DISSERTATION

ON

COMPARATIVE STUDY BETWEEN FINE NEEDLE ASPIRATION CYTOLOGY AND HISTOPATHOLOGICAL EXAMINATION IN COMMON SURGICAL CONDITIONS.

Dissertation submitted to

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

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THANJAVUR - 613 004.

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

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CERTIFICATE

This is to certify that this dissertation entitled "**COMPARATIVE STUDY BETWEEN FINE NEEDLE ASPIRATION CYTOLOGY AND HISTO PATHOLOGICAL EXAMINATION IN COMMON SURGICAL CONDITIONS.**" is the bonafide original work of **Dr.GUNASEKARAN M** in partial fulfilment of the requirements for M.S Branch -I (General Surgery) Examination of the Tamilnadu Dr. M.G.R. Medical University to be held in APRIL - 2013. The period of study was from august - 2011 to november - 2012.

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DECLARATION

I, **Dr.GUNASEKARAN.M**, solemnly declare that the dissertation titled **"DISSERTATION ON COMPARITIVE STUDY BETWEEN FINE NEEDLE ASPIRATION CYTOLOGY AND HISTOPATHOLOGICAL EXAMINATION IN COMMON SURGICAL CONDITIONS."** is a bonafide workdone by me at Thanjavur Medical College, Thanjavur during August 2011 to November 2011 under the guidance and supervision of **Prof.Dr.V.BALAKRISHNAN, M.S.,** Professor and Head of the department,department of general surgery, Thanjavur Medical College, Thanjavur.

This dissertation is submitted to Tamilnadu Dr. M.G.R Medical University towards partial fulfilment of requirement for the award of **M.S. degree (Branch -I) in General Surgery**.

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INTRODUCTION

FNAC is the first choice for the initial investigation and diagnosis of both superficial and deep lesions though core needle biopsy is extremely valuable in selected cases.

FNAC is not only limited to neoplastic conditions, but FNAC is valuable in the diagnosis of inflammatory, infectious and degenerative conditions.

It is relatively painless and produces a speedy result. It is cost effective. Its accuracy in many situations can approach that of histopathology in providing an unequivocal diagnosis in the experienced hands. It is applicable when the lesions are easily palpable.

The risk of needle tract seeding is extremely low, when truly fine needles of twenty two gauge or less are used.

The success of FNAC depends on the representativeness, adequacy of sample and high quality of preparation.

At the community level, FNAC may be regarded as a simple screening test for serious disease, which needs further investigation and referral to a specialist

In the majority of the hospitals, it is an essential component of the final preoperative or pretreatment investigations on which the management of the problem is based.

There would be little danger in extracting a small quantity of tissue from an obscure growth by the aid of a needle, trocar or cannula.So, little substance is necessary for the microscope that the diagnosis of cancer would no longer be equivocal or vague.

HISTORICALDEVELOPMENT

At about the same time, histopathologist and cytologist began their tentative initiatives, Leyden and three years later, Menetrier employed needles to obtain cells and tissue fragments.

In the UK in 1927, Dugeon and Patrick proposed the needling of tumours as a means of rapid microscopic diagnosis

Similarly Martin and Ellis at memorial hospital in USA were also advocates of needle aspiration

In Europe, particularly Scandinavia FNAC as a technique began to flourish in the 1950s and 1960s.

Abulkasim an Arabian physician in the 10th century was credited for using the technique

The earliest microscopist like Malphiggi and Virchow looked at scrapings and fluids under microscope and described their findings.

In 1858 Rudolf Virchow published his cellular physiology, ward in 1912, used FNAC to examine lymphnode for lymphoma

Guthrie in 1921 first used lymph node aspiration on a systemic basis.

In 1957 , Gibson & smith published their report on FNAC. At the radium hemmet in Stockholm about 12000 aspirations were performed every year, 2000 cases of thyroid alone .Other centres using this

technique on a large scale are the Harzen institute of oncology in Moscow and the Curie foundation at Paris.

A current reliable view on FNAC of thyroid neoplasm has been published by Lowhagen et al 1979 and chu et al 1979.

There is a large body of world literature showing to its accuracy and advantages, although the need of interpretation , meticulous attention to the technique and the limitations of diagnosis are well documented.

Of many workers, it was Johanes Muller who set the foundation of clinical cytology. In 1938, he published on the nature and structural characteristic of the cancer and that morbid growth.

In most hospitals in UK, the aspirations are performed by the clinicians, who send slides directly to the laboratory. As the equipment needed for FNAC is minimal, it can be performed in the clinic, ward or even in the patients home. In most cases, definite answer can be given and if a cytological diagnosis of malignant cell is made, histological diagnosis prior to treatment is not required. On the other hand a report of no malignant cells seen does not exclude cancer.

AIM OF THIS DISSERTATION

1) To assess the cytological grading in fine needle aspiration cytology smears of common surgical swellings.
2) To compare the cytological grade with a histopathological grade in surgical specimens and biopsies of common surgical swellings.

The most common surgical conditions included in this study are

1. Salivary Gland Swellings
2. Lymph node Swellings
3. Thyroid Gland Swellings
4. Breast Lumps
5. Soft Tissue Swellings

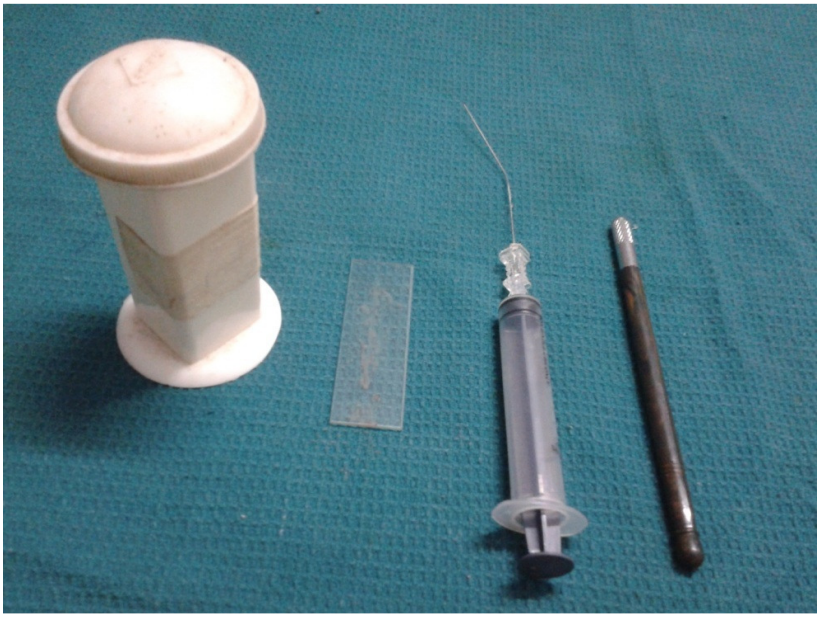
METHODOLOGY

Source of data

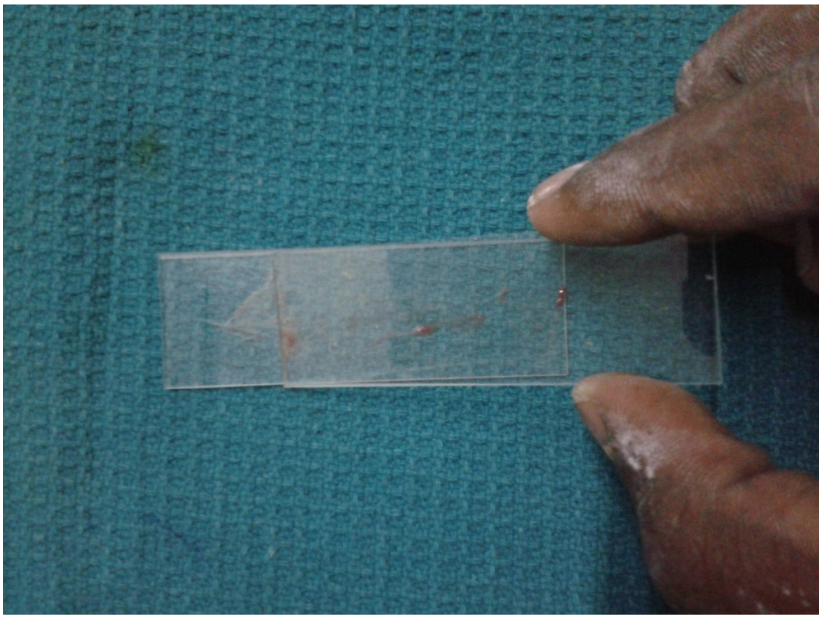
Cytologically confirmed surgical swellings cases with respective specimens received in the department of pathology, THANJAVUR MEDICAL COLLEGE AND HOSPITAL, Thanjavur was studied over a period from August 2011 to Nov 2012.

Materials

1. Disposable hypodermic needles of size 23-24 and of length between 1-1. Inches.
2. Disposable sterile 5 ml syringe .The pistol syringe holder is preferred. But here it is not used
3. Swabs with spirit or skin sterilizing solutions.
4. Several 76 X 26 mm size microscope slides are suitably labeled and numbered
5. Koplin jar for keeping the smeared slides in the fixative, the fixative being isopropyl alcohol.



FNAC apparatus



Making slide

SAMPLE TECHNIQUE

The skin is cleaned and the lump is located. It is firmly held between the thumb and the forefinger of the free hand. The syringe is held by outside of the barrel and the needle tip is pushed into the lesion vertically. The plunger is partially retracted, creating a negative pressure, without loosening the pressure or pulling the needle tip out of the skin; the whole syringe is rotated by the movement of the wrist and gently moved out. The cutting edge of the needle tip frees the cells inside the lesion, which are sucked into the fine bore of the needle.

Using continuous negative pressure by pulling firmly on the plunger of the syringe, guide the cutting tip of the needle forwards and backwards obliquely through the firmly held lump and twisting the wrist to apply a rotating as well as forward and backward action, the cells are aspirated into the lumen of the needle.

Nothing is usually visible in the body of the syringe between the bottom of the plunger and the needle head, a cyst being an obvious exception.

Now, solely release the pressure on the plunger so that there is no more suction effect. Withdraw the syringe and needle gently from the skin. It is important, releasing of the pressure is not performed before removing the needle, and air will rush up the needle and loose the specimen onto the body of the syringe.

EXPELLING THE BIOPSY MATERIAL

After the needle is withdrawn from the patient, it is removed from the syringe. The syringe filled with air and the needle is replaced firmly. Some workers using the air reservoir technique are not used here.

The syringe is held vertically with the needle tip above the surface of the microscopic slide, the plunger is pushed down and the contents of the needle are blown gently on the slide.

MAKING OF THE SMEAR

DIRECT SMEAR:

When the cells are adequate we can directly make the smear.

INDIRECT SMEAR:

When the cells are inadequate, centrifuge the aspirates and then make the smear

HAEMATOXYLIN AND EOSIN STAINING FOR FNAC OF SWELLINGS.

1. Cellular preparation is made rapidly as described above and with as minimal trauma to the cells. For fixation, the slides are immersed in 100% Isopropyl alcohol for a minimum of 30 minutes.
2. The slides are then stained with Haematoxylin and left for 10 minutes.
3. The slides are washed in tap water and differentiated in acid alcohol.
4. The slides are then left in running water till bluing.
5. The slides are stained with Eosin for 2 minutes.
6. Then the slides are washed, dried and mounted.

Two slides prepared for each case.

When aspirating the Thyroid, a vascular organ, a bloody aspirate is sometimes obtained. A technique similar to that of Karolinska Institute, Stockholm is used, the contents in the syringe are emptied rapidly on to one or 2 slides before the blood undergo clotting mechanism. There are semisolid contents on the slide, the spreader slide is turned over and the flat surface is pressed gently on to those small fragments and the slides pulled apart ending up with evenly spaced cells on both surfaces of the slide.

Methods of collection of data

The specimen of the swellings was fixed at 10% buffered formalin. Gross features were recorded. The specimens were processed and stained routinely with Hematoxylin and Eosin stain. Grading of these slides was done by the method of Nottingham modification of the Bloom Richardson method. Then the cytological grade was compared with the histological grade

Statistical analysis:

Data were analyzed by using Spearman's correlation coefficient (r value) for correlation of cytological grading with histological grading. Also statistical test was applied to determine the p value to find the association between two grading systems.

REVIEW OF LITERATURE

FNAC is not the substitute for histopathological examination. it is used in conjunction with clinical and radiological findings to provide best possible initial assessment on which management decisions can be based.

Team work careful technique and enthusiasm for fine needle aspiration cytology are essential factors while the organization of the work shold suit local conditions

BREAST LUMPS

In India breast cancer is the 2nd most common cancer among women after carcinoma cervix. The incidence of the disease has shown a steep rise in women younger than 40 years of age. FNAC of the palpable breast lumps has become increasingly popular to diagnose any neoplastic conditions. FNAC provides a sensitive and economical method to obtain cytological material for assessment. Recently FNAC has largely replaced by excision biopsy. It allows conversation with the patient regarding various management plans for the neoplastic tissue on the same visit. FNAC is used in combination with clinical examination and radiological investigations like mammography. It is called “triple test” as diagnostic triad, which is a best method of analyzing the breast lumps.

FNAC alone however is subject to faulty results and does not confirm identify breast lumps with the reliability of an excision biopsy. The aim of this study was to analyse our experience with FNAC in a group of patients with a palpable breast lump and compare the findings of FNAC with that of histopathology

Martin and Ellis, first reported the application of FNA in the diagnosis of palpable breast masses in 1930. In 1967 Zajicek et al published the fine needle aspiration experience of the Karolinska hospital group in Stockholm. Subsequently American institutions reported their experiences about FNAC of palpable breast lump. In 1984 Wanebo et al suggested FNA in place of an open surgical biopsy for the diagnosis of breast malignancy. The value of the diagnostic triad of physical examination, mammography, and FNAC as a complementary procedure to evaluate breast lump is now well documented.

In another study, this was conducted in the surgery department at federal government service hospital, Islamabad from Oct 2000 to Mar 2001, where comparative study of FNAC with open biopsy of breast masses was done over 50 patients. Of which 22 patients had malignant cytomorphological features (44%) and 28 had benign (56%). Fine needle aspiration cytology was able to detect 20 malignant lumps with sensitivity of 90.9%. All the biopsy specimens presented as malignant with

specificity of 100%. False positive results came as zero percent and false negative were 9.1percent. They finally concluded as fine needle aspiration cytology is simple, rapid, bearable, cosmetically tolerable, trustworthy and cost effective of decisive histology of breast lump. The absence of false positives confirmed its place not only as a complementary addition but also aalternate of open biopsy in the majority of the instances.

In another comparative study of FNAC and open biopsy in breast lumps conducted in Nishtar hospital, Multan, in the period of Oct 2001 to Oct 2003. In malignant disease, the sensitivity of fine needle aspiration cytology was 85.29% with 100% specificity, 100% positive outcome and 98.79% negative outcome. They concluded as, aspiration cytology had good sensitivity and very high specificity. FNAC replaced the excision biopsy in majority malignant breast tumour. Although fine needle aspiration cytology is not as much of sensitive (80%) in benign diseases it is greatly specific (100%), so it helps to bring back confidence and relieves the patients anxiety..

Detection and diagnoses of the breast lump

The role of FNAC in the diagnoses of breast disease is concerned with the examination of cells seen in the nipple discharges and those aspirated from solid and cystic lesions using a fine needle. The former is

a well established diagnostic test for carcinoma of the larger ducts, with or without Paget's disease of the nipple, presenting with a blood stained discharge, but aspiration cytology is a newer technique, which is now finding its place in the breast surgeon's diagnostic armamentarium

In recent years, the place of the rapid frozen section in the diagnosis of breast cancer has become reduced and has been replaced by increasing emphasis on preoperative diagnosis using a combination of clinical examination, mammography and biopsy, using a wide bore needle or aspiration cytology using a narrow hypodermic needle with rather than attempt to combine tissue diagnosis and mastectomy at one operation.

Biopsy of the breast lesion

Following are the methods of biopsy

1. Fine needle aspiration cytology (FNAC)

2. Tru-cut biopsy

3. Intraductal biopsy

4. Smears of nipple secretion

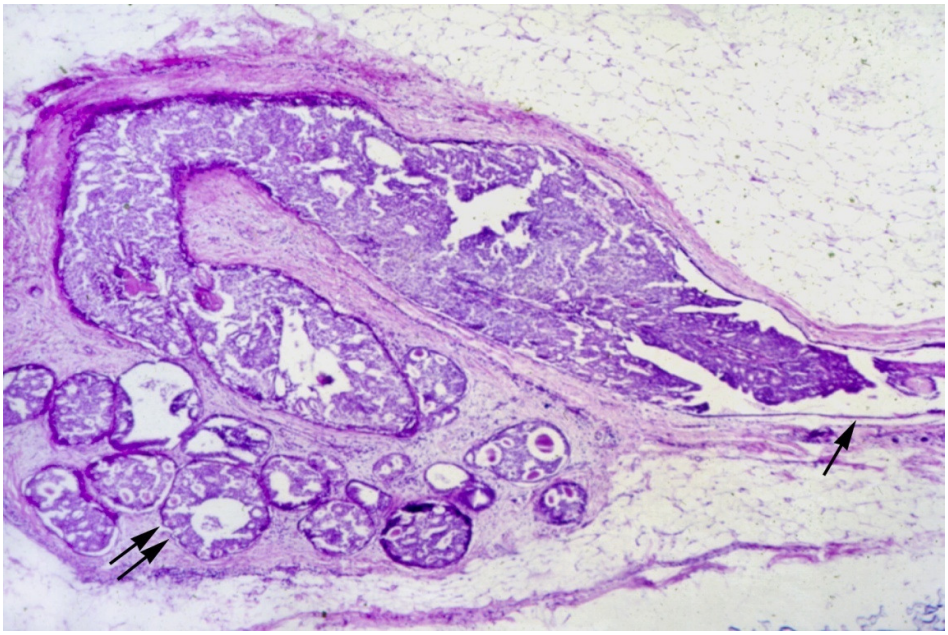
5. Incision biopsy

6. Excision biopsy

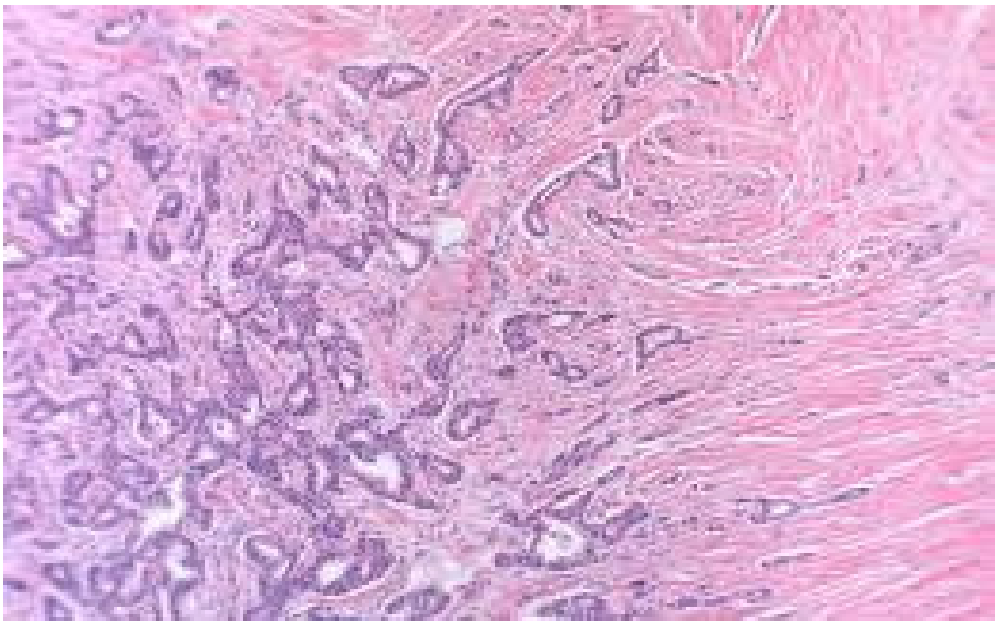
7. Biopsy of lesions of the nipple

Comparison of benign and malignant features in breast fine needle aspirates[1]

Sl. No.	Benign features	Malignant features
1.	Normal Cell Size	Increased Cell Size
2.	Good cell adhesion one to another	Loss of adhesion
3.	Uniformity of cells	Pleomorphism
4.	Rather coarse but regular nuclear chromatin.	Finer, paler nuclear chromatin often with prominent nucleoli with punctate area of pale staining with the nucleus sometimes called as "intranuclearodima"
5.	Low cellularity	High cellularity
6.	Smooth nuclear membrane	Jagged appearance of nuclear membrane.
7.	'Sentinal cells'- presence of small bare nuclei that often aggregate in pairs and clusters as well as appear singly in benign lesions (numerous in fibroadenoma).	Absence of such cells in carcinoma.



Ductal carcinoma in situ



Infiltrating carcinoma breast

Comparison of merits of surgical biopsy and aspiration cytology[8]

Sl. No.		Surgical biopsy	FNAC
1.	Diagnosis	Histopathological	Cytopathological
2.	Diagnostic Facility	Narrow	Broad
3.	Anesthetic	Yes	No
4.	Length of procedure	>5min	<5min
5.	Report available	1 to 2 days	1 to 2 hours.
6.	False positive	None	Very rare
7.	False negative	Few	Some
8.	Cost	High	Low
9.	Specimen obtained	In operating Theatre	In outpatient department
10.	Trauma	Yes	Little if any

BENIGN BREAST DISORDERS CLASSIFICATION[7]

1. ANDI

- Cyclical nodularity and mastalgia
- Cysts
- Fibroadenoma

2. Duct ectasia and periductal mastitis

3. Pregnancy related

- Galactocele
- Puerperal abscess

4. Congenital disorders

- Inverted nipple
- Supernumerary breasts
- Non breast disorders
- Tietze's disease
- Sebaceous cyst and other skin conditions

Risk of future invasive breast carcinoma [2,11]

1. No increase

- Adenosis
- Apocrine metaplasia
- Cysts small or large
- Mild hyperplasia

- Duct ectasia
- Fibroadenoma
- Fibrosis
- Mastitis, inflammatory
- Periductal mastitis
- Squamous metaplasia

2. Slightly increased (RR 1.5-2)

- Moderate or florid hyperplasia
- Duct papilloma with fibrovascular core
- Sclerosing adenosis , well developed

3. Moderately increased (RR 4-5)

- Atypical hyperplasia, ductal or lobular.

FOOTE AND STEWART CLASSIFICATION FOR INVASIVE BREAST CANCER

1. Pagets disease of the nipple
2. Invasive ductal carcinoma
    A. Adeno carcinoma with fibrosis
    B. Medullary carcinoma
    C. Mucinous carcinoma
    D. Papillary carcinoma
    E. Tubular carcinoma

3. Invasive lobular cancer

4. Rare cancer – Adenoid cystic

- Squamous cell
- Apocrine

TNM STAGING OF BREAST CANCER

Tumour

Tx - cannot be assessed

T0 - no evidence of primary

Tis - in situ cancer

T1 - Tumour < 2cm

T2 - Tumour 2-5 cm

T3 - Tumour >5 cm

T4 - any size invading skin or chest wall

Node

Nx- cannot be assessed

N0 - No regional node metastasis

N1 - mobile axillary nodes

N2 - fixed axillary nodes

N3 -Ipsilateral supraclavicular nodes

Metastasis

Mx - cannot be assessed

M0 - No distant Metastasis

M1 - Distant metastasis

LYMPH NODE SWELLINGS

Lymph nodes are the most common organs where FNAC is performed. The simple procedure of needle aspiration of lymph nodes dates back to 1904, when Greig and Gray were investigating cases of trypanosomiasis. Nearly two decades later, in 1921, Guthrie systematically performed FNAC of lymph node for diagnostic purposes. In 1930, Martin and Ellis published their experience with the technique. As a result of the pioneering work of Franzen et al (1960) and the widespread acceptance of the procedure, FNAC of lymph nodes have become a standard laboratory procedure. In 1925, manyconsultants at Memorial hospital in New York examined the use of smears from aspirated materials on a large scale. Stewart reported 2,500 cases. Since FNAC of lymph nodes has become increasingly accepted and has been described often in the literature.

William J Frable (1976) published his personal experience in doing thin needle aspiration cytology with 469 cases and inferred that the victory of the procedure depends upon cautious analysis of the tumour to be biopsied and consideration to the particulars outlined in processing the material and preparing the slides.

Friedman et al (1980), described the cytological findings of Hodgkin lymphoma in fine needle aspiration smears. Levitt et al (1985) inferred that the immunologic markers microscopic appearance of the

aspirated material were trustworthy and reliable in differentiating malignant and benign lymphomas and in decisive the B-cell or T-cell nature of the course.

George KT et al (1987) concluded that cytologic agreement was best for high grade lymphoma.

Das Dilip K et al (1990) published articles depicting scope and limitations of FNAC in the diagnosis of Hodgkin's lymphoma and its subtypes. They indicated that fine needle aspiration cytology is useful not only in the diagnosis of Hodgkin's lymphoma, but also for characterization of 3 of its major subtypes (the lymphocyte predominant, mixed cellularity and lymphocyte depletion forms)

CYTOLOGY AND HISTOPATHOLOGY OF LYMPH NODE LESIONS:

Principal lesions of lymph nodes[35]:-

As described by Koss et al 1992, cytodiagnosis of lymph node aspirates can be grouped under three major categories –

A) Benign lymphadenopathies

B) Lymphomas

C) Metastatic tumors

A) Benign lymphadenopathies :

The following patterns are described under benign lymphadenopathies:

a) Acute lymphadenitis

b) Hyperplastic lymph nodes;

- Follicular hyperplasia
- Paracortical hyperplasia
- Granulomatous lymphadenitis
- Sinusoidal expansion

Malignant lymphomas:

The technique of FNAC has been used extensively for the diagnosis of non Hodgkin's and Hodgkin's lymphoma. Over the past 50 years, several systems have been proposed to classify malignant lymphomas like: Rappaport (1966), Kiel (1967), Lukes& Collins (1974), the Working Formulation (1982). Revised European American Classification of Lymphoid Neoplasms (REAL). In 1998, anworldwide group of hematopathologists and oncologists convened by the WHO reviewed and updated the REAL classification, thus creating the WHO classification of lymphoid neoplasms. This new classification is of great importance for Cytopathology as it markedly decreases the importance of histologic architecture in the classification of NHL and places most of the

emphasis on individual cell morphology coupled with immunophenotypic and clinical characteristics of the NHL

WHO classification of lymphoid neoplasms:

B-cell neoplasms :

-Precursor B – cell lymphoblastic leukemia / lymphoma

-Mature B – cell neoplasms

- Chronic lymphocytic leukemia / Small lymphocytic lymphoma
- B-cell Prolymphocytic leukemia
- Lymphoplasmacytic lymphoma
- Waldenstroms macroglobulinemia
- Mantle cell lymphoma
- Follicular lymphoma
- Extranodal marginal B zone lymphoma (MALT lymphoma)
- Nodal marginal zone lymphoma
- Lymphomatoidgranulomatosis
- Splenic marginal zone B-cell lymphoma
- Hairy cell leukemia(HCL)
- Diffuse large B-cell lymphoma

Subtypes: mediastinal large B-cell lymphoma (thymic), intravascular large B cell lymphoma, primary effusion lymphoma

- Burkitt lymphoma/ leukemia
- Plasma cell neoplasms

--Plasmacytoma

--Plasma cell myeloma(PCM)

--Monoclonal immunoglobulin deposition diseases

--Heavy chain diseases

T cell and Natural Killercell neoplasms:

- Precursor T cell lymphoblastic leukemia / lymphoma

- Mature T cell & Natural Killer cell neoplasms :

- T cell prolymphocytic leukemia
- T cell granular lymphocytic leukemia
- Aggressive Natural Killer cell leukemia
- Extra nodal Natural Killer / T cell lymphoma, nasal type (Angiocentric lymphoma)
- Mycosis fungoides(Sezary syndrome)
- Angioimmunoblastic T cell lymphoma
- Primary cutaneous CD-30 positive T-cell
- Peripheral T cell lymphoma, unspecified
- Adult T cell leukemia / lymphoma (HTLV 1)

- Anaplastic large cell lymphoma (T & null cell types)
- Lymphoproliferative disorders

--Primary cutaneous anaplastic large cell lymphoma (C-ALCL)

--Lymphomatoid papulosis

--Borderline lesions

- Subcutaneous panniculitis like T cell lymphoma
- Enteropathy type intestinal T cell lymphoma
- Hepatosplenic v delta T cell lymphoma
- Blastic NK cell lymphoma

Hodgkin's lymphoma (HL):

-Nodular lymphocyte predominance HL

-Classic HL classified as

- Nodular sclerosis type
- Mixed cellularity type
- Lymphocyte rich type
- Lymphocyte depletion type

Table A - Primary sites of neoplasms and common sites of lymph node metastases:

Cervical group	Upper aero digestive tract Thyroid Skin of face
Supraclavicular group	GIT Head and neck carcinomas Lung breast Prostate Renal Skin Ovary
Mediastinal group	Lungs
Axillary group	Breast Skin
Pelvic group	Uterine cervix Uterine body Prostate
Inguinal group	Skin Uterine cervix Vulva / perineum Anal canal or rectum

Principles of interpretation

The basic principle behind the interpretation of fine needle aspiration cytology specimens is that the cytological sample reflects the cellular composition of the target tissue. Clinical history, method of fixation, morphology of cells and histological appearance of the area being sampled play a significant role in accurate interpretation. A good clinicopathological correlation by a healthy interdepartmental rapport improves the accuracy by FNAC. FNAC material contains samples from the lesion and not exfoliated cells. In addition to cells, a small tissue biopsy is included in net aspiration. This provides information about the structure of the lesion. FNAC fits into an intermediate sampling procedure between exfoliative cytology and surgical biopsy.

Cytopathologists should be well versed with both Cytopathology and histopathology to interpret the morphological picture of the cells studied.

Advantages and uses of FNAC

i) It is a day care procedure, which is less laborious and cost effective.

ii) No hospitalization or anesthesia is required.

iii) It is safe, less traumatic and better tolerated by patients.

iv) Rapidly instant reporting and repetitive if necessary.

v) Viral and fungal infections can be more precisely interpreted.

vi) It procures enough cellular material for various auxiliary studies like DNA analysis, molecular study and IHC studies.

vii) Useful in further management and diagnosis of particularly soft tissue masses.

viii) Confirmatory in certain disseminating cancers and metastatic deposits.

ix) Diagnostic in superficial swellings, hence avoiding open biopsy.

x) Better assessment of response to treatment and detection of recurrence.

Complications

Complications from FNAC is more of theoretical value rather than a reality

Classification of cervical lymphadenopathy[34]

1. Inflammatory - Reactive hyperplasia
2. Infective;

Viral	-	Infectious mononucleosis, HIV
Bacterial	-	Streptococcus, Staphylococcus
	-	Actinomycosis
	-	TB
	-	Brucellosis
Protozoan	-	Toxoplasmosis

3.Neoplastic

Malignant

- Primary – Lymphoma
- Secondary – SCC,melanoma
- Known primary
- Occult primary

THYROID SWELLINGS

The development of important scientific contribution in medicine requires both the elixir of time and synthesis of a number of observations. There are additional social and economic considerations that influence the ultimate acceptance of the medical facts and development of medical procedures. The history of aspiration biopsy was influenced by such factors. The roots of fine needle aspiration cytology can be traced to Scandinavian countries.

The British Medical Journal "Lancet" reported the first use of aspiration in 1833 when, liver mass aspiration was performed. It is done at St. Bartholomew's Hospital situated in London by Edward Stanley. The diagnosis of the liver mass was hydatid cyst not a tumour.

The first report of the needle biopsy can be traced to the literature way back in 1847, where Kun has cited the description of the procedure as follows "on plunging into the tumors with needle has a small depression with cutting edges, and can remove a small amount of tissue and a microscopic examination can be practiced" In the late 1920's, through the efforts of Martin- a clinician, Stewart and Ewing - pathologists, the practice of the fine needle aspiration of the palpable lumps and tumors situated in deeper regions began at "Memorial Hospital" in New York. In all cases, an attempt was made to procure

adequate amounts of material, not only for cytological smears but also for the preparation of the cell block and histological sections. A standard 18G needle was used and local anesthesia was administered. They reported 65 cases with 80 percent accuracy rate and stressed on convenience and rapid diagnosis. The same authors published a total series of 1,400 cases in 1934[24].

In 1988, a new technique - non-aspiration fine needle cytology pioneered in France was applied to study the nodular thyroid disease by Santor JEC and Leiman G. This technique referred to as “capillary suction technique and cytopuncture” by French authors employ insertion of the fine needle syringe and eliminate active aspiration which is replaced by the principle of capillary suction of fluid or semisolid material into the thin channel of the needle.

Frable WJ (1989) found small needles (25G) to be useful in FNAC of the thyroid nodules. He preferred plain slides for air dried smears, because the cells will not give good smears on the surface of the ice-covered slides. frozen slides retained more amount of cells if the material contains blood, water or fat. He described the features which are well depicted in MGG and Papanicolaou stains. Colloid, fire flares and amyloid are well depicted in MGG stain and oncocytes, psammoma

bodies and nuclear characters are well depicted in Papanicolaou stain.[26,27]

In 1998 Nagasimha T et al suggested morphometry to evaluate lesions arising from thyroid follicle. In this study circular rate was higher in adenoma group .circular rate was low in follicular carcinoma and adenomas. The group with follicular carcinoma group had a higher LS ratio than adenomatous goiter groups.

EMBRYOLOGY

The thyroid is the first endocrine gland to appear in the embryo and can be recognized as early as 24 days of gestation. The development of the thyroid gland commences as a median endodermal down growth from the primitive pharynx between the first and the second pharyngeal pouch. This median anlage forms a hollow diverticulum which descends into the anterior neck maintaining its connection with the tongue by a narrow tube, the thyroglossal duct. The tip of the tubular duct bifurcates and subsequently the whole mass divide into a series of double cellular plates from which the isthmus and the lateral lobes of the gland are developed, reaching its final position anterior to the trachea at about 7 weeks of gestation. The thyroglossal duct usually disappears at this stage. But the remnants of the duct may persist at any level along its course and may later develop ectopic thyroid tissue and a median cyst.

The original opening of the thyroglossal duct is represented by a vestigial pit “the foramen ceacum” of the tongue. The ultimobranchial body derived from the fourth and fifth pharyngeal complex fuses with the median thyroid anlage and becomes part of the thyroid, contributing to the lateral lobes. The C cell progenitors are derived from the neural crest. These cells move around to the ultimobranchial bodies prior to develop as thyroid gland.

By the 14th week, the gland consists of well developed follicles lined by follicular cells and contains thyroglobulin positive colloid in the lumen. True developmental anomalies of the thyroid are related to the migration of its median anlage.

ANATOMY

The thyroid gland has two lobes. It is an endocrine organ situated in the middle of the neck region, larynx and trachea anteriorly and weighs approximately 20- 25 g in adult. The lobes are connected by the isthmus which is a band of variable size, lying close to the ventral aspect of the trachea covering the 2nd, 3rd and 4th tracheal rings. Each lobe is about 5 cms in length and extends from the oblique line of the thyroid cartilage to the 6th tracheal ring. It is invested by the pretracheal fascia which is firmly attached posteriorly to the 2nd to 4th tracheal rings.

The superior and inferior thyroid arteries originating from the external carotid arteries and the thyrocervical trunk respectively provide the blood supply. The superior and middle thyroid veins collect the blood from the thyroid gland and transport it into the EJV. The inferior thyroid vein drains into the brachiocephalic vein.

The thyroid is rich supply with lymphatic vessels. These vessels connect both the lobes through the isthmus. Lymph from the upper part of the gland reaches the upper deep cervical lymph nodes either directly or through the prelaryngeal nodes, from the lower part to the lower deep cervical nodes directly and also through pretracheal and paratracheal nodes. Lymphatic form a plexus through which it may pass in any direction and also drain to retropharyngeal and retroesophageal lymph nodes along the recurrent laryngeal nerve chain.

PHYSIOLOGY

The thyroid gland functions primarily to produce the thyroid hormone for normal development of the brain and to regulate the intermediate metabolism of carbohydrates and proteins and the consumption of oxygen. Steps in the biosynthesis of thyroid hormones include the ingestion of iodine present in water and food, the concentration of iodide within the gland and the organification of iodide to iodine by iodide peroxidase and then iodine binds to tyrosine to form monoiodo and diiodotyrosine. The iodotyrosine residues are condensed to form the biologically active thyroid hormone T4 and T3. These are stored as thyroglobulin and are the main constituent of colloid. When the gland is stimulated to release thyroid hormones, the endocytosis of colloid and proteolysis of thyroglobulin by lysosomal enzymes occur and T3 and T4 diffuse into the blood stream.

Thyroid hormone synthesis is regulated by TSH and TRH secretion. Calcitonin is a 32 amino acid peptide that is released from the thyroid when the plasma calcium levels are increased. The activity of the thyroid gland and its constituent hormones can be determined in the laboratory and the gland morphology can be studied by the radioisotope scan and ultrasonography.

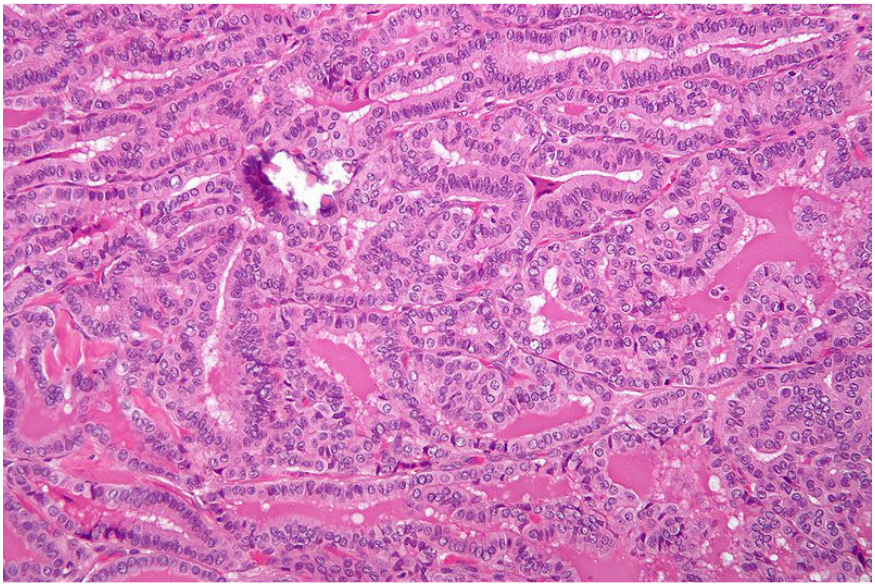
CYTOLOGY

The cytological interpretation depends on the combined evaluation of cellularity, low power architectural pattern of the tissue fragments, high power cytological feature and background characteristics.

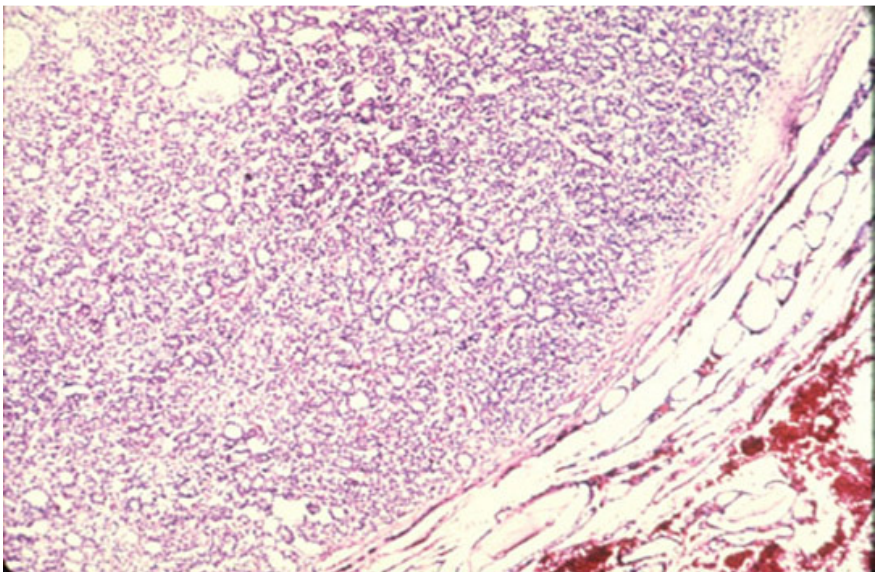
The accuracy of the diagnosis depends on the experience of the individual performing the test and interpreting the findings. By using the well-documented cytologic criteria, most diagnostic entities can be readily identified from cytology samples. Diagnostic errors were most commonly due to inadequate specimens and cystic lesions. Normal thyroid aspiration shows colloid and thyroid follicular cells[20].

Follicular cells

Follicular cells are dispersed or in small clusters. Follicular epithelial cells are fragile, the cytoplasm of the cells which is disrupted appear as empty nuclei. Bare nuclei are usually of similar size and the appearance similar to a normal lymphocyte. The cells are small with regular oval nuclei. The nuclear chromatin is finely granular and evenly dispersed or compact. The follicular cells has deep blue intracytoplasmic "paravacuolar granules". The normal follicle may be seen in a cross section or Enface or in its entirety as a three dimensional structure. The follicle is comprised of cuboidal cells with regularly spaced small nuclei - 7 to 9 μm in diameter with appreciable pale cytoplasm arranged around a lumen with or without



papillary carcinoma thyroid



follicular adenoma

colloid. The cell borders may or may not be well defined. When aspirated in a sheet, the nuclei looks like honeycomb pattern. Occasionally whole follicle may appear as a pseudogiant cell.

C Cells

C cells resemble medullary carcinoma cells but are difficult to find in thyroid smear without resorting to immunostaining for calcitonin.

Colloid

Colloid from the normal thyroid is not ordinarily observed. Colloid has different staining qualities depending on the method of fixation and type of stain. In air dried Romanowsky stained preparation, colloid stains deep magenta. In pap smears the colloid stains from pale green to orange pink often with cracking artifact and clumping. Colloid stain pink in alcohol fixed H & E stain. Colloid may be washed off the slide during processing but parched earth or crazy pavement artifact may remain on the slide to sign the presence of colloid. Thicker colloid presents as dense clumps and globules.

Extraneous cells can be obtained by the passage of the needle through strap muscles of the neck or sternocleidomastoid muscle. Puncture of the trachea yields respiratory epithelial cells, mucous and occasionally fragments of cartilage.

Adipose tissue is not usually obtained except in the very obese although there are other possibilities like lipoma of the neck, thyrolipoma and adipose metaplasia in a nodular goiter.

There is no contraindication to the needle aspiration of the thyroid swellings

Complications

1 The major complication is the hemorrhage and hematoma formation. This occurs mainly in patients with large goiter or in malignancy. This may cause discomfort but dissipates spontaneously.

2 Accidental carotid artery puncture requires to occlude the puncture site for five minutes.

3 Temporary laryngeal nerve paresis.

4 Puncture of trachea. This can cause a coughing spasm and small amounts of blood may be coughed up but recovery occurs within a few minutes.

5 Hemorrhage, necrosis or infarction caused by FNAC may occasionally obscure the histological pattern of the thyroid neoplasms.

6 Occasionally implantation in the needle track following FNB has been reported.

7 To prevent from these complications ,USG guided FNAC is very useful and sensitive tool to diagnose thyroid lesions

Principle lesions of the thyroid gland that may be identified in aspiration cytology are as follows (Koss GL)

1. Cysts
2. Colloid goiter (adenomatous / diffuse / nodular)
3. Thyroiditis – acute, subacute, lymphocytic / autoimmune
4. Adenoma
5. Carcinoma
    - i. Papillary carcinoma and its variants
    - ii. Follicular neoplasm
    - iii. Medullary carcinoma
    - iv. Anaplastic carcinoma
        - a. Large cell
        - b. Small cell
6. Malignant lymphomas
7. Metastatic tumors

CLASSIFICATION OF THYROID SWELLINGS[30]:

1. Simple goiter (Euthyroid)
2. Diffuse hyperplastic
3. Physiological
4. Pubertal
5. Pregnancy
6. Multi nodular goiter
7. Toxic
   - Diffuse-Grave's
   - Multinodular
   - Toxic Adenoma
8. NEOPLASTIC
   - Benign
   - Malignant
9. Inflammatory:
   - Autoimmune-Chronic lymphocytic thyroiditis ,Hashimotos's thyroiditis
   - Granulomatous -De Quervain's thyroiditis
   - Fibrosing -Ridel's thyroiditis
   - Infective -Acute (bacterial, viral, subacute)
   - Chronic (TB, syphilitic)
   - Others- Amyloid.

CLASSIFICATION OF HYPOTHYROIDISM[23]

Autoimmune thyroiditis (chronic lymphocytic)

Non goitrous - Primary myxeodema

Goitrous - Hashimoto's

Iatrogenic

- After thyroidectomy
- After radioiodine therapy
- Drug induce (anti-thyroid, PAS & Iodines in excess)

Dyshormonogenesis

Goitrogens

Secondary to primary or hypothalamic disease

Thyroid agenesis

Endemic Cretinism

CLASSIFICATION OF THYROID NEOPLASMS[32]:

1. BENIGN

- Follicular Adenoma

2. Malignant

i) **Primary**

- **Follicular epithelium**
  - Differentiated - Follicular
    - Papillary
  - Undifferentiated - Anaplastic
- Para follicular cells
  - Medullary
- Lymphoid cells
  - Lymphoma

ii) Secondary

iii) Metastatic

iv) Local infiltration

TNM staging of thyroid cancer

Tx - primary tumour cannot be assessed

T0 - no evidence of primary

T1 - limited to thyroid < 1cm

T2 - limited to thyroid > 4cm

T3 - limited to thyroid > 4cm

T4 - extending beyond the capsule, any size

NODES

Nx - cannot be assessed

N0 - no regional nodal metastasis

N1 - regional nodal metastasis

METASTASIS

Mx - cannot be assessed

M1 - metastasis present

CLASSIFICATION OF THY GRADING[31]

- Thy1- Non Diagnostic
- Thy2 - Nonneoplastic
- Thy3 - Follicular
- Thy4 - Suspicious Of Malignancy
- Thy5 - Malignant

SOFT TISSUE TUMOURS

Despite 2000 years of history of European medicine the first comparative description of sarcomas, called “encephaloid tumors” and carcinomas, called “scirrhous tumors” was done by Samuel Gross in 1866. This classification was modified by James Ewing, pathologist at MemorialHospital for Cancer and Allied disease in New York in 1919. Ewing’s classification system served as the basis for our present classification of sarcomas.

Despite Carrel’s 1926 warning that “connective tissue cells must be defined not only by their morphology but also by their physiological properties”, mesenchymal cells and mesenchymal tumors have rarely been studied from any other point of view other than pure morphology.

In 1976, Hajdu and Hajdu published the book known as Cytopathology of Sarcomas and other Nonepithelial Malignant tumors, which provided cytologic description of a large number of sarcomas.

In 1986, Miralles et al reviewed 117 cases of soft tissue lesions, which included twenty three non-neoplastic lesions, 34 benign mesenchymal tumors and sixty histologically confirmed soft tissue sarcomas. The soft tissue sarcomas were classified according to their cytomorphology into five groups, based on histological diagnosis. These are 1.low grade sarcomas, 2.myxoidtumours, 3.monomorphictumours, 4.round-celltumours and 5.pleomorphic sarcomas. Difficulties were

experienced in the correct assessment of aspirates from low grade malignancies but in high grade malignant sarcoma, Fine needle aspiration cytology was useful for both the initial diagnosis of a new lesion and in confirmation or elimination of a suspected treatment failure. He, however, concluded that the cytologic diagnosis on a FNA was not a substitute for the histological diagnosis on a tissue section and hence the final diagnosis of soft tissue sarcoma should be based upon the histological study.

In 1992, Ricardo Gonzalez-Campora et al reviewed ninety eight cases of FNAC of soft tissue tumors with histological confirmation. They proposed a working morphological classification based on the most prominent cytological features and identified. They believed that this classification allows recognition of the most common soft tissue tumors while helping with the differential diagnosis of other neoplasia, primary or secondary, with similar morphology and presentation.

In 2000, AnirbanMaitra et al studied 72 cases using fine needle aspiration cytology as a primary diagnostic modality for primary mesenchymal lesions.. Based on their study, FNAC gave excellent accuracy of 88%, sensitivity of 89% and specificity of 87% for classification. Their true positive cases were 24 / 72, true negative 39 / 72, false positive 6 / 72 and false negative 3 / 72. the most common diagnostic category were Spindle cell lesions .in these tumor entities,

granular cell tumor had the best cytohistological association with 100% correct identification on FNAB.

TUMORS OF ADIPOSE TISSUE

The first reference to adipose tissue tumors is in the Papyrus Ebers. It was written in 1552 B.C. The largest adipose tissue tumor was reported and illustrated in the Cleveland Medical Gazette in 1859. According to historians, Delameter travelled from Cleveland to Ohio and excised a 268 pound tumor from a patient. The cell of origin of the fat cell was unknown. Ewing, in a lecture in 1935, said that "steatoblasts and lipoblasts are derived from the adventitial layers of blood vessels".

In 2002, KusumKapila et al analysed the cytology and histological features of benign and malignant tumours involving adipose tissue on FNA in 90 cases. They tried to determine if the variants of liposarcoma could be identified since only few reports were available describing the cytomorphology of lipomatous tumors.

In the benign category the age between 12 and 18 years with a male : female ratio of 2:1, while in malignant lipomatous tumors, age varied from 12 to 77 years with a M;F ratio of 1.7:1. The diagnosis of a lipoma on FNAC could be made in conjunction with the clinical setting of a soft, subcutaneous lump with slipping margins on palpation. The aspirator's opinion was important. The consistent cytomorphological features observed on FNAC were adipose tissue lobulation (73%) and

thin capillaries traversing the lobules of adipocytes (92%), with few being thick walled (65%). The diagnostic terms, atypical lipoma and atypical lipomatous tumors were used for liposarcoma and consisted of tumors at particular sites, such as deep seated tumors in the extremity. These tumors had a good prognosis. Well differentiated liposarcoma, posed a problem and only 4 to 8 histologically documented cases could be diagnosed by FNAC. The finding of an unequivocal lipoblast (univacuolated or multivacuolated) with scalloped nuclei was mandatory for the diagnosis. They concluded that FNAC could be a valuable diagnostic method in the preoperative conclusion of benign and malignant lipomatous tumors with further categorization of liposarcomas being possible, but not very reliable.

In 1997, Stanislaw Woyke et al described atypical lipoma as a potential drawback in the cytological and histological diagnosis of subcutaneous tumors. Well-differentiated liposarcomas occurring in the subcutis behaved as benign neoplasms with an exceptionally rare tendency for differentiation, hence were termed, “Atypical lipoma” in 1975. FNA of these subcutaneous tumors showed mature adipose tissue and small dispersed, hyperchromatic, often lobulated and bizarre nuclei that were usually stripped of cytoplasm. Only occasionally, was a wisp of pale, poorly preserved, vacuolated cytoplasm present. They concluded that before a cytodiagnosis of atypical lipoma is suggested, confirmation

by ultrasonography of the confinement of the tumor to subcutis was important, that in cytology reports the term lymphoma with atypical cells should be used for all these entities and that the final categorization should be left to histology.

In 2001, Lourdes R. Ylagan and SanjeevBhalla described the dedifferentiation features of a well-differentiated liposarcoma of retroperitoneum and were the first to do so. Dedifferentiation meant a histologically changed into low grade to high grade. This event occurs inretroperitoneal tumors and who is taking treatment. The features of dedifferentiation could be towards any mesenchymal element present. In their study, using immunohistochemistry, they found the dedifferentiated components as fibrohistiocytic and leiomyosarcomatous. They concluded that the radiologic features of a neoplastic process could be very helpful in decisive the nature of the events.

TUMORS OF SMOOTH MUSCLE

In 1981, Ingvar Dahl et al made the first effort to correlate the cytology and histological features ofleiomyosarcoma of soft tissue with cytological and histological study of 11 cases. The leiomyosarcomas were identified morphologically by stretched out tumor cells arranged in bundles, criscrossing each other at wide angles. The nuclei were lengthened and often dull ended, aligned in position or in rows.Leiomyosarcoma smears were poor in malignant cells. Cells are

arranged in groups or singles. The characteristic dull ended nuclei, which were aligned in rows and in parallels, were identified. Nuclear atypia, although not very pronounced, permitted the diagnosis of malignancy.

TUMORS OF SKELETAL MUSCLE

In 1956, Riopelle and Theriaultanalysed a series of patients with “round-cell sarcoma”, identified by peculiar pseudo-alveolar pattern and rhabdomyoblastic delineation. They selected the name ‘alveolar rhabdomyosarcoma’.

In 1962, Patton and Horn used imprint cytology to study three cases of alveolar rhabdomyosarcoma and invented an undifferentiated representation.but did not mention on cellular details.

In 2000, Henryk A. Domanski and Sigmund Dawiskiba reported two cases of adult rhabdomyomas by fine needle aspiration. The smears showed poorly cohesive cell clusters, single polygonal cells or syncytial cell groups with abundant granular, dense cytoplasm and distinctive cytoplasmic borders. The nuclei were round, small, uniform, usually located peripherally, with a regular chromatin pattern and frequent small nucleoli. Faint striations could be seen in the cytoplasm in some syncytial cell clusters. The background of the smears was bloody.

TUMORS OF PERIPHERAL NERVES

Ancient neurilemmomas were described by Ackerman and Taylor in 1951. It is a cellular form of neurilemoma showing nuclear polymorphism and hyperchromasia.

In 1984, Ingvar Dahl et al presented a correlative cytomorphological study of 28 cases of solitary neurilemomas. In the smears, the Antoni type A area was mentioned by fragments of tissues with a fibrillary ground material, spindle shaped cells forming Verocay bodies. The Antoni type B area was represented by wobbly microcystic materials with cells having lengthened nuclei, its look like fish-hooks, containing vague, slight, cytoplasmic processes. The ancient neurilemomas, a variant, were characterized both cytomorphologically by hyperchromatic nuclei and polymorphism.

In 1999, Jose A. Jimenez–Heffernan et al reviewed 10 patients with malignant peripheral nerve sheath tumor (MPNST). Aspirates were divided into two groups, spindle and epithelioid. No morphological features were specific to MPNST. The only feature suggestive of nerve sheath differentiation is by presence of elongated, slender, often wavy nuclei and less commonly a delicate fibrillary metachromatic stroma. According to their study, the cellularity of the smears and the cellular dissociation along with clinicoradiologic information including the tumor location and size were of critical importance.

In 1999, Scheithauer et al differentiated neurothekeoma (NT) and nerve sheath myxoma (NSM) on the basis of histopathology, immunohistochemical and ultra structural findings. They consider NSM a multilobulated spindle cell neoplasm, predominantly myxoid, showing Schwann cell differentiation, while the term neurothekeoma was used for less myxoid and more cellular lesions with numerous epithelioid cells and lacking this phenotype.

In 2003, Agustin VailloVinagre et al were the first to describe the cytologic features of neurothekeoma. The smears show increased amount of metachromatic, myxoidmatrix ,fusiform and epithelioid cells. these are binucleated or multinucleated, arranged loosely or in cluster and sometimes forming thick whorls. They concluded that the fusiform and epithelioid cells set in thick whorls in a myxoid lesions were the distinctive characteristics of this neoplasm which correlated well with histology.

FIBROHISTIOCYTIC TUMORS

In 1967, Stout and Lattes first introduced the term, “Malignant fibrous histiocytoma”. Various terms had been used for this neoplasm because of its uncertain histogenesis and morphological variations.

Walaas et al, in 1986, in the largest series of study on malignant fibrous histiocytomas (MFH), described the cytologic features in 40

cases. This description included 2 main tumor types, one is atypical fibroblast like cells which is mononucleated or multinucleated, another one is large polymorphic histocyte like cells, with the later showing phagocytosis.

TUMORS OF BLOOD AND LYMPH VESSELS

In 1872, Moritz Kaposi, a Hungarian physician working in Vienna, gave the first account of angiosarcoma, which was later named after him.

In 1943, A.P. Stout adopted the term hemangioendothelioma and employed the reticulin stain to give the classic description of the tumor.

In 1999, Katharine Liu and Lester J. Layfield studied 11 aspirates of angiosarcoma. The aspirates were hypocellular. They proposed that when rare, single round, oval or spindle pleomorphic cells with unusual nuclei and pale, blue-gray, empty cytoplasm are identified in the environment of abundant blood and scattered inflammatory cells, the possibility of angiosarcoma should be raised. They stressed that the identification of intracellular hemosiderin deposits in these pleomorphic cells renders a definitive diagnosis of angiosarcoma. Furthermore, they concluded that it may be not possible to differentiate angiosarcoma from changes occur due to radiation.

In 1990, Kim R. Geisinger et al described the FNA feature of four cases of hemangiopericytomas (HPC). The aspirates were cellular and consisted of uninuclear tumor cells with high nuclear cytoplasmic ratio. The cytomorphological spectrum included nuclei that were oval to elongate and had very finely granular, evenly distributed chromatin with one or two small distinct nucleoli. High mitotic activity was noted in all. They analyzed that a diagnosis of hemangiopericytoma on FNA was unlikely. Cytomorphological evaluation may however allow diagnosis of recurrent or metastatic hemangiopericytoma.

In 1999, David Chhieng et al reported 5 cases of hemangiopericytoma (HPC). They described that hemangiopericytomas appear as spindle cell appearance in cytologic preparations hence must be differentiated from spindle cell lesions. branched capillaries and abundant basement membrane in histological smears rules out diagnosis of hemangiopericytoma. They postulated that IHC and electron microscopy shown on fine needle aspiration samples may be useful in differential diagnosis. They conclude that fine needle aspiration is useful and accurate to confirm frequent or metastatic hemangiopericytomas, however, the forecast of the biologic performance of hemangiopericytoma based on cytologic features is not feasible.

TUMORS OF METAPLASTIC MESENCHYME

In 1953, Stout and Verner first established the entity of extraskeletalchondrosarcoma. They concluded, that since the distribution of benign cartilaginous tumors and extra skeletal chondrosarcomas differ, it is probable that the latter arise de novo, rather than from preexisting chondromas.

In 2002, Lakshmi Rao et al presented a case of extraskeletal myxoid chondrosarcoma affecting chest wall concealed as a lump arising from breast. On aspiration cytology the diagnosis was rendered as mucinous carcinoma or mixed tumor of the breast, but on frozen section, a conclusion of extraskeletal myxoid chondrosarcoma was made. They conclude, that when polygonal cells are seen in a myxoid / mucoidenvironment, the possibility of extraskeletal myxoid chondrosarcoma should be considered.

TUMORS OF SYNOVIAL TISSUE

In 1993, Seena C. Aisner et al quoted2 cases of synovial sarcoma. The first was in 15 year old female with aspiration cytology revealing numerous clusters of spindle cells admixed with small groups of epithelial cells. Cytokeratin and vimentin stains were positive in the epithelial and spindle components, respectively. Second, a 53 year old male presented with a recurrent synovial sarcoma with aspiration cytology revealing only neoplastic spindle cells. Cytokeratin and

vimentin preparations showed focal positivity. They concluded that FNA cytology could be useful in diagnosing both primary and recurrent synovial sarcomas of soft tissues with immunocytochemistry aiding in differentiating it from other malignant soft tissue tumors.

TUMORS OF UNCERTAIN CELL TYPE

In 2005, Paul E. Wakely et al studied 39 cases of myxoma /or juxta articularmyxoid lesion or ganglion (MJG) by reviewing all FNAB specimens. They concluded that FNA cytology diagnosis of MJG lesions can be highly accurate in distinguishing benign from malignant entity and also in subtyping them into 3 distinct categories of ganglion, juxtra-articular myxoid lesion or intramuscular myxoma, when clinical and radiologic data was considered along with the cytopathologic features. Thus FNA biopsy deferred surgery unless clinical symptoms warranted surgical Intervention.

Predisposing factors for sarcoma

- Neurofibromatosis
- Li-Fraumani syndrome
- Retinoblastoma
- Gardners syndrome

Radiation exposure

- Ortho and mega voltage therapeutic radiation

Lymphedema

- Post surgical
- Post irradiation
- Parasitic infection (Filariasis)

Trauma

- Post parturition
- Extremity

Chemical

- 2,3,7,8 – Tetrachlorobenzodioxin
- Polyvinyl chloride
- Hemochromatosis
- Arsenic

AJCC STAGING

Primary tumour

T1 - Tumour< 5 cm

T1a - Superficial

T1b - Deep

T2 - tumour> 5 cm

T2a - superficial

T2b – deep

Regional lymph nodes

N0 - No regional nodal metastasis

N1 - Regional nodal metastasis

Distant metastasis

M0 - No distant metastasis

M1 - distant metastasis

Histological grade

G1 - Well differentiated

G2 - Moderately differentiated

G3 - Poorly differentiated

G4 - Undifferentiated

SALIVARY GLAND SWELLINGS

The salivary glands are not subjected to incisional or core needle biopsy because of the risk of fistula and in neoplasm for fear of tumor implant

More than 50% swellings are non neoplastic

ACCURACY

From the Karolinskastudy , FNAC accuracy for salivary gland neoplasms are more than 90%

More than 90% of pleomorphic adenoma and most malignant tumours are diagnosed correctly

In a review in 1994, sensitivity was 81-100%, specificity was 94-100% and accuracy of typing was between 61-80%

The heterogeneous structure of many salivary gland tumors inevitably limits the accuracy of FNB due to the small size and selective character of the sample

Diagnosis of pleomorphic adenoma and warthins tumour are easy

False negative results are related to cystic tumours, warthins tumour, mucoepidermoidcarcinoma,acinic cell carcinoma etc.

False positive results are related to regenerative epithelial hyperplasia and squamous metaplasia in sialadinitis or warthinstumour.

Hyaline globules in monomorphic adenoma are misdiagnosed as adenoid cystic carcinoma

The distinction between primary and metastatic carcinoma is difficult in poorly differentiated carcinoma

DISORDERS OF SALIVARY GLANDS

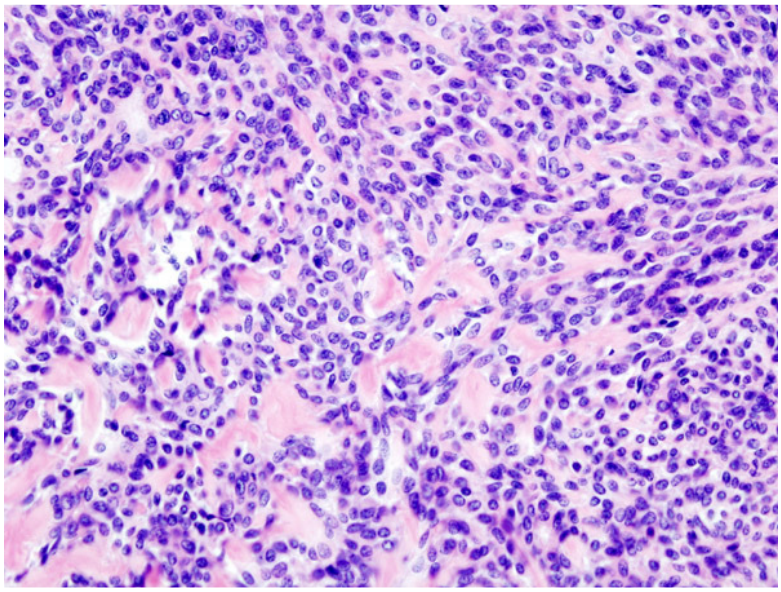
These are four main salivary glands and multiple minor salivary glands.

PAROTID TUMOURS[36]:

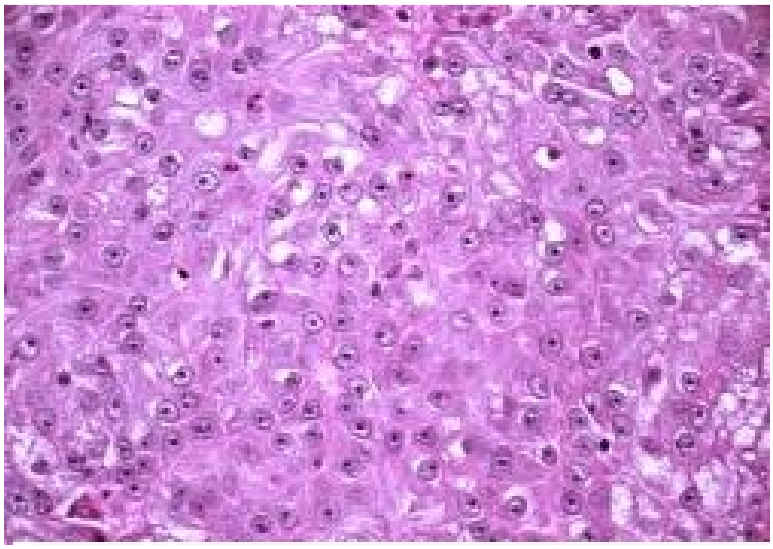
- Most common is pleomorphic adenoma (80-89%)
- Low grade malignant tumours cannot be distinguished from benign neoplasms
- High grade tumors grow rapidly are usually painful and often have lymph node involvement at presentation
- CT and MRI are useful
- Open biopsy is avoided, so FNAC is the preferred investigation
- Tumors should be excised, enucleated

CLASSIFICATION[36]

TYPE	SUBGROUP	EXAMPLES
1. Adenoma	Pleomorphic Monomorphic	Pleomorphic adenoma Warthinstumour
2. Carcinoma	Low grade	Acinic cell carcinoma Adenoid cystic carcinoma Low grade mucoepidermoid Carcinoma
	High grade	Adenocarcinoma Squamous cell carcinoma High grade mucoepidermoid carcinoma
3. Non epithelial tumors		Hemangioma Lymphangioma
4. Lymphomas	Primary	Non Hodgkins
	Secondary	Lymphoma in Sjogren Syndrome
5. Secondary tumors	Local Distant	Head and neck tumours Skin and bronchus
6. Unclassified		
7. Tumor like lesions	Solid	Adeomatoid hyperplasia Benign lymphoepithelial Lesion
	Cystic	Salivary gland cysts



Pleomorphic Adenoma



Mucoepidermoid carcinoma

TNM STAGING[30]
Tumour:

Tx- Primary tumour cannot be accessed

T0-no evidence of primary tumour

Tis-Carcinoma insitu

T1-Tumours 2 cms or less without extraparenchymal extension.

T2-Tumours 2cm-4cm without extra parenchymal extension.

T3-Tumours having extraparenchymal extension without seventh nerve involvement and /or 4cm-6cm in greatest dimension

T4-Tumours invade the base of skull, 7^{th} nerve and/or >6cm.

Node:

Nx-Regional nodes cannot be assessed.

N0-No regional node metastatic.

N1-single ipsilateral node 3cm or less size

N2- N2a-single ipsilateral 3-6cms size

N2b-multiple ipsilateral node no more than 6cm size.

N2c-Bilateral or contralateral lymph node no more than 6cm size

N3-metastasis in lymph node >6cm size

METASTASIS:

Mx- Metastasis cannot be assessed

M0- No distant metastatis

M1- Distant metastasis.

OBSERVATION AND RESULTS

This study was conducted in 200 patients who presented to THANJAVUR MEDICAL COLLEGE AND HOSPITAL with various types of swellings. Out of these 200 patients, 40 were males and 160 were females. As there was more number of breast and thyroid swellings in the study, females outnumbered than males.

The commonest causes of the breast lumps, presented here were, fibroadenoma in case of benign swellings and Infiltrating ductal carcinoma among malignant varieties. In both the conditions FNAC & histopathological procedures done. The reports are found to be same in both procedures in most of the cases which is statistically evident. This is confirmed by using two way proportion Z test, the P values are calculated. So FNAC is useful in diagnosing these two diseases.

In fibroadenosis, FNAC reports are not conclusive needing further HPE for confirmatory diagnosis. There is no statistical correlation between the two reports calculated for fibroadenosis proving that HPE is needed to diagnose this swelling. However Phyllodes tumour could be diagnosed with FNAC alone.

Among the thyroid tumours for multinodular goiter and Papillary carcinoma of thyroid FNAC is conclusive which is statistically proved, so FNAC has more conclusive in diagnosing these thyroid diseases compared to histopathological examination.

In cases of follicular neoplasms, malignant features are diagnosed by histopathologically.

In adenomatous goiter P value is found to be significant so FNAC procedure is not much useful. So further HPE needed to confirm the diagnosis.

In TB adenitis & in metastatic lymph node by using Two way proportion Z test P value for each condition was calculated and was found to be insignificant. So FNAC is the useful procedure in confirming these diseases.

In cases of the primary tumours of lymph nodes where FNAC Procedures was done , the reports came as lymphoproliferative disorders. So Histopathological procedure is the ideal one in both confirmation and classification of these tumours and the above is statistically proven.

In Reactive lymph adenitis P values are calculated and it was found to be Insignificant, so FNAC is the diagnostic procedure in this lymph node disorders Compared to histopathological examination

In partotid gland tumours both benign & malignant tumour Conditions are subjected to histopathological examination & FNAC procedures. The FNAC results are same as that of HPE reports which is Statistically proved, so FNAC is conclusive in making the diagnosis

Obviating further HPE.

In soft tissue tumours, FNAC was no difference with that of HPE in diagnosing Mesenchymal neoplasms was and lipoma. this is statistically proved. P values for Malignant peripheral nerve sheath tumour & in schwannoma were calculated and it was found to be insignificant..so FNAC is much useful to diagnose MPNST & schwannoma

One case reported as lymph cyst of thyroid turned out to be papillary carcinoma on histopathological examination.

One case of the MNG was reported as Follicular neoplasm of thyroid in FNAC.

Three patients who were reported as nodular goiter in FNAC, found to be having Thyroiditis (Autoimmune) from the Histopathology reports

Less than 25 yrs Females presented with fibroadenoma are Subjected to FNAC & histopathological examination, there is no much difference between FNAC and HPE results.

In cases of lymphomas, for detecting the subtypes of Hodgkin's & non Hodgkin's and for immunohistochemistry, histopathological procedure is needed. It is not possible with FNAC to diagnose the subtypes of HL and NHL.

The Diagnosis of the malignant neoplasm of soft tissues is confirmed by trucut biopsy, so FNAC is not useful in diagnosis.

the limitation of this study; the results cannot be generalized

1.**BREAST**

AGE (Years)	FA	Phylloides	IDC
10-20	22	-	-
21-30	10	1	4
31-40	7	2	13
41-50	-	1	9
>50	-	-	9

2.THYROID

AGE (Years)	Adenoma	MNG	PTC
10-20	-	2	-
21-30	2	10	2
31-40	-	10	3
41-50	2	5	-
>50	2	1	1

3. **LYMPHNODE**

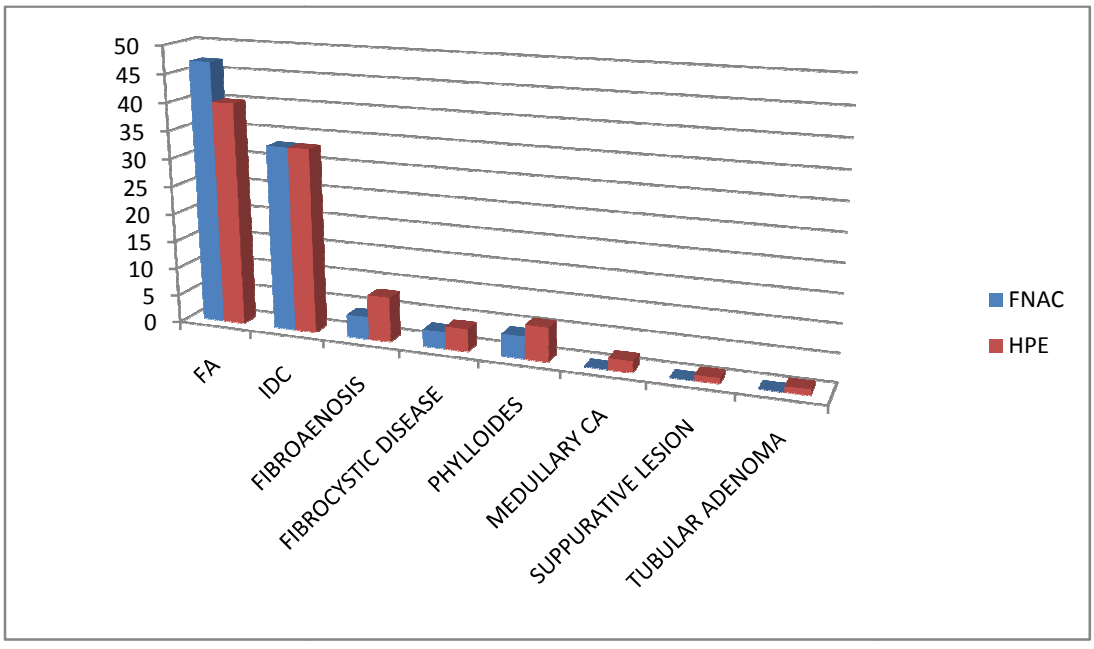
AGE (Years)	TB	Lymphoma	Metastasis
<10	1	-	-
11-20	2	3	-
21-30	3	2	-
31-40	-	2	1
41-50	-	2	1
>50	-	4	2

4. PAROTID

Age Years	Pleomorphic Adenoma	Carcinoma
10-20	-	1
21-30	2	2
31-40	-	2
41-50	1	-
>50	2	2

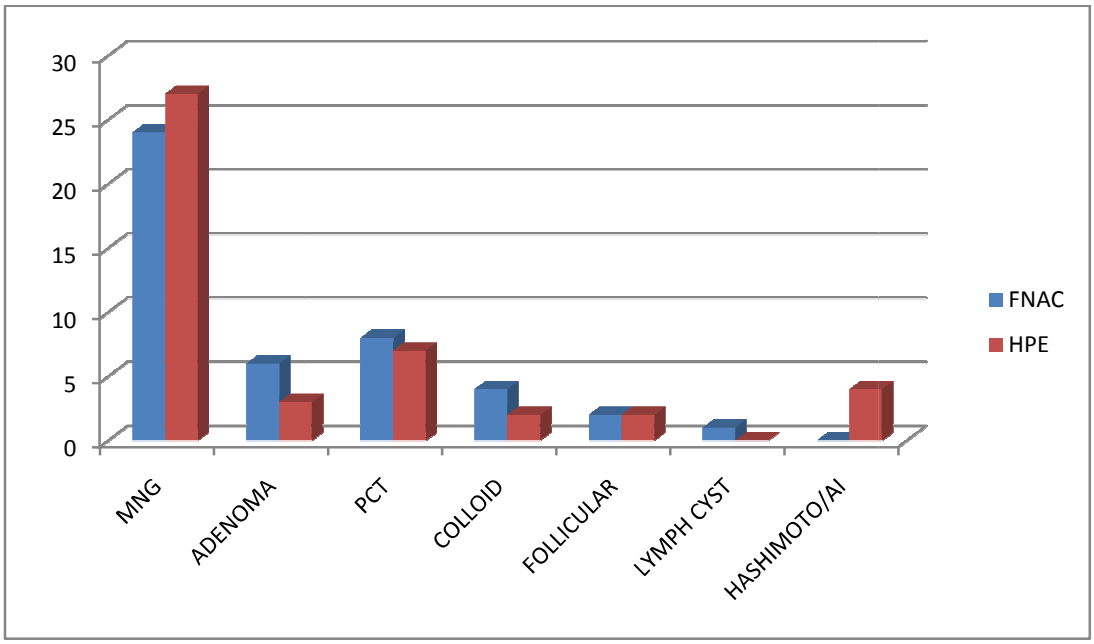
BREAST DISEASES

DISEASES	FNAC	HPE	P
FA	47	40	0.786
IDC	33	33	1.00
Fibroadenosis	4	8	0.059
Fibrocystic Disease	3	4	0.699
Phyllodes	4	6	0.515
Medullary Ca	0	2	0.155
Suppurative Lesion	0	1	0.316
Tubular Adenoma	0	1	0.316
Total	91	91	



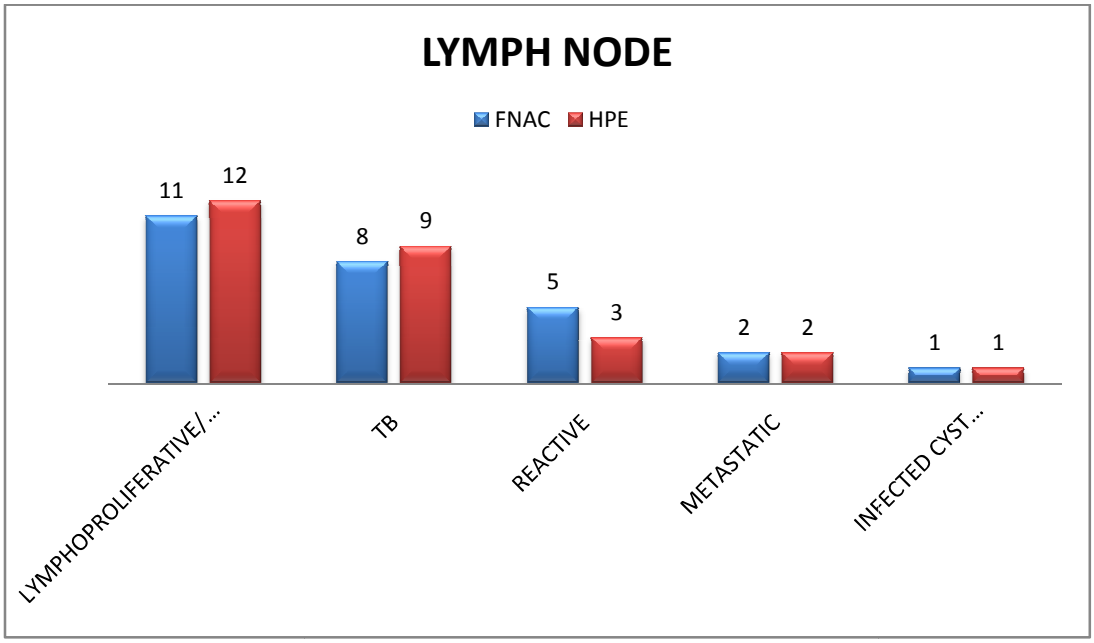
THYROID

DISEASES	FNAC	HPE	P
MNG	24	27	0.523
Adenomatous	6	3	0.291
PCT	8	7	0.777
Colloid	4	2	0.398
Follicular	2	2	1.000
Lymph Cyst	1	0	0.314
Hashimoto/Autoimmune Thyroiditis	0	4	0.040
Total	45	45	



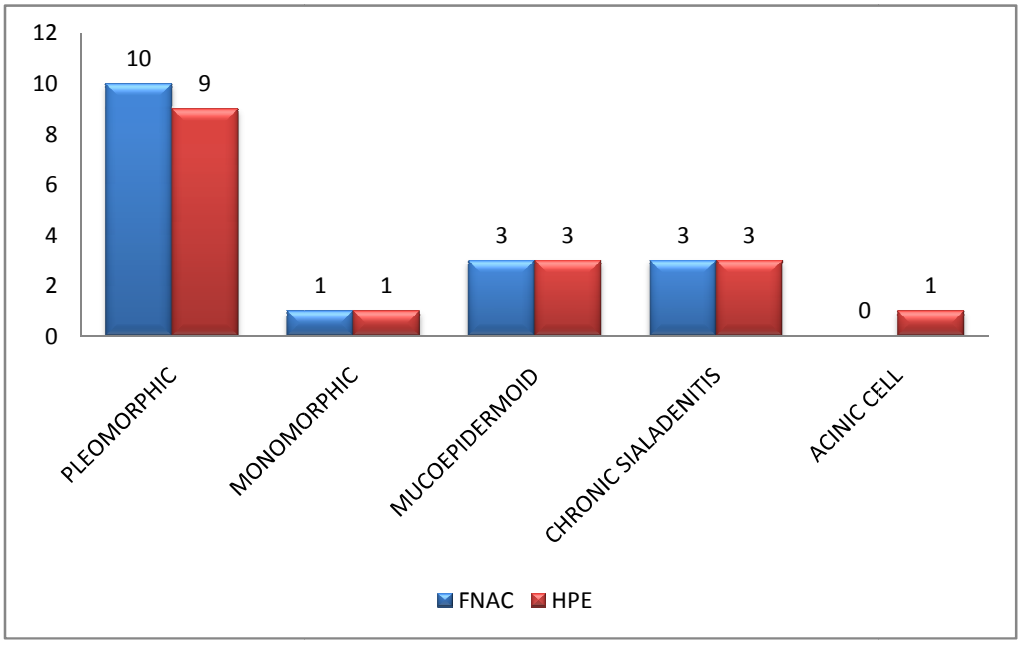
LYMPH NODE SWELLINGS

DISEASES	FNAC	HPE	P
Lymphoproliferative/HL/NHL	11	12	0.783
Tb Adenitis	8	9	0.769
Reactive	5	3	0.443
Metastatic	2	2	1.00
Infected Cyst Neck/Bronchial Cyst	1	1	1.00
Total	27	27	



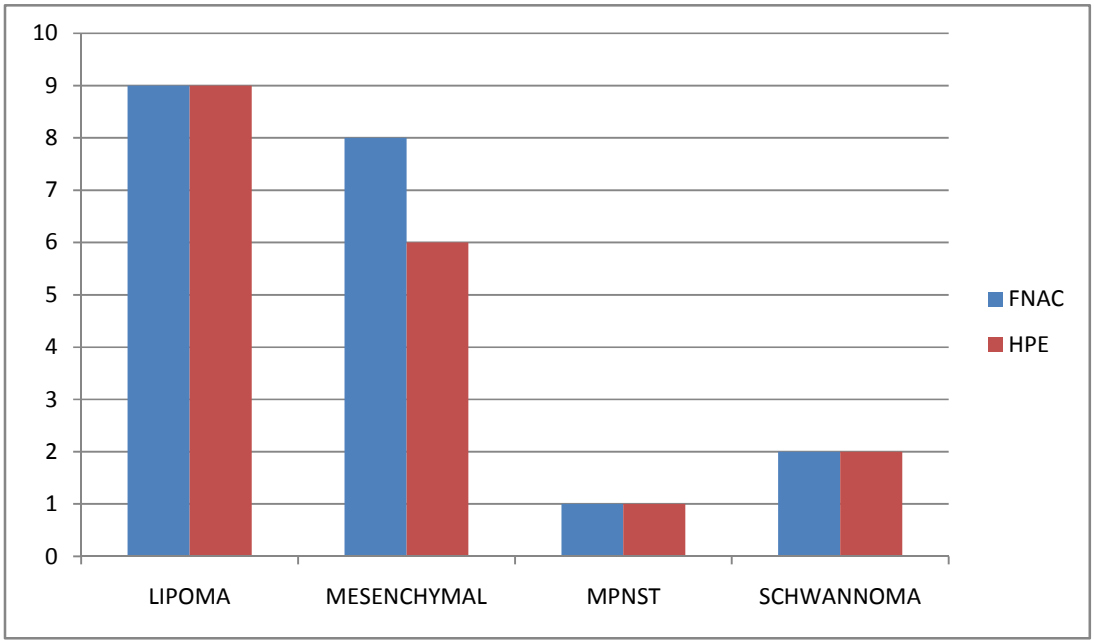
SALIVARY GLAND SWELLINGS

DISEASES	FNAC	HPE	P
Pleomorphic	10	9	0.803
Monomorphic	1	1	1.00
Mucoepidermoid Ca	3	3	0.418
Chronic Sialadinitis	3	3	1.00
Acinic Cell Ca	0	1	0.31
Total	17	17	



SOFT TISSUE SWELLINGS

DISEASES	FNAC	HPE	P
Lipoma	9	9	1.00
Mesenchymal	8	6	0.036
MPNST	1	1	1.00
Schwannoma	2	2	1.00
Total	20	20	



DISCUSSION

The incidence of breast cancer in India is increasing now days and approaching to that in the western world. The incidence of early detection of breast cancer is increasing dramatically due to public awareness and widespread use of mammography. However, no significant decrease in mortality from breast cancer has yet been noted**.**

The literature sensitivity in the diagnosis of carcinoma breast was 90-95%. In our study it was proved and almost matches the literature sensitivity. The commonest benign swelling of the breast, fibroadenoma, is also diagnosed by FNAC and statistically proved.

Ashcroft & Von Henle achieved a diagnosis of thyroid neoplasm in the accuracy of over 90%. Papillary thyroid carcinoma had an accuracy of 80% in the study.

In lymphnode swellings, role of FNAC in diagnosing lymphoma, Tuberculosis, and metastatic node is much important, which is statistically proved in our study, this almost approaches the recommended value from other studies of 84-98% for lymphoma and 90-96% for metastasis. The study conducted at PGI, Chandigarh showed sensitivity for lymphoma, TB & metastasis as 64.8%, 60.5% and 71.6% respectively.

Karolinska produced accuracy of more than 90% in neoplasm's of salivary glands. In 1994 reviews, they produced sensitivity of 81-100% and accuracy of typing in 61-80%. Our study results also proves same that of literature results

The reported sensitivity of 100% lipoma, 82% for mesenchymal malignancy in this study differs a little from the literature results of 86% for benign and 88% for malignant soft tissue tumours.

The lesser sensitivity of FNAC for the diagnosis of fibroadenosis is due to the variable responsiveness of the breast tissue portions to hormonal stimuli and cytology taken from unresponsive fibrous portions

The false positivity in case of papillary carcinoma and Follicular carcinoma I MNG may be due to papillary and follicular pattern observed in the follicle lining epithelium, while they are in a transforming state of non-toxic to toxic. This can be minimized by careful study cytology.

Lymphomas would not be typed from FNAC, even though it is reported as lymphoproliferative disorder. So it would be better to go for excision biopsy if lymphoma is suspected.

CONCLUSION

1. FNAC is highly sensitive in diagnosing neoplasms of breast, Thyroid and Parotid.
2. Lymphomas can be found out by FNAC but typing of Lymphoma needs excision biopsy.
3. Benign swelling of the breast (Fibroadenoma), Parotid (Pleomorphic Adenoma), soft tissue (lipoma) can be diagnosed with high accuracy by FNAC.
4. FNAC is useful in conjunction with clinical radiological findings to provide best possible initial assessment.
5. The diagnostic accuracy not only depends on responsiveness of the aspirate but also on the quality of cytological preparation.
6. Repeat FNAC sampling over a period of time reduces the false negative rates.

BIBLIOGRAPHY

1. Anderson.T.J, Lamp.J, Donnan.P, &Alexander.F.E, Huggins.A, Comparative Pathology of Breast cancer in a randomized trial of screening. Br.J.Cancer(1991)64, 108-113.
2. Anderson T.J &Page.D.L. Risk assessment in breast cancer. Recent advances in histopathology 19.
3. Andersons Pathology 10thedn vol. 2 P. 2354 – 2385.
4. AshutoshS.Kothari, Nicholas Beechey. M.S.- Newman M.S., CorradoD'Ango Ph.D. Breast Carcinoma in women Age 25 yearsro less Cancer2002;94;606-14
5. BeverlyA.James, M.D., MilicentL.Crano and Paul Peter Rosen M.D. Carcinoma of breast arising in MicroglandularAdenosis AMJ.ClinPathol 193; 10:507 – 513.
6. BIBBO – Comprehensive cytopathology – II edition, P 731 – 780.
7. Cano A BodianDr.P.H., H Perzin M.D. and Peter Hoffman M.D. Reproducibility and validity of pathological classifications of benign breast disease and implication for clinical applications.
8. Carol. A. Bodian, Dr.P.H.KarlH.Perzin M.D., Raffaele Latters M.D., Prognostic significance of Benign Proloferative Breast disease Cancer 1993; 71; 38896 – 907.

9.Caroline Martin M.D., BrunaCutili M.D., Michel Velten M.D. Predictive Model of axillary lymphnode involvement in women with small invasive breast carcinoma. Cancer 2002:94:314 – 22

10. David L Page M.D., KerinE.Salhany M.D., Roy.A.Jensen M.D. Subsequent breast carcinoma risk after biopsy with atypia in a breast papilloma. Cancer 1996:78:285 – 66

11.David L Page M.D., Jan O Ellis M.D. Histologic grading of breast cancer – Let's do it American Journal of clinical Pathology, Editorial.

12. DavidL.Page M.D., William D.Dupont Lowell W.Rogers M.D. Atypical hyperplastic lesions of the female breast Cancer 55:2698 – 2708, 1985

13. Dixon, ABC of breast diseases, BMJ Publications 2000.

14.Elston C.W. & Ellis I.O. The Breast Systemic Pathology 3rd edn.

15.Gangadharan.P Epidemiology of Breast cancer

16. Haggenson C.D. Diseases of Breast II edn. 197.

17. Hams.R Marc E Lippman Monica Morrow Diseases of the Breast 2nd edn.

18. HebertH.Davis M.D., Milton Simons M.D. and John B.Davis M.D. Cystic diseases of the Breast, Relationship to Carcinoma Cancer Aug 1964. P 957 – 975.

19. Hughes L.E., Mansek.R.E, Webster D.J.T. Benign disorders and disease of the breast, II edition.

20. Anderson JB, Webb AJ Fine needle aspiration biopsy and the diagnosis of thyroid cancer Br.J.Surg 74:292 – 296, 1987.

21. Block MA, Dailey GE, Robb JA Am.J.Surg 146:72 -76, 1983

22. Boey J, Hsu C, Collins RJ False negative errors in fine needle aspiration biopsy of dominant thyroid nodules: A prospective follow up study.

World.J.Surg 10:623 – 630, 1986.

23.BoonME.Lowhagen T, Cardozo PL, Blonk DI, Computation of preoperative diagnosis probability for follicular adenoma and carcinoma of thyroid on aspiration smears. Anal Quant cytol 4:1 – 5, 192.

24. Cusick EI, Macintish CA, Krukowski ZH, Williams VMM, Ewen SWB, Matheson NA. Management of isolated thyroid swellings.A prospective six year study of fine needle aspiration cytology in diagnosis. Br.Med.J. 301:318 – 321, 1990.

25. Drocese M., FK Schattauer, Cytological aspiration biopsy of the thyroid gland.

26. Frable WJ. The treatment of thyroid cancer.The role of fine needle aspiration cytology. Arch otolaryngology Head Neck Surg 112:1200 – 1203, 1986.

27. Frable WJ, Frable MA Fine needle aspiration biopsy of thyroid.Histopathologic and clinical correlations.Progress in surgical pathology Vol.I, Masson, New York, 1980.

28. Freidmen.M, Shimaokak, Rao.V Diagnosis of chronic lymphocytic thyroiditis by needle aspiration Actacytol 25:513 – 522, 1981.

29. Geddie WR, Bedard YC, Strawbridge HTG Medullary carcinoma of thyroid in fine needle aspiration biopsies. AMJ clin.Pathology 82:552 – 558, 1984.

30. Schwartz's principle of Surgery, 8th edition Pg 453 – 499, 1329 – 1352, 1395 – 1492, 1474 – 1475.

31. Bailey & Love's short practice of Surgery, 24th edition Pg 718 – 738, 776 – 804, 824 – 846, 773 – 774.

32. Sabiston Textbook of Surgery, The Biological Basics of modern surgical practice Pg. 803 – 814, 852 – 855, 867 – 928, 947 – 984.

33. Yao Shi Fu. Bruce,.Head and Neck pathology with clinicalcorrelation.81-109.

34. Ashok Sahah,.Fine needle aspiration cytology in thediagnosis of cervical lymphnodes.Amirican Journal of Surgery 1986: 420-423.

35. Qizilbash AH. Guide to clinical aspiration biopsy. Head and Neck. New York. 1988.

36. Roland NJ et al ,Hojdu SI, Savino A. FNAC of salivary gland lesions reported immediately in a head and neck clinic. Journal of Laryngology and Otology 1993;1025-1028.

37. Parson c a .diagnosis of breast diseases,Singapore,livingstone 1990:1;201-203

38.Trott and randal,fine needle aspiration cytology.lancet1978:2;253

39. Antlyc,mooneyE,layfieldl.breast biopsy and FNAC,cancer cytopathology 1998,84:57-61

40. Bauer Meister D.E., The role and limitations of frozen section and needle aspiration biopsy in carcinoma breast diagnosis. Cancer 1980;46:947-949.

41.Sabiston, Text Book Of Surgery. New Delhi, Elsevier 2005, 2nd volume; 889-890

ANNEXURES

1. STATISTICAL DATA

BREAST DISEASES

DISEASES	FNAC	HPE	P
FA	47	40	0.786
IDC	33	33	1.00
Fibroadenosis	4	8	0.059
Fibrocystic Disease	3	4	0.699
Phyllodes	4	6	0.515
Medullary Ca	0	2	0.155
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MNG	24	27	0.523
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DISEASES	**FNAC**	**HPE**	**P**
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Total	20	20	

P<0.05 is significant – it means FNAC is not USEFUL to detect that particular pathology,HPE correlation is necessaray

Statistic – Two way proportion **Z** test

specimen1	both preliminary and confirmative test proved positive (a)	both preliminary and confirmative test proved negative (b)	Total
BREAST	65	27	92
LYMPHN	10	17	27
SALIVA	11	6	17
SOFT T	11	9	20
THYROI	23	21	44
	120	80	200

specimen1 * common Crosstabulation

		common		
		0	1	Total
specimen1	Count	65	27	92
	% within specimen1	70.7%	29.3%	100.0%
	% within common	54.2%	33.8%	46.0%
	% of Total	32.5%	13.5%	46.0%
	Count	10	17	27
	% within specimen1	37.0%	63.0%	100.0%
	% within common	8.3%	21.2%	13.5%
	% of Total	5.0%	8.5%	13.5%
	Count	11	6	17
	% within specimen1	64.7%	35.3%	100.0%
	% within common	9.2%	7.5%	8.5%
	% of Total	5.5%	3.0%	8.5%
	Count	11	9	20
	% within specimen1	55.0%	45.0%	100.0%
	% within common	9.2%	11.2%	10.0%
	% of Total	5.5%	4.5%	10.0%
	Count	23	21	44
	% within specimen1	52.3%	47.7%	100.0%
	% within common	19.2%	26.2%	22.0%

	F% of Total (I	11.5%	10.5%	22.0%
Total	Count	120	80	200
	% within specimen1	60.0%	40.0%	100.0%
	% within common	100.0%	100.0%	100.0%
	% of Total	60.0%	40.0%	100.0%

The above table clearly says the percentage of tests conducted proved both positive and one negative.

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.742[a]	4	.019
Likelihood Ratio	11.741	4	.019
Linear-by-Linear Association	3.464	1	.063
N of Valid Cases	200		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.80.

PROFORMA

Name: IP No:

Age:

PRESENTING COMPLAINTS

PAST HISTORY

Surgeries

Medical conditions: Diabetes/Hypertension/Tuberculosis/Asthma.

FAMILY HISTORY

PERSONAL HISTORY

Diet Sleep

Bowel habits. Smoker/Alcoholic

EXAMINATION

GENERAL EXAMINATION:

Pallor Icterus

Cyanosis Clubbing

Lymphadenopathy

Vitals: Pulse rate: Blood pressure:

SYSTEMIC EXAMINATION

Per abdomen

Cardiovascular System:

Respiratory System:

Central Nervous System:

LOCAL EXAMINATION

Per rectal: rectal deposits

DIAGNOSIS:

INVESTIGATIONS

Hb%, TC: DC: ESR: RBS: Blood urea:

Serum creatinine: BT: CT: Chest x-ray: ECG, Bleeding time, clotting time.

Serum PSA,X-pelvis and lumbar vertebrae. USG-abdomen and pelvis.

PRE FNAC PREPARATION:

Clean the area with sprit

POST OP HPE report

REGULLAR FOLLOW UP OF THE PATIENT.

Sl. No.	NAME	AGE/ SEX	IP. NUMBER	UNIT	FNAC	HPE
1.	Sathyapriya	20/F	1382415	S3	FA	FA
2.	Ishath Begum	50/F	13821	S3	IDC	IDC
3.	Ramya	20/F	43215	S3	FA	FA
4.	Valaramathi	30/F	1342955	S5	PTC	PTC
5.	Sheela	37/F	1384449	S1	Nodular goiter	MNG
6.	Saleemabeevi	60/F	1377520	S4	IDC	IDC
7.	Inbarasi	55/F	1383990	S4	Nodular goiter	Hashimatos
8.	Srimathi	45/F	1381018	S4	IDC	IDC
9.	Mallika	30/F	1383863	S4	SNG	MNG
10.	Banumathy	35/F	1383823	S4	Fibrocystic mastopathy	Suppurative lesion
11.	Ilamathi	60/F	1383343	S1	Dominant nodule of MNG	MNG with Adenomatous nodule
12.	Prabha	22/F	1312456	S1	FA	FA
13.	Shanthi	50/F	1378980	S1	MNG	MNG
14.	Kousalya	35/F	1384479	S1	Follicular neoplasm	MNG
15.	Vanmathi	14/F	1368868	S1	Fibroadenoma	FA
16.	Devaki	39/F	1385859	S4	MNG	MNG
17.	Anjammal	32/F	1354722	S1	Fibroadenosis	Fibroadenosis
18.	Tamilarasi	26/F	1388697	S2	Follicular neoplasm	MNG
19.	Kannagi	52/F	1383231	S4	IDC	IDC
20.	Indra	36/F	1387148	S2	Colloid goiter	Simple goitre

21.	Kaliyan	46/M	1398993	S1	PTC	PTC
22.	Poongadi	46/F	13949094	S3	Cystic degeneration in nodular goiter	MNG
23.	Radha	30/F	1387541	S1	FA	BnPhillodes
24.	Vembu	28/F	1323675	S3	FA	FA
25.	Priya	18/F	1387630	S1	FA	FA
26.	Janaki	30/F	1386231	S1	Fibroadenosis	IDC
27.	Rahasathnisha	27/F	1327562	S2	FA	Fibrocystic mastopathy
28.	Nagarathinam	35/F	1301682	S3	Colloid nodule	MNG
.29.	Rani	22/F	1328541	S3	FA	FA
30.	Aramauthai	35/F	1330608	S2	FA	Fibro adenosis
31.	Revathi	35/F	1331905	S3	Nodular goiter	Mng
32.	Mayammal	55/F	1334534	S5	FA	Fibrocyticmastopathy
33.	Susheela	45/F	1334750	S6	IDC	IDC
34.	Dhanalakshmi	65/F	1335101	S2	Nodular goiter	MNG
35.	Tamilarasi	40/F	1333874	S1	NODULAR GOITER	HASHIMATOS
36.	Pushpavalli	38/F	1335720	S5	FA	FIBROCYSTIC MASTOPATHY
37.	Veerammal	55/F	1394113	S4	Ductal carcinoma	IDC
38.	Manjula	45/F	1395685	S6	IDC	IDC
39.	Selvi	24/F	1394121	S4	FA	FA
40.	Uthirapathi	32/M	1396354	S3	Nodule of MNG	MNG

41.	Sumathi	23/F	1105325	S1	PTC	PTC
42.	Rajeshwari	53/F	1399297	S4	IDC	IDC
43.	Saroja	20/F	1399366	S4	FA	FA
44.	Geetha	29/F	1325401	S1	PTC	PTC
45.	Selvarani	34/F	1327386	S4	FA	Fibroadenosis
46.	Pushpam	65/F	1339703	S1	FA	Fibroadenosis
47.	Meenambal	65/F	1338978	S4	Fibroadenosis	Fibroadenosis
48.	Sumathi	34/F	1342893	S5	Nodular goiter	MNG
49.	Dhavath Begum	45/F	1345336	S1	Nodular goiter	MNG
50.	Neelavathy	50/F	1344967	S2	FA	FA
51.	Reyeesbeevi	53/F	1343876	S6	IDC	IDC
52.	Pushpam	65/F	1356863	S2	Nodular goiter	Autoimmune thyroiditis
53.	Malarkodi	33/F	1382721	S5	Adenomatous goiter	Mng
54.	Rajalakshmi	37/F	1350746	S1	IDC	IDC
55.	Arumbu	47/F	1329490	S2	FA	FA
56.	Kavitha	29/F	1329585	S3	Cystosarcomaphyllodes	Malignant phyllodes
57.	Amala	45/F	1331143	S5	IDC	IDC
58.	Chithra	20/F	1333627	S5	FA	FA
59.	Shanthi	35/F	1332921	S5	IDC	Medullayca
60.	Uma	35/F	1333444	S3	FA	Benign phllodes

61.	Magamayee	45/F	1389444	S6	Cystosarcomaphyllodes	Malignant phyllodes
62.	Muthulakshmi	48/F	1391633	S4	IDC	IDC-NOS
63.	Usharani	28/F	1392900	S1	FA	FA
64.	Kasthuri	25/F	1391582	S3	FA	FA
65.	Muthulakshmi	40/F	1391638	S3	FA	FA
66.	Pushpavalli	42/F	1396195	S5	COLLLOID GOITER	Simple colloid goiter
67.	Mariyathal	18/F	1399300	S4	FA	FA
68.	Revathy	30/F	1399006	S5	Fibroadenosis	FA
69.	Chinnapillai	52/F	1236121	S5	IDC	IDC –NOS
70.	Sundari	36/F	1326799	S4	IDC	IDC
71.	Jayalakshmi	62/F	1328211	S2	FA	Fibroadenosis
72.	Jothi	37/F	1382640	S4	Phyllodetumour	Invasive papillary ca
73.	Ilamathi	18/F	1383343	S1	FA	FA
74.	Seethamani	35/F	1384745	S5	IDC	IDC NOS
75.	Jaminaparveen	49/F	1388816	S3	Nodular goiter	hashimatos
76.	Kavitha	35/F	1388728	S5	FA	FA
77.	Sudha	13/F	1388683	S1	FA	FA
78.	Sandhya	14/F	1388833	S5	FA	FIBROADENOSIS
79.	Rosi	25/F	1388335	S1	Adenomatous goiter	Adenomatous goiter
80.	Jasmine	19/F	138895	S1	FA	fibroadenosis

81	**vanathi**	**32/f**	**1387856**	**S2**	**Pleomorphic adenoma**	**Lowgrade mucoepidermoid ca**
82	Jegadeesan	48/m	1387878	S4	schwanoma	Schwanoma
83	padmanabhan	40/m	1377556	S1	Chronic sialadinitis	Chronic sialadinitis
84	Senthamarai kannan	15/m	1389735	S1	HL	HL- lymphocytic predominant
85	sathyabama	45/f	1387624	S6	Pleomorphic adenoma	Pleomorphic adenoma
86	Sundarambal	45/f	1387748	S6	Lymphoproliferative disorder	HL
87	Rajendran	26/m	1387679	S3	TB adenitis	TB adenitis
88	Jegatheesan	15/m	1383267	S1	Lowgrade mucoepidermoid carcinoma	Lowgrade mucoepidermoid carcinoma
89	MuTHAMILSELVI	29/F	1382345	S3	Lymphoproliferative disorder	HL
90	REKHA	20/m	1303134	S3	Lymphoproliferative disorder	HL
91	Sarojini	28/f	1342523	S6	Myoepithelial rich pleomorphic adenoma	Acinic cell carcinoma
92	Pariventhan	4/m	1325624	S1	Infected cyst neck	Bronchial cyst
93	Rosemary	50/f	1391298	S1	Nodular goiter	MNG
94	Sathiya	30/m	1324878	RT	Pleomorphic MFH	Pleomorphic variant of RMS
95	Silambarasi	32/f	1346807	S4	IDC	IDC
96	Latha	24/f	1324521	S5	FA	FA
97	Muthukrishnan	29/m	1324562	S2	PCT	PCT
98	Papathi	30/f	1324556	S6	nodule of the nodular goiter	Adenomatous goiter
99	Tamilarasi	30/f	1324566	S3	IDC	IDC
100	Vijayasankar	47/m	1345261	S6	**Pleomorphic adenoma**	**Pleomorphic adenoma**

101	Sakila	16/f	1324512	S5	FA	FA
102	Kasiammal	55/f	1324563	S3	IDC	IDC-NOS
103	Nagammal	60/f	1324156	S1	IDC	IDC-NOS
104	Maruthavani	55/f	1342513	S3	Adenoma thyroid	Follicular adenoma
105	Amsu	35/f	1345262	S5	IDC	IDC-NOS
106	Anjalai	60/f	1324783	S4	IDC	IDC-NOS
107	Rajendran	40/M	1324566	S3	Lymphcyst thyroid	PCT
108	Selvi	24/f	1325647	S5	Nodular goiter	MNG
109	Venkatachalam	53/m	1324561	S4	Reactive adenitis	HL-lymphocytic predominant
110	Suseela	40/f	1342561	S3	Fibrocystic disease atypical hyperplasia	FA
111	Sudha Rani	18/f	1345627	S5	FA	FA
112	Ulaganathan	40/m	1324456	S2	Lipoma(cervical region)	Lipoma
113	Manjula	25/f	1324536	S2	FA	FA
114	Soundaraj	50/m	1324516	S1	Lymphoprolifertive changes	NHL
115	Latha	19/f	1324574	S6	FA	Fibroadenosis
116	Indirani	50/f	1324563	S3	IDC	IDC with fibrocystic changes
117	Kaladevi	25/f	1324567	S4	Nodule of the nodular goiter	MNG
118	Chellamuthu	40/f	1324513	S6	Lipoma	Lipoma
119	Papu	45/f	1324561	S5	Adenomatous goiter	Adenomatous goiter
120	Parvathy	27/f	1367288	S5	PCT	MNG

121	Narayanasamy	55/m	1344343	S2	Lipoma neck	lipoma
122	Palanivel	56/m	1328945	S3	HL	HL-lymphocyte predominant
123	Muniyandi	58/m	1324589	S4	Lymphoproliferative disorder	NHL
124	Kanimozhi	26/f	1324561	S4	FA	fibroadenosis
125	Suganthi	17/f	1324676	S4	FA	FA
126	Ayyasami	40/M	1324243	S1	Pleomorphic population of lymphocytes	Caseating TB adenitis
127	Ponni	33/f	1324554	S2	IDC	IDC
128	Selvi	33/f	1326784	S3	IDC	IDC-NOS
129	Menaka	23/f	1324523	S6	FA	Tubular adenoma of the breast
130	Vijaya	40/f	1324425	S3	Nodular goiter	MNG
131	Amirtha	34/f	1342215	S5	Phylloidestumour	Malignant phyllodes
132	Bharathy	30/m	1345263	S3	NODULAR GOITER	MNG with secondary features of haemorrhage
133	Rani	27/f	1324529	S5	Nodular goiter	MNG
134	Vasantha	57/f	1324523	S3	MFH	Sarcomatous growth
135	Ramakrishnan	18/m	1324567	S4	Lymphoproliferative disorder	HL-lymphocytic predominant
136	Hathija Begam	40/f	1324677	S4	Fibrocystic disease	IDC
137	Valliammai	45/f	1324688	S4	IDC	IDC
138	Rajalaksmi	38/f	1345887	S5	Nodular goiter	Nodule of the nodular goiter
139	Vasanthi	40/f	1324561	S3	IDC	IDC
140	Selvanathan	18/m	1345627	S4	Granulomatous adenitis	TB adenitis

141	**Nirmala**	**30/f**	**1324562**	**S2**	**Chronic sialadinitis**	**Chronic sialadinitis**
142	Ramaselvi	62/f	1345627	S1	Pleomorphic adenoma	Pleomorphic adenoma
143	Chellammal	40/f	1324562	S4	Metastatic adenocarcinoma	Metastatic SCC
144	Parvathy	30/f	1342561	S5	Chronic Granulomatous lymphadenitis	TB adenitis
145	Parthiban	35/m	1324562	S4	Pleomorphic adenoma	Pleomorphic adenoma
146	Jeya	33/f	1234256	S1	Granulomatous lymphadenitis	Caseating TB adenitis
147	Subathra	35/f	1325643	S5	Reactive adenitis	TB adenitis
148	Thangavel	60/m	1346578	S4	High grade Mucoepidermoidca	High grade Mucoepidermoidca
149	Wahithabegam	32/f	1387822	S2	Pleomorphic adenoma	Lowgrademucoepidermoidca
150	Chidambaram	48/m	1387848	S4	schwanoma	Schwanoma
151	Natarajan	40/m	1377510	S1	Chronic sialadinitis	Chronic sialadinitis
152	Surichandran	15/m	1389786	S1	HL	HL- lymphocytic predominant
153	Bhuvaneswari	45/f	1387604	S6	Pleomorphic adenoma	Pleomorphic adenoma
154	Gnanasunder	8/m	1387793	S6	Granulomatous lymphadenitis	Caseating TB adenitis
155	Malligabegam	45/f	1387696	S3	Reactive hyperplasia	Reactive hyperplasia
156	Vanitharani	24/f	1384646	S1	Lipoma	Lipoma
157	Martin	39/m	1386978	S3	Low grade MPNST	Low grade MPNST
158	Eswari	13/f	1339698	S1	Lipoma	Lipoma
159	Logambal	70/f	1387601	S5	Monomorphic adenoma	Pleomorphic adenoma
160	Radhika	25/f	1389765	S2	Granulomatous adenitis	Tuberculous adenitis

161	**Marimuthu**	**70/m**	**1388755**	**S3**	Pleomorphic adenoma	**Monomorphic adenoma**
162	Thangaraj	45/m	1333938	S1	Lipoma(arm)	Lipoma
163	Dhanaraj	42/m	1387657	S4	Pleomorphic adenoma	Pleomorphic adenoma
164	Jegatheesan	25/m	1388732	S3	Lymphoproliferativa disorder	HL
165	Selvaraj	65/m	1383208	S1	GCT-seminoma	Embryonalrhabdomyosarcoma
166	Murugan	50/m	1382308	S3	Lipoma	Lipoma
167	Devaraj	20/m	1303106	S3	Dermoid	CALCFIED PILLAR CYST
168	Rajangam	54/m	1342561	MGE	HCC	ADENOCARCINOMATOUS DEPOSITS
169	Vidivelli	45/f	1367543	S5	Lipoma both axilla	Lipoma
170	Nallamal	35/F	1324532	S5	Lipoma both axilla	Lipoma
171	Settu	40/m	1325632	S5	Metastatic deposits	Metastatic SCC
172	Jeyamary	56/f	1325698	S6	Reactive hyperplasia	Reactive hyperplasia
173	Pattamal	70/f	1345678	S5	Mucoepidermoidca	High grade Mucoepidermoidca
174	Kumari	58/f	1356789	S6	Mesenchymal neoplasm	MaligMesenchymal neoplasm
175	Ramayee	40/f	1387055	S3	Basal cell adenoma	Basal cell adenoma
176	Muthulakashmi	9/f	1324567	S5	Reactive adenitis	Reactive adenitis
177	Kasinathan	60/m	1387654	S4	Lymphoproliferative	HL
178	Bhuvaneswari	24/f	1386758	PS	Post auricular dermoid	Lymph cyst
179	Jeganathan	65/m	1386645	S5	Mesenchymal neoplasm	Malignant PNST
180	Saritha	20/f	1390034	S3	FA	FA

181	**Jothi**	**20/f**	**1387765**	**S3**	**IDC**	**IDC**
182	Vellaiammal	37/f	1389876	S2	IDC	IDC
183	Anjammal	37/f	1382349	S1	FA	FA
184	Sowharnsha	38/f	1388987	S4	Nodular goiter	Nodule of nodular goiter
185	Vasavi	18/f	1389007	S2	FA	FIBROCYSTIC MASTOPATHY
186	Sasikala	18/f	1388945	S4	FA	FA
187	Vijaya	37/f	1388907	S5	PTC	PTC
188	Saranya	18/f	1388951	S1	FA	FA
189	Poongothai	24/f	1388812	S4	Nodular colloid goitre	MNG
190	Malarvizhi	18/f	1388925	S6	FA	FA
191	Sellamarai	23/f	1390129	S1	Adenomatous goiter	MNG
192	Selvi	24/f	1390001	S2	IDC	IDC-NOS
193	Krishnaveni	20/f	1390082	S2	FA	FA
194	Visalatchi	45/f	1390034	S1	IDC	IDC-NOS
195	Vasantha	40/f	1388888	S2	IDC	IDC-NOS
196	Jasmine	19/f	1388955	S1	FA	FA
197	Senthamarai	60/f	1388896	S3	IDC	IDC-NOS
198	Sahayamary	43/f	1388937	S2	PCT	MNG
199	Rosi	18/f	1388868	S1	FA	fibroadenosis
200	Santhya	17/f	1388833	S5	FA	FA

PTC-Papillary Thyroid Carcinoma, MNG-Multinodular Goiter, FA-Fibroadenoma

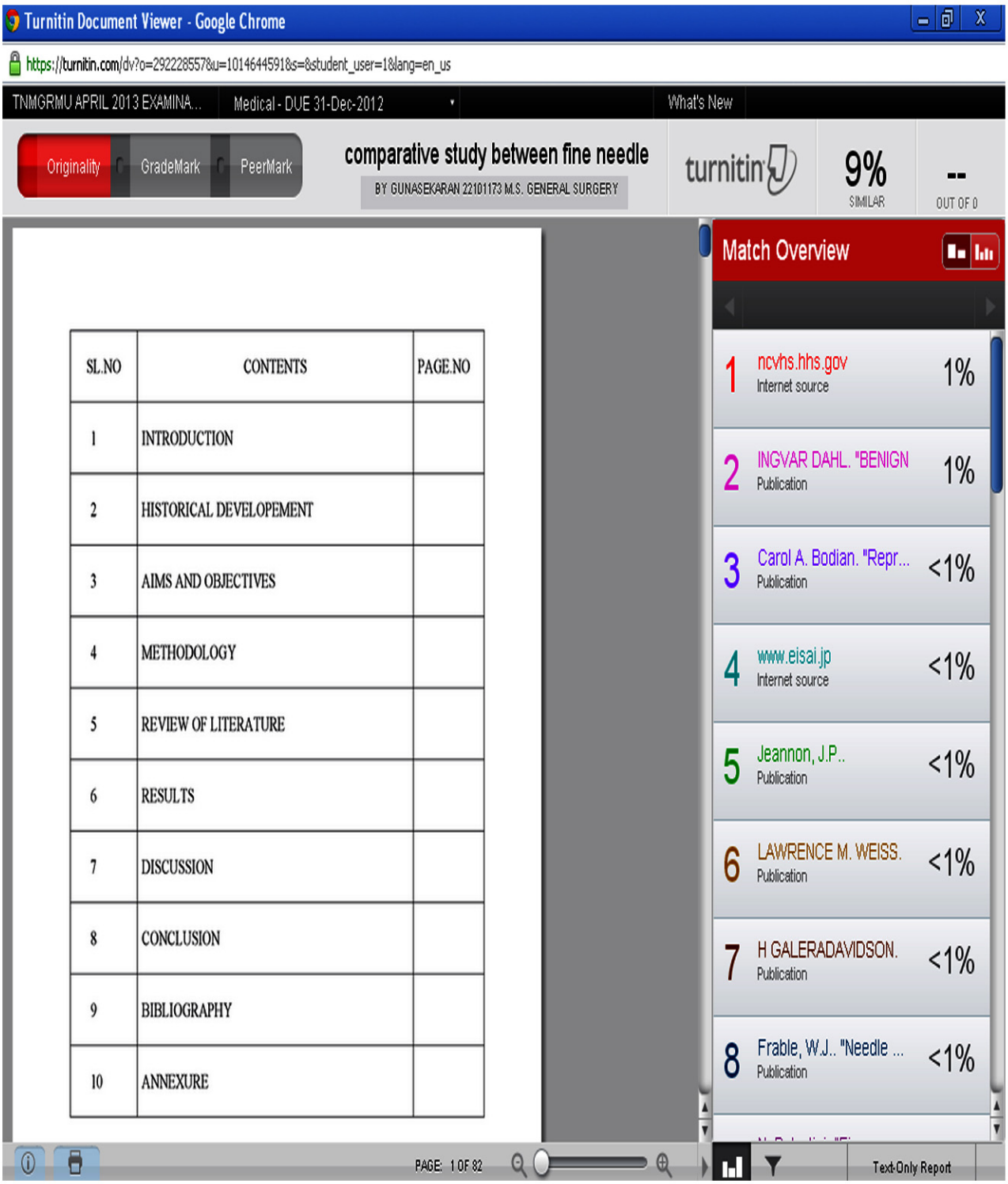
,IDC-NOS-Intraductalcarcinoma, Nothing Otherwise Specified,

ADH-Atypical Ductal Hyperplasia,

HL-Hodgekins Lymphoma, MPNST-Malignant Peripheral Nerve Sheath Tumour

NHL- Non Hodgkins Lymphoma

FNAC-Fine Needle Aspiration Cytology, HPE-Histopathological Examination



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SL.NO CONTENTS PAGE.NO 1 INTRODUCTION 2 HISTORICAL DEVELOPEMENT 3 AIMS AND OBJECTIVES 4 METHODOLOGY 5 REVIEW OF LITERATURE 6 RESULTS 7 DISCUSSION 8 CONCLUSION 9 BIBLIOGRAPHY 10 ANNEXURE INTRODUCTION FNAC is the first choice for the initial investigation and diagnosis of both superficial and deep lesions though core needle biopsy is extremely valuable in selected cases. FNAC is not only limited to neoplastic conditions, but FNAC is valuable in the diagnosis of inflammatory, infectious and degenerative conditions. It is relatively painless and produces a speedy result. It is cost effective. Its accuracy in many situations can approach that of histopathology in providing an unequivocal...