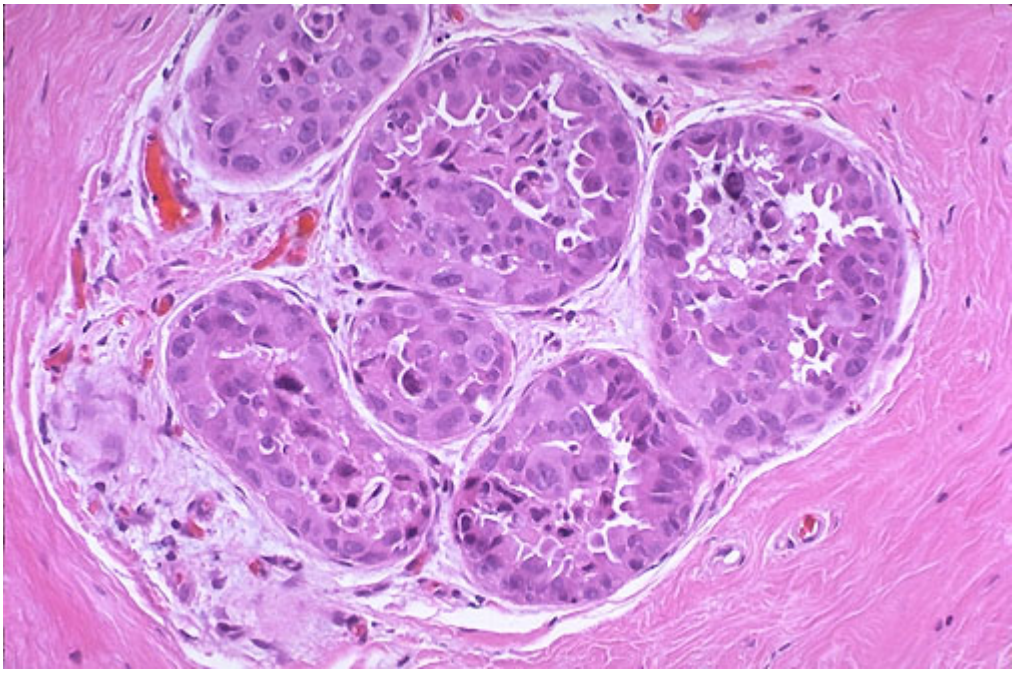
Breast cancers can be classifed histologically based upon the types and patterns of cells that compose them. Carcinomas can be invasive (extending into the surrounding stroma) or non-invasive (confined just to the ducts or lobules). The tables below identify the major histologic types of invasive and non-invasive breast cancers, along with their frequency of all breast cancer types, and overall relative 5-year survival (% of patients with that histologic type surviving for 5 years following diagnosis). The "NOS" categories contain carcinomas not easily classified into other histologic types or carcinomas for which minimal tissue was available for diagnosis.

Invasive Carcinomas of the Breast

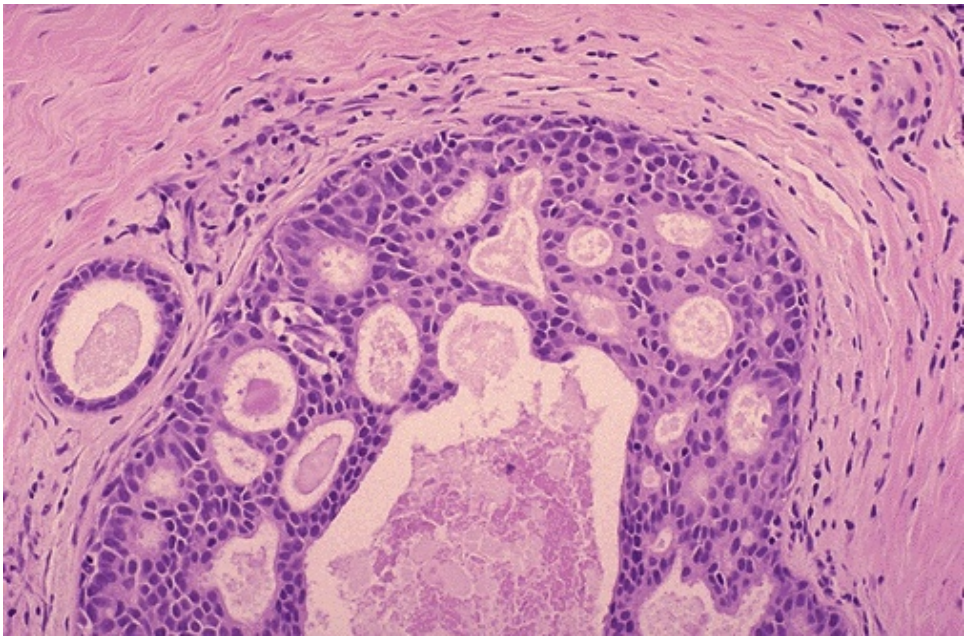
Histologic Type	**Frequency (%)**	**5-year Survival (%)**
Infiltrating Ductal Carcinoma	63.6	79
Infiltrating Lobular Carcinoma	5.9	84
Infiltrating Ductal & Lobular Carcinoma	1.6	85
Medullary Carcinoma	2.8	82
Mucinous (colloid) Carcinoma	2.1	95
Comedocarcinoma	1.4	87
Paget's Disease	1.0	79
Papillary Carcinoma	0.8	96
Tubular Carcinoma	0.6	96
Adenocarcinoma, NOS	7.5	65
Carcinoma, NOS	3.5	62

Non-invasive Carcinomas of the Breast

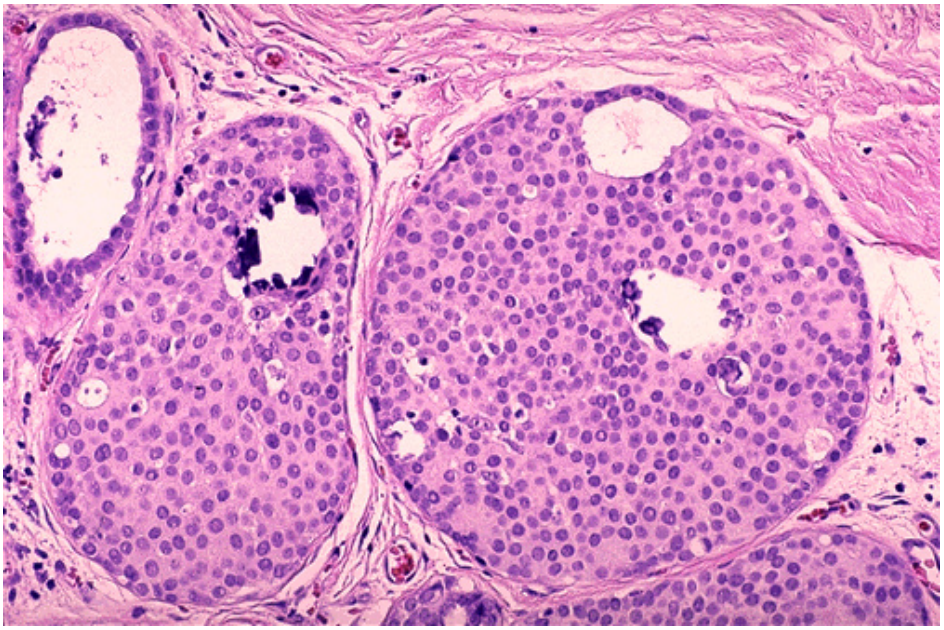
Histologic Type	Frequency (%)	5-year Survival (%)
Intraductal Carcinoma	3.6	>99
Lobular Carcinoma in situ (LCIS)	1.6	>99
Intraductal & LCIS	0.2	>99
Papillary Carcinoma	0.4	>99
Comedocarcinoma	0.3	>99



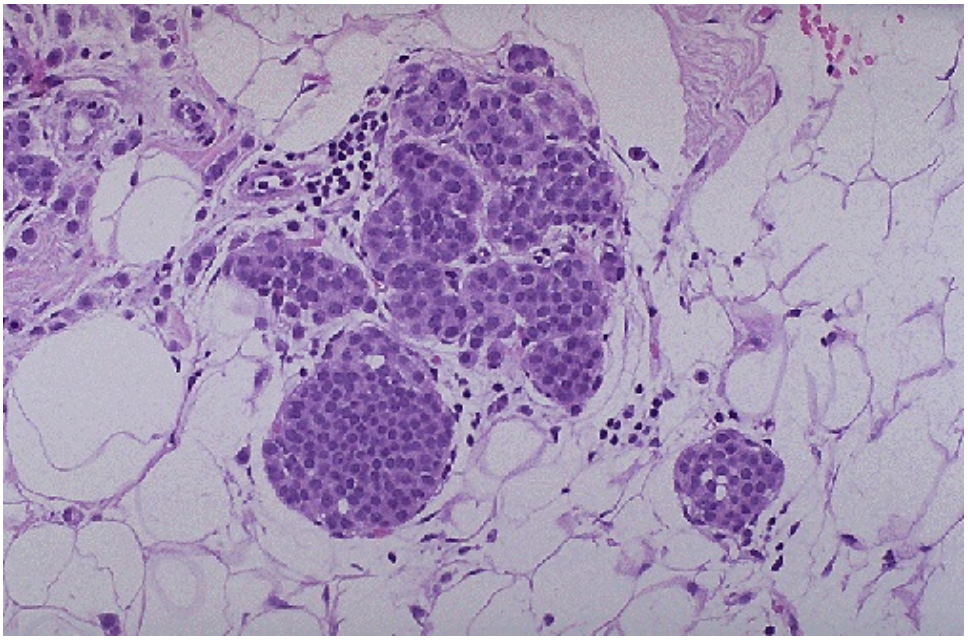
This is **atypical ductal epithelial hyperplasia** of the breast. A significantly increased risk (5 times normal) for breast carcinoma occurs with cytologically atypical epithelial hyperplasia.



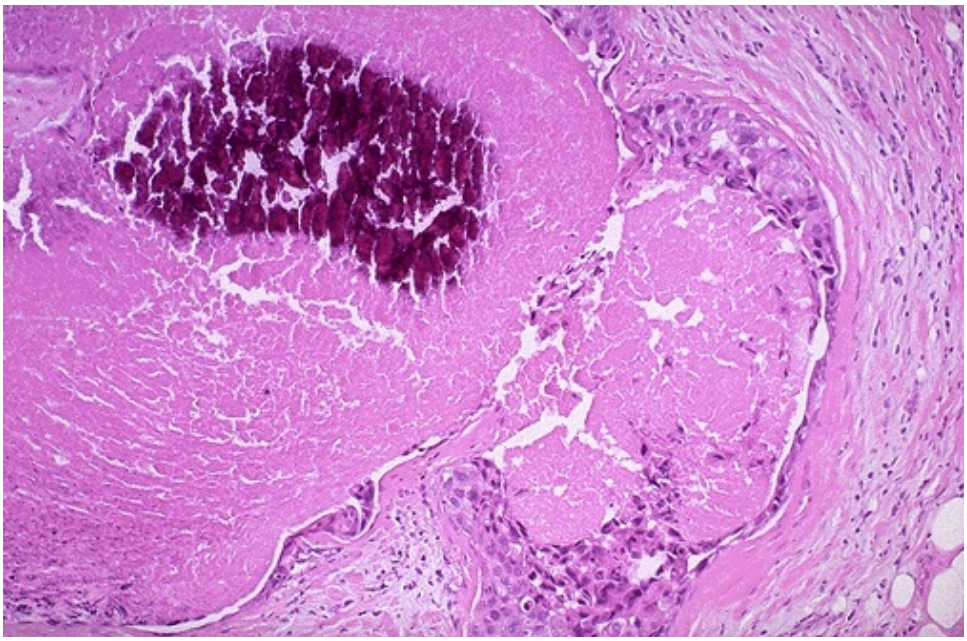
The classic **cribriform pattern of intraductal carcinoma** of the breast is seen here. The neoplastic epithelial cells within the duct show minimal hyperchromatism and pleomorphism, but they have holes with sharp margins as though punched out by a cookie cutter.



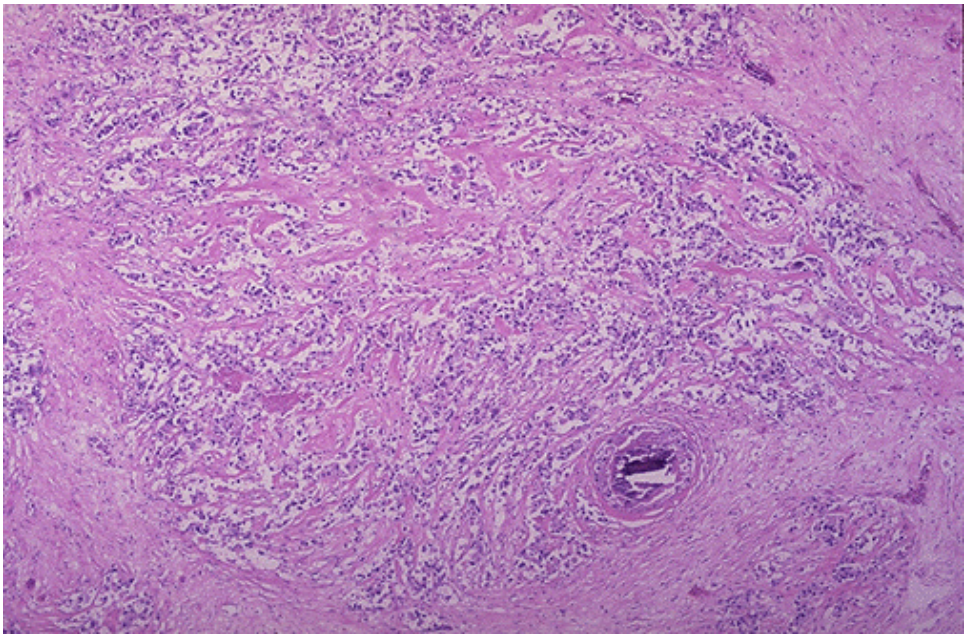
This high power microscopic view demonstrates **intraductal carcinoma**. Neoplastic cells are still within the ductules and have not broken through into the stroma. the two large lobules in the center contain microcalcifications. Such microcalcifications can appear on mammography.



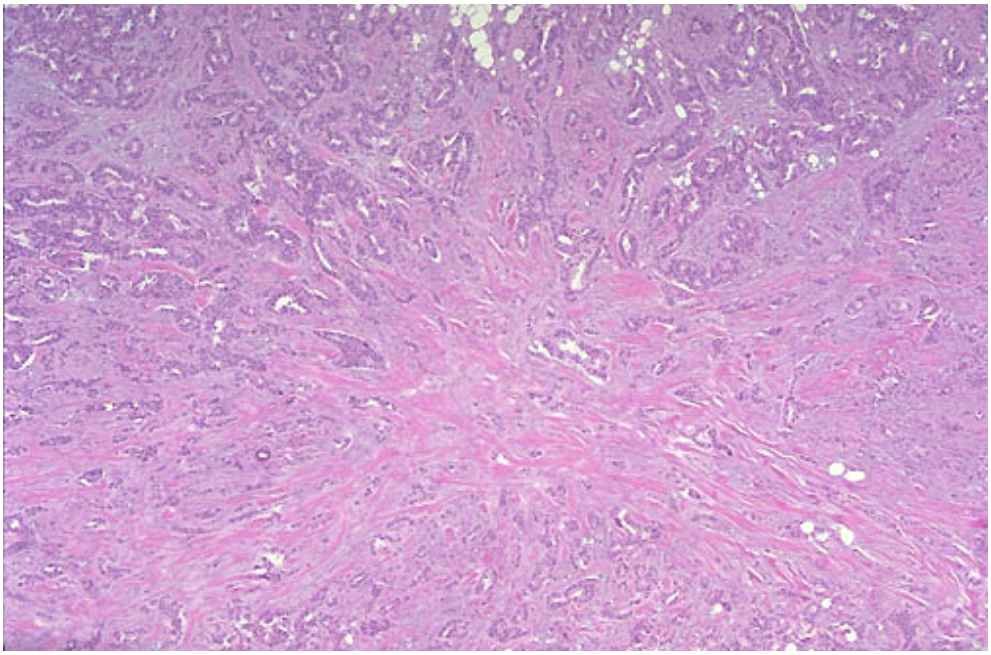
Lobular carcinoma in situ (LCIS) is seen here. LCIS consists of a neoplastic proliferation of cells in the terminal breast ducts and acini. The cells are small and round. Though these lesions are low grade, there is a 30% risk for development of invasive carcinoma in the same or the opposite breast.



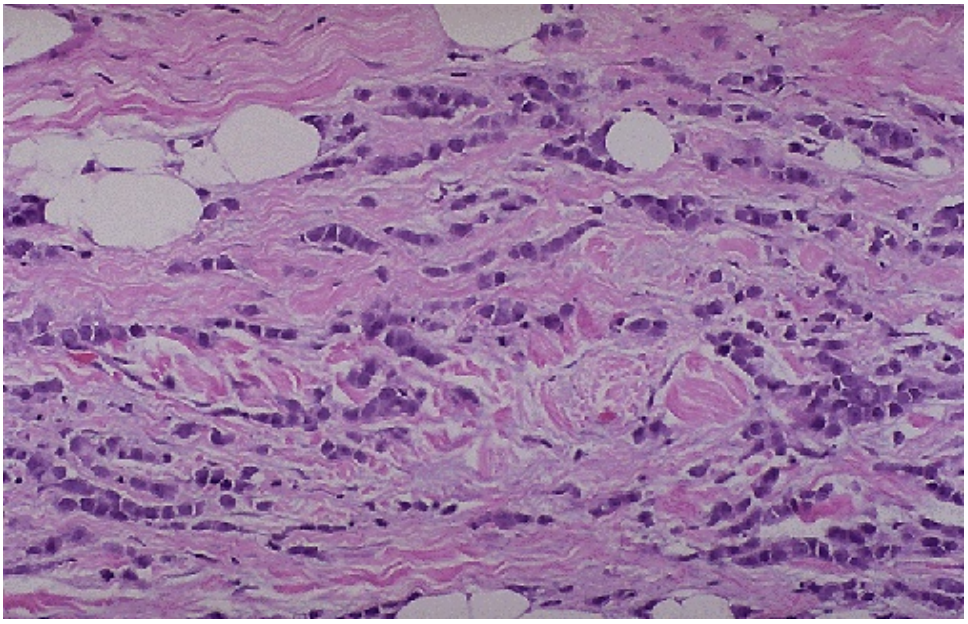
Comedocarcinoma pattern of intraductal carcinoma, which is characterized by the presence of rapidly proliferating, high-grade malignant cells. The cells in the center of the ducts with comedocarcinoma are often necrotic and calcify, as shown here. This central necrosis leads to the gross characteristic of extrusion of cheesy material from the ducts with pressure (comedone-like).



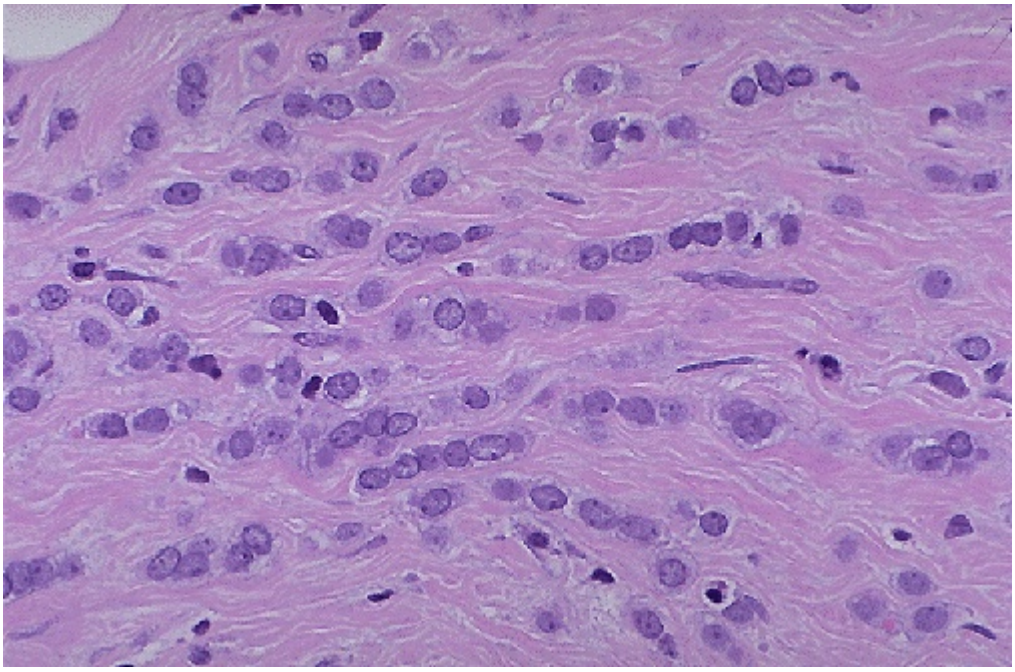
Infiltrating ductal carcinoma of breast. Note the infiltration of ill-defined glands into the surrounding collagenous stroma. There is also a small microcalcification at the lower right of center, a finding that could be seen by mammography. About 65 to 80% of breast cancers are of this type.



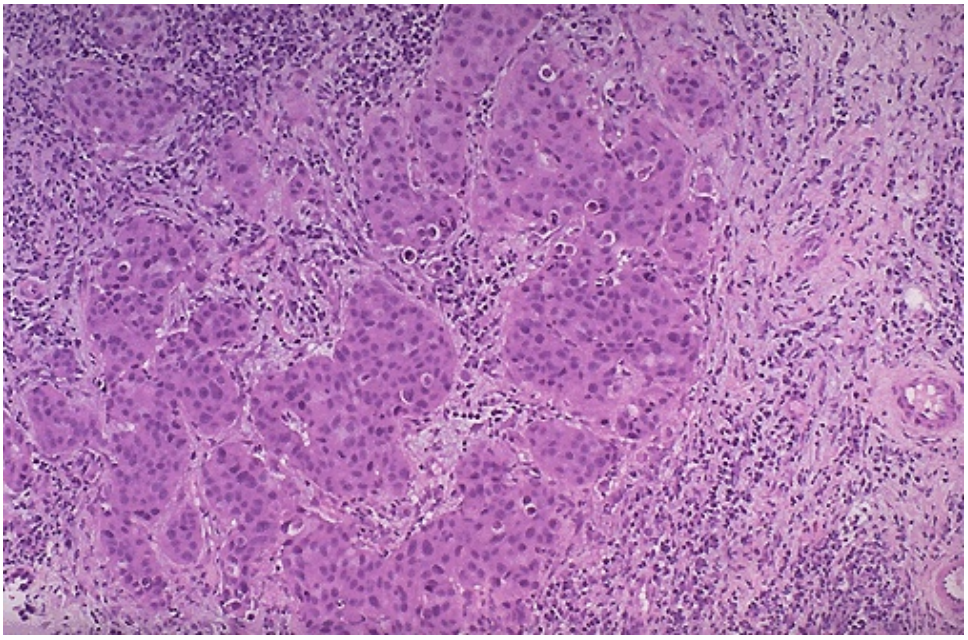
Infiltrating ductal carcinoma of breast at low magnification appears to radiate from a central area of desmoplasia. This collagenous component gives the neoplasm a hard "scirrhous" consistency that is palpable. Such an invasive carcinoma may be fixed to underlying chest wall, making it non-mobile.



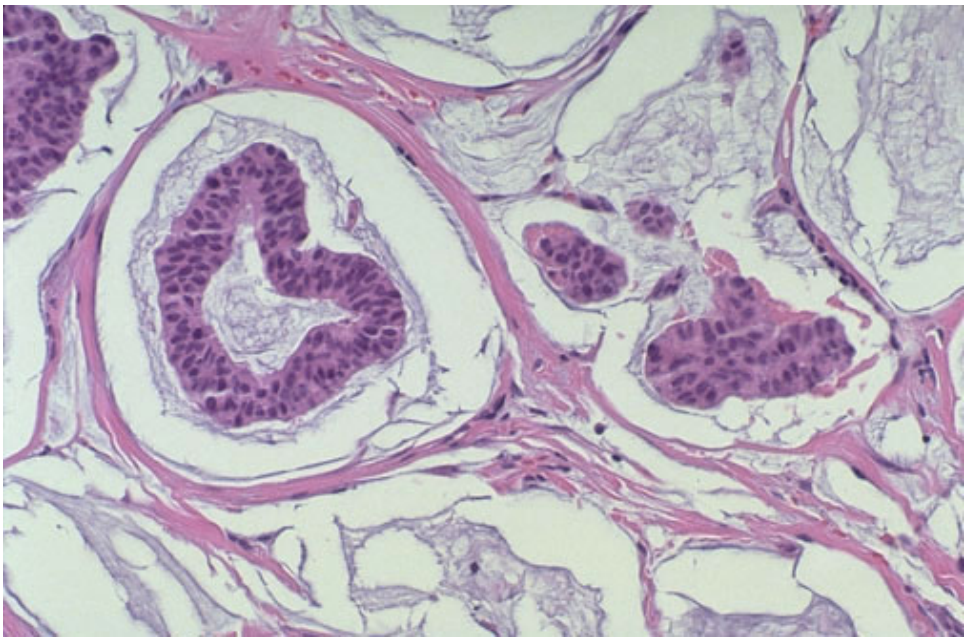
Invasive lobular carcinoma of the breast.This neoplasm arises in the terminal ductules of the breast. About 5 to 10% of breast cancers are of this type. There is about a 20% chance that the opposite breast will also be involved, and many of them arise multicentrically in the same breast.



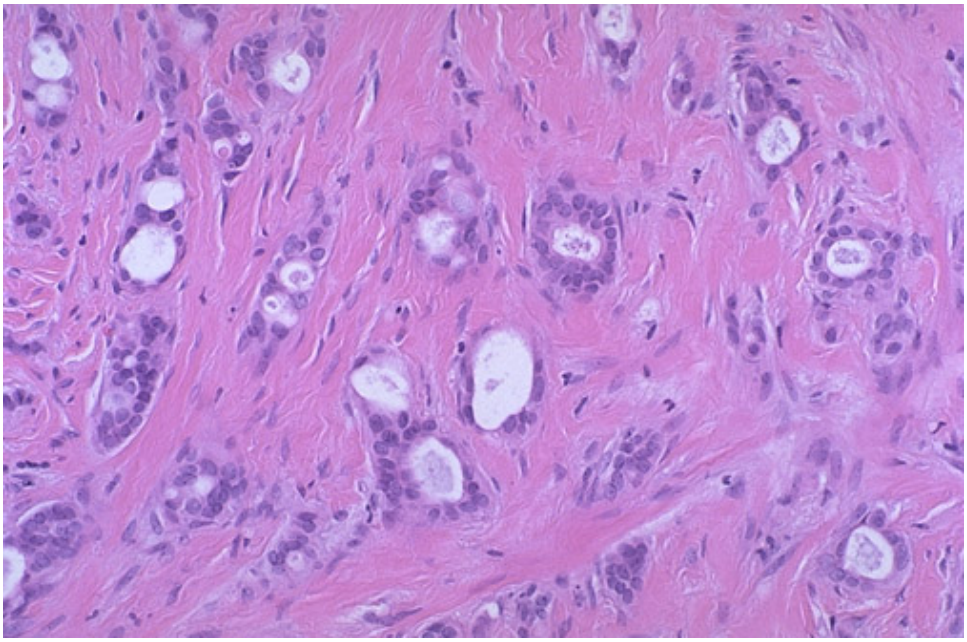
Invasive lobular carcinoma – high power At high magnification, the characteristic "Indian file" strands of infiltrating lobular carcinoma cells are seen in the fibrous stroma. Pleomorphism is not great.



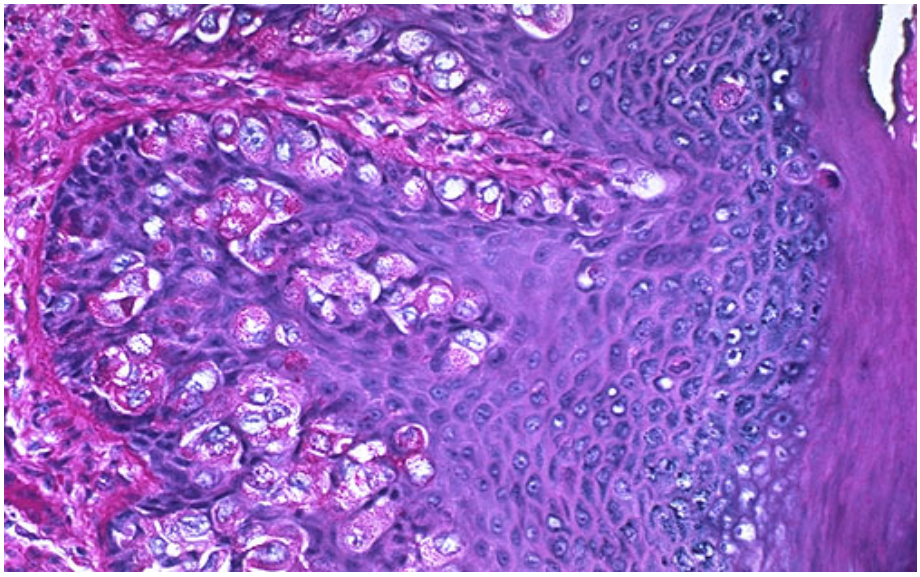
Medullary carcinomas account for less than 5% of breast cancers. They can sometimes be large, fleshy masses up to 5 cm in size. At low power, sheets and nests of cells are surrounded by a lymphoid stroma with little desmoplasia. The prognosis with medullary carcinoma is better than for **infiltrating ductal or lobular carcinoma.**



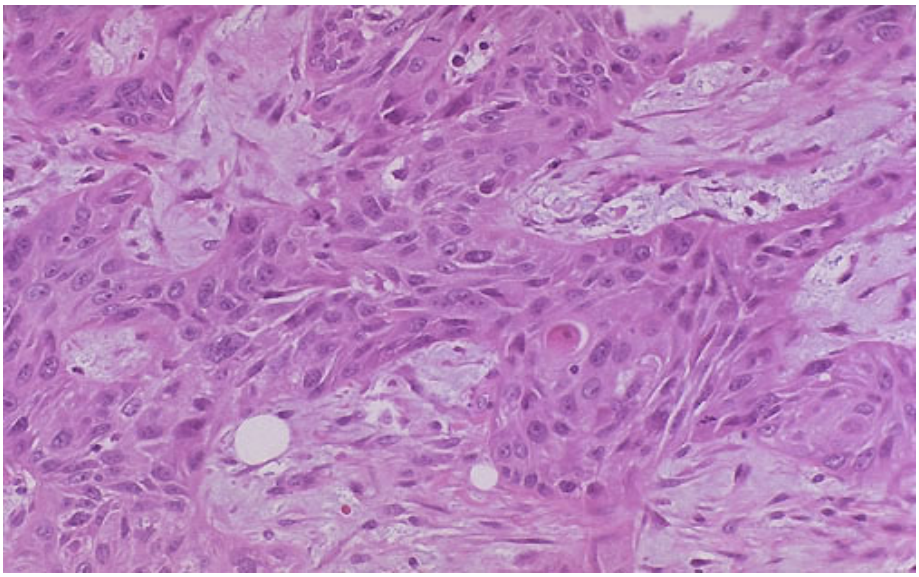
This variant of breast cancer is known as **colloid, or mucinous, carcinoma**. Note the abundant bluish mucin. The carcinoma cells appear to be floating in the mucin. This variant tends to occur in older women and is slower growing, and if it is the predominant histologic pattern present, then the prognosis is better than for non-mucinous, invasive carcinomas.



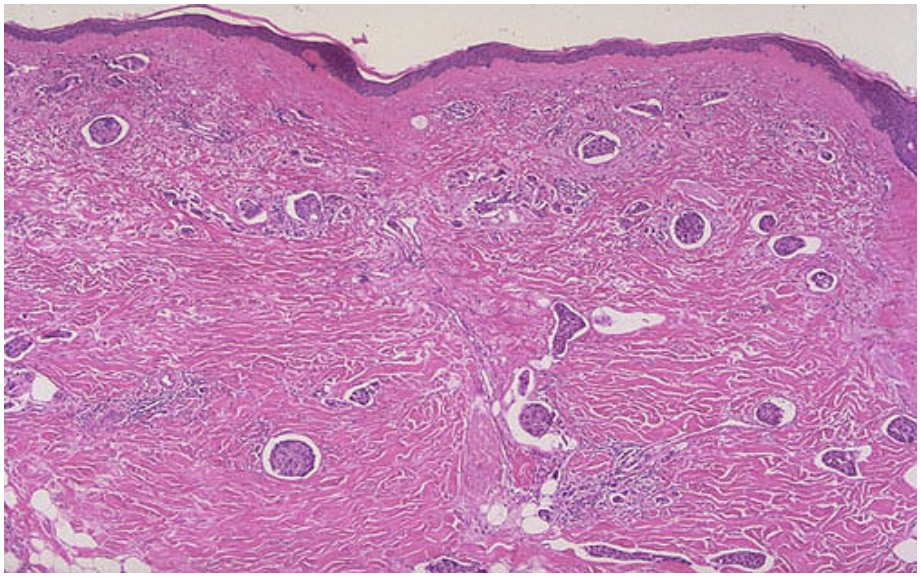
This variant of breast cancer is **tubular carcinoma**. The neoplastic cells form a single cuboidal layer in small round to teardrop shaped ductules widely spaced in a fibrous stroma. The prognosis tends to be better than for an intraductal carcinoma.



Pagets Disease Of Breast: A PAS stain demonstrates mucin within the Paget's cells of Paget's disease of the breast. This is evidence for their origin from an underlying ductal carcinoma. By immunoperoxidase staining, they will also be keratin positive and epithelial membrane antigen positive.



Metaplastic breast carcinoma has elements of squamous metaplasia as shown here at high magnification. Such tumors are rare in humans (though common in canines). The metaplastic patterns can include cartilagenous, bony, and myxoid areas as well.



INFLAMMATORY CARCINOMA

The skin overlying the breast has prominent lymphatic spaces filled with small metastases from breast carcinoma. Carcinomas often metastasize to lymphatics. Breast cancers most often metastasize to the axillary lymph nodes, and these nodes are often removed at the time of surgery for breast cancer.

GRADING

- Cytologic grade is the best predictor of disease prognosis in carcinoma in situ but is dependent on the grading system used, such as the Van Nuys classification (high-grade, low-grade comedo, low-grade noncomedo).
- The grading of invasive carcinoma is also important as a prognostic indicator, with higher grades indicating a worse prognosis. Microscopic criteria for grading are ,
- Grading System in Invasive Breast Cancer (Modified Bloom and Richardson)

	Score		
	1	**2**	3
A. Tubule formation	>75%	10-75%	<10%
B. Mitotic count per high-power field (microscope- and field-dependent)	<7	7-12	>12
C. Nuclear size and pleomorphism	Near normal Little variation	Slightly enlarged Moderate variation	Markedly enlarged Marked variation

  - Cancer is considered grade I if the total score (A + B + C) is 3-5.
  - Cancer is considered grade II if the total score (A + B + C) is 6 or 7.
  - Cancer is considered grade III if the total score (A + B + C) is 8 or 9.

- Lymphovascular: Lymphatic invasion, vascular invasion, microvessel quantification, and lymphoplasmacytic infiltration are associated with a worse prognosis.

GRADING AND STAGING

A completely uniform system of grading for breast cancers is not possible because of the wide variety of histologic cell types. The cell types themselves, along with the invasiveness of the cancer, help to predict the biologic behavior of the cancer. A grading system (a modified Scarff-Bloom-Richardson system) outlined below utilizes histologic characteristics of the breast carcinoma.

Tubule Formation (% of carcinoma composed of tubular structures)	**Score**
>75%	1
10-75%	2
less than 10%	3
Nuclear Pleomorphism	**Score**
Small, uniform cells	1
Moderate increase in size and variation	2
Marked variation	3
Mitotic Count (per 10 high power fields)	**Score**
Up to 7	1
8 to 14	2
15 or more	3

The grade is calculated by adding the above scores. The grade correlates with survival as follows:

Grade	Score	5-year Survival (%)	7-year Survival (%)
1	3 to 5	95	90
2	6 or 7	75	65
3	8 or 9	50	45

METHODS, MATERIALS AND TECHNIQUES

THE TRIPLE TEST

FNA cytology should always be interpreted in the context of the triple test.

The triple test is the recommended approach for the investigation of palpable or impalpable breast lesions detected by imaging. It comprises the following components:

- Clinical breast examination and medical history
- Imaging – mammography and/or ultrasound
- Non-excision biopsy – FNA cytology and/or core biopsy.

The triple test is positive if **any** of the three components is positive, and negative if all the components are negative.The triple test has a sensitivity (truepositive rate) of 99.6%, and a specificity of 93%. Irwig and Macaskill (1997) have developed models to illustrate the accuracy of the triple test results for clinically and mammographically detected breast lesions.

The aims of the triple test are to:

- Maximise the diagnostic accuracy in breast disease
- Maximise the preoperative diagnosis of cancer
- Minimise the proportion of excision biopsies for diagnostic purposes
- Minimise the proportion of benign excision biopsies for diagnostic purposes.

INDICATIONS

Indications for FNA cytology

FNA cytology may be indicated in the following clinical situations:

- Investigation of palpable masses, regardless of whether they are considered benign or malignant
- Investigation of impalpable image-detected masses that are considered likely to be benign or with typically malignant features
- Investigation of suspected local recurrence of breast cancer, as suggested by the presence of palpable masses, impalpable image-detected masses, or lymph node involvement
- Evaluation of cystic lesions with atypical imaging features
- Confirmation of a diagnosis of breast cancer when core biopsy is not available, not possible or contraindicated.

ADVANTAGES AND DISADVANTAGES OF FNACYTOLOGY

The reliability of FNA cytology depends on the skills of the aspirator, the cytopathologist and the histological type of the lesion.The age of the patient, size of the lesion and method of detection (clinically detected or image detected) also influence reliability.

ADVANTAGES

The relative advantages of FNA cytology, compared with core biopsy, include:

- The sampling procedure for FNA cytology is quicker to perform than core biopsy

- In most instances FNA cytology does not require local anaesthetic
- FNA cytology is generally less traumatic than core biopsy and may be more appropriate for women taking anticoagulant medication
- FNA cytology is associated with a low complication rate
- FNA cytology results are available relatively quickly (within a few hours in some centres); the presence of a cytopathologist may facilitate an immediate result.
- relatively inexpensive to perform.

DISADVANTAGES

The relative disadvantages of FNA cytology, compared with core biopsy, include:

- FNA cytology requires training in the preparation of quality smears
- Considerable cytology expertise is required to interpret FNA cytology
- FNA cytology is generally inappropriate for the assessment of microcalcifications
- FNA cytology does not enable the pathologist to distinguish between DCIS and invasive carcinoma
- Definitive diagnosis of some lesions can be difficult to make on the basis of FNA cytology.These include atypical ductal hyperplasia (ADH), lowgrade DCIS, some tubular carcinomas and some invasive lobular carcinomas
- FNA cytology may not be the sampling technique of choice for lesions that are relatively hypocellular and yield scanty epithelial material.These include sclerotic fibroadenomas, sclerosing ductal carcinoma, and infiltrating lobular carcinoma.

POTENTIAL COMPLICATIONS OF FNA CYTOLOGY

Displacement of the epithelium and needle tract implantation are potential complications of FNA cytology.

Displacement of the epithelium

Displacement of both benign and malignant epithelium into other structures may have diagnostic or treatment implications. Displacement may occur into stroma, other ducts, skin or vascular and lymphatic spaces.

Displacement of epithelium may occur with any procedure involving a needle, including the insertion of local anaesthetic and guidewires. However, it is more common with larger gauge needles, such as those used in core biopsy. Few appropriately designed studies have evaluated the risk of an adverse event due to displacement of malignant epithelium by FNA cytology or core biopsy.

Needle tract implantation

The biological significance of needle tract implantation in the breast is not known at this time, though there is evidence from studies of other cancer types indicating that the risk of malignancy is increased in those tissues. Rosen 1997) reported several cases where fragments of breast carcinoma were found in the needle tract following 14-gauge core biopsy. Rosen also reported one case of carcinoma cells in the skin of a mastectomy specimen.

PERFORMING FNA CYTOLOGY

Recommended steps involved in adequately preparing a woman for FNAC.

Before the procedure

- Explain why the procedure is needed, and the expected outcome
- Ask how much detail the woman would like to know about the procedure

before explaining it. The information may include:

° Where the procedure might take place, and who will perform it

° Any tests needed before the procedure

° What the woman will need to do before the procedure

° What the woman is likely to experience during and after the procedure

- Encourage the woman to talk about her concerns, such as pain, fear, death, embarrassment
- Ask the woman what she thinks she can do to cope
- Enquire about, and reinforce, previous coping strategies (eg relaxation techniques and imagery).

During the procedure

- Provide information about what will be done and how it will feel
- Give the woman control, where possible (eg ask her to tell you when she is ready to begin)
- Encourage the use of coping strategies.

After the procedure

- Encourage the use of coping skills (eg relaxation techniques and imagery)
- Encourage the woman to state her needs and reframe her complaints into requests
- Arrange follow-up and support

Choosing the guidance technique

Available guidance methods are:

- Clinical guidance for palpable lesions
- Ultrasound and stereotactic mammographic guidance for impalpable and palpable lesions that can be visualised by the imaging technique.

Comparison of guidance techniques

Guidance techniques:

	Guidance techniques		
Parameters	**Clinical**	**Ultrasound**	**Stereotactic**
Speed	+++	+++	+ if not digital ++ if digital
Ease and comfort of the woman	+++	+++	+ if upright ++ if prone
Ease and comfort of the clinician performing the procedure	+++	+++	+ if upright ++ if prone
Flexibility of approach	+++	+++	++
Complication rate	+	+	+

Code: +++ high, ++ moderate, + low

EQUIPMENT REQUIRED FOR FNACYTOLOGY

Contents of tray or trolley for FNA cytology sampling

The following items are typically required for FNA cytology sampling:

- Sampling needle:
- Venipuncture needle or specifically designed biopsy needle depends on the guidance technique and preference of the operator.
- Typically 22–25-gauge.
- Length – depends on the guidance technique and preference of the operator.
- Syringe (10–20 ml).
- Syringe holder +/- extension tubing.
- Alcohol or iodine preparation cleansing agent.
- Swabs.
- Gloves.
- Adhesive dressing.
- Pencil for labelling slides, pen for labelling specimen containers.
- Local anaesthesia, needles and syringe if required.
- Glass slides and transport medium, if required.
- Protective cover for ultrasound probe, if ultrasound-guided procedure.
- Gel or other coupling fluid, if ultrasound-guided procedure.
- Needle guides, if mammography-guided procedure.
- Koplin – Jar for transport.
- Laboratory request form.

TECHNIQUES OF ASPIRATION

This can be described by the following 4 steps, which are done in sequence without any time gap.

1. Introduction of the needle

Attach the needle with syringe. The syringe with the needle is manipulated with dominant hand while the biopsy site is stabilised with the other hand. The needle is introduced centrally into small masses and peripherally into large ones, particularly those with necrotic core.

2. Creating and maintaining the negative pressure

Once the needle is within the mass a negative pressure is created by retraction of the plunger to the 10 cc mark.Adequade negative pressure (-300cm H2O) is created and maintain with the syringe plunger pulled back to 10ml. This negative pressure should be maintained till the required amount of material is seen in the hub of the needle. The functions of the negative pressure is not to tear cells from the tissue but merely to hold the tissues against the sharp-cutting edge of the needle. The softer tissue components protrude over the edge are cut or scrapped off and accumulate in the lumen ias the needle advances through the tissues.

The maintenance of the negative pressure is easier if a syringe holder is used. In other cases the negative pressure can be maintained by the Bracer thumb technique using the dominant hand while the other hand steadies the biopsy site. In this technique the medial three fingers grip the retracted plunger against the palm while the thumb and the index finger are positioned against the back of the barrel, preventing it from retracting and steadying it’s biopsy site. Some experienced operators, free their left hand after placing the needle exactly where it is desired and use both hands to maintain the negative pressure. In this study the braced thumb technique was used to maintain the negative pressure.

3. Needle manoeuver under negative pressure

To obtain an adequate specimen, the needle must be manoeuvered within the circumscribed area. An up and down motion, a fan path with short stabs or a corkscrew motion. Nothing is usually visible in the body of the syringe between the bottom of the pluger and the needle head except in cystic aspiration or haemorrhagoc aspirations. Sometimes the aspirate may be seen at the hub of the needle. If a cyst is encountered it is emptied completely and the third is collected for indirect smearing. If the blood is observed within the syringe needle manoeuvers should be halted, the needle withdrawn and another specimen procured.

4. Release of negative pressure and withdrawal

The negative pressure is released prior to the needle along with the syringe is withdrawn. Centrifugal force prevents expulsion of the specimen and possible tumour seeding between the mass and skin surface. Failure to comply with this step may result in air rushing up the needle and loss of specimen into the body of the syringe. The syringe and the attached to it, is gently withdrawn from the skin.

Air Reservoir Technique of Aspiration

Here about 5 cc of air is aspirated into the syringe prior to the introduction of the needle. After the introduction of the needle into the required site, the syringe is pulled to full suction and the manoeuvers of the needle are carried out as described previously. After completion of aspiration, the plunger is released. This fall is suction allows plunger to return to the original 5cc mark. According to the proponents of this technique, this ensures a more uniform distribution of aspirated material on the glass slide and eliminated the necessity for the removal of syringe from the needle.

Non-Aspiration Technique of Needle Sampling

It is a useful innovation by Santos. JE and Leiman G. (1988).

It involves grasping the needle itself, without an attached syringe and moving it rapidly within the lesion. If the lesion is not cystic and if the aspirate are haemorrhagic the non-aspiration technique may give better, cleaner and less haemorrhagic material. It also allows detection of more subtle differences in the texture of tissue and may allow smaller lesions to be sampled.

Completion of Aspiration

After the needle is withdrawn, the puncture site should be examined for any possible bleeding or haematoma and the patient is reassured that the procedure is over and she will not have any discomfort. The patient is asked to sit up after the completion of the procedure and exert firm pressure over the site for about 5 minutes.

Aspiration vs capillary technique for FNA cytology

Most operators use a suction or aspiration technique for FNA cytology, using a syringe alone or with a syringe holder. Extension tubing may also be used. The use of suction has been shown to reduce the rate of inadequate/non-diagnostic sampling from benign lesions. The aspirator may choose to convert from a non-aspiration technique if the lesion yields limited cellular material or if the lesion feels fibrous. Some operators prefer a non-suction or capillary technique, which has the advantages of enhancing fingertip sensitivity and needle control and reducing the risk of blood contamination. Conversion to an aspiration technique is recommended if the lesion is fibrous or yields limited cellular material.

Complications of FNA cytology and strategies to minimise or avoid them.

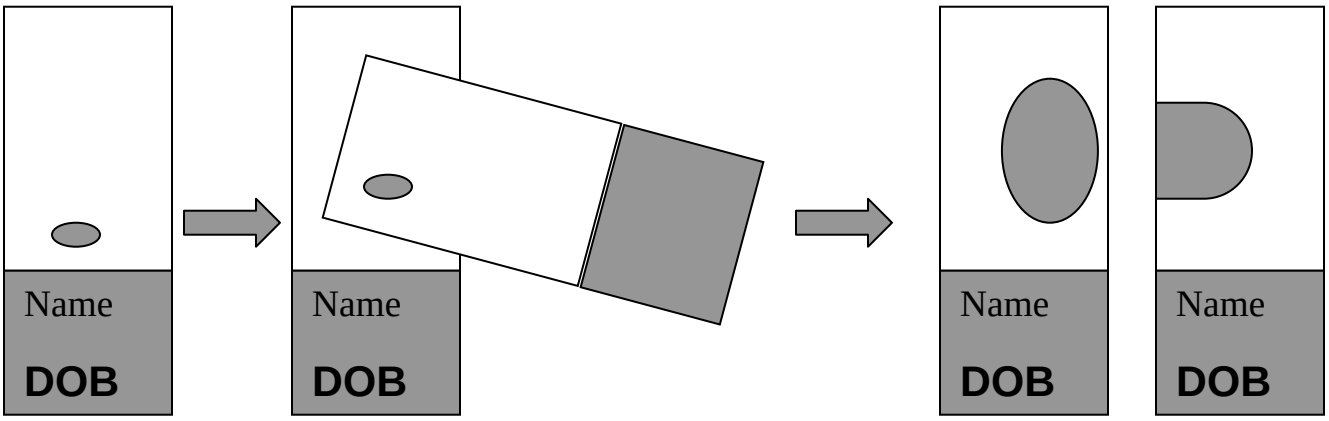
Complication	Comment	Strategies to minimise or avoid complications
Pain	Discomfort is common but pain is typically minimal	Can be minimised by: fully explaining the procedure; using local anaesthesia as required with FNA cytology, and routinely with corebiopsy; and (in some cases) using analgesic and anxiolytic medication
Bruising	Minimal bruising is common	Bruising may be difficult to avoid entirely, especially in older women.
Haematoma	Uncommon; likelihood increased by the use of anticoagulants, including aspirin	Both can be minimised by compressing the biopsy site both in between sampling and at the completion of the procedure.When large core biopsies are performed or the lesion is thought to be vascular, then it is recommended local anaesthesia be used with a vasoconstrictor
Infection	Rare	Can be avoided by careful skin cleansing and by use of sterile disposable items and equipment
Fainting	Uncommon May present special difficulty when using upright stereotactic systems	Can be minimised by treating anxiety, fully explaining the procedure, providing analgesia or anaesthesia where appropriate, and performing the procedure with the patient lying down
Pneumothorax	A rare complication, but the most serious one. The risk is increased in very thin women or if the lesion is close to the chest wall, in the upper inner quadrant or high in the axilla	Can be avoided by taking care not to angle the sampling needle towards the chest wall, but rather parallel to it. Pneumothorax can be minimised by monitoring the needle position with imaging

PREPRATION AND PROCESSING OF FNA CYTOLOGY SPECIMENS

The principal aims for FNA cytology slide preparation is to make a thin smear that is not subject to crush artefact, and to allow rapid air-drying of air-dried slides and rapid fixation of wet-fixed slides. One commonly used method of preparing slides is as follows:

Expel a drop of the aspirated fluid onto two of the pre-labelled glass slides. If all the material is expelled onto one slide, it can be split simply by touching the second slide to the surface and separating them again. The material can be spread in several ways.The quickest (and probably easiest) method is illustrated in Figure 1.

A method for preparing slides for FNA cytology



Note: No excessive downward pressure or surface squash should be used as this will distort the cells and may render the slides uninterpretable.

The following items should be available and prepared before the procedure:

• Frosted ended slides labelled with the patient's name and date of birth. Theuse of two identifiers is recommended, especially if more than one woman is to have an aspirate at the same clinic

• Fixative solutions

• A rapid Romanovsky stain, if the material is to be assessed for adequacy at the time of the aspirate. Any wet-fixed slides can be stained later in the laboratory.

• A balanced salt solution in which the needle can be rinsed

• Slide trays or plastic slide carriers for transport.

Fixation of slides for FNA cytology

Slides may be fixed as follows:

1. Wet-fixed slides: Immediate placement into a Coplin jar containing either 95% ethanol or Carnoy's solution. (If Carnoy's or modified Carnoy's solution is used, then the slides should be transferred to 95% ethanol after five minutes, to avoid excessive cell shrinkage).

2. Air-dried slides: Rapid air-drying either by gently waving the slide in the air or by using a hair drier on a cold or low heat setting. Blowing from the mouth should not be used to air-dry slides. It is important to ensure the slide is dry before it is fixed.The slide can then either be placed in methanol for at least 30 seconds, or transported to the laboratory where it can be fixed at a later stage.

Staining of slides for FNA cytology

A rapid Romanovsky stain, can be used if the material is to be assessed for adequacy at the time of the aspirate.Any wet-fixed slides can be stained later in the laboratory.

One method of staining slides is as follows:

1. Air-dried slides can be stained at the time of the procedure using a rapid Romanovsky-type stain.
2. After rinsing in water, the slide can be viewed under the microscope and assessed for adequacy.
3. Wet-fixed slides are stained with a Papanicolaou stain.

FIXATION AND STAINING USED IN MY STUDY

We used wet fixation method using isopropyl alcohol followed by staining with hematoxylin and eosin as follows.

12-24 hours after fixation the slides are taken through descending grades of alcohol (i.e. 80%, 75%, 50%) to water.

Then slides were covered with Harn's Hematoxylin stain for about 3 minutes.

The slides were rinsed in tap water for about 1 – 2 minutes.

Slides were then treated with acid – alcohol for a few secons till the excess stains are cleared and only nuclei retain the stain.

The slides were covered with 1% eosin solution for about 1 minute and was

Rinsed in water and allowed to dry.

Then the slides were ready for scrutinization under microscope.

Processing needle-rinse material from FNA

After the slides have been made, material remaining in the needle and syringe may be utilised for further studies such as ER and PR assays. Needle contents may be extracted by rinsing with a balanced salt solution, and used in cytospin or cell block preparations. If a cell block is required, a separate pass can be placed into the solution.

Processing cyst fluids obtained via FNA

Although it is not standard practice to submit cyst fluid from cysts for cytological evaluation, cyst fluid should be sent for cytological evaluation if any of the following apply:

• It is bloody or serosanguinous

• There is a residual palpable mass or solid lesion on ultrasound45

• Imaging studies indicate that the cyst is complex

CODING FOR FNAC REPORT

Diagnostic category	Corresponding numerical code
• Inadequate/insufficent	1
• Benign	2
• Atypical/indeterminate	3
• Suspicious of malignancy	4
• Malignant	5

COMMON PITFALLS IN THE INTERPRETATION OF FNACYTOLOGY

FALSEPOSITIVE DIAGNOSES IN FNACYTOLOGY

False positive diagnoses in FNA cytology occur at a rate of less than 1%, and are frequently due to difficulties with interpretation. Conditions associated with false positive diagnoses include:

• **Fibroadenoma with atypical features.** This is the lesion most commonly mistaken for cancer, especially when there is sub-optimal cell preservation, as the epithelial cells may be large and dissociated.

However the presence of bare bipolar nuclei should prevent a diagnosis of malignancy.

• **Mass or thickening associated with lactation.** A clinical history is most important to prevent a false positive cytological diagnosis. During pregnancy, lactation, or post lactation, most of the cells are acinar and dispersed with prominent nucleoli. However, the presence of abundant cytoplasm, vacuolation and a lipo-proteinaceous background should prevent misdiagnosis, especially when used in conjunction with the triple test.

• **Radial scar with hyperplasia.** Ductal hyperplasia is usually an incidental histological finding, but when associated with radiological findings suggestive of malignancy (eg a radial scar), differentiation from a well differentiated carcinoma can be difficult. Bare bipolar nuclei are usually a feature. It is important that a definite diagnosis of malignancy is not made if bare bipolar nuclei are present with the atypical cells.

• **Papilloma.** It is not possible to reliably distinguish between papilloma, atypical papilloma, intracystic papillary carcinoma and invasive papillary carcinoma on

cytological material alone. Core biopsy may provide a definitive diagnosis in some papillary lesions.The clinical and imaging findings may also overlap. Excision biopsy is recommended following a diagnosis of a papillary lesion on FNA cytology.

• **Radiation changes.** The more widespread use of breast conserving surgery has resulted in an increased use of breast irradiation. Radiationinduced epithelial atypia is common in benign breast tissue after treatment.A diagnosis of malignancy should be made only if all cytological criteria are met. Similar problems may arise following chemotherapy.

• **Fat necrosis.** Mesenchymal cells or histocytes may resemble abnormal epithelial cells but the presence of inflammatory cells, foamy macrophages and multinucleated histiocytic giant cells should avoid a false positive diagnosis.This is one lesion for which the result of the triple test may be misleading, as fat necrosis is a lesion that can mimic carcinoma both clinically and on imaging.

• **Atypical apocrine cells.** Apocrine carcinoma is rare, whereas apocrine cells in fibrocystic change are common.The differential diagnosis between apocrine metaplasia and apocrine carcinoma can occasionally be difficult.

• **Gynecomastia.** The cellularity of the smears is highly variable, and epithelial atypia is common. Bare bipolar nuclei are present and a diagnosis of malignancy should not be made unless all the cytological criteria are met.

• **Phyllodes tumour.** This is a stromal neoplasm with a biphasic pattern. In some cases, the associated epithelial hyperplasia may result in a false positive diagnosis.Again, the presence of bare bipolar nuclei and assessment of the stromal fragments should prevent a malignant diagnosis.

• **Adenomyoepithelioma.** This is a rare tumour, for which large atypical epithelioid cells and spindled cells are common features. Bare bipolar nuclei are usually numerous and should prevent a definitive diagnosis of malignancy.

• **Tubular adenoma.** This is much less common than fibroadenoma but is cellular and shows marked dispersal, microacini and prominent nucleoli.

Bare bipolar nuceli are present.

• **Granular cell tumour.** This is a rare soft tissue tumour which can occur in the breast. Dispersed cells with granular cytoplasm, combined with suspicious radiological features, make this lesion a pitfall. However, the granular cells do not show malignant criteria. Maintaining strict cytological criteria for malignancy will assist in keeping false positive diagnoses to a minimum.

FALSE NEGATIVE DIAGNOSES IN FNACYTOLOGY

False negative diagnoses in FNA cytology are more common than false positive diagnoses, and have been reported to be between 3% and 24%.Sampling error is the most common reason for a false negative diagnosis. FNA cytology is highly dependent on the skill and experience of the aspirator. A false negative result can also be due to interpretation error. Situations and conditions associated with false diagnoses in FNA cytology include:

• Some lesions may be more difficult to sample. Examples of situations that may result in sampling difficulty include:

° Small malignant lesions are a special problem, particularly those that are well differentiated and sclerotic, as the cell yield is low and cells may be difficult to distinguish from benign cells.This may result in a false negative diagnosis

° For mass lesions that are difficult to feel, such as those deep in the breast, ultrasound guided FNA cytology may be useful

° If the lesion is close to the chest wall, it may be difficult to obtain sufficient cells. Ultrasound guidance may increase the yield.

• Well-differentiated grade 1 carcinomas may be difficult to diagnose, as the cell yield may be poor or there may be only mild cellular atypia

• Infarcted papilloma. Infarction causes cell dispersal. Recognition of degenerate columnar forms should prevent a diagnosis of malignancies

• Invasive lobular carcinomas may yield few cells, which are often difficult to distinguish from benign cells. They are often mixed with benign ductal elements

• Low-grade DCIS, some tubular carcinoma and cribriform carcinoma may yield deceptively ‘benign’ aspirates

• Inflammatory carcinomas by definition show involvement of the dermal lymphatics by carcinoma.An adequate sample can be difficult to obtain and ultrasound guidance is advised if no definite mass is palpable

• Necrosis may be present in the centre of a high-grade carcinoma. It is important to sample the edge of such a lesion, either by increasing the amplitude of the needle passes to achieve passage of the needle through the lesion, and/or by specifically aiming for the edge of the lesion as palpated or with image guidance.The use of a needle without aspiration may also be useful

• Sclerosis is a potential cause of a low cell yield

• Papillary carcinomas may yield numerous cells, but differential diagnosis ofmost papillary lesions requires excision and examination of the whole lesion and capsule

• Mucinous tumours are often well differentiated and the cell yield may be poor. The presence of mucin raises the possibility of a mucinous tumour.

Application of the triple test should reduce the incidence of missed cancers when there is a false negative cytology result.

TECHNIQUES FOR REDUCING FALSE POSITIVE AND FALSE NEGATIVE RESULTS IN FNA CYTOLOGY:

To reduce false positive and false negative results in FNA cytology, it is recommended that:

• A multidisciplinary approach with appreciation of the importance of theclinical and imaging findings (triple test) is adopted

• Imaging is used to sample lesions difficult to localise or palpate

• There is adequate training of operators

• A minimum of three passes is considered standard practice.The presenceof a pathologist or cytoscientist at the procedure is helpful to assess adequacy of the specimen, otherwise multiple passes are required. If the specimen is still inadequate, core biopsy should be performed

• Slides are well spread,well prepared and well fixed

• There is adequate training of cytopathologists in cytology as well as histology

• Services and individuals participate in quality assurance programs.

Needle type	**Sensitivity**	Specificity
Fine-needle aspiration (FNA)	52-95%	95-100%
Tru-Cut	68-84%	100%
Biopty cut 18G	93-96%	100%
Biopty cut 14G	88-98%	100%
Mammotome	96-99%	100%

Minimum standards for FNA cytology

Performance indicator FNA cytology	**Minimum Standard**
Absolute sensitivity	> 60%
Complete sensitivity	> 80%
Positive predictive value (PPV)/malignant	> 98%
False positive rate	< 1%
False negative rate	< 6%
Inadequate sample rate	< 25%
False negative or inadequate rate	N/A

PATHOLOGY REQUEST FORM FOR FNA CYTOLOGY

PATHOLOGY REQUEST

Date: ____ / ____/ ____

Patient Name:_____

Date of Birth: ___/___/___

Address: _____

_____

_____

Requesting clinician – Name : _____

☐ urgent request ☐ routine request

If urgent, relay report by: mobile phone no _____

Request ☐ cytology ☐ histology ☐ receptors ☐ other_____

Specimen

Date: ____ / ____/ ____ Time: _____

• Site sampled: ☐ breast ☐ lymphnode ☐ skin ☐ other _____

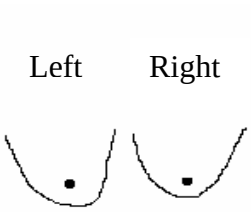
• Site position: side + 'o'clock' _____ distance from nipple _____

Guidance: ☐ palpation ☐ stereotaxis ☐ ultrasound

Site of lesion (specify on diagram)

Specimen radiology:

☐ done
☐ accompanies specimen
☐ microcalcification present



History:

Medical history: _____

_____

Clinical findings: _____

Imaging findings:

stellate lesion simple cyst

circumscribed opacity complex cyst

asymmetric density well defined hypoechoic

microcalcifications ill defined hypoechoic

microcalcifications & mass microcalcifications & mass

disturbance of architecture disturbance of architecture

other (specify) _____ other (specify)_____

Provisional diagnosis:_____

_____

_____

Copies of report to: _____

Managing clinician: _____

OBSERVATION AND RESULTS

"The only function of FNAC is to differentiate neoplastic from non neoplastic tissue" this statement by FERGUSSEN in 1937 may still be valid.

289 patients was enrolled for this study , conducted between July 2003 to February 2006. The age group of patients selected for this study ranged from 15 years to 88 years.

EPIDEMOLOGY OF BREAST DISORDERS IN TIRUNELVELI MEDICAL COLLEGE HOSPITAL:

The total number of Female Inpatients during the period of this study was 53,723.The Percentage of Female Inpatients with Breast disorders (261) in TVMCH during this study period was 0.48 %.

The Percentage of female inpatients having Breast cancer (134) during this study period was 0.249 %.

Total number of major cases performed in surgery dept during this study period was 19,312.The Percentage of Breast surgeries (289) in TVMCH during this study period was 1.49 %.

Out of the 289 patients 28 patients were male. TABLE I and TABLE 11 shows distribution of patients according to their sex and age.

The 289 patients selected were clinically examined, investigated, diagnosed and was subsequently operated upon. TABLE 1V shows the distribution of patients according to their preoperative FNAC diagnosis.

FNAC was done for all the 289 patients. All the patients enrolled in this study were in-patients and all the patients were followed up ,during surgery and after discharge, and their HPE reports were collected by me personally.

All the 289 patients readily agreed for the procedure, after proper explanation. Patients showing acellular smear or paucicellular smear were subjected to repeat FNAC.

TABLE III. shows the result of FNAC and the distribution of patients under each category. Out of the 289 patients the number of patients diagnosed under various diseases as per FNAC report is given in TABLE 1V.

All the 289 patients underwent surgical procedure based on their clinical and FNAC diagnosis. TABLE VI shows the distribution of patients according to the surgery done.

Histopathological study was done for all the excised specimens of the 289 patients and the reports were obtained from the pathology department. TABLE V shows the distribution of histopathological report.

The results of the HPE were then compared with FNAC report of the patient and the correlation was noted. TABLE 1X shows the comparison between HPE and FNAC.

TABLES AND CHARTS

I. SEX DISTRIBUTION OF SAMPLE GROUP

Sl.No.	Sex	Number	% Distribution
1	Male	28	09.68 %
2	Female	261	90.31 %
Total		**289**	**100 %**

II. AGE WISE DISTRIBUTION OF SAMPLE GROUP

Sl.No	Age Group	No.	% Distribution
1	0-10	0	0
2	10-20	42	14.53 %
3	20-30	63	21.79 %
4	30-40	61	21.10 %
5	40-50	58	20.06 %
6	50-60	43	14.87 %
7	60-70	19	06.57 %
8	70-80	2	0.69 %
9	80-90	1	0.34 %
Total		**289**	

III. FNAC REPORT : DISTRIBUTION OF PATIENTS ACCORDING TO CATEGORY

Report Category	Number
Imaging Abnormality detected/Negative Aspiration (Category1)	3
Benign Findings (Category2)	149
Indeterminate (Category3)	0
Suspicious of malignancy (Category4)	7
Malignant (Category5)	130
Total	**289**

IV. FNAC REPORT : DISTRIBUTION OF PATIENTS ACCORDING TO DIAGNOSIS

Diagnosis	Number
Ductal Carcinoma	129
Fibroadenoma	106
Fibrocystic Disease	9
Phyllodes Tumor	10
Gynaecomastia	24
Medullary Carcinoma	1
Acellular Smear	3
Suspicious Of Malignancy	7
Total	**289**

V. HPE REPORT - DISTRIBUTION OF PATIENTS

Diagnosis	Number
Infiltrating Ductal Carcinoma	134
Fibroadenoma	106
Fibrocystic Disease	9
Phyllodes Tumor (Benign)	11
Phyllodes Tumor (Malignant)	1
Gynaecomastia	26
Medullary Carcinoma	2
Total	**289**

VI. DISTRIBUTION OF PATIENTS ACCORDING TO SURGERY

Sl.No	Surgery	No. Of Patient
1.	**Modified Radical Mastectomy (MRM)**	137
2.	**Simple Mastectomy (SM)**	11
3.	**Excision**	115
4.	**Webster's Procedure**	26
Total		**289**

VII. FALSE NEGATIVE CASE

Sl.No.	FNAC Report	No Of Cases	HPE Diagnosis	Probable Reason For Negative Report
1.	Acellular smear	1	Fibro Adenoma	Sampling Error
2.	Acellular smear	2	Gynaecomastia	Sampling Error
3.	Fibro adenoma	1	Phyllodes	Interpretation Error

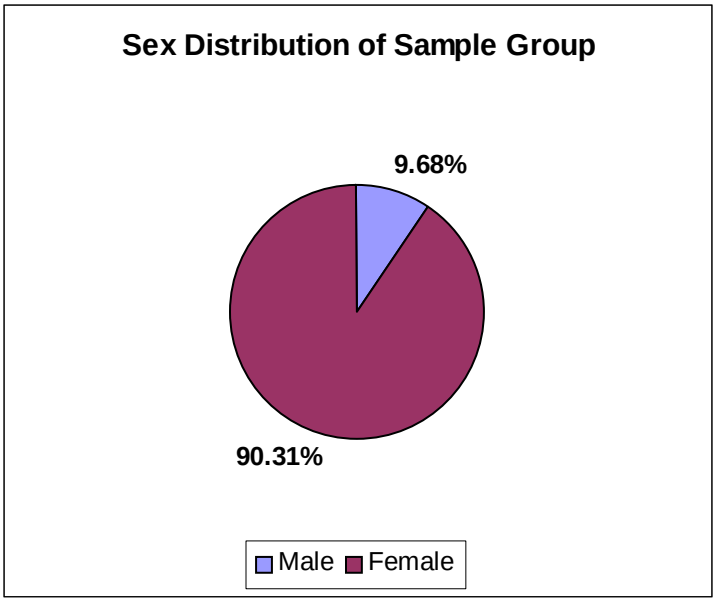
VIII. DISTRIBUTION ACCORDING TO MENSTRUAL AGE

Sl.No	Surgery	No. Of Patient
1.	Prepubertal	3
2.	Menstrual	172
3.	Post Menopausal	86
Total		**261**

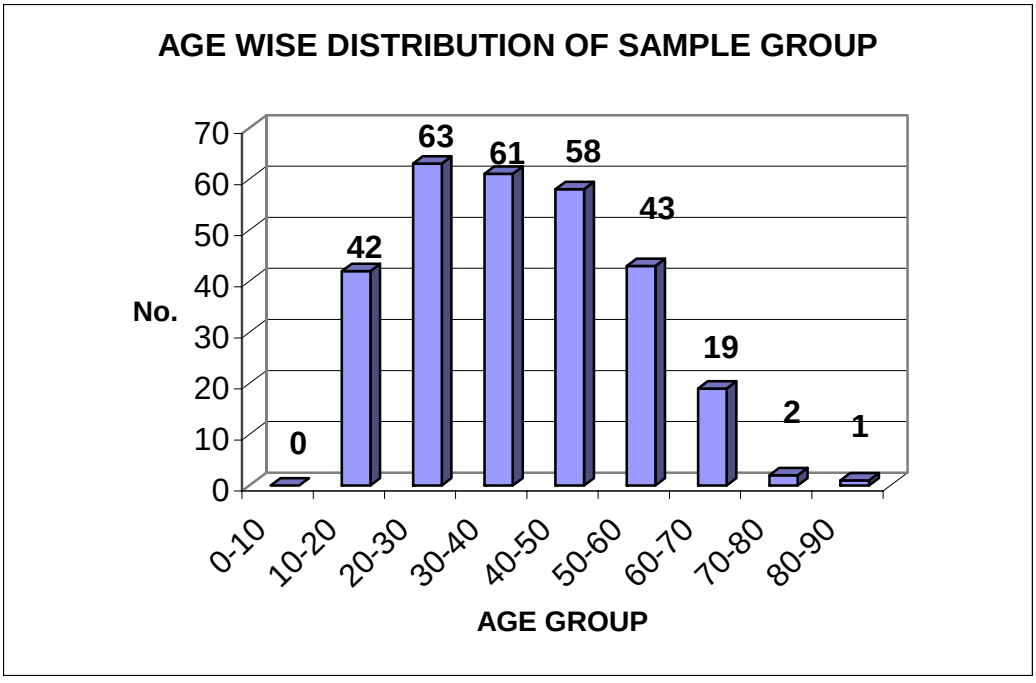
IX. FNAC : HPE COMPARISION

Sl. No.	Diagnosis	HPE Report	By FNAC	Accuracy
1.	Infiltrating Ductal Carcinoma	134	129	96.26 %
2.	Fibroadenoma	106	105	99.01 %
3.	Fibrocystic Disease	9	9	100%
4.	Benign Phyllodes Tumor	11	10	90.90 %
5.	Malignant Phyllodes Tumor	1	0	0%
6.	Gynaecomastia	26	24	92.3%
7.	Medullary Carcinoma	2	1	50%

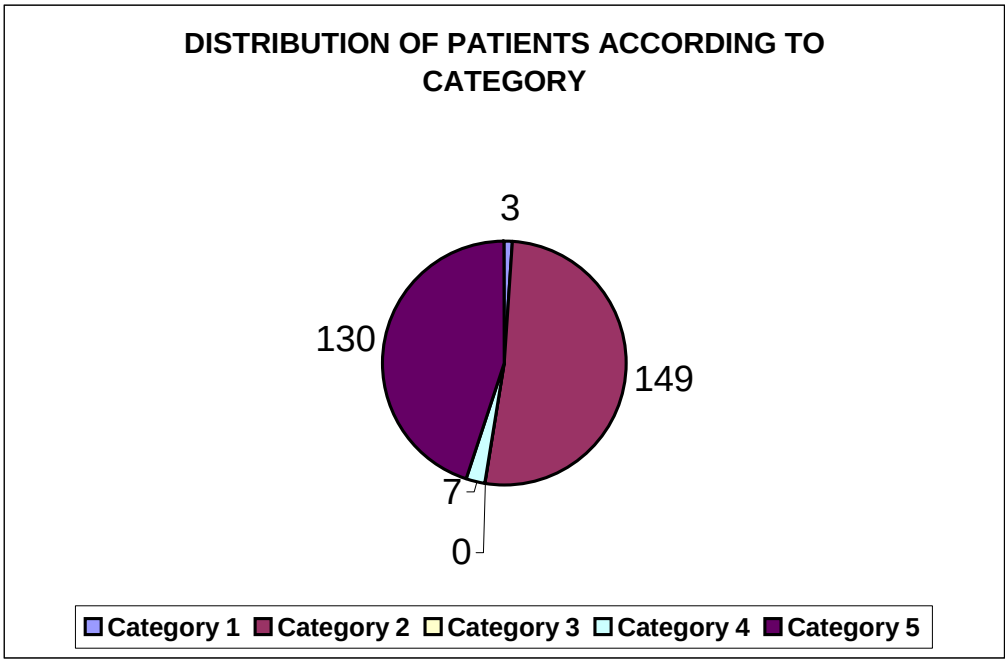
I.SEX DISTRIBUTION OF SAMPLE GROUP



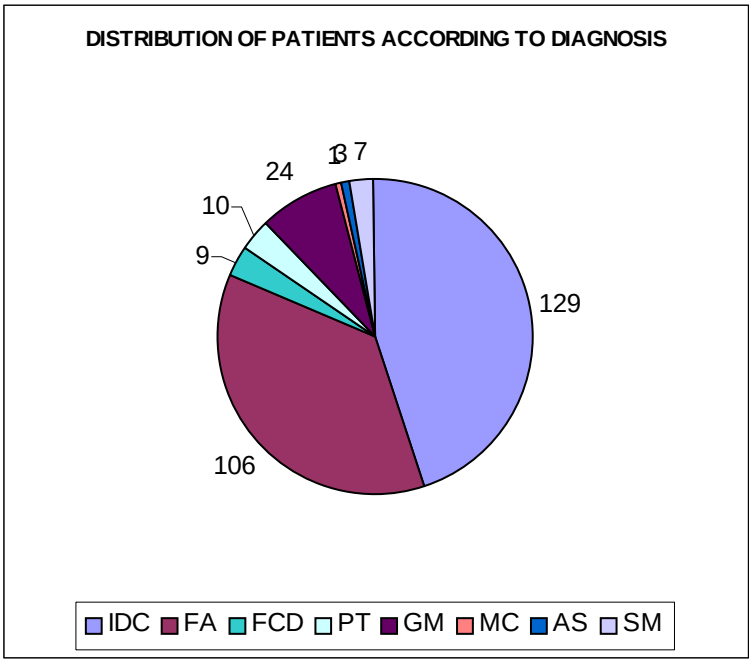
II. AGE WISE DISTRIBUTION OF SAMPLE GROUP



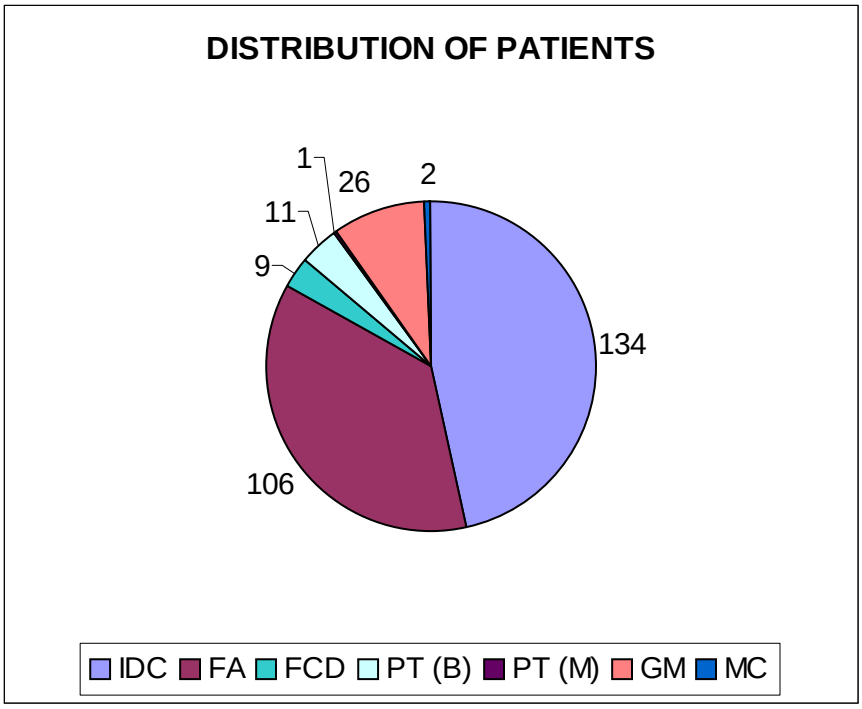
III. FNAC REPORT : DISTRIBUTION OF PATIENTS ACCORDING TO CATEGORY



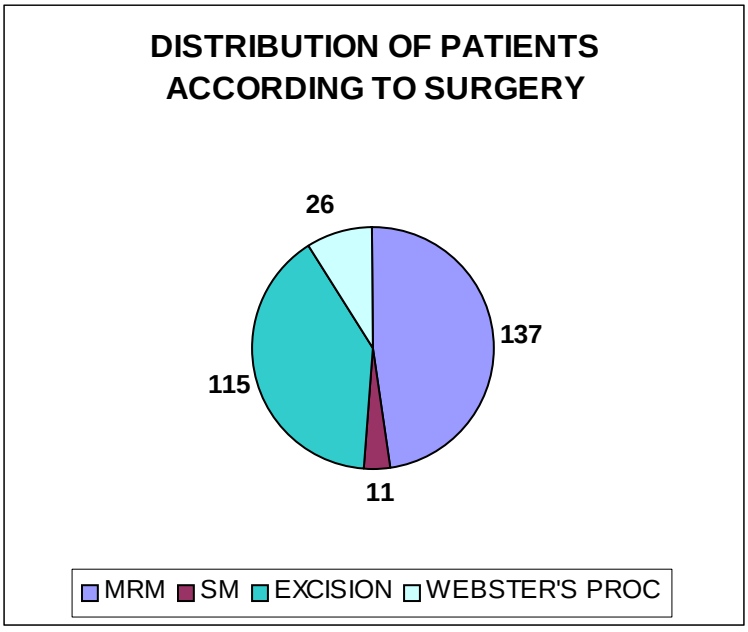
IV. FNAC REPORT : DISTRIBUTION OF PATIENTS ACCORDING TO DIAGNOSIS



V. HPE REPORT - DISTRIBUTION OF PATIENTS

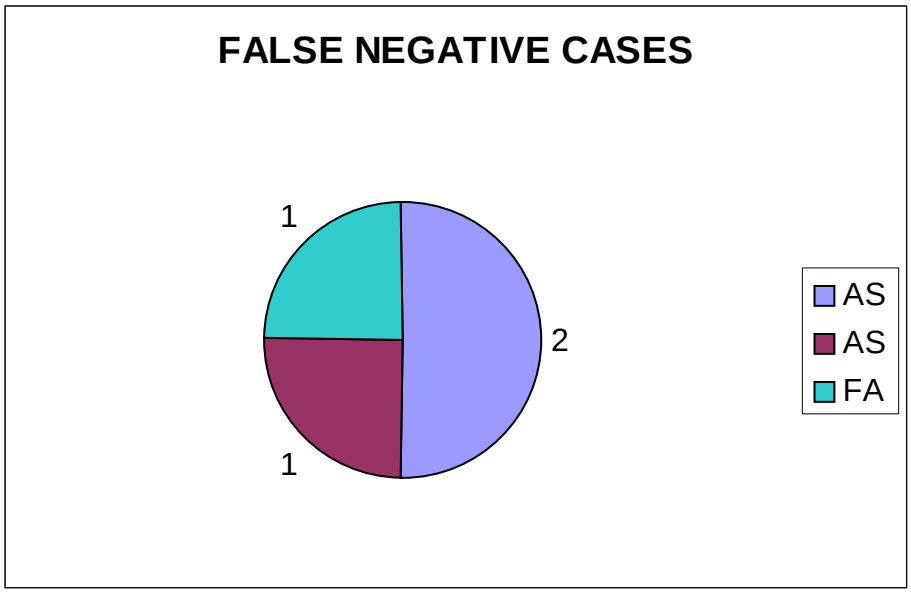


VI. DISTRIBUTION OF PATIENTS ACCORDING TO SURGERY

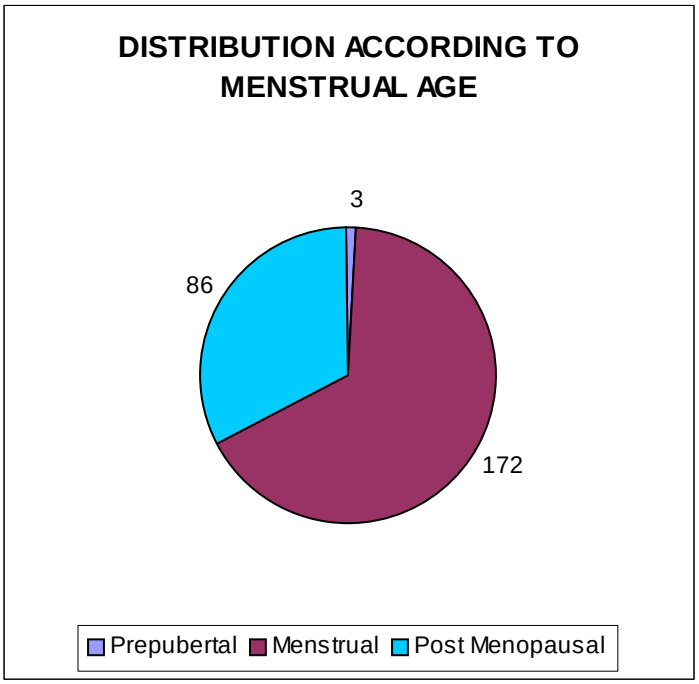


MRM – MODIFIED RADICAL MASTECTOMY
SM – SIMPLE MASTECTOMY

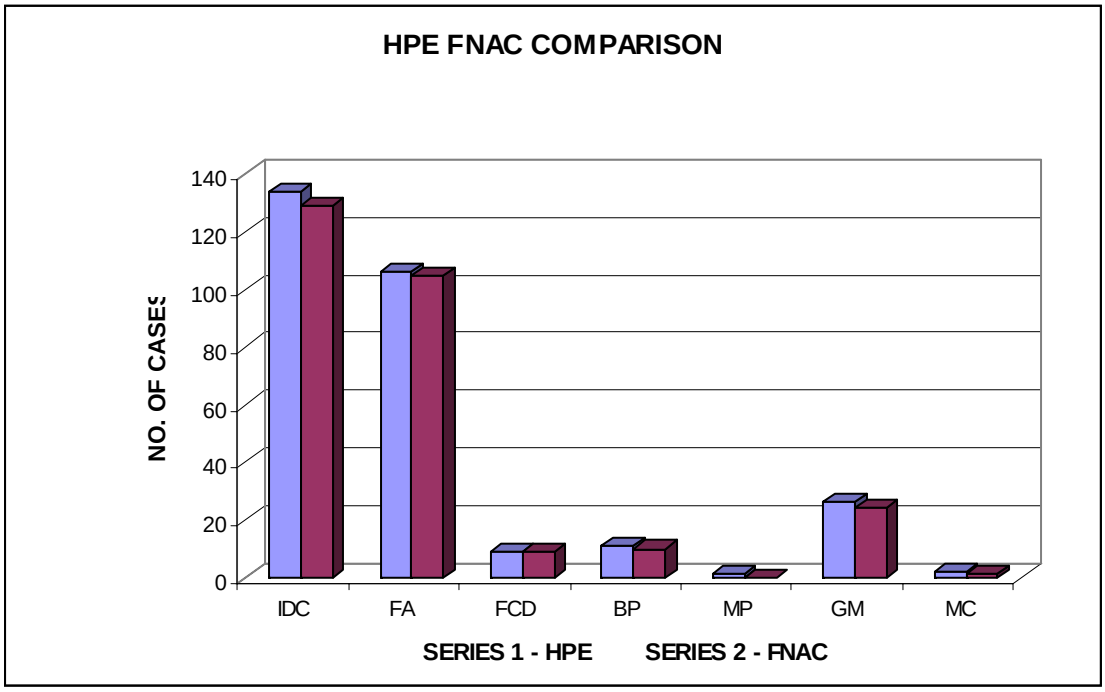
VII. FALSE NEGATIVE CASE



VIII. DISTRIBUTION ACCORDING TO MENSTRUAL AGE



IX. FNAC : HPE COMPARISION



IDC - INFILTRATING DUCTAL CARCINOMA.

FA - FIBRO ADENOMA.

FCD - FIBRO CYSTIC DISEASE.

GM - GYNAECOMASTIA.

BP - BENIGN PHYLLODES TUMOR.

MP - MALIGNANT PHYLLODES.

MC - MEDULLARY CARCINOMA.

SM - SUSPICIOUS OF MALIGNANCY

AS - A CELLULAR SMEAR

DISCUSSION

From Table I it may be seen that female patients far outnumber male patients, confirming the fact that breast diseases are more common in females out of 289 patients FNAC was inconclusive in only 4 patients, indicating the usefulness of the procedure.

After the arrival of HPE report, the FNAC report of each patient was compared with the corresponding HPE report.

ACCURACY OF FNAC

TABLE IX, shows the number of FNAC reports, subsequently confirmed by HPE.from the table it may be observer that the diagnostic accuracy was 96.26 % in diagnosing infiltrating ductal carcinoma, 99.01 % in diagnosing fibroadenoma,100 % in diagnosing fibrocystic disease, 90.9 % in diagnosing phyllodes tumor, 92.3 % in diagnosing gynaecomastia, and 50 % in diagnosing medullary carcinoma in this study.

FNAC gave a category IV report in a case of malignant phyllodes tumor. The accuracy was low in diagnosing malignant phyllodes tumor, benign phyllodes tumor, and medullary carcinoma.

FALSE NEGATIVE RESULTS:

Totally there were 4 false negative cases encountered in this study, including 3 acellular smears.

These three cases were examples of sampling errors.

Another case of phyllodes tumor was reported as fibroadenoma. It was an example of interpretation error.

In this study the overall false negative rate was 1.38 %.sampling error was responsible for most of the negatives, which can be brought down using guidance techniques.

SENSITIVITY:

The sensitivity of this study was 96.26 % for Breast malignancy and 95.32 % for benign Breast disorders.There was no False positive cases in this study.

POSITIVE PREDICTIVE VALUE OF POSITIVE TEST:
(FOR MALIGNANCY)

PPV in this study was 96.26 % ,for diagnosing breast malignancy**.** This reflects the usefulness of FNAC in predicting malignant conditions of the breast, based on which definite treatment strategy can be planned.

Cost effectiveness of FNAC

FNAC is sensitive and direct method for identifying malignant Breast Tumors. the diagnostic sensitive reported in the literature varies, it is usually above 95%. The low cost of FNAC is appealing especially considering the increasing financial restrictions being placed on laboratory test.

NEWER DEVELOPMENTS

1. Non aspiration method is quite useful if the aspirate is haemorrhagic.
2. Development in radiology helped to do guided aspiration from deep seated tumors and axillary lymphodes.
3. Recently fine needle aspiration samples are used in other sophisticated procedures like a) morphometric techniques viz, planimetric methods, flowcytometry and single cell microspectrometry b) Study under electron microscopy c) immunocytohistochemistry procedures.

RECENT STUDY REVIEWS

1) Fine-needle aspiration cytology vs. core biopsy in the diagnosis of breast lesions. Diagn Cytopathol. 2003 Dec;29(6):344-8.

BERNERA, DAVIDSON B.Department of Pathology, Division of Cytology, The Norwegian Radium Hospital, University of Oslo, Montebello N-0310 Oslo,Norway.aasmund@labmed.uio.no.

Fine-needle aspiration cytology (FNAC) is an established, highly accurate method for diagnosing breast lesions The aim of this study was to evaluate the accuracy of FNAC and compare the quality assessment parameters of FNAC in palpable and nonpalpable breast lesions. A total of 4,367 FNAC samples from the years 1999-2001 was reviewed. Of these, corresponding histology results were available for 1,275 lesions, of which 1,248 were primary breast epithelial lesions.High specificity and sensitivity, as calculated for satisfactory specimens, were achieved with the use of both FNAC and CB. False-positive and false-negative diagnoses were seen in 7/404 (1.7%) and 45/635 (7.1%) of biopsy-proven specimens sampled by FNAC. FNAC is a valuable method, although moderately less sensitive than CB. FNAC is most accurate when experienced cytologists are available and when immediate assessment by professionals is performed for evaluation of material adequacy, so that additional aspirations can be done when needed.

2) J Coll Physicians Surg Pak 2004 Nov;14(11):654-6 (ISSN: 1022-386X)
Aziz M; Ahmad N;Zahid J; Faizullah; Aziz M Department of General Surgery, Nishtar Medical College and Hospital, Multan.

CONCLUSION: **FNAC** has good sensitivity (85.29%) and very high specificity (100%). It can replace the open biopsy in majority cases of clinically malignant disease. Although **FNAC** is slightly less sensitive (80%) in benign diseases, it is highly specific (100%), so it can help to reassure and relieve the anxiety of the patients.

3) Fine-needle aspiration cytology vs. core biopsy in the diagnosis of **breast** lesions.
Diagn Cytopathol 2003 Dec;29(6):344-8 (ISSN: 8755-1039)
Berner A; Davidson B; Sigstad E; Risberg B Department of Pathology, Division of **Cytology**, The Norwegian Radium Hospital, University of Oslo, Montebello N-0310 Oslo, Norway.

High specificity and sensitivity, as calculated for satisfactory specimens, were achieved with the use of both **FNAC** and CB. False-positive and false-negative diagnoses were seen in 7/404 (1.7%) and 45/635 (7.1%) of biopsy-proven specimens sampled by **FNAC**. The corresponding values for CB were 0% and 5.7%, respectively. Inadequate sampling (15.1%) with use of **FNAC** was particularly seen in collagenous lesions and in submitted

specimens sampled by physicians lacking experience with the **FNAC** procedure. **FNAC** is a valuable method, although moderately less sensitive than CB. CB is the preferred method for preoperative diagnosis when sampling **FNAC** provides scarce material and suspicion of a fibrotic and collagenous lesion such as lobular carcinoma and radial scar arises. **FNAC** is most accurate when experienced cytologists are available and when immediate assessment by professionals is performed for evaluation of material adequacy, so that additional aspirations can be done when needed

4) A comparison of **aspiration cytology** and core **needle** biopsy in the evaluation of **breast lesions.**
Cancer 2001 Apr 25;93(2):146-50 (ISSN: 0008-543X)
Westenend PJ; Sever AR; Beekman –De Volder HJ; LiemSJ Laboratory for Pathology, Albert Schweitzer Hospital, Dordrecht, The Netherlands.

RESULTS: Core **needle** biopsy and **FNAC** do equally well for sensitivity (88% vs. 92%), positive predictive value for malignancy (99% vs. 100%), and inadequate rate (7% vs. 7%). However, statistical differences are found for the specificity (CNB, 90%; **FNAC**, 82%). In addition, differences are found in the positive predictive value of both suspicious (CNB, 100%; **FNAC**, 78%) and atypia (CNB, 80%; **FNAC**, 18%) and for the suspicious rate (CNB, 5%; **FNAC**, 13%) reflecting difficulties in interpreting some **FNACs**. Combining the findings of both **FNAC** and CNB results in an increase in absolute sensitivity, a decrease in the positive predictive value of atypia compared with **FNAC** and CNB per se, and a decrease in the inadequate rate for cancers. CONCLUSIONS: For the lesions selected in this study, **FNAC** and CNB are comparable for most parameters, but CNB has a higher specificity and lower suspicious rate. Combining results of **FNAC** and CNB leads to an increase in absolute sensitivity without affecting specificity and a decrease in the inadequate rate for cancers.

5) Impact of inadequate fine-needle aspiration cytology on outcome of patients with palpable breast lesions.
Aust N Z J Surg 2000 Sep;70(9):656-9 (ISSN: 0004-8682)
Lee HC; OoiP J; Poh WT; Wong CY Department of General Surgery, Singapore General Hospital.

BACKGROUND: The purpose of the present study was to assess the impact of inadequate **fine-needle aspiration cytology** (**FNAC**) **breast** specimens on the outcome of patients with a palpable **breast** lesion. RESULTS: One hundred and thirty-eight (16.6%) of 831 **FNAC** specimens were reported inadequate, and these form the study group. CONCLUSION: **Breast** cancer was present in 8.5% of the inadequate **FNAC** specimens. When clinical suspicion of malignancy is high, an excision biopsy is advised in patients with inadequate **FNAC** specimens. If properly managed with triple tests and good clinical judgement, the inadequate **FNAC** specimens do not delay treatment in patients with **breast** cancer.

6) Randomized clinical trial of the effect of needle gauge and local anaesthetic on the pain of breast fine-needle aspiration cytology.

Br J Surg 2000 Jun;87(6):777-9 (ISSN: 0007-1323)

Daltrey IR; Kissin MW Department of Surgery, The Royal Surrey County Hospital, Guildford, UK.

BACKGROUND: **Breast fine-needle aspiration cytology** (**FNAC**) is an invasive investigation which can be uncomfortable or distressing. This randomized study investigated the discomfort of **breast FNAC** and the effect of different techniques. METHODS: Some 116 **FNAC** samples were taken from 98 women with a palpable **breast** mass. Each patient was randomized to one of four study groups; **aspiration** was performed using a green-hub (21 G) or blue-hub (23 G) **needle**, either with or without local anaesthetic. Each patient scored the pain of the whole procedure using a visual analogue scale. RESULTS: A green-hub **needle** caused significantly more discomfort (mean(s.e.m.) pain score 5.1(0. 4) cm) than a blue-hub **needle** (2.9(0.4) cm), or either a blue- or green-hub **needle** with local anaesthetic (3.0(0.4) and 2.1(0.4) cm respectively) ($F = 10.28$, 3112 d.f., $P < 0.01$, analysis of variance). CONCLUSION: The discomfort of **breast FNAC** is dependent upon the gauge of the **needle** and the use of local anaesthetic. A blue-hub **needle** without local anaesthetic should be first choice for **breast FNAC**.

7) Diagnostic accuracy of vacuum-assisted biopsy device for image-detected breast lesions.

ANZ J Surg 2001 Aug;71(8):457-60 (ISSN: 1445-1433) Hung WK; Lam HS; Lau Y; Chan CM; Yip AW Department of Surgery, Kwong Wah Hospital, Hong Kong Special Administrative Region, China

BACKGROUND: Non-palpable **breast** lesions present diagnostic difficulties. Ultrasound-guided **fine-needle aspiration cytology** (**FNAC**) is a common method used to obtain a diagnosis, but **FNAC** is frequently inconclusive or insufficiently accurate. Recently a vacuum-assisted biopsy device (Mammotome, Ethicon, Endo-surgery, USA) has been introduced. The diagnostic accuracy of this biopsy device was assessed for lesions that were visible on ultrasound. METHODS: Fifty ultrasound-guided mammotome biopsies were performed. All were small **breast** lesions primarily detected by ultrasound. All received **FNAC** as initial assessment. Mammotome biopsy was performed whenever the **breast** lesion was considered indeterminate or if it was considered benign and there were associated risk factors such as a family history of **breast** cancer. RESULTS: Of 50 mammotome biopsies 45 had benign histology. Three of 45 lesions were excised at the patients' request and were confirmed to be benign. The remaining 42 patients received an ultrasound follow up at 6 months. The lesion size remained static in 39 patients. In three patients the lesion size increased and they were excised and histology was benign. For the four malignancies diagnosed with mammotome biopsy, three patients received definitive treatment and one patient defaulted. There was one failed mammotome biopsy in the present series. CONCLUSIONS: Mammotome biopsy is an acceptable diagnostic method for small

breast lesions seen on ultrasound. It reduces the need for open biopsy without compromising diagnostic accuracy.

8) Fine needle aspiration cytology of the **breast**. Experience at an outpatient **breast** clinic.
Acta Cytol 2000 May-Jun;44(3):361-7 (ISSN: 0001-5547)
Kim A; Lee J; Choi JS; Won NH; Koo BH Department of Pathology, Korea University College of Medicine, Seoul, Korea.

OBJECTIVE: To evaluate the accuracy of **fine needle aspiration cytology** (**FNAC**) of the **breast** at our institution and to perform quality assurance. STUDY DESIGN: Two hundred forty-six cases with pathologic confirmation were selected and reviewed. A pathologist performed most of the aspirations at an outpatient **breast** clinic. We correlated cytologic and histologic findings and evaluated the influence of the size, location, grade, and pathologic subtypes and fibrosis in **breast** lesions on diagnostic results. RESULTS: The likelihood ratios for malignant, suspicious, atypical, benign and unsatisfactory cytologic diagnoses were 98.71, 5.48, 1.09, 0.07 and 0.55, respectively. The absolute and complete sensitivities for malignant lesions were 64.5% and 90.3%, respectively. The specificity was 71.9%. False negative and positive rates were 4.3% and 0.7%, respectively. The predictive value for a malignant cytologic diagnosis was 98.4%. The rate of unsatisfactory samples was 9.3%. The rate of concordance between cytologic and histologic diagnosis was lower for large and diffusely growing lesions (benign and malignant), for malignancies with abundant fibrosis and of unusual types and for carcinomas of low grade. All axillary and recurrent chest wall lesions were diagnosed cytologically. Cell block sections were useful in a small number of cases. CONCLUSION: Understanding the performance and limitations of FNAC can enhance its value as a diagnostic technique in the management of breast disease

9) FNAC: its role, limitations and perspective in the preoperative diagnosis of breast cancer [In Process Citation]
Eur J Gynaecol Oncol 2005;26(2):143-9 (ISSN: 0392-2936)
Zagorianakou P; Fiaccavento S; Zagorianakou N; Makrydimas G; Agnantis NJ Department of Pathology, Medical School, University of Ioannina, Greece

We conclude that **FNAC** plays an important and essential role in the management of patients with breast lesions and also offers a great potential for prediction of patient outcome, disease response to therapy and assessment of risk of developing breast cancer. The reliability and efficiency of the method depends on the quality of the samples and the experience of the medical staff that performs the **aspiration**

10) Fine-needle aspiration cytology vs. core biopsy in the diagnosis of breast lesions.
Diagn Cytopathol 2003 Dec;29(6):344-8 (ISSN: 8755-1039)
Berner A; Davidson B; Sigstad E; Risberg B Department of Pathology, Division of **Cytology**, The Norwegian Radium Hospital, University of Oslo, Montebello N-0310 Oslo, Norway

High specificity and sensitivity, as calculated for satisfactory specimens, were achieved with the use of both **FNAC** and CB. False-positive and false-negative diagnoses were seen in 7/404 (1.7%) and 45/635 (7.1%) of biopsy-proven specimens sampled by **FNAC**. The corresponding values for CB were 0% and 5.7%, respectively. Inadequate sampling (15.1%) with use of **FNAC** was particularly seen in collagenous lesions and in submitted specimens sampled by physicians lacking experience with the **FNAC** procedure. **FNAC** is a valuable method, although moderately less sensitive than CB. CB is the preferred method for preoperative diagnosis when sampling **FNAC** provides scarce material and suspicion of a fibrotic and collagenous lesion such as lobular carcinoma and radial scar arises. **FNAC** is most accurate when experienced cytologists are available and when immediate assessment by professionals is performed for evaluation of material adequacy, so that additional aspirations can be done when needed.

CONCLUSION

The following conclusions were drawn from this study,

The Percentage of Female Inpatients with Breast disorders (261) in TVMCH during this study period was 0.48 %.

- The Percentage of female inpatients in TVMCH having Breast cancer (134) during this study period was 0.249 %.
- Breast surgeries made up 1.49 % of all the major surgeries performed in TVMCH during this study period.

1) The over all accuracy rate of FNAC was 87.92% and it reliably helped to plan the nature of Surgery to be undertaken. With Experience and use of Guidance techniques, the accuracy rate can be Improved to 94-96% at par with current international standards.

2) The sensitivity of this study was 96.26 % for Breast malignancy, and 95.32 % for benign breast disorders.

3) FNAC can reliably diagnose Fibro Cystic disease and Surgery can be avoided for those patients. The 9 patients with FCD operated in this study had a Dominant, Symptomatic and Chronic lump, refractory to medical management.

4) The predictive value of a Positive test for Malignancy was 96.26 % in this study.

5) FNAC was reliable in diagnosing recurrent tumors and Metastatic nodes.

6) Preoperative FNAC report and clinical diagnosis were both correlated before planning a Mastectomy and was Justified in all the patients who underwent Mastectomy.

7) There were no False positive cases this study.

8) FNAC was less accurate in diagnosising & confirming Medullary Carcinoma (50 %), Gynaecomastia (92.3 %) and Phyllodes (90.9 %). With experience and guidance techniques, there results can no doubt be improved upon.

9) FNAC can aid in the follow up of patients, with the least incidence of complication. In this study, there was a only a single case of Haematoma after FNAC in a case of Advanced IDC.

10) There were totally 4 False Negative cases and most of then were due to sampling error, which can be brought down by experience.

11) Females obviously dominated the study with maximum incidence of breast tumors in the 20 to 60 years age group.

12) In 1933,STEWART stated that “diagnosis by aspiration is as reliable as the combined intelligence of the clinician and pathologist ,make it”. This wise euphorism holds good for any study, and will influence the outcome of any study.

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- Core biopsy versus **FNAC** for palpable **breast** cancers. Is image guidance necessary? **Eur J Cancer 2003 Jan;39(1):52-6** (ISSN: 0959-8049) Agarwal T; Patel B; Rajan P; Cunningham DA; Darzi A; Hadjiminas DJ

Breast Care Unit and Academic Surgical Unit,St Mary's Hospital, London, UK.

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PROFORMA

1. CASE NO:

2. **NAME :** **AGE :** **SEX :**

ADDRESS : OCCUPATION & INCOME :

DATE OF ADMISSION : DATE OF SURGERY :

DATE OF DISCHARGE :

3. PRESENTING COMPLAINTS :

(a) lump : 1) Site Number :

2) Duration

3) Nature / Consistency

4) Rate of growth

(b) pain : (1) Whether associated with pain YES / NO

(2) If yes, nature of pain :

(3) Any radiation :

(4) Precipitating factors :

(5) Relieving factors :

(c) nipple : (1a) Retraction : YES / NO

(1b) If yes, time of onset :

(2) Nipple discharge : bloody/serous/greenish/milky/others/ nil

(d) Bone pain if any :

(e) Malaise / fatigability :

(f) Others :

4. PAST HISTORY :

(a) h/o of previous lumps if any :

(b) h/o cyclical mastagia if any :

(c) h/o any treatment for breast lumps :

(d) h/o previous surgeries for lumps if any :

(e) other relevent h/o :

5. PERSONAL HISTORY :

(a) habits : tobacco / alchohol / others / nil.

(b) diet : mixed / vegetarian.

(c) appetite : good / loss of appetite.

(d) bowel movements : regular / constipation / diarrhoea / malena / haematochezia

(e) bladder movements :

(f) personal hygiene : good / moderate / poor.

6. MENSTRUAL H/O : premenopausal / postmenopausal :

(a) age at menarche :

(b) period cycle : regular / irregular

(c) age at menopause if postmenopausal :

(d) h/o of menstrual regulation if any :

(e) h/o of oral contraceptive pill intake : Yes / No

(f) if yes, time and duration of intake :

(g) complication if any :

(h) h/o of D & C if any :

7. FAMILY H/O

(a) whether married :

(b) duration of married life :

(c) no of children : Male / Female / Nil

(d) h/o previous abortions / still births if any :

(e) h/o of contraception :

(f) h/o of similar lumps in family / relative :

(g) h/o of surgery for lump breast in family / relatives :

(h) if yes, degree of relation :

8. GENERAL PHYSICAL EXAMINATION

(a) Vital signs : Pulse: Blood Pressure : Heart Rate :
Temperature : Respiratory Rate :

(b) Built and nutrition :

(c) State of hydration :

(d) Evidence of anaemia / jaundice / clubbing / cyanosis / pedal edema / lymphedema generalized lymphadenopathy :

9. EXAMINATION OF THE BREAST :

(a) Inspection : (Examination done with arms by the side of the patient, arms raised straight above, arms on the hips and on bending forward)

1) Nipple :
Position :
Size and Shape : Prominent / Flattened / Retracted
Surface :
Discharge if any :

2) Areola :

3) Lump, if visible :
Position :
Size and Shape :
Surface :
Number :

4) Skin over the breast :
Colour : Redness / Shininess / Others.
Engorged veins :
Surface :Dimpling / Retraction / Puckering / Others.
Ulcers :
Advanced signs : Peaud' orange/Cancer en cuirasse/Fungation /Others

5) The opposite breast :

6) Any arm lymphedema :

(b) Palpation :

1) Local temperature and tenderness :

2) Situation of lump :

3) Number :

4) Size and Shape :

5) Surface : Smooth / Irregular / Other

6) Margin :

7) Consistency :

8) Fixity to skin over the breast : Tethering / Puckering / Retraction / Nil.

9) Fixity to the breast tissue :

10) Fixity to the underlying fascia & Muscles :

11) Fixity to the chest wall :

12) Transillumination :

13) Ulcer :

14) Examination of lymphnode regions: Number/Size/ Consistency /Mobility / Others

Anterior (Pectoral) :

Posterior (Subscapular) :

Medial :

Lateral (Brachial) :

Central :

Apical :

Other regions :

Opposite axilla :

15) The opposite breast :

16) Percussion :

17) Ausculation : Bruit / Others.

10) EXAMINATION OF OTHER SYSTEMS

(a) Abdomen :

Shape / Surface :

Movement with respiration :

Umbilicus :

Organomegaly if any :

Abdominal mass if any :

Ascitis if any :

Per vaginal examination :

Per rectal examination :

(b) Cardiovascular system :

(c) Respiratory system :

(d) Central nervous system :

11) CLINICAL DIAGNOSIS AND STAGING :

12) INVESTIGATION :

(a) Routine labs :1) Blood Hb% TC DC BT CT

Blood grouping and typing :

Blood : Urea Mgs%. Sugar Mgs%.s.creatinine Mgs%

2) Urine :albumin Sugar Deposites

3) ECG in all leads :

(b) Special :

i) Non invasive :

1) X-ray chest pa view :

2) Mammography finding :

3) Ultra sound breast :

4) CT / Others if any :

5) Nipple discharge cytology and analysis if any :

(ii) Invasive investigations :

1) Fine needle aspiration cytology :

2) CT / USG guided biopsies if any :

13) PRE OPERATIVE DIAGNOSIS AND TREATMENT PLAN :

14) PRE OPERATIVE PREPARATION :

15) OPERATIVE DETAILS :

(a) Surgery done :

(b)Procedure : bcs / radical / palliative / toilet / others

(c) Axillary lymphnode dissection :

(d) Closure :

(e) Preoperative complications if any :

16) POSTOPERATIVE PERIOD :

(a) Complications if any :

(b) Skin graft for raw area in chest wall if any :

(c) If yes : Primary / delayed

17) POST OPERATIVE DIAGNOSIS :

(a) FNAC REPORT :

(b) HISTOPATHOLOGY REPORT :

(c) CORRELATION :

(d) REMARKS :

18) POST OPERATIVE TREATMENT :

(a) Chemotherapy :

(b) Radiotherapy :

(c) Hormone therapy :

19) POST OPERATIVE FOLLOW UP AND OUTCOME :

(a) Chemothrapy schedule :

(b) Radiotherapy :

20) REMARKS :

MASTER CHART

S.No.	Name	Age/ Sex	IP No.	FNAC Report	Surgery Done	HPE No.	HPE Report
1.	Mookammal	45/F	182886	DC	MRM	298/03	IDC
2.	Velammal	47/F	184546	DC	MRM	347/03	IDC
3.	Muthu	19/F	183011	FA	Excision	353/03	FA
4.	Oorkali	31/F	185636	FA	Excision	369/03	FA
5.	Muthukani	29/F	185636	FA	Excision	370/03	FA
6.	Karpagam	40/F	185127	FA	Excision	374/03	FA
7.	Aundiammal	50/F	185978	DC	MRM	421/03	IDC
8.	Sivasodevar	37/F	187035	FA	Excision	423/03	FA
9.	Araichimani	58/F	187033	DC	MRM	440/03	IDC
10.	Savariammal	88/F	186723	DC	MRM	441/03	IDC
11.	Marimuthu	17/M	187816	GM	Websters	445/03	GM
12.	Mariammal	29/F	186930	FA	Excision	463/03	FA
13.	Seriammal	29/F	186942	DC	MRM	465/03	IDC
14.	Grazy	38/F	188072	DC	MRM	484/03	IDC
15.	Arputham	34/F	189722	DC	MRM	506/03	IDC
16.	Anandhi	21/F	190228	DC	MRM	506/03	IDC
17.	Thangam	50/F	191130	DC	MRM	523/03	IDC
18.	Ramani	38/F	187924	DC	MRM	531/03	IDC
19.	Nasiammal	40/F	190227	FCD	Excision	553/03	FCD
20.	Vasantha	40/F	190229	DC	MRM	557/03	IDC
21.	Thoulath	19/F	192521	FA	Excision	563/03	FA
22.	Muthulakshmi	31/F	191974	Acellular smear	Excision	566/03	FA
23.	Saraswathi	21/F	191970	FA	Excision	569/03	FA
24.	Annalakshmi	19/F	193423	FA	Excision	597/03	FA
25.	Ariyanatchi	20/F	183658	FA	Excision	614/03	FA
26.	Murugakani	22/F	193933	FA	Excision	625/03	FA
27.	Petchiammal	20/F	194577	FA	Excision	643/03	FA
28.	Rajalakshmi	25/F	194577	FA	Excision	652/03	FA
29.	Mariasuseela	19/F	192733	FA	Excision	652/03	FA
30.	Essakiammal	19/F	194425	FA	Excision	654/03	FA
31.	Janaki	55/F	194691	DC	MRM	667/03	IDC
32.	Vasantha	35/F	195380	DC	MRM	672/03	IDC
33.	Angaleshwari	55/F	194930	DC	MRM	712/03	IDC
34.	Arumugan	37/F	197924	Suspicion of malignancy	MRM	729/03	IDC
35.	Pitchammal	20/F	194597	FA	Excision	759/03	FA
36.	Arumugakani	32/F	193933	FA	Excision	761/03	FA

37.	Lakshmi	58/F	198061	DC	MRM	775/03	IDC
38.	Mariammal	45/F	198198	DC	MRM	781/03	IDC
39.	Saraswathi	52/F	195181	PHYLLODES	SM	787/03	PHYLLODES
40.	Poonal	40/F	198384	FA	Excision	796/03	FA
41.	Kuruvammal	26/F	198381	FA	Excision	797/03	FA
42.	Mariammal	32/F	198439	DC	MRM	803/03	IDC
43.	Anandaselvan	17/M	198856	GM	Websters	809/02	GM
44.	Rosemari	28/F	198893	DC	MRM	812/03	IDC
45.	Antony	28/M	194221	GM	Websters	815/03	GM
46.	Sankar	24/M	199616	GM	Websters	821/03	GM
47.	Vellathai	60/F	195560	DC	MRM	822/03	IDC
48.	Arumugam	37/F	199150	DC	MRM	812/03	IDC
49.	Vijayalakshmi	38/F	200548	DC	MRM	848/03	IDC
50.	Fathima	50/F	199800	DC	MRM	851/03	IDC
51.	Mariammal	45/F	199085	DC	MRM	857/03	IDC
52.	Muthulakshmi	70/F	200120	Suspicious of malignancy	SM	868/03	MALIGNANT PHYLLODES
53.	Vasanthi	27/F	215833	FA	Excision		FA
54.	Vaikundar	21/M	200827	GM	Websters	886/03	GM
55.	Annakili	61/F	221913	DC	MRM	891/03	IDC
56.	Pappathy	40/F	201125	DC	MRM	896/03	IDC
57.	Saraswathy	45/F	201404	Suspicious of malignancy	MRM	905/03	IDC
58.	Gandhi	55/M	201292	GM	Websters	920/03	GM
59.	Nadatchi thangam	50/F	201568	DC	MRM	921/04	IDC
60.	Lakshmi	50/F	202513	DC	MRM	936/03	IDC
61.	Chellammal	57/F	202499	DC	MRM	959/03	IDC
62.	Aathikani	42/F	202637	FA	SM	960/03	PHYLLODES
63.	Selvan	32/M	202483	GM	Websters	962/03	GM
64.	Parvathi	51/F	202628	DC	MRM	964/03	IDC
65.	Vanaja	50/F	204554	DC	MRM	1014/03	IDC
66.	Ruby	47/F	203853	DC	MRM	1016/03	IDC
67.	Selvi	35/F	203401	DC	MRM	1017/03	IDC
68.	Sangaershwari	34/F	204152	DC	MRM	1019/03	IDC
69.	Pushpa	19/F	204271	FA	Excision	1020/03	FA
70.	Rajan	25/M	204100	acellular smear	Websters	1021/03	GM
71.	Janaki	32/F	204907	FA	Excision	1023/03	FA
72.	Balassubramanian	29/M	204800	GM	Websters	1032/03	GM
73.	Paulthangam	43/F	206099	DC	MRM	1040/03	IDC
74.	Vellaiammal	25/F	204549	FA	Excision	1050/03	FA
75.	Nirmala	25/F	206435	FA	Excision	1051/03	FA
76.	Alagurathi	42/F	206170	DC	MRM	1101/03	IDC

77.	Mothai	48/F	210198	DC	MRM	1166/03	IDC
78.	Jeyakani	37/F	212785	FA	Excision	70/04	FA
79.	Jesuchristian	58/F	211549	FA	Excision	21/04	FA
80.	Visalatchi	72/F	209931	DC	MRM	26/04	IDC
81.	Malliga	54/F	212154	DC	MRM	29/04	IDC
82.	Gandhi	26/F	213033	FA	Excision	33/04	FA
83.	Ambika	20/F	213279	FA	Excision	38/04	FA
84.	Sitammal	33/F	209568	FA	Excision	53/04	FA
85.	Mahalakshmi	30/F	208752	FA	Excision	55/04	FA
86.	Perumalammal	50/F	212025	DC	MRM	57/04	IDC
87.	Annalakshmi	45/F	209784	DC	MRM	59/04	IDC
88.	Sivakami	30/F	215548	DC	MRM	102/04	IDC
89.	Pitchammal	55/F	215430	DC	MRM	116/04	IDC
90.	Ramachandran	42/M	214495	FA	Excision	125/04	FA
91.	Saraswathu	47/F	215855	FCD	Excision	134/04	FCD
92.	Ganapthivalli	21/F	217217	FCD	Excision	148/04	FCD
93.	Karpagam	42/F	217251	FA	Excision	165/04	FA
94.	Gothiammal	60/F	216229	DC	MRM	169/04	IDC
95.	Mariammal	57/F	217744	DC	MRM	177/04	IDC
96.	Vilashini	45/F	217940	DC	MRM	186/04	IDC
97.	Sudaiammal	50/F	215583	DC	MRM	207/04	IDC
98.	Subbulakshmi	41/F	217648	FA	SM	210/04	PHYLLODES
99.	Gandhiammal	45/F	217576	DC	MRM	219/04	IDC
100.	Periyaratchi	60/F	215561	DC	MRM	238/04	IDC
101.	Petchithai	45/F	218593	DC	MRM	242/04	IDC
102.	Rajendran	35/M	219783	GM	Websters	246/04	GM
103.	Latha	45/F	215828	DC	MRM	248/04	IDC
104.	Annammal	55/F	219803	DC	MRM	250/04	IDC
105.	Karpagam	25/F	220546	FA	Excision	271/04	FA
106.	Krishnammal	51/F	220562	FA	Excision	272/04	FA
107.	Chandra	22/F	220553	FA	Excision	273/04	FA
108.	Iyyammal	42/F	218933	PHYLLODES	SM	341/04	PHYLLODES
109.	Punitha	23/F	223205	FA	Excision	399/04	FA
110.	Kamatchi	70/F	222804	FCD	Excision	413/04	FCD
111.	Chandrakani	27/F	2241032	FA	Excision		FA
112.	Duraitchi	40/F	223999	Suspicious of malignancy	MRM	429/04	IDC
113.	Chellathai	55/F	221375	FCD	Excision	433/04	FCD
114.	Ramalakshmi	19/F	223998	FA	Excision	444/04	FA
115.	Motharani	19/F	224916	FA	Excision	455/04	FA
116.	Karupayeeammal	70/F	225504	DC	MRM	466/04	IDC
117.	Subbulakshmi	37/F	223971	DC	MRM	469/04	IDC
118.	Chitra	37/F	225627	FA	SM	578/04	PHYLLODES

119.	Gnanasundari	24/F	226290	FA	Excision	519/04	FA
120.	Kumar	17/M	226438	GM	Websters	521/04	GM
121.	Peer Mohammed	13/M	227240	GM	Websters	554/04	GM
122.	Sethuraman	18/M	227236	GM	Websters	556/04	GM
123.	Surah	30/F	227942	IDC	MRM	570/04	IDC
124.	Murugesh	15/M	228173	GM	Websters	573/04	GM
125.	Subramanian	20/M	227011	GM	Websters	574/04	GM
126.	Petchiammal	27/F	227464	FA	Excision	555/04	FA
127.	Sahayarani	40/F	227915	DC	MRM	581/04	IDC
128.	Arumugammal	45/F	226281	DC	MRM	589/04	IDC
129.	Balammal	22/F	228045	FA	Excision	590/04	FA
130.	Nagoormeeral	23/F	228093	FA	Excision	591/04	FA
131.	Asulammal	26/F	228285	FA	Excision	597/04	FA
132.	Leelavathi	19/F	228092	FA	Excision	800/04	FA
133.	Lakshmi	28/F	251995	FA	Excision	1503/04	FA
134.	Masood Beevi	55/F	251791	DC	MRM	1513/04	IDC
135.	Kavitha	26/F	262905	FA	Excision	1514/04	FA
136.	Ramalakshmi	28/F	252270	FA	Excision	1516/04	FA
137.	Subbulakshmi	65/F	252272	DC	MRM	1521/04	IDC
138.	Sudalaimuthu	15/M	252402	GM	Websters	1536/04	GM
139.	Petchiammal	22/F	253646	FA	Excision	1552/04	FA
140.	Geetha	40/F	252859	Suspicious of malignancy	MRM	1554/04	MEDULLARY CARCINOMA
141.	Subbulakshmi	65/F	253017	DC	MRM	1556/04	IDC
142.	Antony	48/M	254177	GM	Websters	1560104	GM
143.	Ramjan Begam	36/F	255007	DC	MRM		IDC
144.	Kandammal	45/F	259916	DC	MRM	1606/04	IDC
145.	Vasantha	33/F	259183	FA	Excision	1615/04	FA
146.	Sarojini Devi	49/F	254726	DC	MRM	1638/04	IDC
147.	Muthulakshmi	32/F	256391	PHYLLODES	SM	2/05	PHYLLODES
148.	Udavammal	70/F	256313	DC	MRM	32/05	IDC
149.	Kasim Beevi	24/F	256639	FA	Excision	45/05	FA
150.	Madathy	42/F	256003	FA	Excision	46/05	FA
151.	Indira	21/F	256007	FA	Excision	51/05	FA
152.	Essakiammal	60/F	257354	DC	MRM	96/05	IDC
153.	Mary	53/F	254512	DC	MRM	97/05	IDC
154.	Serdu	45/F	256368	Suspicious of malignancy	MRM	119/05	IDC
155.	Santakumari	18/F	813	FA	Excision	133/05	FA
156.	Ulagammal	50/F	499	FA	Excision	149/05	FA
157.	Geetha	45/F	790	DC	MRM	156/05	IDC
158.	Nargees Banu	31/F	2433	PHYLLODES	SM	214/05	PHYLLODES
159.	Arifa	39/F	1680	DC	MRM	223/05	IDC

160.	Maheshwari	17/F	3374	FA	Excision	242/05	FA
161.	Sudha	19/F	3377	FA	Excision	243/05	FA
162.	Selva Pannu	42/F	2802	DC	MRM	249/05	IDC
163.	Kala	39/F	2806	DC	MRM	250/05	IDC
164.	Kalaiselvi	40/F	255793	PHYLLODES	SM	251/05	PHYLLODES
165.	Poomari	31/F	3822	FA	Excision	288/05	FA
166.	Subbulakshmi	50/F	2918	DC	MRM	289/05	IDC
167.	Subbiah Thevar	54/M	3084	DC	MRM	290/05	IDC
168.	Fathima	70/F	1487	DC	MRM	355/05	IDC
169.	Pappa	58/F	1479	DC	MRM	356/05	IDC
170.	Parvathy	58/F	3718	DC	MRM	381/05	IDC
171.	Lakshmi	45/F	6057	DC	MRM	403/05	IDC
172.	Muthulakshmi	33/F		FA	Excision	405/05	FA
173.	Parvathy	30/F	4872	DC	MRM	409/05	IDC
174.	Poongani	70/F	5748	DC	MRM	417/05	IDC
175.	Lakshmi	70/F	5795	DC	MRM	421/05	IDC
176.	Mariammal	21/F	7121	FA	Excision	432/05	FA
177.	Suffammal	69/F	7281	DC	MRM	463/05	IDC
178.	Subbulakshmi	71/F	8342	DC	MRM	477/05	IDC
179.	Paul Durai	28/M	8344	GM	Websters	489/05	GM
180.	Selvalakshmi	20/F	8551	FA	Excision	497/05	FA
181.	Anand	31/M	9609	GM	Websters	498/05	GM
182.	Arumugalakshmi	15/F	9839	FA	Excision	501/05	FA
183.	Selvalakshmi	27/F	9874	FA	Excision	512/05	FA
184.	Selvi	33/F	2959	FCD	Excision	518/05	FCD
185.	Lakshmi	50/F	10045	DC	MRM	524/05	IDC
186.	Fathima	30/F	11080	FA	Excision	536/05	FA
187.	Saraswathy	35/F	10661	DC	MRM	546/05	IDC
188.	Vijayasundai	16/F	11758	FA	Excision	576/05	FA
189.	Subbulakshmi	70/F	5342	DC	MRM	580/05	IDC
190.	Singari	40/F	11079	DC	MRM	610/05	IDC
191.	Suseela	39/F	13575	Medullary Carcinoma	MRM	630/05	MEDULLARY CARCINOMA
192.	Subbiah	44/M	11632	GM	Websters	640/05	GM
193.	Kaliyammal	41/F	12878	FA	Excision	614/05	FA
194.	Rajammal	55/F	11339	DC	MRM	650/05	IDC
195.	Indira	35/F	12331	DC	MRM	651/05	IDC
196.	Vellammal	36/F	13403	FA	Excision	665/05	FA
197.	Krishnammal	55/F	13759	DC	MRM	676/05	IDC
198.	Sivakami	55/F	13043	DC	MRM	685/05	IDC
199.	Arulthangam	16/F	14063	FA	Excision	690/05	FA
200.	Sarojini	58/F	14783	DC	MRM	728/05	IDC
201.	Sheela	20/F	15442	FA	Excision	741/05	FA

202.	Muthulakshmi	16/F	16436	FA	Excision	763/05	FA
203.	LakshmiNarayanan	18/M	16694	Acellular smear	Websters	769/05	GM
204.	Ramesh	32/M	15074	GM	Websters	773/05	GM
205.	Bhagya Thai	65/F	15186	DC	MRM	811/05	IDC
206.	Annathai	58/F	16899	DC	MRM	812/05	IDC
207.	Subbammal	60/F	14792	DC	MRM	815/05	IDC
208.	Alphonse Maryt	46/F	15770	DC	MRM	824/05	IDC
209.	Poomani	53/F	20097	PHYLLODES	SM	851/05	PHYLLODES
210.	Sundari	23/F	21615	FA	Excision	857/05	FA
211.	Vellammal	68/F	20177	DC	MRM	868/05	IDC
212.	Muppidathi	59/F	22652	FA	Excision	905/05	FA
213.	Revathy	25/F	23445	FA	Excision	927/05	FA
214.	Duraimuthu	60/M	23435	GM	Websters	934/05	GM
215.	Rajammal	65/F	22651	DC	MRM	938/05	IDC
216.	Muthumari	14/F	25655	FA	Excision	963/05	FA
217.	Rani	26/F	27141	FA	Excision	1032/05	FA
218.	Subbulakshmi	17/F	28128	FA	Excision	1053/05	FA
219.	Sundaram	52/F	25708	DC	MRM	1054/4	IDC
220.	Parvathyammal	68/F	25345	DC	MRM	1070/05	IDC
221.	Devakani	47/F	16784	FA	Excision	1084/05	FA
222.	Thavasiammal	38/F	28245	PHYLLODES	SM	1106/05	PHYLLODES
223.	Saraswathy	24/F	28184	FA	Excision	1127/05	FA
224.	Prema	42/F	28502	DC	MRM	1139/05	IDC
225.	Muthammal	30/F	29395	FA	Excision	1154/05	FA
226.	Vanitha	22/F	30812	FA	Excision	1188/05	FA
227.	Prema	42/F	28502	DC	MRM	1140/05	IDC
228.	Mohammad	30/F	29395	FA	Excision	1154/05	FA
229.	Arpudam	49/F	31345	FCD	Excision	1208/05	FCD
230.	Chandra	38/F	32156	FA	Excision	1214/05	FA
231.	Krishraveri	26/F	31660	FA	Excision	1233/05	FA
232.	Shyamala	49/F	29812	FCD	Excision	1247/05	FCD
233.	Karuppayi	64/F	22674	DC	MRM	1272/05	IDC
234.	Mariappan	19/M	32144	GM	Websters	1273/05	GM
235.	Balakrishnan	13/M	33271	GM	Websters	1286/05	GM
236.	Sundari	56/F	32541	DC	MRM	1319/05	IDC
237.	Vennila	50/F	32924	DC	MRM	1326/05	IDC
238.	Navikithai	34/F	32598	DC	MRM	1329/05	IDC
239.	Selvakani	38/F	24282	DC	MRM	1349/05	IDC
240.	Anthony Ammal	51/F	34995	DC	MRM	1352/05	IDC
241.	Gomadevi	30/F	35045	FA	Excision	1353/05	FA
242.	Sudali	27/F	35171	FA	Excision	1359/05	FA
243.	Nagammal	53/F	34580	DC	MRM	1365/05	IDC

244.	Parameswari	19/F	37779	FA	Excision	1372/05	FA
245.	Karapagavalli	27/F	36964	FA	Excision	1424/05	FA
246.	Mariammal	19/F	36343	FA	Excision	1441/05	FA
247.	Amalapushpam	70/F	38541	DC	MRM	1459/05	IDC
248.	Selvi	25/F	36908	FA	Excision	1461/05	FA
249.	Muthulakshmi	40/F	39017	FA	Excision	1468/05	FA
250.	Lakshmi	42/F	38205	DC	MRM	1474/05	IDC
251.	Guru	18/F	39272	FA	Excision	1555/05	FA
252.	Gomathiammal	42/F	41182	FA	Excision	1558/05	FA
253.	Shanthi	42/F	42124	DC	MRM	1559/05	IDC
254.	Anandhi	55/F	44023	DC	MRM	1606/05	IDC
255.	Sarojini	64/F	43235	DC	MRM	1610/05	IDC
256.	Bhuvaneshwari	19/F	43234	FA	Excision	1627/05	FA
257.	Vasanthi	35/F	41021	FA	Excision	1643/05	FA
258.	Subbulakshmi	35/F	41027	FA	Excision	1655/05	FA
259.	Kalivardhan	24/M	41947	GM	Excision	1670/05	GM
260.	Sornakili	37/F	44610	DC	MRM	1689/05	IDC
261.	Manju	27/F	41663	DC	MRM	1692/05	IDC
262.	Antonyammal	52/F	46351	DC	MRM	1702/05	IDC
263.	Muthulakshmi	35/F	45647	FA	Excision	1713/05	FA
264.	Aruna	35/F	42863	FA	Excision	1714/05	FA
265.	Arulmari	65/F	42868	DC	MRM	1730/05	IDC
266.	Guruvammal	34/F	45878	DC	MRM	1745/05	IDC
267.	Sornalakshmi	51/F	46083	DC	MRM	1796/05	IDC
268.	Ramalakshmi	50/F	47395	DC	MRM	1766/05	IDC
269.	Sornam	37/F	44610	DC	MRM	1768/05	IDC
270.	Sokammal	55/F	43758	DC	MRM	1769/05	IDC
271.	Rani	44/F	43090	DC	MRM	1781/05	IDC
272.	Kalpana	16/F	47609	DC	MRM	1784/05	IDC
273.	Vasanthi	38/F	48320	DC	MRM	49/06	IDC
274.	Mookammal	55/F	47891	BP	SM	56/06	BP
275.	Muthumari	23/F	47933	FA	Excision	58/06	FA
276.	Kalavathy	18/F	48544	FA	Excision	60/06	FA
277.	Meenakshi	50/F	48777	DC	MRM	80/06	IDC
278.	Devamari	22/F	2064	FA	Excision	100/06	FA
279.	Mookammal	47/F	2027	DC	MRM	107/06	IDC
280.	Poonkili	19/F	2562	FA	Excision	116/06	FA
281.	Daulath	30/F	1553	FA	Excision	120/06	FA
282.	Saroja	53/F	1033	DC	MRM	151/06	IDC
283.	Rringo	24/F	1044	FA	Excision	153/06	FA
284.	Gomathy	33/F	4689	FDC	Excision	200/06	FDC
285.	Ambika	35/F	2790	FA	Excision	201/06	FA
286.	Lakshmi	42/F	4335	DC	MRM	213/06	IDC

287.	Melammal	22/F	5908	FA	Excision	236/06	FA
288.	Selvi	25/F	4992	DC	MRM	289/06	IDC
289.	Pappa	50/F	5028	DC	MRM	303/06	IDC

IDC - INFILTRATING DUCTAL CARCINOMA
FCD - FIBRO CYSTIC DISEASE
BP - BENIGN PHYLLODES TUMOR
MC - MEDULLARY CARCINOMA
FA - FIBRO ADENOMA.
GM - GYNAECOMASTIA.
MP - MALIGNANT PHYLLODES
DC - DUCTAL CARCINOMA

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