"CYTOMORPHOLOGICAL STUDY OF FLUID ASPIRATES: COMPARISON BETWEEN CONVENTIONAL SMEARS AND CELL BLOCK TECHNIQUES"

By

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IN

PATHOLOGY

Under the guidance of

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LIST OF ABBREVIATIONS

CS – Conventional smears

CB – Cell blocks

FNA - Fine needle aspiration

FNAC – Fine needle aspiration cytology

GIST – Gastro-intestinal stromal tumours

H and E – Hematoxyllin and Eosin

IHC - Immunohistochemistry

SCC – Squamous cell carcinoma

USG – Ultrasound guided

ABSTRACT

Background:

Patients with swellings in various parts of the body undergo FNAC. The solid tissue fragments obtained by aspirations when smeared show a cytological pattern. The fluid aspirates on FNAC often show scanty cells or do not exhibit satisfactory cytological patterns and therefore are confounded with diagnostic dilemmas at microscopy and to reach a reasonable diagnosis.

The fluid aspirates when subjected for concentration by centrifugation will give high cell yield and show cytological patterns like luminal borders, ductal, papillary, cribriform, trabecular, tubular, Indian file pattern, rosettes, etc. These patterns are compared with the cell block sections.

Objective of the study:

The purpose of this study was to study the cytomorphological patterns of fluid aspirates, to compare routine conventional smears prepared from centrifuged fluid aspirate with cell block sections and to compare between the two cell block techniques, plasma-thromboplastin cell block technique and ethanol-formalin fixed cell block technique.

Methods:

The study was carried at The Department of Pathology, R.L.Jalappa Hospital and Research Centre attached to Sri Devaraj Urs Medical College, Tamaka, Kolar, during the period of 01-11-2010 to 30-04-2012. The study included 96 cases which yielded fluid on aspiration. Conventional smears were prepared with centrifuged material and stained with H and E, Papanicolaou, and May-Grünwald-Giemsa stains. The residual fluid was halved and subjected for cell block preparation by the following two techniques, plasma-thromboplastin techniques and ethanol-formalin techniques.

All the conventional smears and sections from both the cell block techniques were reviewed separately. The cytomorphological features like cellularity, cytoarchitecture, cytoplasmic and nuclear features, background details and final diagnoses were noted. The two cell block techniques were compared. Categories like cellularity, area of cell concentrate, architecture, cytoplasmic features, nuclear features, background and diagnosis were noted. The cases were categorised into 4 groups based on the final diagnosis: non neoplastic (inflammatory), neoplastic (benign and malignant) and inadequate.

Results:

In the present study, conventional smears of 93/94 (98.9%) cases contained diagnostic material and the cell blocks of 92/94 (97.9%) cases contained diagnostic material. Absolute concordance between smears and cell block was seen in 91/94 (96.8%) cases. When both conventional smears and cell blocks were compared, cell blocks increased the level of confidence in arriving at diagnosis in 42 (44.7%) [8 (8.5%) benign and 34 (36.2%) malignant] cases. Aspiration from one case of testicular swellings did not yield any diagnostic material in conventional smears, while the cell block material was diagnostic of Seminoma testis.

Conclusion:

Fluid aspirates of FNAC pose diagnostic challenges due to scarcity of cells. The cell blocks are complementary and demonstrate diagnostic microtissue architecture especially in cases with purulent aspirates of lymph node deposits with SCC. All the fluid aspirates of FNAC should be subjected for centrifuged conventional smears and the residual fluid should be processed for cell block for valuable diagnostic material.

Keyword : FNAC fluid aspirate; Conventional smears; Cell block.

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INTRODUCTION

Patients with swellings in various parts of the body undergo FNAC. The solid tissue fragments obtained by aspirations when smeared show a cytological pattern. The fluid aspirates on FNAC often show scanty cells or do not exhibit satisfactory cytological patterns and therefore are confounded with diagnostic dilemmas at microscopy and to reach a reasonable diagnosis. This is more so with aspirates from salivary glands and pancreas which require better cytoarchitectural visualization for proper diagnosis.

The fluid aspirates when subjected for concentration by centrifugation will give high cell yield and show cytological patterns. These patterns can be luminal borders, solid tissue fragment with angulations, ductal, papillary, cribriform, trabecular, tubular, Indian file pattern, rosettes, etc. These patterns are compared with the cell block sections.

OBJECTIVES

1. To demonstrate the cytomorphological patterns of fluid aspirates.
2. To compare routine conventional smears prepared from centrifuged fluid aspirate with cell block sections.
3. To compare between the two cell block techniques,
    i. Plasma thromboplastin cell block technique
    ii. Ethanol and formalin fixed cell block technique.

REVIEW OF LITERATURE

Fine needle aspiration cytology

Fine needle aspiration cytology (FNAC) known today was initially conceived as a means to confirm a clinical suspicion of local recurrence or metastasis of known cancer without subjecting the patient to further surgical intervention. The idea to obtain cells and tissue fragments through needle introduced into abnormal tissue comes from nineteenth century itself. Kun[1] (1847), Lebert[2] (1851) and Menetrier[3] (1886) employed needles to obtain cells and tissue fragments to diagnose cancer. Leyden[4] (1883) used same method to isolate pneumonic microorganisms. Following success in this area, the interest focussed on preliminary preoperative diagnosis of all kinds of neoplastic processes, benign or malignant, in any organ or tissue of the body and on definitive, specific diagnosis in inoperable cases. It is also valuable in diagnosing inflammatory, infectious, and degenerative conditions. Now it has become a common procedure.[5]

It has several advantages like,

i. It is an outpatient procedure,
ii. Is easy, safe with minimal discomfort to patients and
iii. Quick procedure with rapid generation of reports unlike histopathology,
iv. Requires no anaesthesia,
v. Is cost effective,
vi. No wound is formed,
vii. Readily repeatable, and
viii. Immediate diagnosis relieves patient's anxiety, definitive treatment can be planned in advance, and the need for frozen section diagnosis is reduced.

The success of FNAC depends on following requirements [1]

1. Samples must be representative of the lesion investigated
2. Samples must be adequate in terms of cells and other tissue components
3. Samples must be correctly smeared and processed
4. It must be accompanied by sufficient and correct clinical / radiological information.

However, sometimes fine needle aspiration does not yield information sufficient for precise diagnosis. The architecture of small pieces of tissue is lost during smear preparation and the risk of false negative and indeterminate diagnosis is always present.[6] This is more so when aspirate yields large amount of fluid or when mixed with blood.

Large amount of fluid obtained from any swelling following a fine needle aspiration procedure can be either due to

i. Cystic change / degeneration occurring within the swelling,
ii. High vascularity of the swellings leading to bloody aspirate (in case of malignant neoplasms), or
iii. Whenever a vessel adjacent to swelling is punctured while performing FNAC.

Cystic change is seen in several benign as well as malignant lesions and is commonly observed in metastatic lymph nodes from certain primary tumours.

The cysts can be due to

i. Increased secretion from the tumour cells.
ii. Retention of the secretions.
iii. As a result of liquefaction necrosis

The reported primary tumours with cystic change are most commonly squamous cell carcinoma (SCC) and thyroid papillary carcinoma. Cystic metastases are encountered in other tumours such as serous papillary carcinoma of the ovary or endometrium and malignant melanoma.[7]

Cystic change is common in metastatic squamous cell carcinoma. It can be secondary to pseudocystic change or formation of a true cyst. Pseudocystic change results from spontaneous degradation of keratin and cellular debris within the carcinomatous lymph node deposit.[8] True cysts can be explained by the transformed keratinocytes that have intrinsic properties for cyst formation which become malignant. Cyst formation could also be related to the sudden blockage of lymphatic flow passing through a node that has metastatic colony. This lymphatic fluid fills a potential space, which have tumour cells in periphery.[9]

Cystic change is also common with papillary carcinoma thyroid. It can be both at primary site and at secondary deposits in lymph nodes. It is due to extensive liquefaction necrosis and colloid production within the gland. In a study conducted by Wunderbaldinger P et al., (2002) it was observed that approximately 40% of all cervical lymph node metastases from papillary thyroid carcinomas had the tendency to completely cavitate a lymph node by cystic degeneration and thus may mimic an apparently benign cervical cyst.[10]

Therefore, fine needle aspiration from such swellings with cysts often show scanty cells or do not exhibit cytological pattern and therefore are confounded with diagnostic dilemmas at microscopy. In such case, a specific technique is applied to concentrate the scanty cells aspirated from the fluid for better appreciation of morphology and for proper diagnosis. One of such methods is cell block preparation.

Cell block

Cell block preparation from aspirates is done to obtain additional information. The cell-block method is a procedure to concentrate and solidify cell samples and observe them three dimensionally after processing by histopathological techniques. It is performed for the examination of materials such as body fluids, urine, and endometrium.[11]

Cell block preparation from cytological material is quite an old technique. It was reported by Bahrenburg in 1895 as an adjunct to conventional smears of ascitic fluid. Bahrenberg allowed a large quantity of fluid to stand and clot spontaneously. After pouring off the supernatant fluid, the clot was shrunken and hardened by successive addition of alcohol, until a small stringy mass was obtained. This was finally embedded in celloidin and sectioned with microtome. With the aid of this technique, Bahrenberg was able to find epithelial cells in two ascitic fluids. The autopsy in these cases later revealed carcinoma involving the peritoneum.[6, 12, 13]

In 1917, Mandelbaum devised a technique for the preparation of cell block. Zemansky, Schlesinger and Honigman showed that, when properly carried out, the method was not only technically practical but also diagnostically useful. He found that the examination of the serous fluids for evidence of malignant neoplasm by the cell block technique is an eminently worthwhile and dependable procedure. He found that the procedure was of great diagnostic value in cases of carcinoma originating in the ovary, breast, lung, pancreas, gastrointestinal tract and kidney.[14]

Cell block method now has become a well established and an important tool for diagnosis in the cytological world. The usefulness of cell blocks is long established for the confident diagnosis of several types of tumours, especially [15]

- Primary and metastatic gastrointestinal stromal tumors,
- Head and neck masses,
- Hepatic lesions,
- Recurrent gynecologic malignancies and
- Tumors of soft tissues.

The advantages of cell block procedure are [6, 16] :-

i. Recognition of histologic patterns of diseases that sometimes cannot be identified reliably in cytological smears.
ii. Possible processing of multiple sections of the same material for routine staining, special staining, immunocytologic procedures.
iii. Less cellular dispersion in cell blocks permits easier microscopic observation and enhance the detection of malignant cells than conventional smears.
iv. No hemorrhagic background like in conventional smears.
v. Lower cost than with tru-cut biopsy.
vi. Possibility of storing cell blocks for retrospective studies, especially when immunocytochemical research is necessary.

An important aspect during cell block preparation is to collect the sediment without loss of any material. To achieve this different fixatives and various techniques have been used for over a century.

A wide range of histologic fixatives have been used for cell blocks [17]

i. Bouin's fixative
ii. Picric acid fixative
iii. Buffered formalin
iv. Ethanol [18]
v. Carnoy fixative

Various techniques that are known till today include

i. Fixed sediment method. [17]
ii. Simplified cell block method. [17, 19]
iii. Bacterial agar method.[17, 20]
iv. Cell block using ethanol-formalin fixative. [21]
v. Cell block using plasma-thromboplastin.[22]
vi. Cell block using cotton block method.[15]
vii. Cell block using colloidin-bag.[23]
viii. Compact cell block technique.[17]
ix. Scrape cell block technique.[24]
x. Automated cell block technique. [25]

Fixed sediment method. [17]

1. Mix sediments or tissue fragments in appropriate fixative.
2. Centrifuge this mixture for 10 minutes.
3. Pour off supernatant and drain tube well by inverting the tube on a paper towel.

4. Carefully remove the packed sediment from the test tube by means of a spatula and wrap it in lens paper. Place wrapped sediment in a tissue cassette and submit for routine histopathological technique.

Simplified cell block method. [17, 19]

In 1988, Krogerus and Anderson introduced a simple technique for preparation of cell blocks from material obtained by fine needle aspiration, brushings and effusions. The technique is unique in that the procedure is carried out in a sample tube, ensuring minimal cell loss. No transfer of sample material to a cassette is necessary, eliminating the need for wrapping paper, agar, or thrombin. The procedure is

1. In a 50 ml plastic conical centrifuge tube, fix the sample with 50% alcohol for 1 hour.
2. Spin the sample at 300 g for 7 minutes and pour off supernatant.
3. Re-suspend cell pellet in 3 ml of acetone for 10 minutes.
4. Spin the sample at 300 g for 10 minutes. Pour off acetone.
5. Place tubes for 1 hour on a warm plate (not more than 60°C).
6. Add melted paraffin to the dry, warm pellet.
7. After paraffin has solidified, tap the bottom of the tube to remove block.
8. Trim and process the conical end of the paraffin block.

Bacterial agar method. [17, 20]

<u>Preparation of stock agar</u>

3% agar is prepared by dissolving 3 gm of bacterial agar in 100 ml of boiling water. The melted agar is coloured with a small amount of food colouring agent to

ensure contrast with the paraffin. The dissolved agar is aliquoted into sterile glass tubes with a screw cap. Cap the tubes loosely until the agar cools and hardens. When the agar has cooled, tighten the caps and place the tubes in a refrigerator until ready for use.

Preparation of working solution

Working solution is prepared by melting the agar in a 60°C water bath.

Procedure

1. Sediments or tissue fragments are mixed in fixative.
2. Mixture is centrifuged for 10 minutes.
3. The sediment is removed from the test tube with a spatula and placed on a paper towel.
4. Slice the sediment with a scalpel.
5. Place the cut side of the packed sediment in a small pool of melted agar that has been spread on a glass slide or a Petri dish. Cover all exposed areas of the sediment with melted agar and let stand a few minutes to harden.
6. Trim the excess agar from the sediment and place the agar button in a tissue cassette.
7. Put tissue cassette in the fixative and process the tissue.

Cell block using ethanol-formalin fixative [21]

1. Aspirated material centrifuged in a 10-mL disposable centrifuge tube at 4,000 rpm for 6 minutes to create cell pellet.

2. The supernatant fluid decanted and the deposit fixed in *freshly* prepared Nathan alcohol formalin substitute consisting of 9 parts of 100% ethanol and 1 part of 40% formaldehyde.
3. The fixed cell pellets recentrifuged at 4,000 rpm for 6 minutes.
4. The cell pellets wrapped in crayon paper, placed in a cassette, and stored in 80% ethanol until ready for histopathological processing.
5. Routine H and E staining used on all cell block sections.

Cell block using plasma-thromboplastin [22]

1. The aspirated fluid poured into the centrifuge tube and centrifuged
2. The supernatant poured off.
3. Two drops of pooled plasma to be added to the sediment and mixed well, followed by four drops of thromboplastin and quickly mixed well again.
4. The tube is allowed to stand for 5 minutes.
5. The resultant clot in the test tube is slid onto Whatman Filter Paper No. 1 that is premoistened with formalin, wrapped, and put in a tissue cassette and fixed in buffered formalin.
6. Further, the sample is processed as per routine histological technique.

Cell block using cotton block method [15]

Carlos Musso et al in 2005 tried a new technique of cell block, cotton block method.

1. The plastic hub of 22-23 gauge needle is snugly fit with a cotton bud and the piston of 10ml syringe is connected.
2. Aspiration is performed and the smear prepared.
3. The material remaining in the needle and the material retained in the cotton

mesh are immediately fixed by aspiration of a fixative fluid (70% alcoholic formaldehyde–acetic acid).

4. After fixation, the cotton tip is removed and routinely processed for paraffin embedding, and the sections are stained by routine stains.

Compact cell block technique [17]

Here the cells are packed into a small area free of erythrocytes and extracellular protein, thereby reducing the screening time and eliminating the time for deep cuts.

1. Pour off the supernatant after centrifugation of 40cc of a well mixed sample.
2. Mix the sediment with an equal volume of cytorich red cells.
3. After 2 minutes, add 4 drops of plasma and 3 drops of thrombin.
4. Gently agitate the mixture when the clotting stops and slide the clot onto lens paper.
5. Mold the clot flat and compact by pressing with the finger.

Scrape cell block technique [24]

Kulkarni M.B et al (2000) thought that an inconclusive diagnosis on FNAC may be due to poor spreading and presence of thick tissue fragments despite aspiration of adequate material. They tried with cell block preparation from the material scraped from preformed slides, using agar as embedding medium.

1. Previously stained smears containing thick material was decoverslipped in xylene and the slides passed through two changes of absolute alcohol and brought to water.
2. Papanicolaou-stained smears destained with 1% acid alcohol, whereas Romanowsky stained smears destained with 2% glacial acetic acid.

3. After destaining, the smears thoroughly washed in running tap water for 2 hours.
4. Then, the slides carefully scraped with the help of a scalpel blade.
5. The scraped material then meticulously placed with a forceps in 3% molten agar to form a small button.
6. After the agar solidifies, it is wrapped in Whatman filter paper No. 1 and put in a tissue cassette. The scraped material is refixed in a histological fixative such as Bouin's fluid or formal saline for 5–6 hours.
7. It is then routinely processed to make a paraffin wax block and sections prepared.

Special stains

Various special stains like Ziehl-Neelsen stain to demonstrate acid fast bacilli, Periodic Acid Schiff stain to demonstrate glycogen and fungal elements, Alcian blue, Mucicarmin to demonstrate mucin are used on cell blocks. The other stains like Grams stain, Fite-Faraco stain, Grocott methenamine silver, elastic stains, toluidine blue, Congo red can also be used appropriately.

Immunostains and other ancillary techniques can also be applied to cell block material.

Immnocytochemistry is being used increasingly as an adjunct to conventional cytomorphology in the diagnosis of FNACs and effusions. Application of immunocytochemistry to conventional smears has following limitations:[22]

1. Limited cellularity for testing.

2. Specific staining may not be obtained because of disrupted cells and membrane fragments sticking to slides.
3. Lack of parallel samples of the same cells for additional tests or to run the control.
4. Large area of the conventional smear needs to be covered leading to wastage of antibodies.

It is possible to overcome these limitations by preparing a good cell block.

Kerstens HMJ et al., (2000) had tried techniques like In situ hybridization, Polymerase chain reaction successfully.[20]

Other studies

Since 1943, many authors have reported their results with the smears and cell block technique for various fluids and FNA, and this method is accepted as a routine laboratory procedure.

Keyhani Rofaga et al. (1984) in a study of 85 cases reported that, 55% of the original smear diagnoses were improved after the cell blocks were examined. The sensitivity of cell block varies from 60% to 86% depending on sample type and size, type of specimens and aspiration technique.[26]

Kern and Heber (1986) studied 393 cases of cell block preparation. In 273 (60.3%) the findings were confirmatory and in 103 (60.3%) cases cell blocks provided additional information for diagnosis.[27]

Hajudu (1987) showed cell blocks prepared from the residual tissue and fluid can be particularly useful for the identification of tumours that causes diagnostic difficulties on smears. This technique is simple reproducible and safe. Further the

effectiveness of the cell block lies in the availability of diagnostic material for further histological examination, histochemistry and IHC for better classification of the tumour.[28]

Wojcik and Selvaggi (1991) showed that 84% of the cases had identical results on both smear and cell block.[29]

Leung and Bedard (1993) found that all cases with adequate material could be diagnosed on a cell block preparation.[30]

Brown et al., (1993) described a study in which the examination of 84 FNAs revealed 55 malignancies with cytology alone, but further 9 malignancies were identified on examining the cell blocks.[31]

Maksem M et al., (1996) prepared cell blocks from endometrial tissue fragments suspended in a liquid fixative. The diagnostic accuracy of endometrial cytology increased, especially in cases of hyperplasia with atypia and adenocarcinoma.[32] Kulkarni M.B et al., (2000) in his scrape cell block study, studied 27 cases. In 12 cases scrape cell block slides added information to the FNAC smears.[24]

Nathan NA et al., (2002) developed a modified cell block technique using an improvised ethanol formalin fixative (Nathan alcohol formalin substitute) followed by a simple paraffin processing and showed its increased efficacy in diagnostic cytology. He concluded that his improved preparation offers excellent cytomorphologic features comparable to cells in Papanicolaou-stained smears and ensures optimal preservation of histochemical and immunocytochemical properties. In this series of 409 FNAC specimens, a definitive cytologic conclusion was possible from smears alone in 347

cases (84.8%) and cell blocks alone in 300 (73.3%). The overall improvement, when both smears and cell blocks were studied together, was 62 (15.2%) cases.[21]

Nigro K et al. (2007) compared four cell block methods in the setting of nongynecologic specimens. 48 cell blocks were prepared from 12 nongynecologic specimens. They observed that in the setting of nongynecologic specimens, the plasma thromboplastin cell blocks were easily prepared and produced the best cell blocks with regards to cellularity, cell distribution, and background quality.[33]

MATERIALS AND METHODS

Source of Data:

Patients with swellings in various part of the body who underwent FNAC and yielded fluid on aspiration at the cytology unit of R L Jalappa Hospital were studied from 01-11-2010 to 30-04-2012.

Method of collection of data (including sampling procedure, if any):

All the patients were clinically examined and a detailed history was taken according to the proforma. Careful examination of the swelling was done.

Inclusion criteria :

All patients visiting R.L.Jalappa Hospital and Research Center attached to Sri Devaraj Urs Medical College, who are subjected for FNAC for evaluation of swelling and yielded fluid on aspiration.

Exclusion Criteria :

1. Solid tissue aspirates.
2. Scanty tissue aspirates.

Under aseptic precautions, the aspiration was done with 22-23 G needle. USG guided FNAC was performed for intra-abdominal masses using 22 G lumbar puncture needle.

Conventional smears

Once the fluid was aspirated, it was subjected for centrifugation at 3000 rpm for 5 minutes. The conventional smears were prepared with the sediment and stained with Haematoxylin and Eosin, Papanicolaou, and May-Grünwald-Giemsa stains.

The residual fluid was halved and subjected for cell block preparation by the following two techniques, plasma-thromboplastin technique and ethanol-formalin technique.

Cell block preparation:

Two techniques were employed to prepare cell block.

1. Plasma thromboplastin cell block technique
2. Ethanol - formalin fixed cell block technique.

Plasma thromboplastin cell block technique

1. The aspirated fluid was centrifuged in a disposable centrifuge tube.
2. The supernatant was poured off.
3. Two drops of pooled plasma was added to the sediment and mixed well
4. Four drops of thromboplastin was added and quickly mixed well again.
5. The tube was allowed to stand for 5 minutes.
6. The resultant clot in the test tube was slid onto filter paper premoistened with formalin, wrapped, and transferred to a tissue cassette.
7. Further, the cassette was processed as per routine histological technique.

Ethanol - formalin fixed cell block technique

1. Aspirated material was centrifuged in a 10 ml disposable centrifuge tube at 4,000 rpm for 6 minutes to create cell pellet.
2. The supernatant fluid decanted and the deposit fixed in freshly prepared solution consisting of 9 parts of 100% ethanol and 1 part of 40% formaldehyde.
3. The fixed cell pellet was recentrifuged at 4,000 rpm for 6 minutes.
4. The cell pellet wrapped in filter paper premoistened with formalin, placed in a cassette, and processed as routine histological technique.

The cytomorphological features in the cytological smears and cell blocks were compared and analysed.

Categorisation

All the cases were categorised according to age distribution, sex distribution, site wise distribution of swellings, size of the swelling, volume of the aspirate, colour of the precipitate.

Method of analysis

All the conventional smears and sections from both the cell block techniques were reviewed separately. The cytomorphological features like cellularity, cytoarchitecture, cytoplasmic and nuclear features, background details and final diagnoses were noted. The two cell block techniques were compared. Categories like cellularity, area of cell concentrate, architecture, cytoplasmic features, nuclear features, background and diagnosis were noted.

They were categorised into 4 groups based on the final diagnosis: non neoplastic (inflammatory), neoplastic (benign and malignant) and inadequate. The number of cases that were diagnostic only on conventional smears and only on cell blocks were noted. Conventional smears and cell blocks were compared. The diagnostic features clinching the diagnosis were noted and the conclusive diagnosis was made.

Further, each of the lesions were studied and compared under following headings.

1. Conventional cytological smears alone were better in the diagnosis of lesions
2. Cell blocks alone were better
3. Absolute concordance between conventional smears and cell blocks
4. Cell blocks increased the levels of confidence over conventional smears.

The present study results were compared with other previous similar studies.

RESULTS

Analysis of data

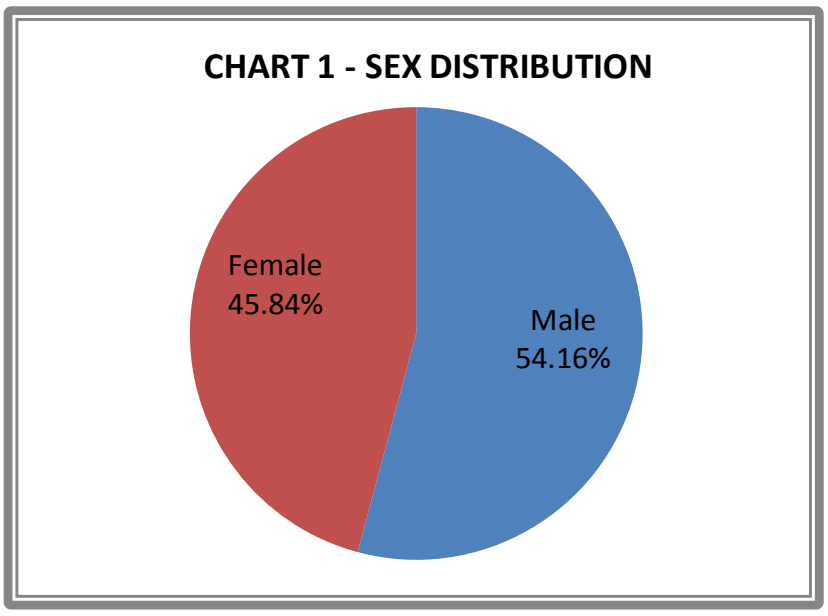
The present study comprises of 96 patients with swellings in various parts of body referred for fine needle aspiration cytology and yielded fluid on aspiration. Conventional smears and cell blocks were prepared in all cases. Turnaround time for cell block was 24 hours.

SEX DISTRIBUTION

In the present study males were 52 (54.16%) and females were 44 (45.84%) in number.

TABLE 01 – DISTRIBUTION OF CASES IN BOTH SEXES

SEX	NO OF CASES	PERCENT
Male	52	54.16
Female	44	45.84
TOTAL	**96**	**100**

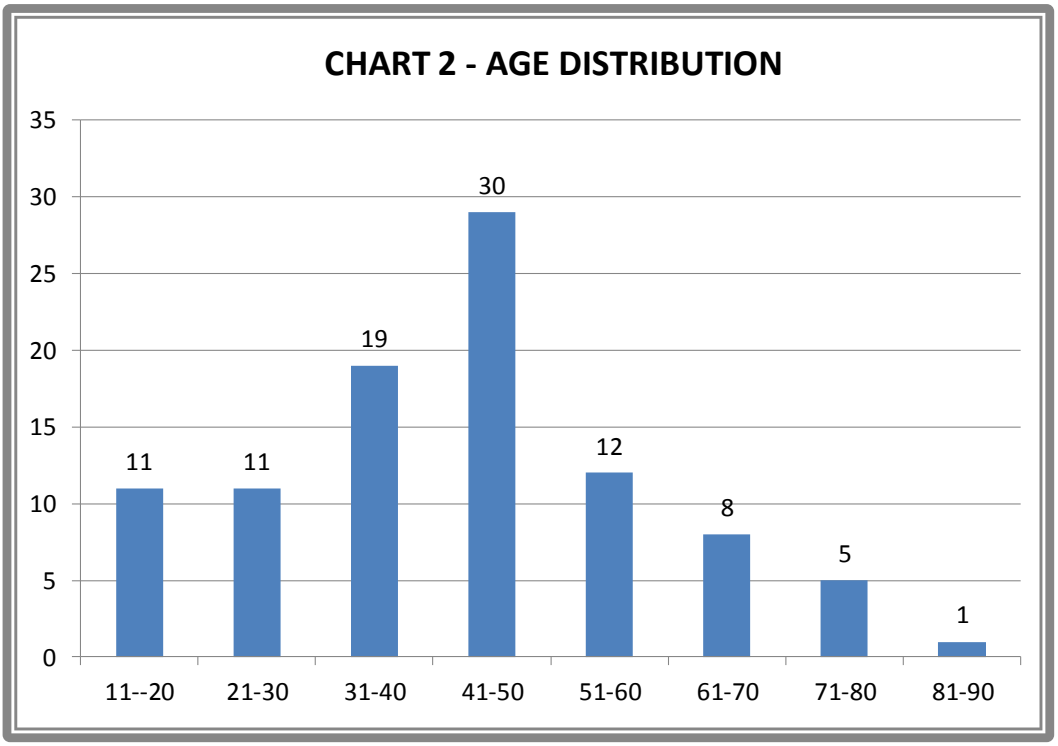


AGE DISTRIBUTION

The age of patients ranged from 13 years to 87 years.

TABLE 02 – DISTRIBUTION OF CASES IN DIFFERENT AGE GROUPS

AGE GROUP (YEARS)	NO OF CASES	PERCENT
11-20	11	11.45
21-30	11	11.45
31-40	19	19.80
41-50	29	30.21
51-60	12	12.51
61-70	08	08.33
71-80	05	05.21
81-90	01	01.04
TOTAL	**96**	**100**



SITE DISTRIBUTION

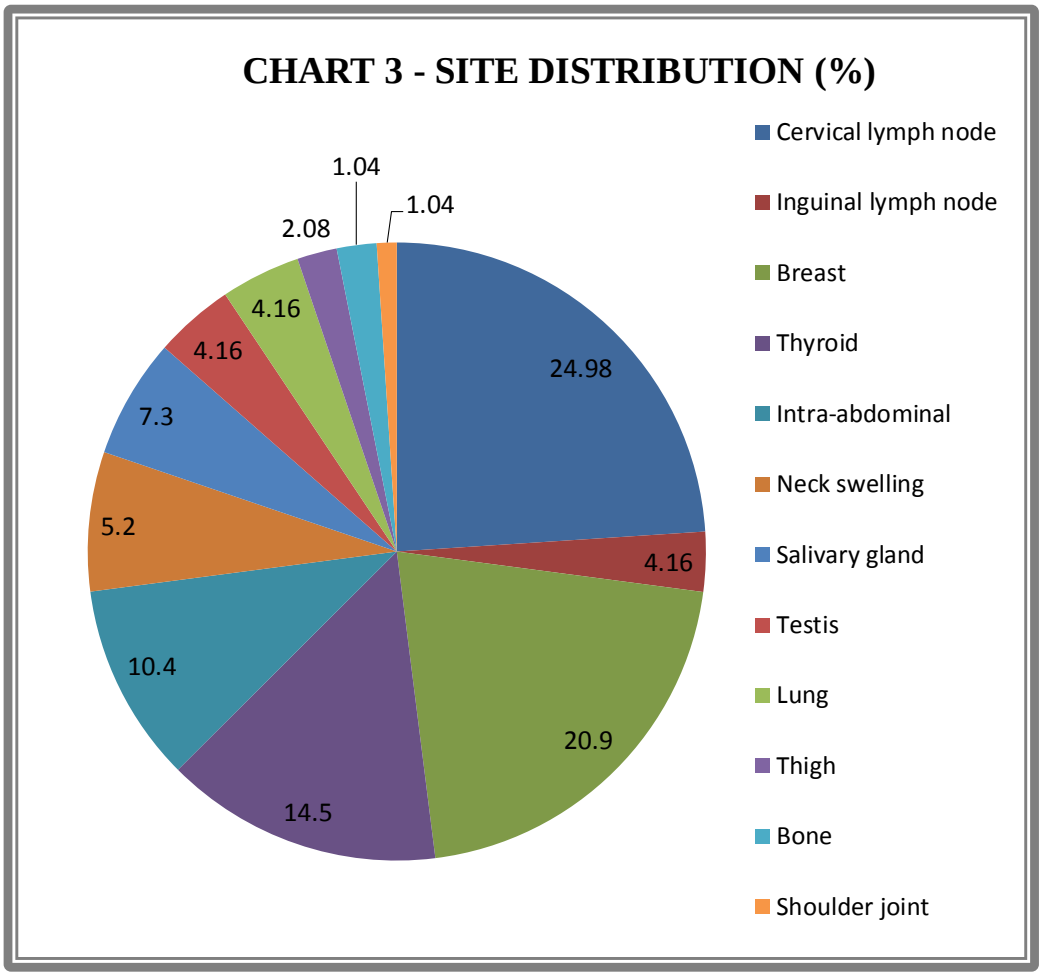
Out of total 96 patients, 24 patients presented with lymph node swellings in the cervical region and 4 in the inguinal region. Fourteen patients presented with thyroid swellings, 7 with salivary gland swellings which included both major and minor salivary glands, 5 patients with swellings in the lateral region of neck, 20 patients with lump in the breast and 4 with lung masses. Ten patients presented with intra-abdominal mass of which 4 were with liver nodules, one each with renal mass, splenic nodule, mass in the ovary, mesentery, stomach wall and retroperitoneum. Four presented with testicular swellings, 2 with swelling in the thigh region, 1 with bony swellings and 1 with swelling in the shoulder region.

TABLE 03 – DISTRIBUTION OF CASES IN DIFFERENT SITES

SITE	NO OF CASES	PERCENT (%)
Lymph Node – Cervical - Inguinal	24 04	24.98 04.16
Thyroid	14	14.58
Salivary Gland	07	07.30
Neck swelling*	05	05.20
Breast	20	20.90
Lung	04	04.16
Intra abdominal**	10	10.40
Testis	04	04.16
Thigh	02	02.08
Bone	01	01.04
Shoulder Joint	01	01.04
TOTAL	**96**	**100**

* Neck swellings – Acute suppurative lesion–1, Tubercular abscess– 1, Branchial cleft cyst – 3.

** Intra abdominal - Liver – 4, Kidney – 1, Spleen – 1, Ovary – 1, Mesentery– 1, Stomach– 1, Retroperitoneum – 1.

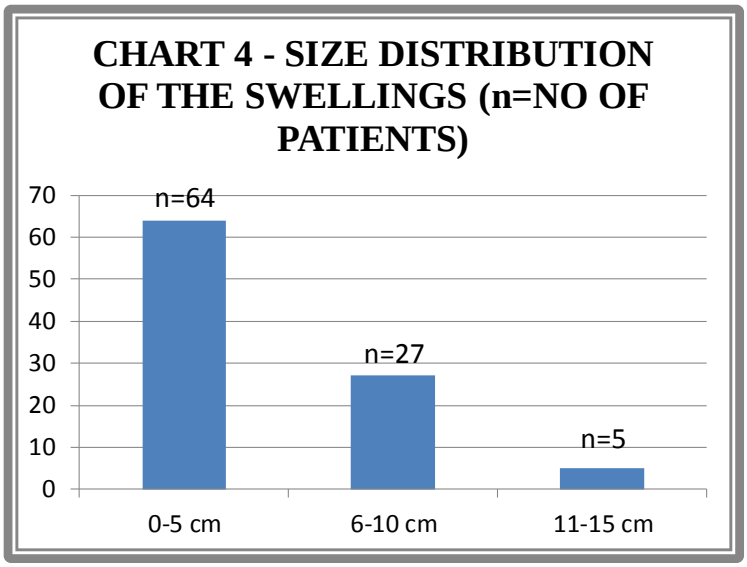


SIZE DISTRIBUTION

Size of the swellings with which patients presented varied from 2 cm to 15 cm. Twenty nine of them showed surface nodularity and remaining 67 had smooth surface.

TABLE 04 – SIZE WISE DISTRIBUTION OF SWELLINGS

SIZE (Cm)	NO OF CASES	PERCENT
0-5	64	66.7
6-10	27	28.1
11-15	05	05.2
TOTAL	**96**	**100**

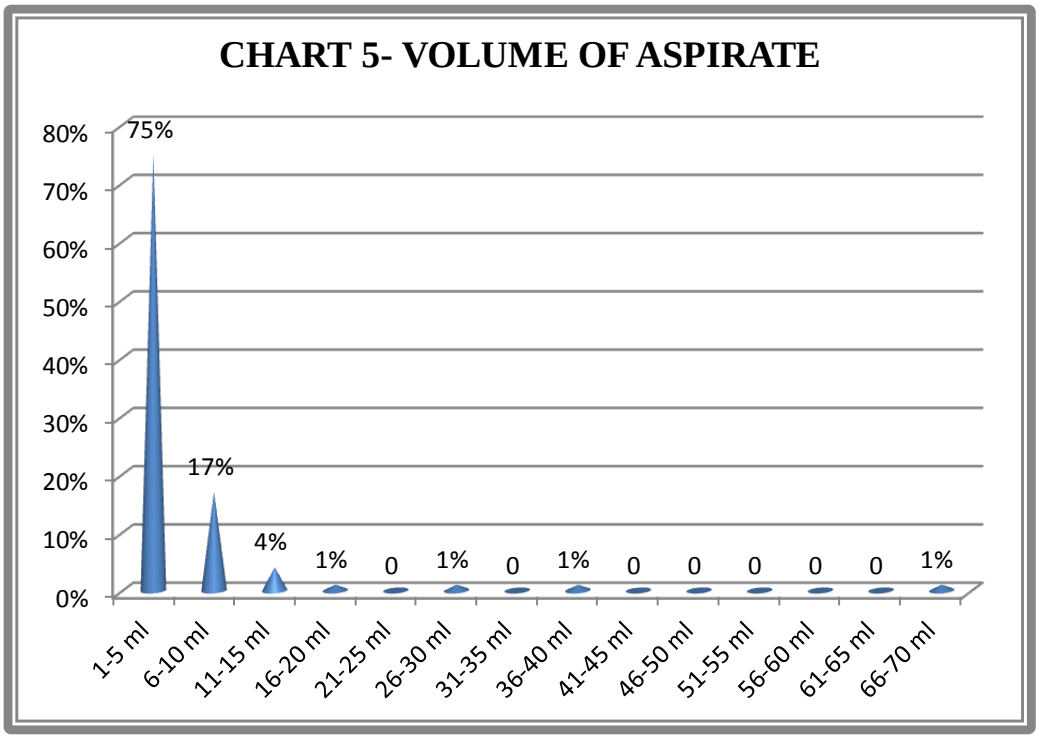


VOLUME OF ASPIRATE

Aspirated fluid volume ranged from 2ml to 70ml.

TABLE 05 – VOLUME OF THE ASPIRATE

VOLUME (ML)	NO OF CASES	PERCENT (%)
1-5	72	75.00
6-10	16	16.66
11-15	04	04.18
16-20	01	01.04
21-25	00	0
26-30	01	01.04
31-35	00	0
36-40	01	01.04
41-45	00	0
46-50	00	0
51-55	00	0
56-60	00	0
61-65	00	00
66-70	01	01.04
TOTAL	**96**	**100**

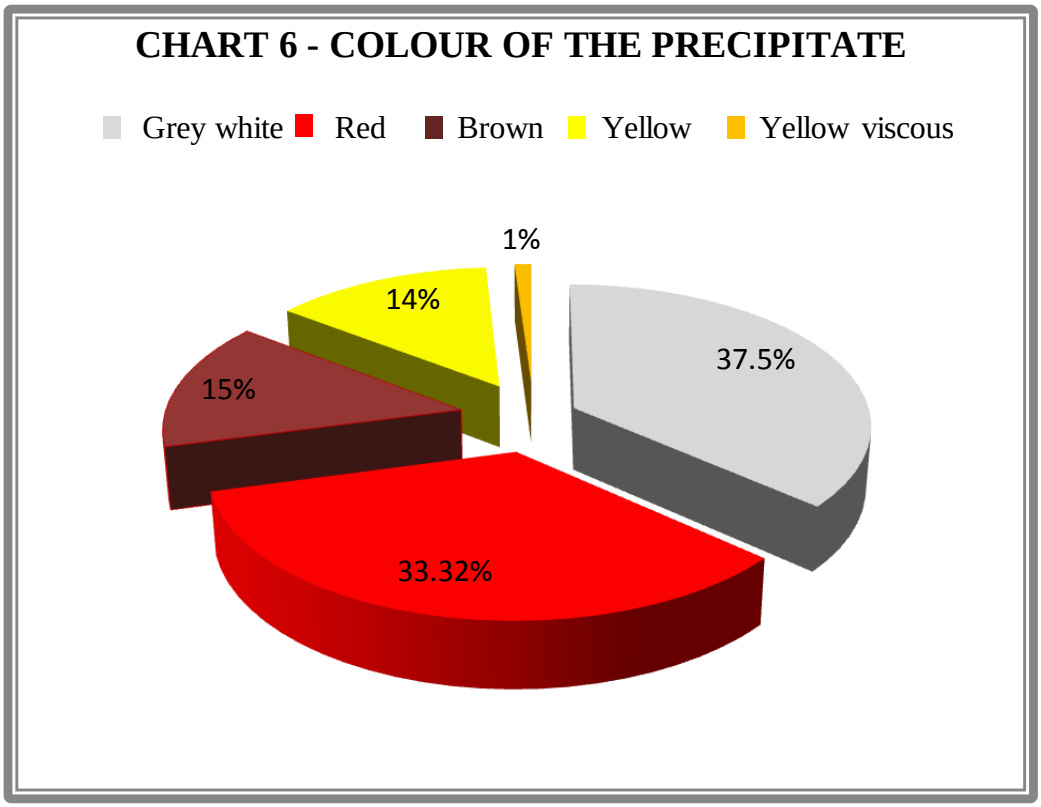


COLOUR OF THE PRECIPITATE

Fluid aspirated from swellings was subjected for centrifugation. The supernatant was discarded and the colour of the precipitate was noted. The colour of the precipitate was considered and not the colour of the aspirated fluid because, precipitate is the concentrate of the deposited cells following centrifugation.

TABLE 06 - COLOUR OF THE PRECIPITATE

COLOUR	NO OF CASES	PERCENT
Grey white	36	37.50
Red	32	33.32
Brown	14	14.58
Yellow	13	13.56
Yellow viscous	01	01.04
TOTAL	**96**	**100**



CASE CATEGORIES AND THEIR CYTOMORHOLOGICAL FEATURES

Out of 96 cases, 54 (56.25%) were malignant cases, 40 (41.67%) were non malignant cases and 2 cases were inconclusive. Of 40 non malignant cases, inflammatory lesions were 06 (06.26%), and benign lesions were 34 (35.41%).

TABLE 07 – CATEGORIZATION OF CASES

CATEGORY	NO OF CASES (PERCENTAGE)
Inflammatory	06 (06.26%)
Benign	34 (35.41%)
Malignant	54 (56.25%)
Inconclusive	02 (02.08%)
TOTAL	**96 (100%)**

TABLE 08 - INFLAMMATORY LESIONS

Site	No of cases	Diagnosis on conventional smears	Diagnosis on cell blocks		Result
			PT	EF	
Neck Swellings	01	Acute Inflammatory Process - Abscess	Acute Inflammatory Process - Abscess	Acute Inflammatory Process - Abscess	A
	01	Tubercular Abscess	Tubercular Abscess	Tubercular Abscess	A
Salivary gland	01	Post inflammatory serous cyst	Post inflammatory serous cyst	Post inflammatory serous cyst	A
Thyroid	01	Suppurative thyroiditis	Suppurative thyroiditis	Suppurative thyroiditis	A
Breast	01	Acute Suppurative Mastitis	Acute Suppurative Mastitis	Acute Suppurative Mastitis	A
Liver	01	Hydatid cyst	-	-	CS
Total Cases	**06**				

PT – Plasma thromboplastin technique, **EF** – Ethanol-formalin technique

A – Absolute concordance, **CS** – Conventional smears better.

Six inflammatory lesions yielded fluid on aspiration. Cellularity was high in all the aspirates except in post inflammatory serous cyst and in hydatid cyst. Conventional smears and cell blocks showed inflammatory cells in discretes. Thyroid follicular cells in clusters and follicular pattern could be demonstrated in case of suppurative thyroiditis, clusters of ductal epithelial cells were identified in acute suppurative mastitis. Demonstration of acid fast bacilli was possible in both conventional smears and in cell block sections in case of tubercular abscess. Hooklets of hydatid cyst could be demonstrated in conventional smears (Figure 1) which were not demonstrated in cell block sections. There was absolute concordance between conventional smears and cell blocks in all the cases except one, Hydatid cyst of liver.

TABLE 09 - BENIGN LESIONS

Site	No of cases	Diagnosis on conventional smears	Diagnosis on cell blocks		Result
			PT	EF	
Cervical lymph node	02	Lymphatic cyst	Lymphatic cyst	Lymphatic cyst	I
Thyroid	07	Colloid Cyst	Colloid Cyst	Colloid Cyst	A
	03	Colloid goitre	Colloid goitre	Colloid goitre	A
Salivary gland	01	Simple cyst	Simple cyst	Simple cyst	A
	01	Pleomorphic adenoma	Pleomorphic adenoma	Pleomorphic adenoma	A
	01	Monomorphic adenoma	Basal cell adenoma	Basal cell adenoma	I
Neck swellings	03	Branchial cleft cyst	Branchial cleft cyst	Branchial cleft cyst	A
Breast	04	Fibrocystic disease	Fibrocystic disease	Fibrocystic disease	A
	02	Cystic lesion	Cystic lesion	Cystic lesion	A
	01	Galactocele	Galactocele	Galactocele	A
	01	Phyllodes tumour	Phyllodes tumour	Phyllodes tumour	A
	01	Angiomatous Hamartoma	Hemangioma	Hemangioma	I
Intra-abdominal	01	Lymphatic cyst	Lymphatic cyst	Lymphatic cyst	I
	01	Schwannoma	Schwannoma	Schwannoma	I
	01	GIST	GIST	GIST	I
Testis	02	Spermatocele	Spermatocele	Spermatocele	A
Thigh	01	Keratinous cyst	Keratinous cyst	Keratinous cyst	A
Shoulder joint	01	Bursitis	Bursitis	Bursitis	I
Total	**34**				

PT – Plasma thromboplastin technique, **EF** – Ethanol-formalin technique

A – Absolute concordance, **I** – Increased level of confidence

Benign lesions accounted for 35cases.

Cervical lymph node

Swellings from cervical lymph nodes included 2 cases of **lymphatic cysts**. Cell blocks increased the level of confidence in arriving at diagnosis by demonstrating tiny vessels lined by endothelium filled with lymphocytes in the lumen.

Thyroid

There were 10 patients with thyroid swellings. FNAC yielded brown coloured fluid on aspiration ranging from 3 ml to 70 ml. Seven cases were diagnosed as **colloid cysts** and 3 cases as **colloid goitre**. Both the cases showed similar architectural and cytomorphological features on conventional smears and on cell block sections. There was an absolute concordance between smears and cell blocks.

Salivary gland

Of the 3 salivary gland swellings, one case each was from parotid, submandibular, and minor salivary gland in the hard palate.

Parotid swelling yielded 2 ml of brown colour fluid on aspiration. Cell blocks and conventional smears showed moderate cell yield consisting of normal acinar cells in a background of cyst macrophages and proteinaceous material. It was diagnosed as **simple cyst** of salivary gland. There was an absolute concordance between smears and cell blocks.

Submandibular gland yielded 2 ml of hemorrhagic fluid on aspiration. Smears showed high cell yield consisting of monomorphic cells in acinar pattern, and in clustes with moderate cytoplasm, benign nuclear features showing uniformly distributed chromatin and intercellular fibrinous material in background. Cell blocks showed bilayered strands/ribbons of basal cells adhered to hyaline basement

membrane like material and well vascularised stroma. Cell blocks highlighted the architecture and increased the level of confidence in arriving at diagnosis of **basal cell adenoma (**Figure 3 and 4**)**.

Aspiration from the minor salivary gland swelling in the hard palate yielded 1 ml hemorrhagic fluid. Smears showed high cell yield, consisting of plasmacytoid cells in clusters, chondromyxoid stroma in the background. Cell blocks showed epithelial cell clusters, acini, sheets of spindle cells and fibromyxoid stroma. A diagnosis of **pleomorphic adenoma** was made. There was an absolute concordance between smears and cell blocks.

Neck swellings

Neck swellings included 3 cases of **branchial cleft cysts** which yielded 2-10 ml of fluid on aspiration. Both conventional smears and cell blocks showed similar features of high cellularity, dispersed nucleated and anucleate squamous cells in a background of proteinaceous material and occasional inflammatory cells. There was an absolute concordance between smears and cell blocks.

Breast

Breast lumps were noted in 9 patients. FNA yielded fluid ranging from 2 ml to 10 ml. Six cases were of **fibrocystic disease** and demonstrated similar architectural and cytomorphological features on cytology smears and on cell block sections. They showed moderate to high cellularity consisting of ductal epithelial cells arranged in clusters, sheets having benign nuclear features with cyst macrophages in the background. There was an absolute concordance between smears and cell blocks.

Aspiration of breast swelling in a 35 yr old female yielded 6 ml of grey white turbid fluid. Smears showed moderate cellularity consisting of benign ductal epithelial cells in sheets, acinar pattern, and moderate amount of cytoplasm, bland nuclear features and inflammatory cells in the background. A diagnosis of **galactocele** was made. There was an absolute concordance between smears and cell blocks.

Aspirate from breast from 65 yr old male yielded 3 ml of hemorrhagic fluid. Conventional smears showed only haemorrhage and occasional spindle shaped cells. Cell blocks showed well formed capillaries along with haemorrhage and increased the level of confidence level in arriving at a diagnosis of **hemangioma**.

A breast lump from 60 yr female measuring 8x6cm in size yielded 4 ml of blood tinged turbid yellow fluid. Both conventional smears and cell blocks showed good number of stromal cells and occasional benign ductal epithelial cells. A diagnosis of **Phyllodes tumour** was made. There was an absolute concordance between smears and cell blocks.

Intra-abdominal

Three intra-abdominal swellings were diagnosed as benign. All FNACs were done under USG guidance and yielded fluid on aspiration. Cell blocks increased the level of confidence in diagnosis in all the three cases.

FNAC of mesenteric swelling yielded 10 ml of milky white fluid. Conventional smears showed numerous small lymphocytes in discretes. Cell blocks demonstrated a good number of endothelium lined vessels filled with lymphocytes and eosinophilic material (lymph). It was diagnosed as mesenteric **lymphatic cyst** (Figure 5 and 6).

Second case was **Schwannoma** (retroperitoneal mass). Repeated aspiration in this case initially yielded scanty material which failed to demonstrate any cells. Final aspiration yielded 3 ml of hemorrhagic fluid. Conventional smears showed spindle shaped cells in discrete, fascicles, sheets. Nuclei were wavy in appearance. Cell blocks very well demonstrated Verocay bodies with Antony A pattern (Figure 7 and 8).

The third case was swelling arising from stomach wall. FNAC yielded hemorrhage that showed spindle cells in fascicles. Spindle shaped smooth muscle cells arranged in fascicles, whorls were seen in cell blocks. A diagnosis of **GIST** was arrived at.

Testis

Testicular swellings with clinical suspicion of malignancy were noted in 2 patients. Aspiration yielded 15 ml of milky white fluid. Cell blocks and conventional smears showed a large number of sperms and leucin crystals. Diagnosis of **spermatocele** was arrived at.

Thigh region

Swelling in the thigh region yielded 2ml of purulent aspirate which showed similar features on conventional smears and cell blocks. Both consisted of nucleated and anucleate squamous cells and necrotic material in the background. A diagnosis of **keratinous cyst** was arrived at.

Shoulder joint

A cystic swelling measuring 12x10 cm in the shoulder joint yielded 20 ml of yellow viscous fluid. Conventional smears showed scanty cell yield consisting of

occasional inflammatory cells in a proteinaceous background. Cell blocks showed high cell yield consisting of inflammatory cells and demonstrated fibrin characteristic of **bursitis.**

TABLE 10 – MALIGNANT LESIONS

Site	**No of cases**	**Diagnosis on conventional smears**	**Diagnosis on cell blocks**		**Result**
			PT technique	**EF technique**	
Cervical lymph node	20	SCC deposits	SCC deposits	SCC deposits	I
	02	Adenocarcinoma deposits	Adenocarcinoma deposits	Adenocarcinoma deposits	I
Inguinal lymph node	04	SCC deposits	SCC deposits	SCC deposits	I
Thyroid	02	Papillary carcinoma	Papillary carcinoma	Papillary carcinoma	I
Salivary gland	01	Adenocarcinoma	Adenocarcinoma	Adenocarcinoma	A
	01	Adenoid cystic carcinoma	Adenoid cystic carcinoma	Adenoid cystic carcinoma	I
	01	Acinic cell carcinoma	Acinic cell carcinoma	Acinic cell carcinoma	I
Breast	06	Ductal carcinoma	Ductal carcinoma	Ductal carcinoma	A
	02	Tubular carcinoma	Tubular carcinoma	Tubular carcinoma	1A+1I
	01	Neuroendocrine tumour	Carcinoid tumour	Carcinoid tumour	A
	01	Carcinoma breast	Metaplastic carcinoma	Metaplastic carcinoma	I
Lung	03	Adenocarcinoma	Adenocarcinoma	Adenocarcinoma	A
Liver	01	Hepatocellular carcinoma	Hepatocellular carcinoma	Hepatocellular carcinoma	A
	01	Adenocarcinoma metastasic deposits	Adenocarcinoma metastasic deposits	Adenocarcinoma metastasic deposits	A
	01	Ductal carcinoma metastatic deposits	Ductal carcinoma metastatic deposits	Ductal carcinoma metastatic deposits	A
Kidney	01	Renal cell carcinoma	Renal cell carcinoma	Renal cell carcinoma	A

Site	No of cases	Diagnosis on conventional smears	Diagnosis on cell blocks		Result
			PT technique	EF technique	
Spleen	01	Metastatic deposits from testis	Yolk sac tumour deposits	Yolk sac tumour deposits	I
Ovary	01	Adenocarcinoma	Adenocarcinoma	Adenocarcinoma	I
Testis	01	Acute inflammatory process	Seminoma	Seminoma	CB
	01	Seminoma	Seminoma	Seminoma	A
Thigh	01	MMT	MMT	MMT	A
Bone	01	Osteosarcoma	-	-	CS
TOTAL	**54**				

A – Absolute concordance, **CB** - Cell block better, **CS –** Conventional smears better, **I**–Increased level of confidence, **MMT-** Malignant mesenchymal tumour

Total number of malignant lesions accounted to 54 in number. Majority of cases which yielded fluid on aspiration were from lymph node swellings with metastatic deposits.

Lymph nodes

FNAC performed in 26 lymph node swellings (22 cervical lymph nodes and 4 inguinal lymph nodes), 24 cases (20 of 22 cervical lymph nodes, all 4 inguinal lymph nodes) were diagnosed to be metastatic deposits from squamous cell carcinoma elsewhere in the body. Two cases of cervical lymph node aspirates revealed adenocarcinoma deposits.

In swellings with **SCC deposits**, aspirate was grey white turbid in colour and ranged from 2 ml to 5 ml in volume. Conventional smears in all cases showed moderate to high cell yield except in 2 cases wherein the smears had sparse cell spread. Smears consisted of cells in discrete. Cells were atypical squamous cells with

intense eosinophilic cytoplasm, increased nuclear cytoplasmic ratio, irregular nuclear membrane and hyperchromatic nucleus (Figure 9). Cell blocks showed sheets of atypical squamous cells with all the above mentioned cytomorphological features and additional features like well formed squamous keratin pearls, and demonstration of intact intercellular bridges (Figure 10). Cell blocks increased the level of confidence in diagnosis.

Two cases with cervical lymph nodes were given diagnosis of adenocarcinoma deposits. One swelling yielded 8 ml of mucinous material and showed scanty cell yield both on conventional and on cell blocks. Smears consisted of round to oval cells with moderate amount of cytoplasm, irregular nuclear membrane and hyperchromatic nucleus. Diagnosis of carcinomatous deposits was given. Cell blocks along with above mentioned cytomorphological features preserved architectural pattern very well, which showed well formed glandular structures (Figure 11 and 12). A diagnosis of **Adenocarcinoma deposits** was given following cell block.

Second case yielded 3ml of blood tinged straw coloured fluid. Both conventional smears and cell blocks showed similar features of **adenocarcinoma deposits**. By preserving architectural features, cell blocks increased level of confidence in diagnosis.

Thyroid

There were two cases of thyroid swellings which yielded an average of 5 ml of brown coloured fluid on FNAC. One case showed moderate cell yield on conventional smears demonstrating mild pleomorphic thyroid follicular cells arranged in sheets, follicles. Cells were plasmacytoid with moderate amount of cytoplasm, nuclei with fine chromatin showing occasional transpolar grooves and intranuclear

inclusions in a background of cyst macrophages. Cell blocks demonstrated well formed papillae with central fibrovascular core and similar above mentioned nuclear features. It was diagnosed as **papillary carcinoma thyroid.**

Second case yielded scanty cell yield consisting of only occasional clusters of thyroid follicular cells. Cells in one of the clusters demonstrated intranuclear inclusions, and demonstrated mild pleomorphism. With these cytological features and clinical examination of swelling, a possibility of papillary carcinoma was given. A final diagnosis of **papillary carcinoma** was confirmed after appreciating well formed papillae with central fibrovascular core in cell blocks (Figure 13 and 14). Cell blocks increased level of confidence in diagnosis.

Salivary gland

Three salivary gland swellings yielded 2ml of hemorrhagic fluid. A final diagnoses as **adenocarcinoma, adenoid cystic carcinoma** (Figure 15 and 16) **and acinic cell carcinoma** were made both on cytology and cell blocks. There was absolute concordance between smears and cell blocks in case of adenocarcinoma. Cell blocks increased the level of confidence in diagnosing adenoid cystic carcinoma and acinic cell carcinoma by demonstrating cytoarchitectural pattrerns.

Breast

Ductal carcinoma breast were diagnosed in 6 cases. Aspiration in 5 cases yielded hemorrhagic fluid ranging from 2ml to 8 ml. One case yielded 2 ml of turbid yellow fluid. Conventional smears and cell blocks showed similar cytomorphological features of ductal carcinoma. Both showed moderate to high cell yield with pleomorphic cells arranged in loose sheets, clusters and glandular pattern, moderate

amount of cytoplasm, increased nuclear cytoplasmic ratio, irregular nuclear membrane, hyperchromatic nuclei, and prominent nucleoli. Background showed hemorrhage and necrosis. There was absolute concordance between smears and cell blocks.

Two cases were diagnosed as **tubular carcinoma**. Both conventional smears and cell blocks showed similar cytomorphological features. Cell yield was high consisting of cells arranged in clusters with angulated borders. Cells had moderate amount of cytoplasm, isonucleosis in a background of hemorrhage. There was absolute concordance between smears and cell blocks. In one of the cases architecture was better preserved in cell blocks.

One case of **neuroendocrine tumour** yielded 2ml of turbid white fluid. Both conventional smears and cell blocks showed cytomorphological features of neuroendocrine tumour with high cell yield consisting of cells arranged in rossets, sheets, having indistinct cell membrane, scant cytoplasm, round nucleus with fine granular chromatin in a background of RBCs. There was absolute concordance between smears and cell blocks.

Another lump in the breast yielded 2ml of hemorrhagic fluid. Conventional smears showed features of carcinoma breast along with a few number of large, bizarre cells. A diagnosis of carcinoma breast was made. Cell blocks could identify those bizarre cells which were seen in conventional smears as squamous cells. They clearly demonstrated intercellular bridges between cells. A final diagnosis of **metaplastic carcinoma** was given. (Figure17, 18).

Lung

In all the 3 lung masses FNAC was performed under CT guidance, two of which yielded 2ml of hemorrhagic fluid and one case yielded 10 ml. Conventional smears showed moderate to high cell yield consisting of round to oval cells arranged in glandular pattern, loose sheets, mild anisokaryosis, vesicular nuclei and prominent nucleoli with haemorrhage in background. There was an absolute concordance between conventional smears and cell blocks. It was diagnosed as **adenocarcinoma lung**.

Liver

There were 3 USG guided FNACs from liver masses, which yielded hemorrhagic fluid on aspiration. One case was metastatic deposits of **adenocarcinoma** and the second case was metastatic deposit from **ductal carcinoma** breast and the third case was of primary **hepatocellular carcinoma** liver. There was an absolute concordance between conventional smears and cell blocks.

Kidney

2 ml of hemorrhagic fluid was aspirated from a renal mass under USG guidance. Both conventional smears and cell blocks showed similar cytomorphological features of **renal cell carcinoma.** There was an absolute concordance between conventional smears and cell blocks.

Spleen

FNAC of a splenic mass with suspected metastasis from a patient with past history of testicular tumour was done under USG guidance. 3 ml of hemorrhagic fluid was aspirated. A moderate cell yield was obtained. Conventional smears showed large

pleomorphic cells arranged in clusters, sheets and cribriform pattern. Cells had abundant cytoplasm and large vesicular nucleus with prominent nucleoli. Background showed RBCs. Diagnosis of metastatic deposits in spleen was made (Figure 19). Cell blocks demonstrated well preserved Schiller-Duval bodies in addition to cytological features seen in smears (Figure 20). A final diagnosis of **yolk sac tumour** deposits in spleen was given.

Ovary

USG guided FNAC performed on ovarian mass yielded 5 ml of hemorrhagic fluid which showed scanty cell yield. Cells with malignant conventional features were arranged in loose clusters. A diagnosis of poorly differentiated carcinoma was given. Cell blocks, along with malignant cell features could also demonstrate the glandular architecture. A final diagnosis of **adenocarcinoma** was given. Cell blocks increased the level of confidence in providing the correct diagnosis.

Testis

Two cases with testicular swelling were included in the study. FNAC was done to rule out malignancy.

One case yielded 3 ml of hemorrhagic fluid with moderate cell yield consisting of large round to polygonal cells with indistinct cell membrane, vacuolated to clear cytoplasm, large centrally placed vesicular nucleus with prominent nucleoli in a background of lymphocytes. Cell blocks demonstrated similar features but architectural pattern was well appreciated which consisted of above mentioned cells arranged in loose sheets separated by delicate fibrous septae infiltrated by lymphocytes. A final diagnosis of **seminoma** testis was offered.

Second case yielded 6 ml of purulent aspirate. Conventional smears showed only acute inflammatory cells on repeat FNAC. Patient was treated with antibiotics and failed to respond to treatment. Cell blocks were performed with the material on repeat FNAC and demonstrated malignant cells arranged in loose sheets separated by delicate fibrous septae infiltrated by lymphocytes. A final diagnosis of **seminoma** testis was given. Cell blocks had an edge over conventional smears in this case. (Figure 21 and 22)

Thigh

A swelling in the thigh region which was thought of liposarcoma clinically yielded 2ml of hemorrhagic fluid on FNAC. It showed similar cytomorphological features on conventional smears and on cell blocks. It consisted of moderate to high cell yield, large pleomorphic cells in sheets, consisting of moderate amount of cytoplasm, anisokaryosis, increased nuclear cytoplasmic ratio, irregular nuclear membrane, hyperchromatic nuclei. Background showed hemorrhage and multinucleated giant cells. A diagnosis of malignant fibrous histiocytoma was made on conventional smears. Cell blocks demonstrated additional features which were not seen in conventional smears like skeletal muscle bundles. A final diagnosis of **malignant mesenchymal tumour with giant cells** probably of vascular origin was offered.

Bone

FNAC performed on supra-patellar swelling yielded 4 ml of hemorrhagic fluid. Conventional smears demonstrated moderate cell yield consisting of spindle shaped cells with dense eosinophilic cytoplasm, with coarse nuclear chromatin and perinuclear halo in a background of calcification and hemorrahge. It was diagnosed as

osteosarcoma. Cell block sections did not demonstrate any cells, showed only hemorrhage and osteoid like material.

TABLE – 11 COMPARISON BETWEEN SMEARS AND CELL BLOCKS

CATEGORY	**CONVENTINAL SMEARS**	**CELL BLOCKS - PT**	**CELL BLOCKS - EF**
Inflammatory	06 (06.3%)	05 (05.3%)	05 (05.3%)
Benign	34 (36.2%)	34 (36.2%)	34 (36.2%)
Malignant	53 (56.4%)	53 (56.4%)	53 (56.4%)
Inconclusive	01 (01.1%)	02 (02.1%)	02 (02.1%)
SUB TOTAL	**94 (100%)**	**94 (100%)**	**94 (100%)**
Insufficient Material	02	02	02
TOTAL	**96**	**96**	**96**

PT – Plasma-thromboplastin technique, **EF** – Ethanol-formalin technique

Present study included total of 96 cases, among them 2 (2.08%) cases did not show any diagnostic material in both smears and cell blocks. In the remaining 94 cases, conventional smears alone could provide diagnosis in 93/94 (98.9%) cases. Cell blocks alone provided diagnosis in 92/94 (97.9%) cases. In one case of seminoma, smears were inconclusive but cell blocks provided diagnosis. In two cases, which included hydatid cyst of liver and osteosarcoma each, smears provided diagnosis but cell blocks were inconclusive.

TABLE 12 – COMPARISON BETWEEN TWO CELL BLOCKS

FEATURE	PLASMA-THROMBOPLASTIN TECHNIQUE	ETHANOL-FORMALIN TECHNIQUE
Cellularity	**Number of cases**	**Number of cases**
No cells found	02	02
Low	10	09
Moderate	47	48
High	37	37
Total	**96**	**96**
Area of cell concentrate	Wide area of dispersion	Focal
Architecture	Similar in both methods	
Cytoplasmic features	Similar in both methods	
Nuclear features		
N : C	Similar in both methods	
Nuclear membrane		
Chromatin		
Nucleoli		
Background	Similar in both methods	
Final diagnosis	Similar in both methods	

PT – Plasma-thromboplastin, EF – Ethanol-formalin, N:C – Nuclear cytoplasmic ratio

The two cell block techniques were compared based on cellularity, architecture, cytoplasmic, nuclear and background features. All the features were similar in the cell block sections from both the techniques except cellularity and area of cell concentrate. Cellularity was less in one of the cases of squamous cells carcinoma deposits in lymph nodes by plasma-thromboplastin technique. The cell blocks showed squamous pearls and were diagnostic compared to the conventional smears with low cell spread of atypical squamous cells. Area of cell concentrate was more in sections with plasma-thromboplastin technique when compared to sections with ethanol formalin technique.

Following are the pictures with conventional smears and corresponding cell block sections. These pictures are illustrating the advantages of highlighting the diagnostic material in the cell blocks, thus increasing the levels of confident diagnosis by cell blocks.

HYDATID CYST OF LIVER

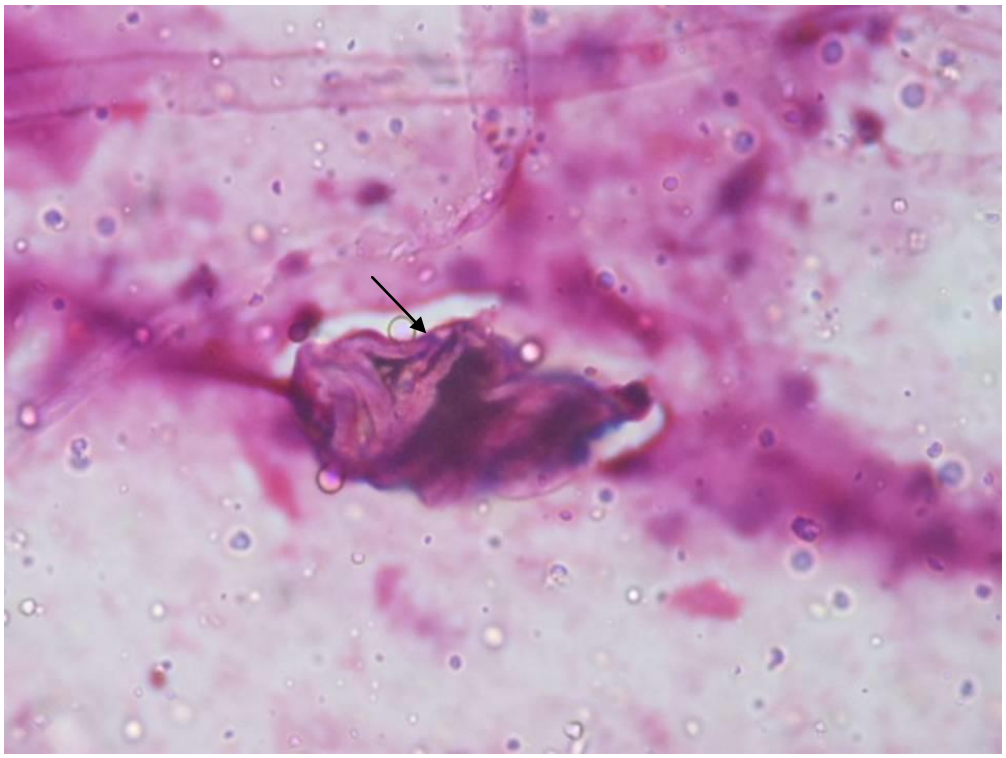


Figure 1- CS – Microphotograph - Hooklets of Ecchinococcus granulosus (MGG X 400)

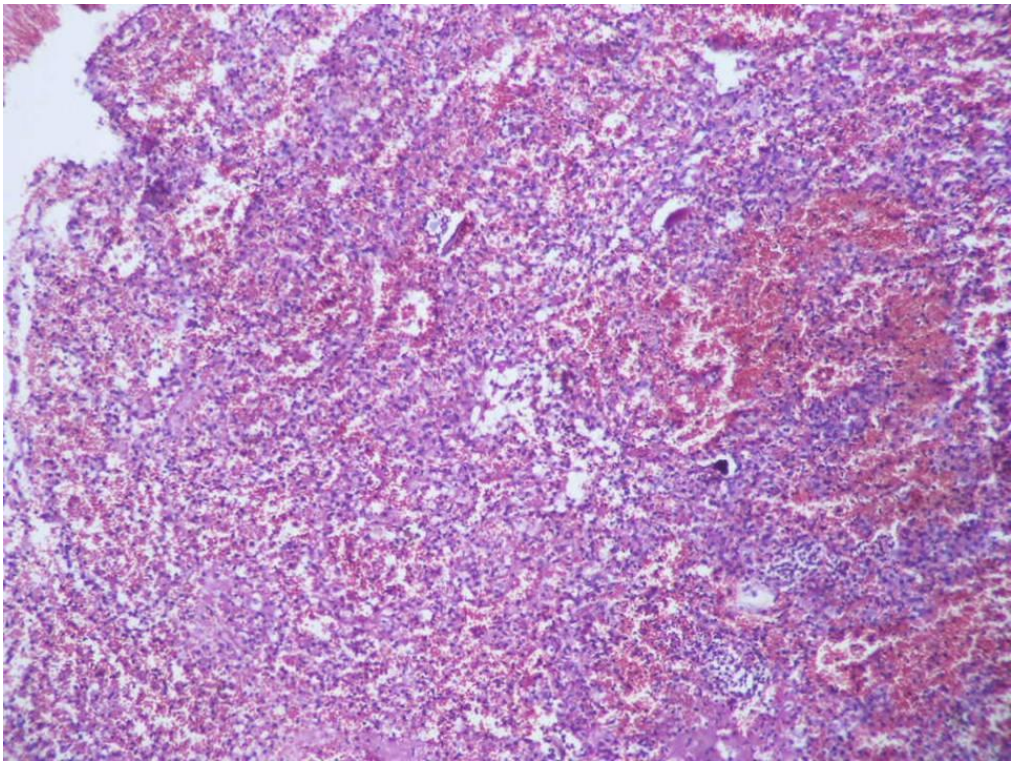


Figure 2 – CB – Microphotograph - Inflammatory cells only. No hooklets were demonstrated. (H and E X 100)

BASAL CELL ADENOMA

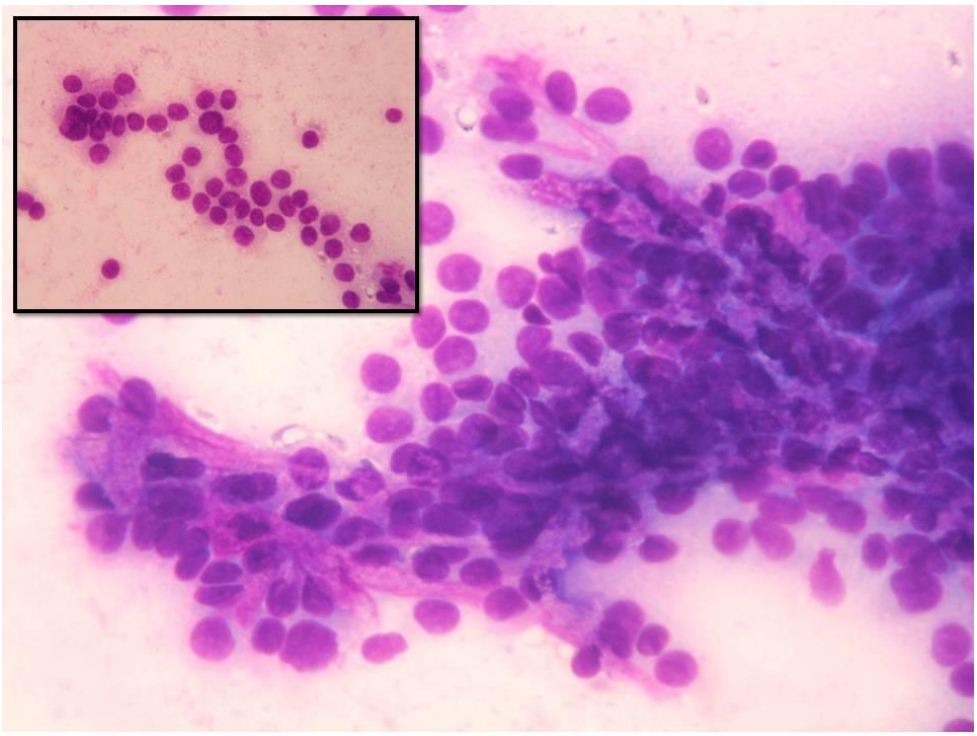


Figure 3 – CS – Microphotograph - Monomorphic cells in clusters with bland chromatin (MGG X 400), Inset – Cells arranged in acinar pattern (MGG X 400)

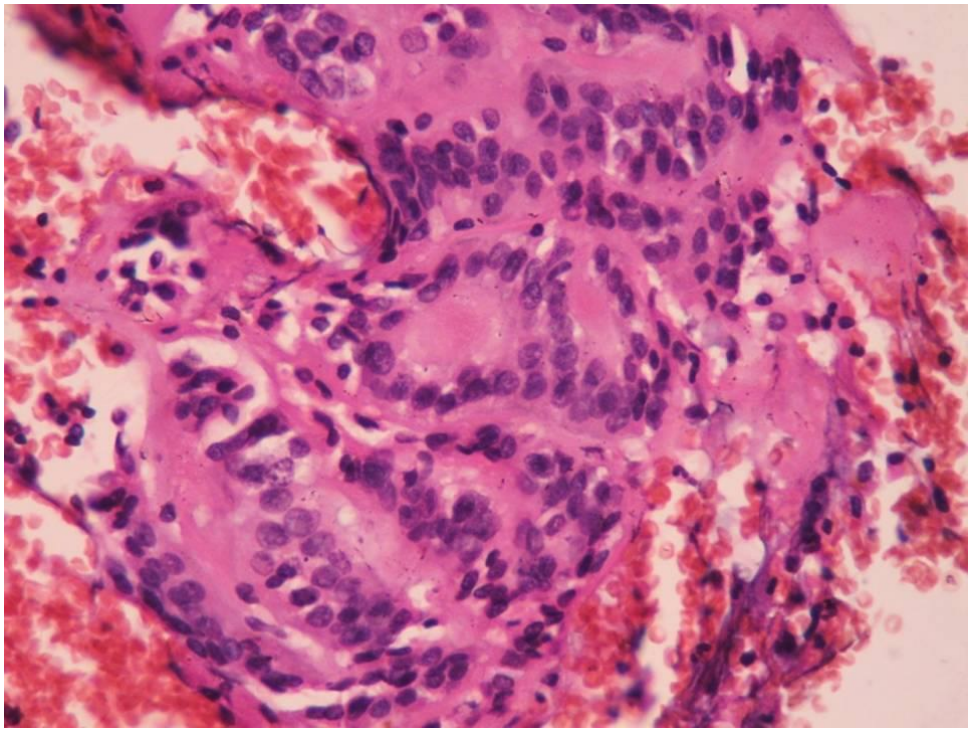


Figure 4 - CB - Microphotograph - Basaloid cells arranged in glandular, tubular pattern with basal lamina material well appreciated. (H and E X 400)

MESENTRIC LYMPHATIC CYST

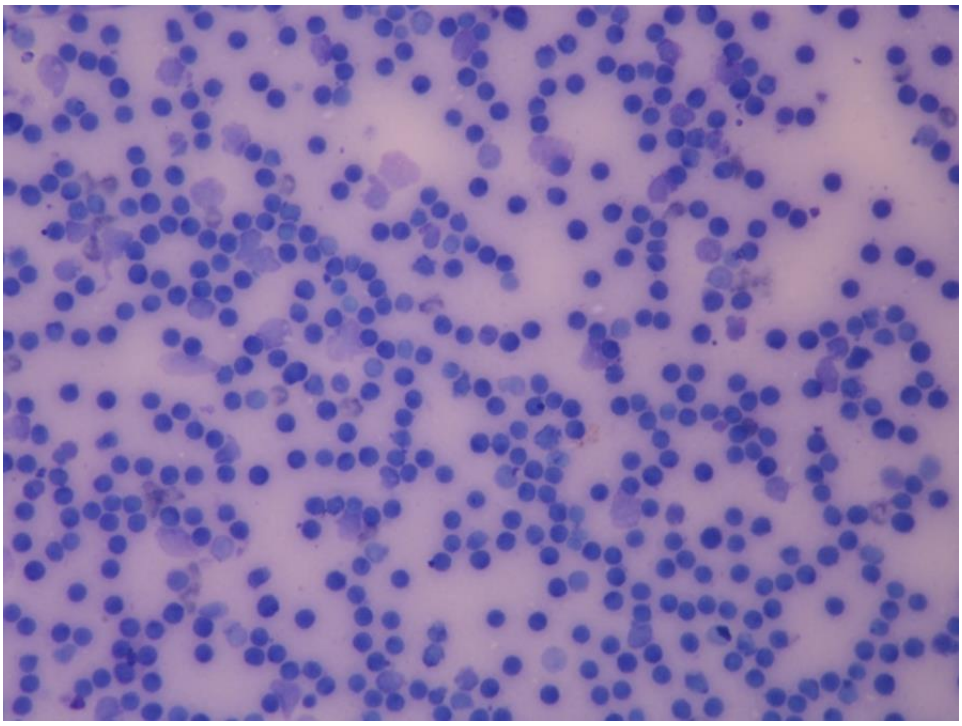


Figure 5 - CS – Microphotograph - Small lymphocytes in discrete (MGG X 100)

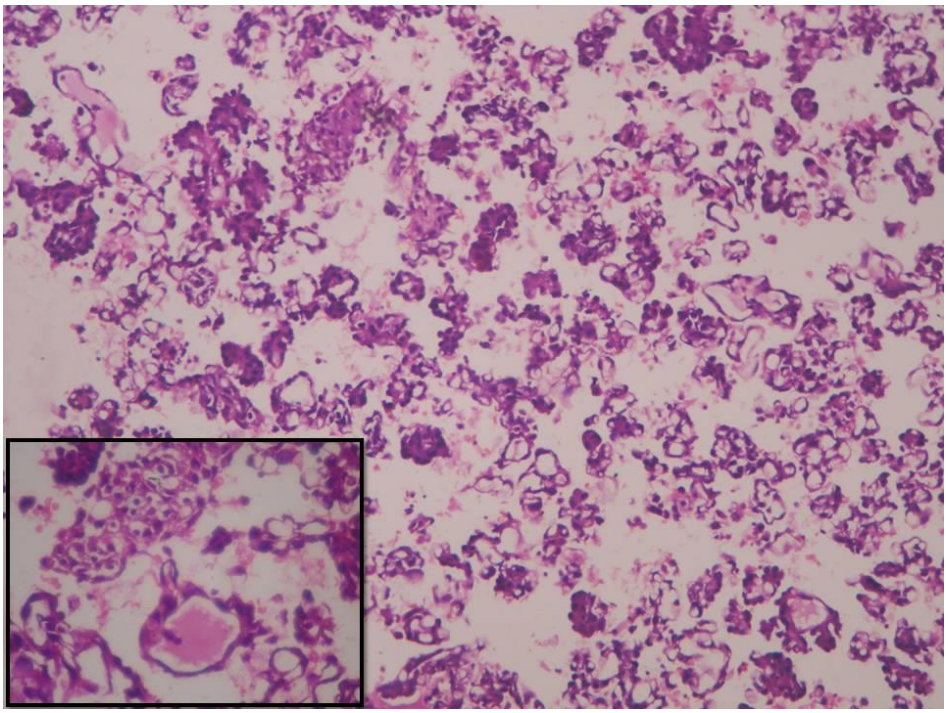


Figure 6 - CB - Microphotograph - Numerous tiny vessels lined by endothelium (H and E X 100), Inset – Endothelium lined vessels filled with eosinophilic proteinaceous fluid (lymph) and small lymphocytes (H and E X 400)

SCHWANNOMA

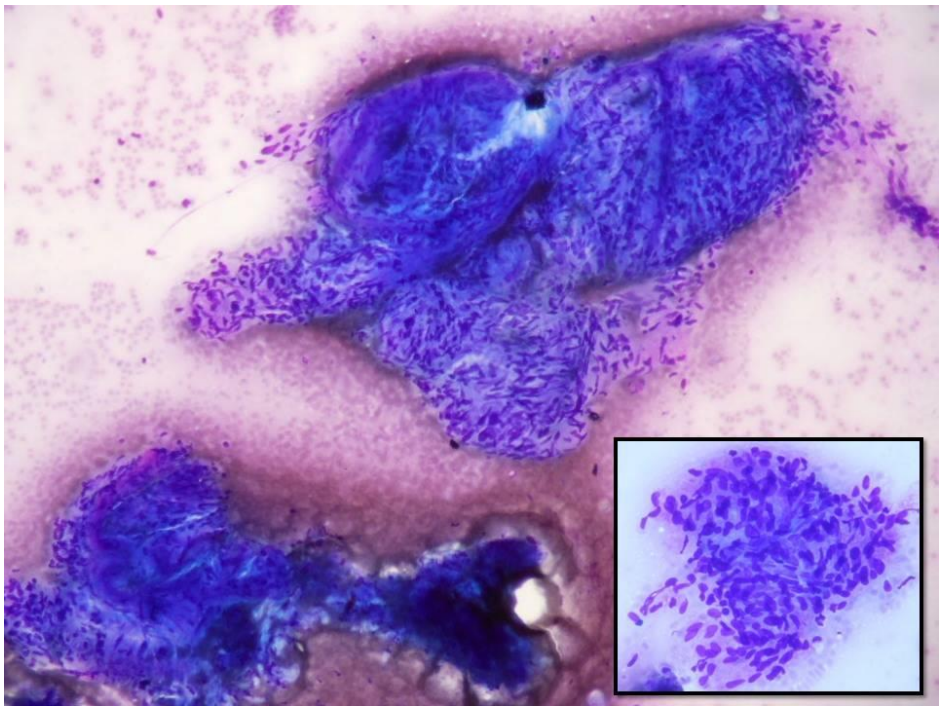


Figure 7 - CS - Microphotograph - Spindle cells arranged in fascicles, whorls (MGG X 100) Inset – (MGG X 400)

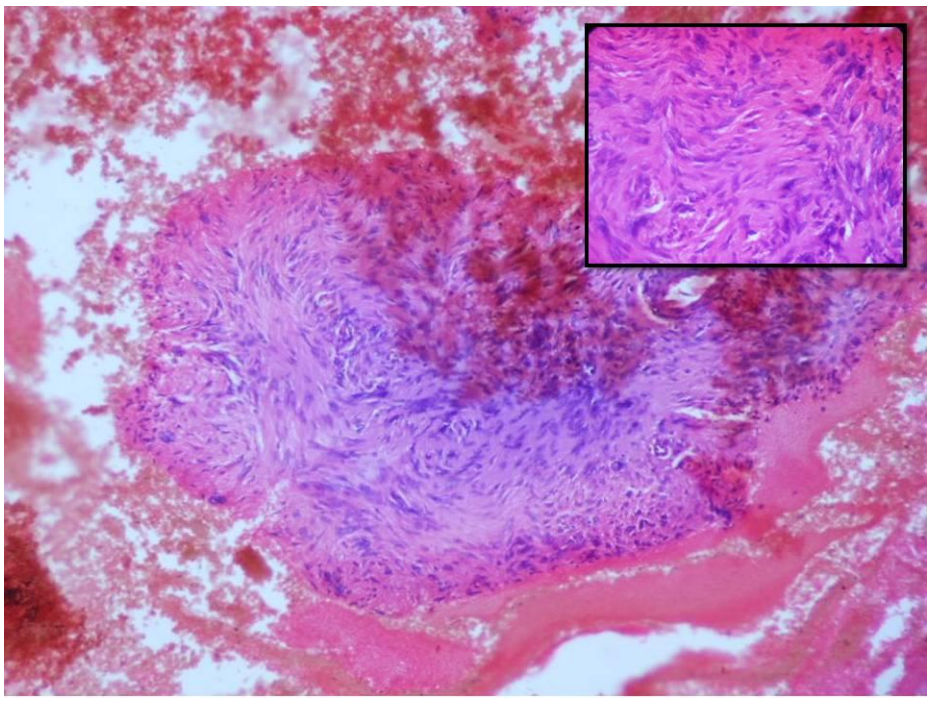


Figure 8 - CB - Microphotograph - Antony A pattern (H and E X 100),

Inset - Verocay body (H and E X 400)

SQUAMOUS CELL CARCINOMA

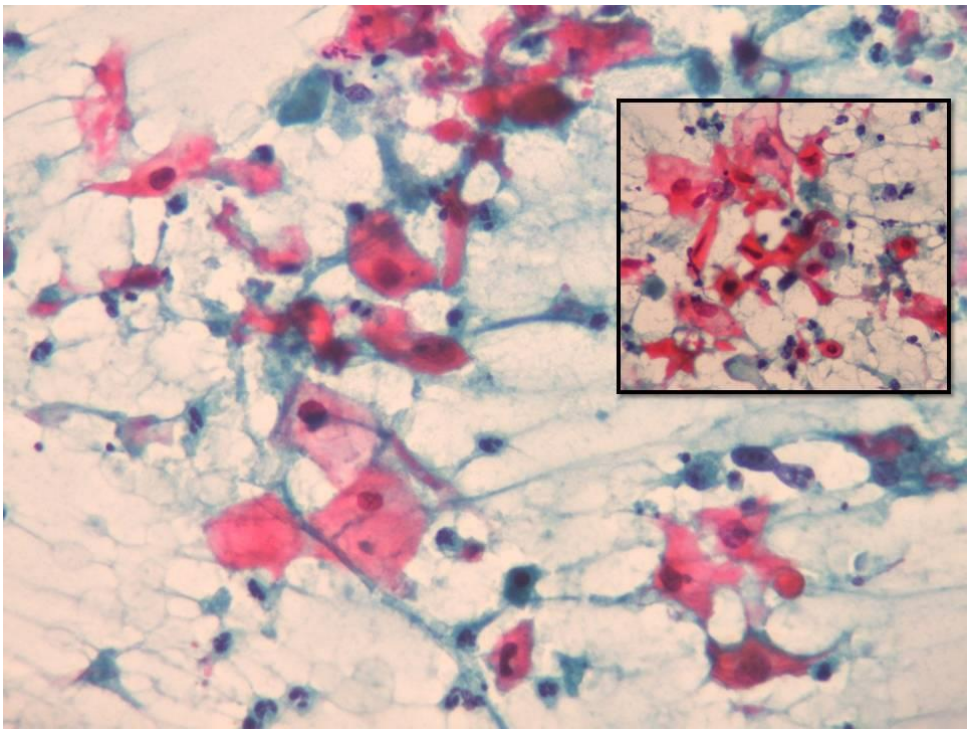


Figure 9 - CS – Microphotograph - Pleomorphic squamous cells in discrete, a few cells showing increased N:C ratio. Inset – Squamous cells with increased keratin (Pap X 400)

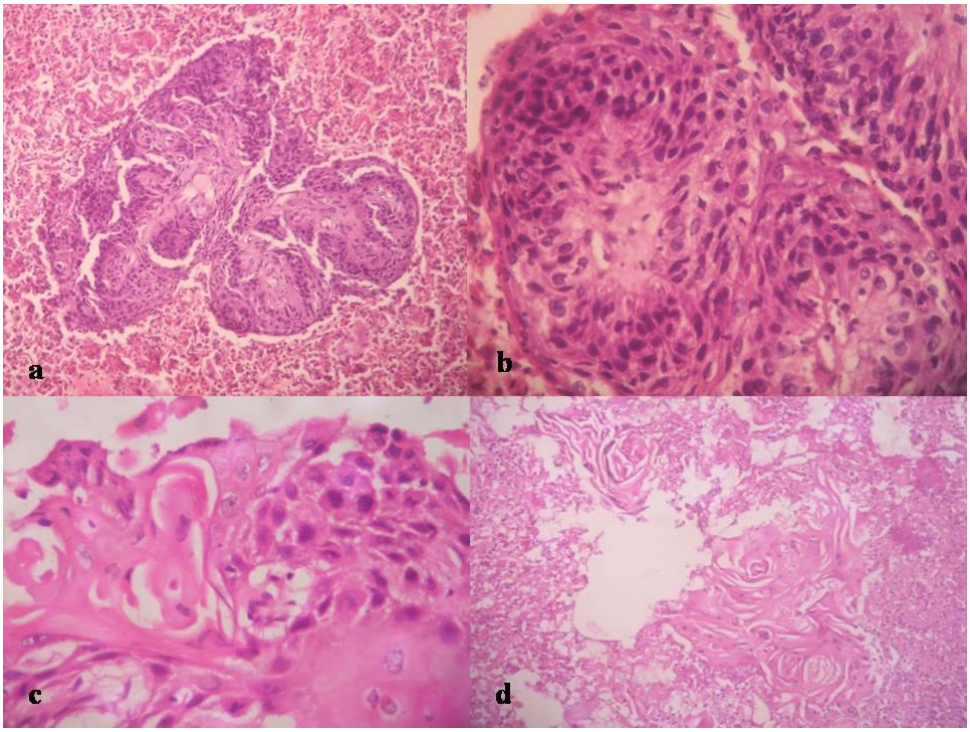


Figure 10 – CB – Microphotograph - Pleomorphic squamous cells in sheets (a, b, c), intercellular bridges (c), and keratin pearls (d). [H and E X 100(a, b, d), H and E X 400(c)]

ADENOCARCINOMA DEPOSITS IN LYMPH NODE

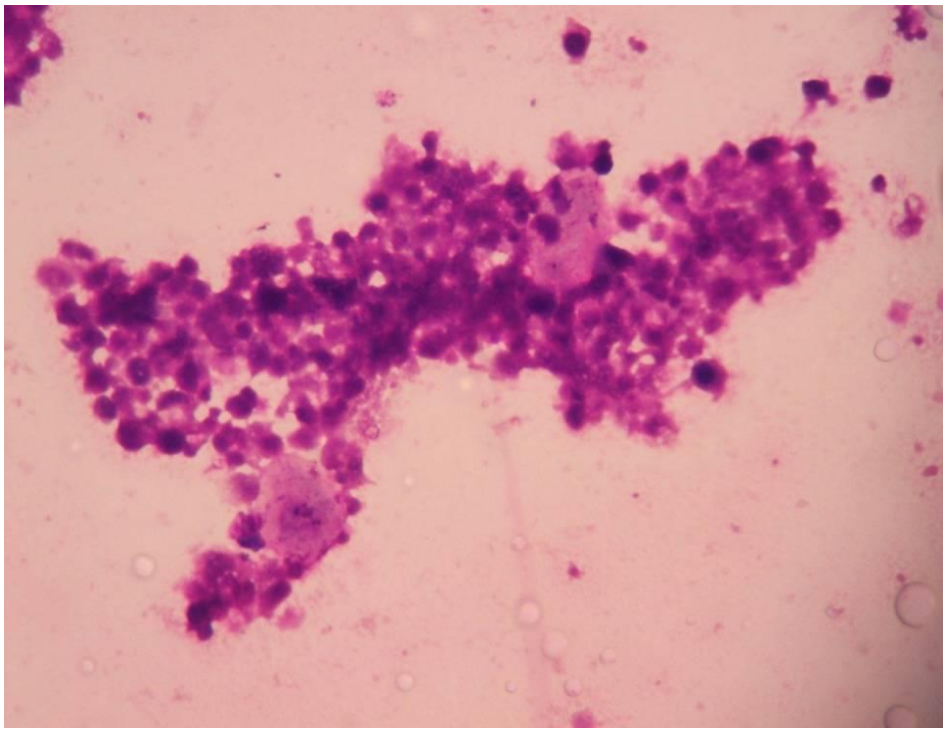


Figure 11- CS – Microphotograph - Round cells in sheets, in vague glandular pattern with hyperchromatic nuclei (MGG X 400)

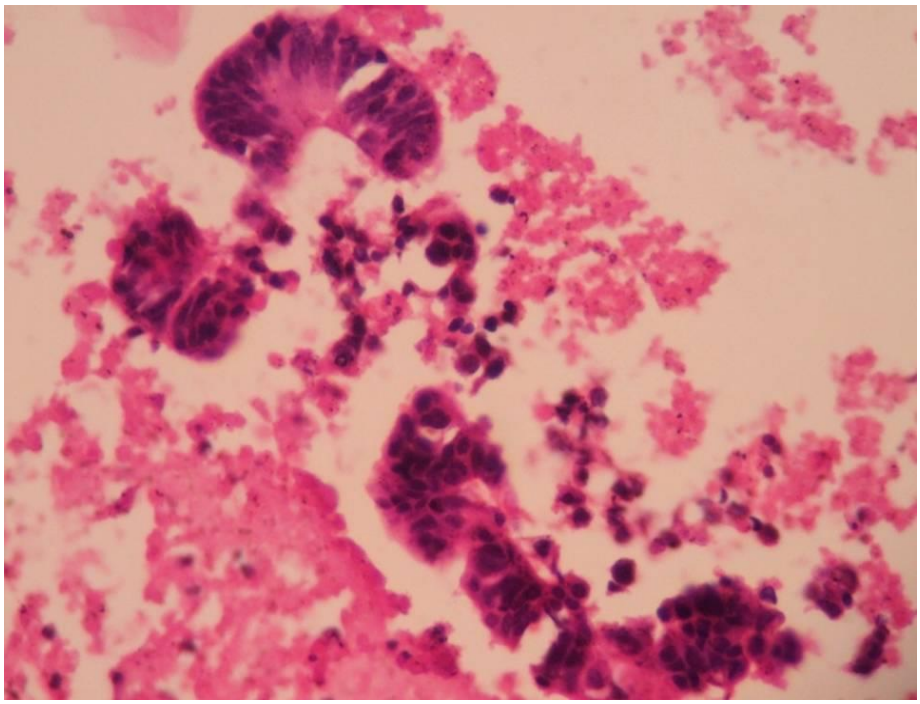


Figure 12 - CB – Microphotograph - Columnar cells with hyperchromatic nuclei arranged in glandular pattern (H and E X 100)

PAPILLARY CARCINOMA THYROID

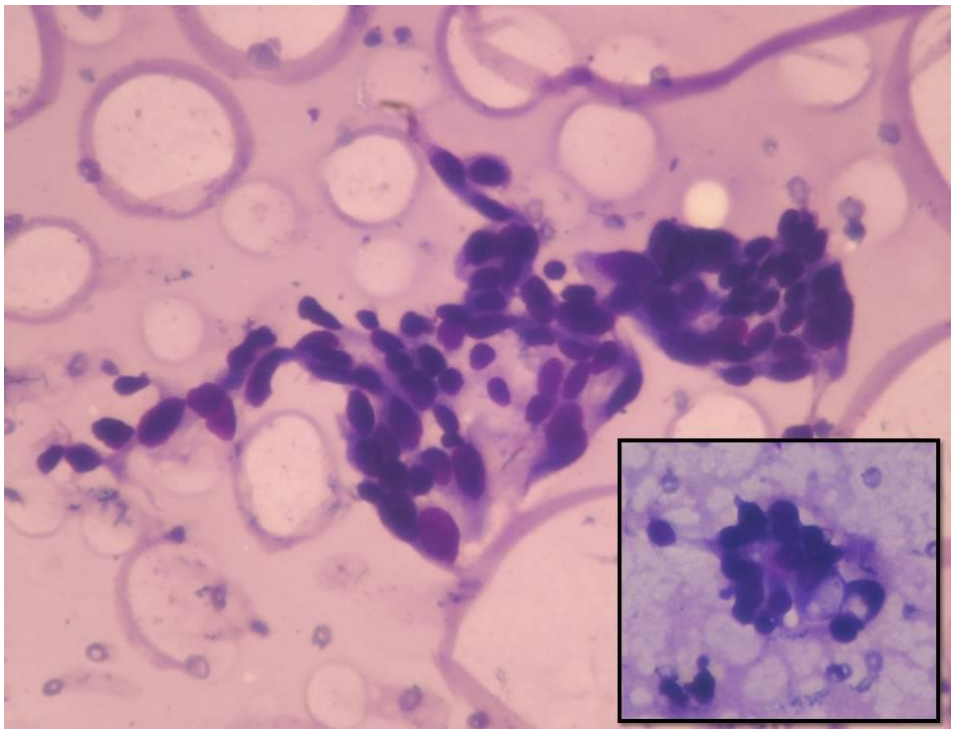


Figure 13 – CS - Microphotograph - Cells in clusters with moderate amount of cytoplasm. Inset – Another cluster. (MGG X 400)

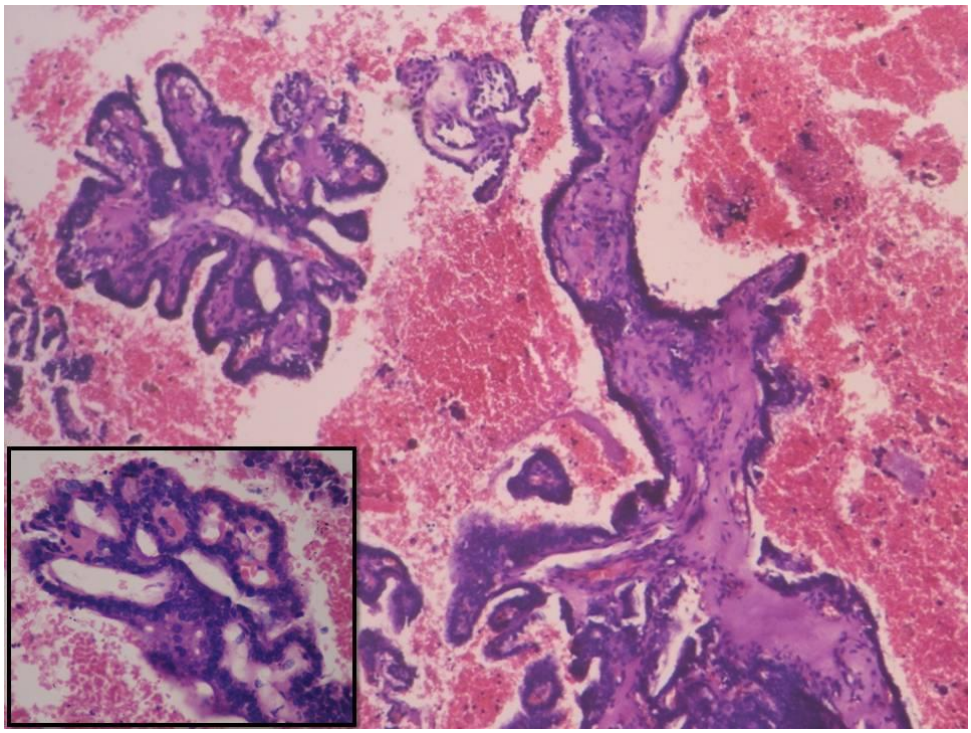


Figure 14 - CB – Microphotograph - Papillary structures with fibrovascular core. Inset – Another area in the section with papillary structure (H and E X 100)

ADENOID CYSTIC CARCINOMA

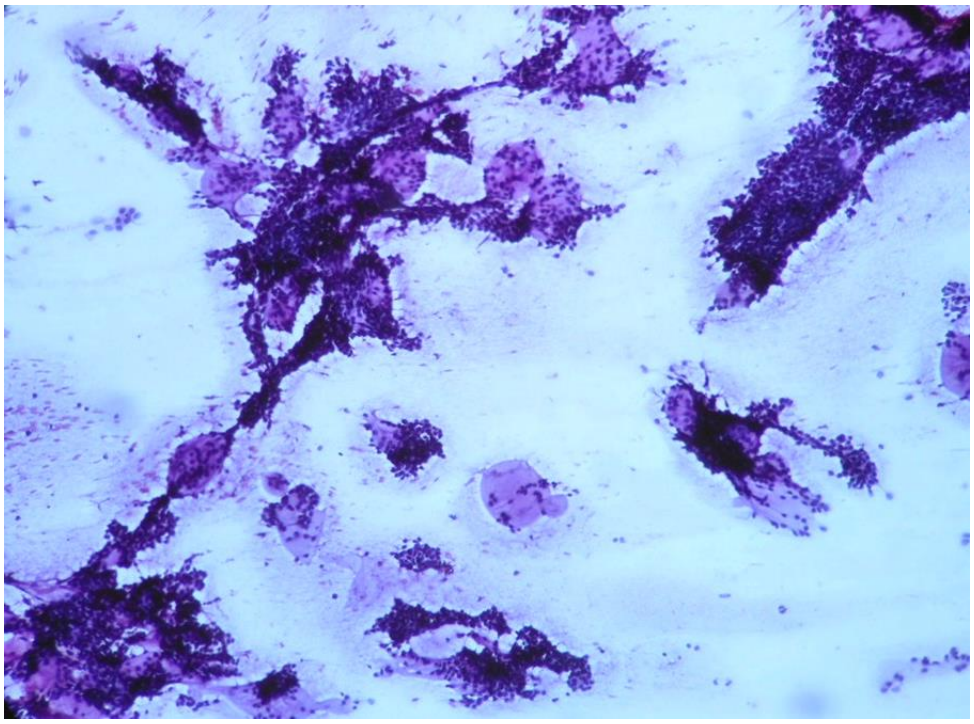


Figure 15 –CS - Microphotograph - Cells in clusters with hyaline globules (MGG X 100)

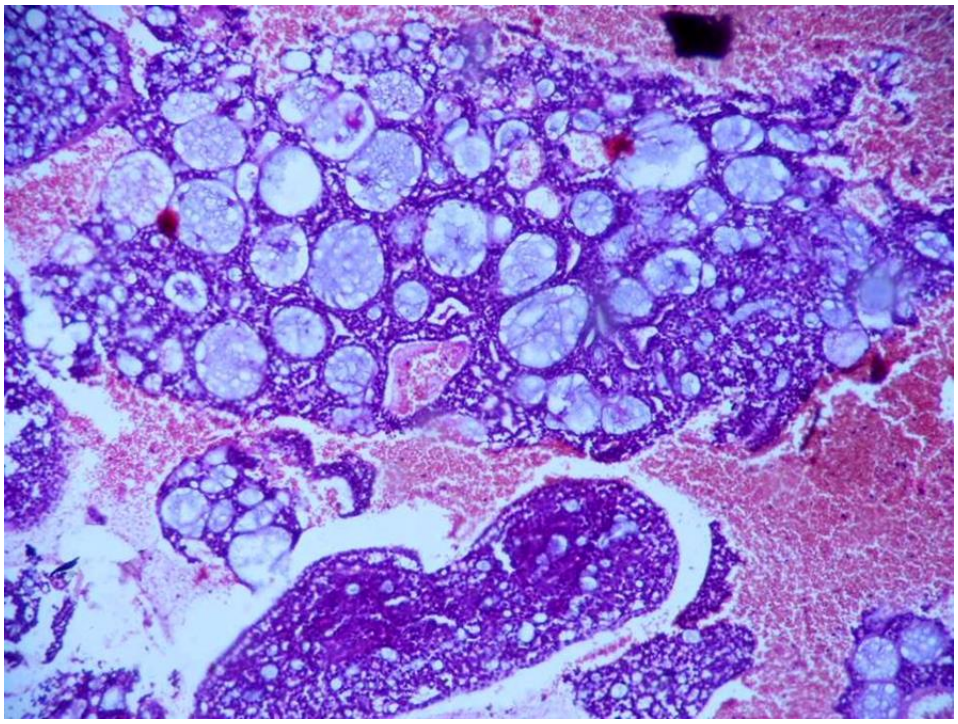


Figure 16 - CB – Microphotograph - Numerous pseudocysts characteristic of adenoid cystic carcinoma (H and E X 100)

METAPLASTIC CARCINOMA – BREAST

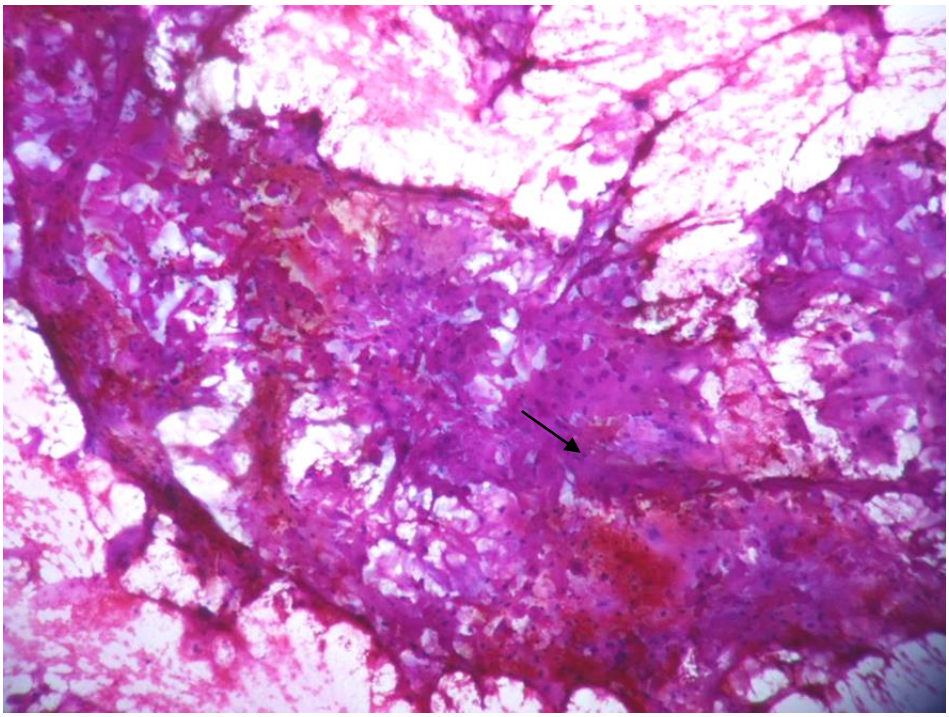


Figure 17– CS - Microphotograph -Thick amphophilic material with atypical cells within (H & E X 100)

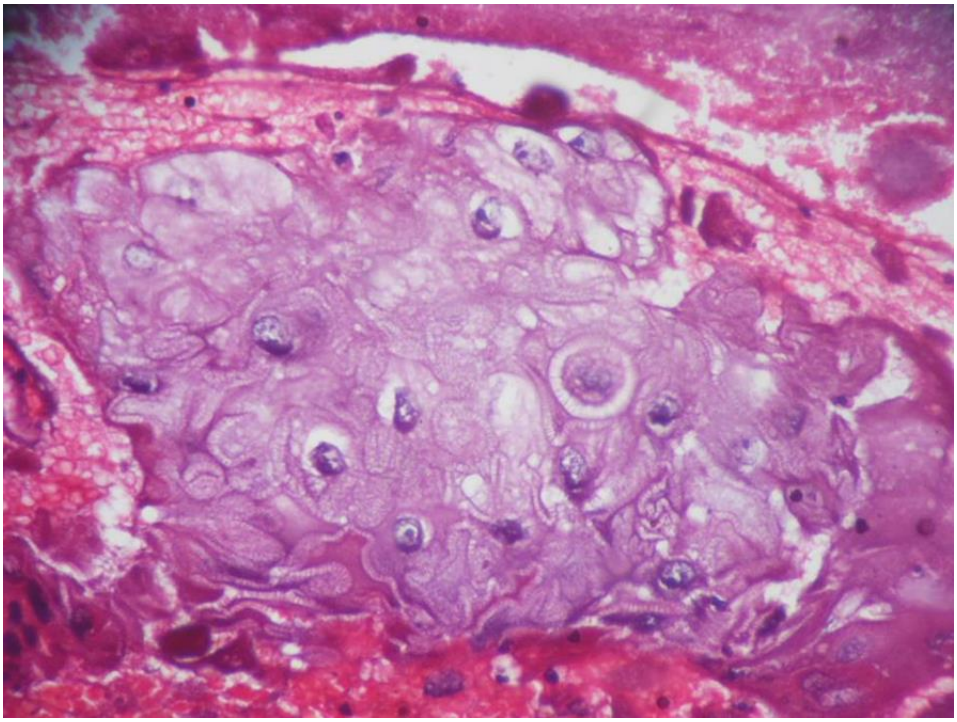


Figure 18 - CB – Microphotograph - Sheets of squamoid cells demonstrating intercellular bridges. (H and E X 400)

YOLK SAC TUMOUR DEPOSITS IN SPLEEN

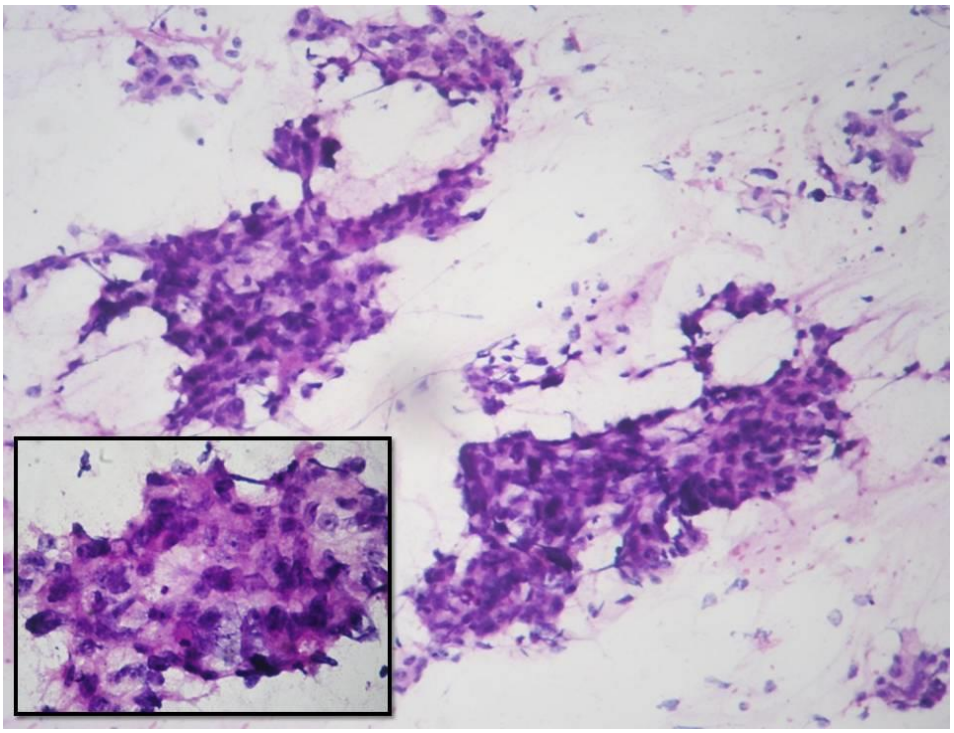


Figure 19 – CS – Microphotograph - Cells arranged in clusters, glandular pattern (MGG X 100). Inset – cells show large nuclei with prominent nucleoli (MGG X 400).

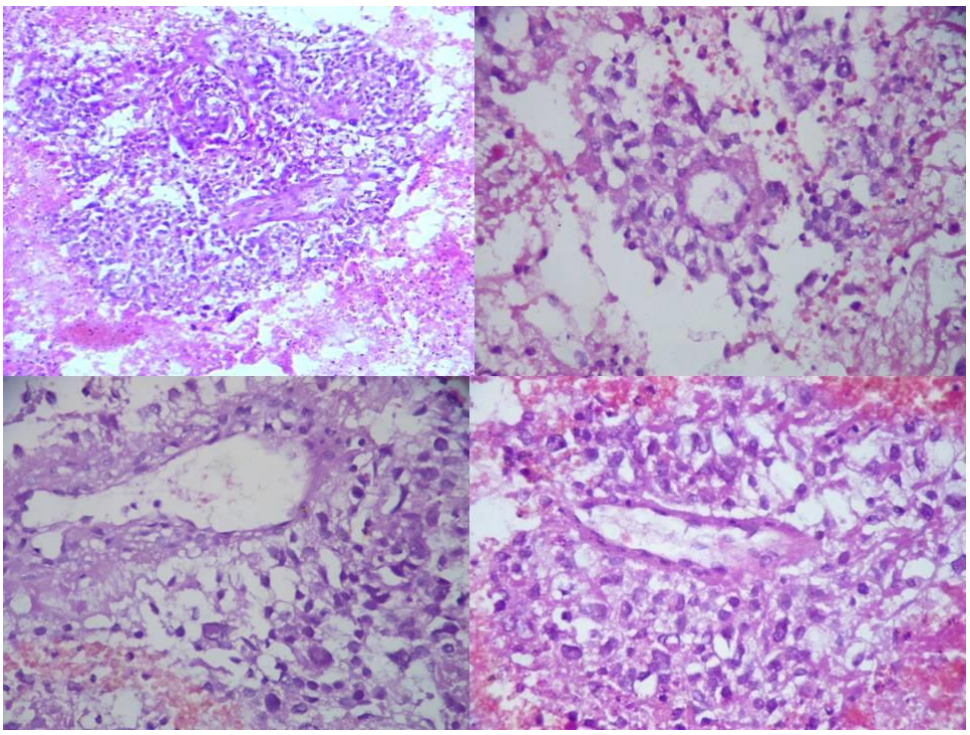


Figure 20 - CB – Microphotograph - Schiller-Duval bodies. (H and E X 400)

SEMINOMA – TESTIS

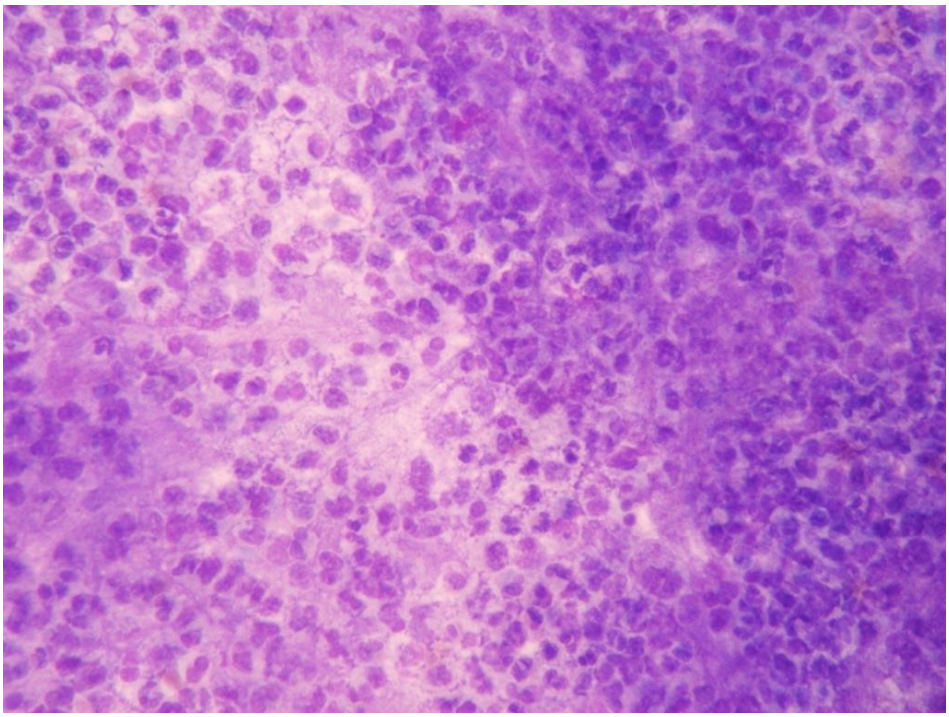


Figure 21 – CS - Microphotograph - Polymorphs in a background of proteinaceous material. No tumour cells identified. (MGG X 100)

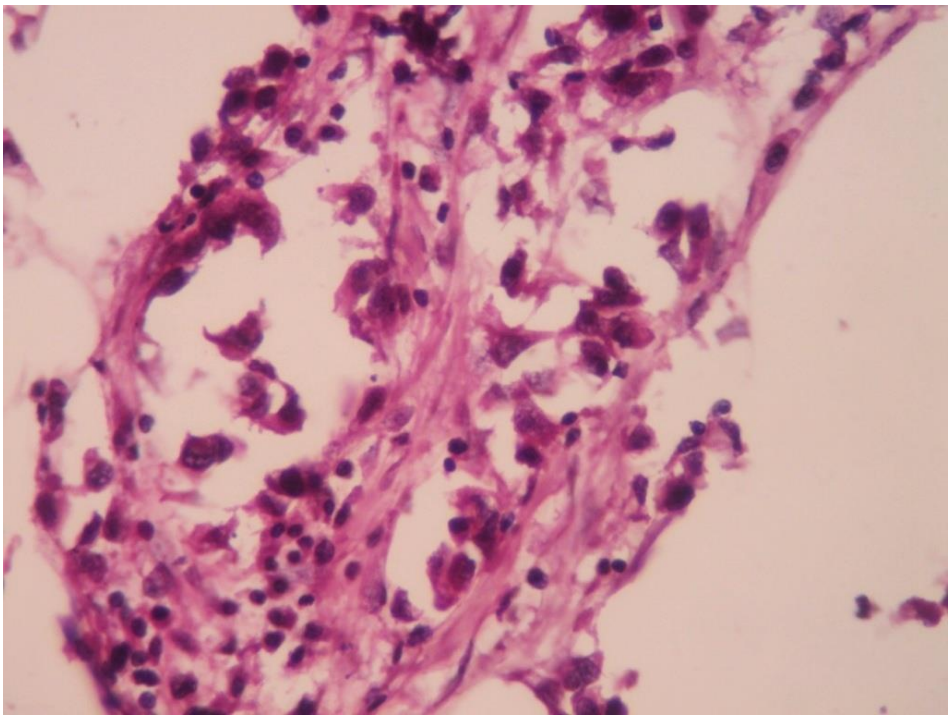


Figure 22 – CB – Microphotograph - Malignant cells in loose sheets with fibrous septa infiltrated by lymphocytes characteristic of seminoma. (H and E X 100)

DISCUSSION

Fine needle aspiration cytology is an established first line investigation of any swelling in different organs and sites of the body. In addition, cell block preparation is a useful complementary method for cytological diagnosis. Cell blocks are generally prepared with tiny tissue fragments or from syringe and needle rinses.[34-48] The fluid aspirates on FNAC either from cystic swellings or when accompanied by blood, often show scanty cells or do not exhibit satisfactory cytological patterns and therefore are confounded with diagnostic dilemmas at microscopy and to arrive at a reasonable diagnosis. Such aspirates can be subjected for cell block preparation which will harvest cells by providing adequate diagnostic material.

This study mainly concentrates on the utility of cell blocks in diagnosing cases that yield fluid aspirates on FNAC.

Various authors like Liu, Nathan, Zito and Kulkarni have also performed similar studies of comparing cell blocks with conventional smears. Comparison of present study with other studies is shown. The site wise distribution, lesion wise categorisation and their results are compared with present study.

TABLE 13 - DISTRIBUTION OF LESIONS IN DIFFERENT SITES IN OTHER STUDIES

STUDIES	**Liu et al**	**Nathan et al**	**Zito et al**	**Kulkarni et al**	**Present study**
SITES	**Cases (%)**	**Cases (%)**	**Cases (%)**	**Cases (%)**	**Cases (%)**
Lymph Nodes	18 (03.8%)	41 (08.8%)	28 (08.4%)	05 (15.6%)	28 (29.14%)
Breast	04 (0.8%)	114 (24.5%)	-	01 (03.1%)	20 (20.9%)
Thyroid	08 (01.6%)	72 (15.5%)	113 (33.9%)	-	14 (14.58%)
Intra abdominal	192 (39.8%)	50 (10.8%)	111 (33.3%)	25 (78.2%)	10 (10.40%)
Neck swellings	-	59 (12.7%)	-	-	05 (05.20%)
Salivary Gland	03 (0.6%)	13 (02.8%)	04 (01.2%)	-	07 (07.30%)
Testis	-	01 (00.2%)	-	-	04 (04.16%)
Lung	99 (20.4%)	85 (18.3%)	28 (08.4%)	-	04 (04.16%)
Thigh	-	-	-	-	02 (02.08%)
Bone	101 (21.0%)	20 (04.2%)	-	-	02 (02.08%)
Shoulder Joint	-	-	-	-	01 (01.04%)
Abdominal wall	-	-	-	01 (03.1%)	-
Miscellaneous / soft tissue	58 (12.0%)	10 (02.2%)	49 (14.8%)	-	-
TOTAL	**483 (100%)**	**465 (100%)**	**333 (100%)**	**32 (100%)**	**96 (100%)**

In a study by Liu et al.[49] (1998), total number of cases were 483, most of the lesions were intra-abdominal swellings [192(39.8%)] and bone swellings [101(21.0%)].

In Nathan et al.[21] (2000) study, total number was 465 swellings, with most of the lesions from breast, 114(24.5%) and thyroid, 72 (15.5%).

In the study by Zito et al.[6] (1995) out of 333 cases most of the cases were thyroid swellings, 113(33.9%) and intra-abdominal swellings, 111(33.3%).

Kulkarni et al.[22] study (2009) included 32 cases of USG guided aspirations from various intra-abdominal masses.

Present study included total of 96 cases. Most cases were from lymph nodes (29.14%), breast (20.9%), thyroid (14.58%) and intra-abdominal swellings (10.40%).

TABLE 14 – CATEGORIZATION OF LESIONS IN OTHER STUDIES

Study	Liu et al	Nathan et al	Zito et al	Kulkarni et al	Present study
Categories		No malignant cells seen		Atypical	Inflammatory
	Benign	Benign	Benign	Reactive/ Benign	Benign
	Malignant	Malignant	Malignant	Malignant	Malignant
	Suspicious	Suggestive malignancy			
	Inadequate	Inadequate	Inadequate	Nonrepresen-tative	Inconclusive

Liu et al.[49] (1998) categorised cases in his study as benign, malignant, inadequate and suspicious for malignancy.

Nathan et al.[21] (2000) categorised cases as no malignant cells seen, benign, malignant, suggestive of malignancy and inadequate cell yield.

Zito et al.[6] (1995) categorised lesions as benign, malignant and inadequate material on aspiration.

Kulkarni et al.[22] (2009) categorised lesions as reactive/benign, malignant, atypical and nonrepresentative.

In the present study, cases were categorised as non neoplastic (inflammatory), neoplastic (benign, malignant) and inconclusive.

TABLE 15 – COMPARISON OF RESULTS WITH OTHER STUDIES

STUDY	Liu et al	Nathan et al	Present study
Diagnosis with conventional smears alone	94%	84.8%	98.9%
Diagnosis with cell blocks alone	57%	73%	97.9%
Additional information obtained with cell blocks	12%	15.2%	44.7%

In Liu et al.[49] (1998) study, smears alone were diagnostic in 94% of cases and cell blocks alone in 57% of cases. Cell blocks were inadequate for diagnosis in 43% of all cases. Cell blocks provided additional information in only 12% of cases which was less compared to our study [40 (42.5%)].

In Nathan et al.[21] (2000) study definitive diagnosis was possible from smears alone in 347 cases (84.8%) and cell blocks alone in 300 (73.3%). The overall

improvement, when both smears and cell blocks were studied together, was 15.2% (62 cases).

TABLE 16 –COMPARISON OF RESULTS WITH KULKARNI'S STUDY

STUDY	**Kulkarni et al**		**Present study**	
CATEGORY	**CS**	**CB**	**CS**	**CB**
Diagnostic material	31(96.8%)	30(93.75%)	93 (98.9%)	92 (97.9%)
Atypical	02 (06.3%)	-	-	-
Reactive/Benign	05 (15.6%)	06 (18.7%)	40 (42.5%)	39 (41.5%)
Malignant	24 (75.0%)	24 (75.0%)	53 (56.4%)	53 (56.4%)
Nonrepresentative	01 (3.1%)	02 (6.3%)	01 (01.1%)	02 (02.1%)
TOTAL	**32 (100%)**	**32 (100%)**	**94 (100%)**	**94 (100%)**

In Kulkarni et al.[22] study (2009), one case (3.1%) of pancreatic aspiration, smears were paucicellular and were reported as nonrepresentative but cell blocks showed architectural details of adenocarcinoma. There were two cases (6.3%) which yielded non representative material in blocks and showed adenocarcinoma cells in conventional smears. Absolute concordance between the smears and the cell blocks was seen in 66/70 cases (94%) which was less compared to our study [90/94(95.7%)].

In the present study, conventional smears of 93/94 (98.9%) cases contained diagnostic material and cell blocks of 92/94 (97.9%) cases contained diagnostic aspirates. Aspiration from one case of testicular swellings did not show any diagnostic material on conventional smears which on cell block was diagnosed as **seminoma testis** (Figure 21 and 22). In two cases, which included hydatid cyst of liver and osteosarcoma each, smears provided diagnosis but cell blocks were inconclusive. Absolute concordance between smears and cell block was seen in 91/94 (96.8%)

cases. When both conventional smears and cell blocks were compared, cell blocks increased the level of confidence in arriving at diagnosis in 42 (44.7%) [8 (8.5%) benign and 34 (36.2%) malignant] cases. Cell blocks increased the level of confidence in arriving at definitive diagnosis in benign lesions like hemangioma breast, lymphangioma neck, basal cell adenoma and schwannoma, GIST and malignant lesions like squamous cell carcinoma and adenocarcinoma deposits in lymph nodes, adenoid cystic carcinoma, acinic cell carcinoma, papillary carcinoma thyroid, tubular carcinoma breast, metaplastic carcinoma breast, yolk sac tumour deposits in spleen, seminoma and adenocarcinoma ovary.

In study by Zito et al.[6] (1995) histopathological correlation was obtained in 67/333 cases. Statistical studies showed cell block to be 95% sensitive and 100% specific.

Lymph nodes

Liu et al.[49] (1998), in his study found that cell blocks contributed additional information most frequently in lymph node lesions.

Our study also showed similar findings of increased level of confidence with cell blocks 28/94 (29.8%) in reporting both benign and malignant cases involving lymph nodes. In squamous cell carcinoma deposits, cell blocks demonstrated well formed squamous pearls and intact intercellular bridges (Figure 10).

Thyroid

Keyhani et al.[26] (1984), and Kung et al.[40] (1989) studied cell blocks on thyroid lesions and found cell blocks to be superior in the diagnosis of colloid nodules.

Liu et al.[49] (1998) study did not show any cases where the cell block contributed additional information to that obtained by the direct smear in thyroid lesions.

Sanchez et al.[50] (2006) studied 546 thyroid FNAs. Cell blocks were non-contributory in 56 (68%) cases, contributory in 25 (31%) cases. In only one case the cell blocks yielded additional information because smears did not show any material in that case.

Qiu et al. (2008) studied diagnostic efficacy of direct smears vs cell blocks in hemorrhagic thyroid fine needle aspirates. They studied 77 aspirates. They concluded saying that when hemorrhagic aspirate material is entirely submitted for cell block, the diagnostic efficacy for offsite fine needle aspiration is greatly improved relative to traditional direct smears preparation. Also reducing the number of slides and obviating repeat fine needle aspirates for non diagnostic cases make cell block preparation a cost effective diagnostic procedure.[51]

In our study cell blocks demonstrated well formed papillary structures with fibrovascular cores and increased level of confidence in diagnosing papillary carcinoma thyroid (Figure 14). But they did not show any addition features in other thyroid lesions.

Breast

Istvanic S et al., (2007) studied 40 consecutive cell blocks from **breast** fine needle aspirates to look for invasion and hyperplasia. Of 25 carcinomas, invasion could be identified in the cell block sections in 11 (44%). Cell blocks from 12 of 14

benign breast FNAs showed sufficient cells to assign a histologic diagnosis of no hyperplasia and usual hyperplasia.[52]

Our study included 20 breast lesions (10 benign and 10 malignant cases). There was absolute concordance between conventional smears and cell blocks in all the cases. In a case of hemangioma and metaplastic carcinoma cell blocks increased the level of confidence in arriving at diagnosis. In cell blocks from hemangioma breast, well preserved endothelium lined vessels were demonstrated and in cell blocks from metaplastic carcinoma, sheets of squamoid cells demonstrating intact intercellular bridges were appreciated (Figure 18).

Kyroudi A et al., (2006) studied cell block on 263 endometrial cytology samples. They found that addition of cell block histology to the cytologic diagnosis increased the diagnostic accuracy of endometrial cytology to 96.3% and 100% for benign/atrophic endometrium and adenocarcinoma, respectively.[53]

Axe et al., (1986) showed that the sensitivity of Papanicolaou-stained smears (79%) was slightly superior to cell blocks (73%).[34]

A study by Flint (1993) on cytology and cell blocks from 111 bronchial washings found 52 malignancies in the cytological preparations and 43 in the cell blocks.[16]

Testicular swellings

Present study included four aspirates from testicular swellings. Purulent aspirate was obtained in three cases and hemorrhagic fluid in one case. Among these purulent aspirates, two cases were diagnosed as spermatocele and the other one was diagnosed as seminoma. Therefore, the purulent aspirates from testicular swellings

need not always be inflammatory, and performing cell blocks might harvest diagnostic material.

Soft tissue swellings

Cysts are often lined by secretory epithelium and the cystic change can be seen in glandular epithelial tumours and in epithelial tumours with cystic degeneration. Further, cystic change can also be seen in soft tissue tumours with connective tissue degeneration viz myxoid, mucoid degeneration, etc and fluid aspirate can be obtained from these swellings on FNA.[54]

Our study included a case of schwannoma, a case of GIST and a malignant mesenchymal tumour with secondary changes which yielded hemorrhagic fluid on aspiration.

In almost all above mentioned studies on FNA material, cell blocks were prepared with the rinses of syringes and needles that were collected in normal saline and centrifuged after the conventional smears were prepared from aspiration of solid swellings. Ours is the study to demonstrate utility of cell blocks in swellings which yield fluid on FNA.

Comparison of techniques with other studies.

Burt et al. studied 54 lung aspirates and used plasma thromboplastin method to prepare cell block. He believed that plasma-thromboplastin method enables more widespread use of fine needle aspiration and by using immunohistochemistry on them may enhance the yield of diagnostic information.[55]

Cheryl J et al. (1996) tried cell block in serous effusions using PVA sponge and compared with PT and agar methods. In his study results of plasma-

thromboplastin method showed best cell recovery even in less cellular specimens than other methods.[56]

Nigro et al. (2007) studied 13 cytology specimens using plasma-thromboplastin method for cell block preparation. He found that this method was most successful in generating cellular cell blocks with high quality in terms of cell distribution and background.[33]

Kulkarni et al. (2009) also used plasma-thromboplastin method to prepare cell blocks in his study. He observed that if the aspirated material was collected in formalin fixative or in 50% alcohol, it requires thorough washing in isotonic saline before adding plasma and thromboplastin, else it did not clot properly.[22]

Nathan et al. (2000) used ethanol in conjunction with formalin in preparing cell blocks. He observed that centrifugation of the precipitated proteinaceous material, blood and plasma also resulted in sizable, firm cell pellets that enabled the recovery of cells and tiny microscopic cell aggregates, as well as facilitated subsequent easy handling, embedding and sectioning of these paraffin blocks. He also observed that his method resulted in deeper H and E staining.[21]

Present study

In our study, 2 cell block techniques have been studied, plasma-thromboplastin technique and ethanol-formalin technique.

Cell yield was better in cell blocks compared to conventional smears. Cell blocks of 10/96 (10.4%) cases with plasma-thromboplastin technique and 09/96 (9.4%) cases with ethanol-formalin technique yielded scanty cell yield. Whereas, 16/96 (16.6%) cases of conventional smears showed scant cellularity. Aspirates from

2/96 (2.08%) cases did not yield any cells in both smears and cell blocks and were excluded. This might be due to failure to hit proper site during FNA.

We also observed similar findings as in Kulkarni's study[22] that, at least 3 cycles of isotonic saline wash was done to all the aspirates that were fixed in formalin before performing cell block with plasma-thromboplastin method. Otherwise the aspirate failed to clot.

Plasma-thromboplastin method was less time consuming when compared to ethanol-formalin technique. The architectural pattern, cytoplasmic features and nuclear details were well preserved in both the techniques.

The purulent aspirate from degenerated cystic SCC deposits would yield a soft mashed precipitate and firm to hard button in plasma-thromboplastin technique and ethanol-formalin technique respectively. Caution is exercised to handle the precipitate obtained by plasma-thromboplastin technique. Further the mashed material will necessitate viewing of dispersion of material. The ethanol-formalin technique did not pose this difficulty.

If the purulent aspirate is admixed with blood, then the precipitate was firm in both the techniques.

Insufficient material

Nathan et al.21 have found 12% (56/465) of cases with insufficient material. In the present study, we found 2.08% (2/96) of cases with insufficient material. Even the cell blocks could not harvest any diagnostic material.

Therefore, a small percentage of cases with insufficient material or material from non representative sites on aspiration are always a disadvantage with FNAC.

CONCLUSION

- Fluid aspirates of FNAC pose diagnostic challenges due to scarcity of cells. The cell blocks are complementary and demonstrate diagnostic microtissue architecture.
- The purulent aspirates of lymph node deposits with SCC when subjected for cell blocks have demonstrated intercellular bridges and keratin pearls and increased the level of confident diagnosis.
- The cell blocks of fluid aspirates from papillary carcinoma thyroid yielded micropapillary architecture and were diagnostic. Whereas, in the benign cystic lesions of thyroid, cell blocks were not very useful.
- The purulent aspirates from testicular swellings are not always inflammatory and cell blocks can harvest diagnostic material and can establish the diagnosis of malignancy.
- The lower turnaround time of cell block processing can be shortened by rapid tissue processing technique.
- The plasma-thromboplastin cell block technique is a simple time saving procedure and has the disadvantage of dispersed cell spread compared to ethanol-formalin technique.
- In 2.1 % of cases, the cell yield is not diagnostic in conventional cytology and the cell blocks. Therefore, it may warrant excision biopsy.
- Cell blocks can be used for ancillary studies, viz. histochemistry, immunohistochemistry and they can be archived for retrospective studies.
- The fluid aspirate obtained at FNAC is mandatorily subjected for conventional smears and cell block preparation to obtain precious diagnostic material.

SUMMARY

1. This is a cytomorphological study of fluid aspirates by conventional smears and cell block techniques, undertaken in the Department of Pathology, Sri Devaraj Urs Medical College.
2. A total of 96 cases that yielded fluid on aspiration were studied. Males were 52 (54.16%) and females were 44 (45.84%) in number.
3. Cases included swellings from lymph nodes, thyroid, salivary gland, breast, lung, intra-abdominal, testis, thigh, bone, and from shoulder joint.
4. Cases were categorised as non neoplastic (inflammatory), neoplastic (benign, malignant) and inconclusive.
5. Out of 96 cases, 54 (56.25%) were malignant cases, 40 (41.67%) were non malignant cases and 2 cases were inconclusive. Of 40 non malignant cases, inflammatory lesions were 06 (06.26%), and benign lesions were (35.41%).
6. Conventional smears of 93/94 (98.9%) cases contained diagnostic material and the cell blocks of 92/94 (97.9%) cases contained diagnostic material. Absolute concordance between smears and cell block was seen in 91/94 (96.8%) cases. When both conventional smears and cell blocks were compared, cell blocks increased the level of confidence in arriving at diagnosis in 42 (44.7%) [8 (8.5%) benign and 34 (36.2%) malignant] cases.
7. Aspiration from one case of testicular swellings did not show any diagnostic material which on cell block was diagnosed as seminoma testis.
8. In two cases, which included hydatid cyst of liver and osteosarcoma each, smears provided diagnosis but cell blocks were non diagnostic.
9. Cell blocks increased the level of confidence in arriving at definitive diagnosis in benign lesions like hemangioma breast, lymphangioma neck, basal cell

adenoma and schwannoma, GIST and malignant lesions like squamous cell carcinoma and adenocarcinoma deposits in lymph nodes, adenoid cystic carcinoma, acinic cell carcinoma, papillary carcinoma thyroid, tubular carcinoma breast, metaplastic carcinoma breast, yolk sac tumour deposits in spleen, seminoma and adenocarcinoma ovary.

10. In present study, 2 cell block techniques have been studied, plasma-thromboplastin technique and ethanol-formalin technique.
11. Cell yield was better in cell blocks compared to conventional smears. Cell blocks of 10/96 (10.4%) cases with plasma-thromboplastin technique and 09/96 (9.4%) cases with ethanol-formalin technique yielded scanty cell yield. Whereas, 16/96 (16.6%) cases of conventional smears showed scant cellularity. Aspirates from 2/96 (2.08%) cases did not yield any cells in both smears and cell blocks and were excluded. This might be due to failure to hit proper site during FNA.
12. Plasma-thromboplastin method was less time consuming when compared to ethanol-formalin technique. The architectural patterns, cytoplasmic features and nuclear details were well preserved in both the techniques
13. The purulent aspirate from degenerated cystic SCC deposits would yield a soft mashed precipitate in plasma-thromboplastin technique and firm to hard button in ethanol-formalin technique respectively. Caution is exercised to handle the precipitate obtained by plasma-thromboplastin technique. Further the mashed material will necessitate viewing of dispersed material in the sections. The ethanol-formalin technique did not pose this difficulty

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ANNEXURES

PROFORMA

1) NAME: CASE NO:

2) AGE\SEX: CYTOLOGY NO:

3) OP \ IP NO: CELLBLOCK NO:

4) WARD:

5) PRESENTING COMPLAINTS:

6. PAST HISTORY –

7. FAMILY HISTORY-

8. GENERAL PHYSICAL EXAMINATION-

A) BUILT

B) NUTRITION

C) PALLOR

D) ICTERUS

E) CYANOSIS

F) CLUBBING

G) LYMPHADENOPATHY

Number Mobility Matting

H) EDEMA

I) SKIN

J) TEMPERATURE

K) PULSE

L) BLOOD PRESSURE

9) RESPIRATORY SYSTEM

10) CARDIOVASCULAR SYSTEM

11) PER ABDOMEN

12) CENTRAL NERVOUS SYSTEM

13) SWELLING

A) NUMBER

B) SITE

C) SIZE

D) TEMPERATURE

E) SURFACE

F) BORDERS

G) CONSISTENCY

H) MOBILITY

I) RELATION TO VESSELS

14) INVESTIGATIONS:

15) CLINICAL DIAGNOSIS:

16) NATURE OF ASPIRATE

Volume - Colour - Consistency – Clear / Turbid

Colour of Supernatant - Colour of the Deposit -

Particulars	**Conventional smears**	**Cell block using PT Technique**	**Cell Block using EF Technique**
Cellularity			
Architecture			
Any other patterns			
Cell morphology Cytoplasm			
Nuclear features			
Background			
Diagnosis			

PT – Plasma Thromboplastin **EF –** Ethanol Formalin

19) FINAL DIAGNOSIS

KEY TO MASTER CHART

A - Plasma-thromboplastin technique
Ab – Abundant
AK – Anisokaryosis
B – Ethanol-formalin technique
Bo – Borders
CB – Cell block
C – Cytoplasm
Ca – Carcinoma
Ce – Cells
Cl – Clusters
Cr – Chromatin
Ct – Categorisation
I – Inflammatory
B – Benign
M – Malignant
D – Ductal
Di – Discrete
E – Eosinophilic
Epi – Epithelial cells
F – Fine
Fib – Fibrillar
Fo – Follicular
G – Glandular
GIST – Gastrointestinal stromal tumour
Gr – Granular
Gv – Grooves
Gy – Grey
H – Highly
Hc – Hyperchromatic
HCC – Hepatocellular carcinoma
Hm – Haemorrhage
I – Irregular
In – Indidstinct
Inc – Inconspicous
Incl – Inclusion
Inf – Inflammatory
L – Large
LN – Lymph node
M – Moderate
Mac – Macrophages
Mat – Material
Mi – Mild
MNG – Multinucleated giant cells
N – Nucleus
Nec – Necrosis
Ni – Nucleoli
No – Number
Nt – Nucleate
O – Oval
Ob – Osteoblasts
Occ – Occasional
P – Pearl

Pl – Pleomorphic

Poly – Polygonal

Ppt – Precipitate

Ps - Plasmacytoid

Pr – Prominent

Pro - Proteinaceous

R – Round

RBC – Red blood cells

Re – Results

A – Absolute concordance

I – Increased level of confidence

CB – Cell blocks are better

CS – Conventional smears better

Ro - Rosettes

SI. No – Serial number

S – Scant

SCC – Squamous cell carcinoma

SDB – Schiller-Duval Body

Sex – F- Female, M – Male

Sh – Sheets

Sq – Squamous

Str – Stroma

S-P – Salt and Pepper

T – Tumour

TB – Tuberculosis

Tr – Trabecular

Tri – Triangular

Tu – Turbid

V – Vacuolated

Vasc – Vascular

Vs – Vesicular

W – With

WD – Well Differentiated

Wh – White

Vg – Vague

Y – Yellow

SI. No.	Cytology No.	CB No.	Age	Sex	Swelling		Clinical Diagnosis	Aspirate		Cellularity			Architecture			Cell morphology	Cell morphology
					Site	Size (cm)		Volume	Ppt	Smear	CB A	CB B	Smear	CB A	CB B	Smear	CB A
1	2	3	4	5	6	7	9	10	11	12	13	14	15	16	17	18	19
1	C/2634/10	3A, 3B	60	F	Thigh	7X3	? Liposarcoma	2ml	Red	M	M	M	Discohesive cells	loose Sh	loose Sh	Pl	Pl
2	C/2737/10	1A, 1B	32	F	Abdomen	7X5	? Carcinoma Ovary	5ml	Red	S	M	M	Loose Cl, Vg G	G, Cl	G, Cl	L, R-O, In Bo	L, In Bo
3	C/2770/10	4A, 4B	35	M	Cervical Lymph node	2X1	? Lymphadenitis	2ml	Yellow	M	M	M	Di	Sq P	Sh, Sq P	Poly	Poly
4	C/2801/10	6A, 6B	15	M	Anterior Surface of Neck	3X3	Septicemic abscesses	5ml	Gy Wh	H	H	H	Di	Sh	Sh	Inf Ce	Inf Ce
5	C/2838/10	7A, 7B	60	F	Cervical Lymph node	4X2	? Ca Oesophagus	2ml	Gy Wh	H	H	H	Cl, Di	Sq P	Sq P	L	L
6	C/2899/10	8A, 8B	70	F	Cervical Lymph node	4X3	? Ca Ovary + 2° LN	8ml	Gy Wh	S	S	S	Loose sh, Vg G	G	G	R-O-Poly	In Bo
7	C/2949/10	9A, 9B	48	M	Thyroid	10X8	? Ca Thyroid	40ml	Brown	S	S	S	Di	Cl	Cl	Inf Ce	R, In Bo
8	C/29/11	11A, 11B	43	M	Salivary Gland	5X4	Pleomorphic adenoma	2ml	Red	M-H	M	M	Cl, D, Di	G, Tr	G, Tr	Ps, Epi	In Bo
9	CP/1/11	12A, 12B	25	M	Testis	8X6	Epididymo Architis	6ml	Yellow	H	M	M	Di	Sh, Di	Sh, Di	Inf Ce	R-O-Tri
10	CP/2/11	14A, 14B	65	M	Breast	2X2	Ca Breast	2ml	Gy Wh	H	M	M	Di, Ro,	Sh, Ro	Sh, Ro	R-O-Pleo	In Bo
11	CP/3/11	15A, 15B	30	M	Testis	6X6	Epididymo Architis	3ml	Red	M	M	M	Sh, Di	Sh	Sh	L, R-Poly,	L, R-Poly
12	CP/4/11	17A, 17B	65	M	Breast	4X3	Gynaecomastia	3ml	Red	S	M	M	Di	Di, Loose Sh	Di, Loose Sh	Spindle	O-Spindle
13	CP/5/11	18A, 18B	45	M	Inguinal Lymph node	3X2	Ca Penis	3ml	Yellow	M	M	M	Cl, Sh, Di	Sh, Sq P	Sh, Sq P	In Bo	In Bo
14	CP/6/11	21A, 21B	35	F	Cervical Lymph node	4X3	? Ca Oesophagus	2ml	Gy Wh	M	M	M	Di	Sq P	Sh, Sq P	Poly	Poly
15	CP/7/11	22A, 22B	60	M	Cervical Lymph node	3X2	? Ca Oesophagus	3ml	Gy Wh	M	S	M	Loose Cl, Di	Sh, Sq P	Sh, Sq P	R-Poly, Tadpole	L Ce
16	C/383/11	23A, 23B	60	F	Sternal Notch	4X3	? Lipoma	2ml	Gy Wh	H	M	M	Di	Di	Di	Inf Ce	Inf Ce
17	C/282/11	24A, 24B	45	M	Thyroid	7X6	Goitre	70ml	Brown	M	M	M	Di	Di	Di	Cyst Mac	Csyt Mac
18	CP/8/11	25A, 25B	20	M	Left Cervical Region	4X3	? Lymphadenitis	8ml	Yellow	H	H	H	Di	Sh, Cl, Di	Sh, Cl, Di	Lymphocytes	Lymphocytes
19	C/389/11	26A, 26B	26	F	Inguinal Lymph node	13X9	2° in LN	5ml	Gy Wh	S	M	M	Loosely Cohesive	Sh	Sh	R-Poly	R-Poly
20	C/471/11	27A, 27B	60	F	Salivary Gland	5X4	? Carcinoma	2ml	Red	H	H	H	Loose Cl, Di, G,	Sh, G	Sh, G	Pleo, Poly	Pleo
21	C/472/11	28A, 28B	22	F	Thyroid	5X4	Colloid Goitre	2ml	Red	M	M	M	Di	Di	Di	Cyst Mac	Csyt Mac
22	CP/9/11	29A, 29B	45	F	Breast	3X2	Fibrocystic disease	2ml	Gy Wh	M	M	M	Sh, Cl	G	Inf Ce	R-O	R-O
23	CP/10/11	30A, 30B	19	M	Cervical Lymph node	2X2	Ca Oesophagus	1ml	Gy Wh	H	M	M	Di	Sh, Sq P	Sh, Sq P	Poly	Poly
24	C/562/11	31A, 31B	40	F	Breast	15X15	Ca Breast	2ml	Red	H	H	H	Cl, Sh, G, Di	Cl,Sh,D,G	Cl,Sh,D,G	Pleo	Pleo
25	C/575/11	32A, 32B	20	F	Bone (Supra patellar)	12X10	Osteosarcoma	4ml	Red	M	S	S	Loose Sh, Di	-	-	O-Spindle	-
26	CP/11/11	33A, 33B	21	F	Cervical Lymph node	4X4	Cystic lesion neck	2ml	Gy Wh	H	H	H	Di	Di	Di	Lymphocytes	Lymphocytes
27	CP/12/11	34A, 34B	45	F	Breast	4X3	Fibroadenoma	3ml	Yellow	H	H	H	Di	Di	Di	Occ benign D Epi Ce	Benign D Epi
28	CP/13/11	35A, 35B	45	M	Testis	8X8	Ca Testis	15ml	Gy Wh	H	H	H	Di	Di	Di	Sperms	Sperms
29	C/621/11	36A, 36B	48	F	Breast	5X4	Ca Breast	8ml	Red	M	M	M	Loose Cl, Sh, micropapillary	Sh, D	Sh, D	Pleo, Myo Epi Ce	Pleo
30	CP/14/11	37A, 37B	40	F	Cervical Lymph node	2X1	Ca Oesophagus	2ml	Gy Wh	M	M	M	Di	Sh, Sq P	Sh, Sq P	Poly	Pleo
31	C/857/11	38A, 38B	45	M	Inguinal Lymph node	2X2	Ca Penis	1ml	Gy Wh	H	H	H	Di	Sq P	Sq P	Poly, Pleo	Pleo
32	C/884/11	40A, 40B	13	F	Salivary Gland	2X2	Malignancy	1ml	Red	H	H	H	Cl, Aggregates, Singles	Sh, Acinar	Sh, Acinar	Plasmacytoid	Pleo
33	C/894/11	41A, 41B	70	M	Liver	2X2	Secondaries in Liver	1ml	Red	M	M	M	Cl, G, singles	G, Di	G, Di	Medium size Ce	L, Pleo
34	C/1072/11	42A, 42B	40	F	Cervical Lymph node	4X4	Ca Tonsil	5ml	Gy Wh	M	M	M	Loose Cl, Di	Sh, Sq P	Sh, Sq P	Poly, Pleo	L, Pleo
35	C/1049/11	43A, 43B	50	M	Testis	10X8	Ca Testis	15ml	Gy Wh	H	H	H	Di	Di	Di	Sperms	Sperms
36	C/947/11	44A, 44B	50	M	Lung	5X4	Malignancy	2ml	Red	No Ce identified in all 3 slides				-	-	-	-
37	CP/15/11	45A, 45B	15	M	Intra abdominal	10X6	Mass abdomen	10ml	Gy Wh	H	H	H	Di	Di,	Di	Lymphocytes	M R Ce
38	CP/16/11	46A, 46B	45	F	Breast	4X4	Fibrocystic disease	10ml	Gy Wh	H	H	H	Di	Di	Di	Occ benign D Epi Ce	Benign D Epi
39	C/1287/11	48A, 48B	40	M	Liver	5X5	Amoebic abscess	8ml	Brown	S	S	S	Di	-	-	Degenerated Ce	-
40	C/1300/11	50A, 50B	46	F	Left Cervical Region	5X5	Sialadenitis	6ml	Gy Wh	S	NC	NC	Di	-	-	Lymphocytes	-
41	C/1376/11	51A, 51B	18	M	Thyroid	7X5	Diffuse Goitre	6ml	Brown	S	S	S	Fo, Di	Fo, Di	Fo, Di	Benign Thyroid Fo Ce	Benign Thyroid Fo Ce
42	CP/17/11	52A, 52B	24	F	Breast	4X3	Fibrocystic disease	5ml	Gy Wh	H	H	H	Di	Di	Di	Occ benign D Epi Ce	Occ benign D Epi Ce
43	C/1387/11	53A, 53B	27	F	Thyroid	5X4	Multinodular Goitre	15ml	Brown	S	M	M	Fo, Di	Fo, Di	Fo, Di	Benign Thyroid Fo Ce	Benign Thyroid Fo Ce
44	C/1377/11	54A, 54B	50	F	Breast	15X10	Ca Right Breast	5ml	Gy Wh	M	M	M	Di	Di	Di	Inf Ce	Inl Ce
45	CP/18/11	55A, 55B	20	M	Thyroid	2X2	Malignancy	4ml	Brown	M	H	H	Fo, Di	Papillary	Papillary	Thyroid Fo Ce	Cuboidal Ce
46	C/1620/11	56A, 56B	79	F	Breast	7X5	Ca Right Breast	3ml	Red	H	H	H	angulated Cl , G	Tubular	Tubular	Uniform	Uniform
47	CP/19/11	57A, 57B	40	F	Breast	3X2	Fibrocystic disease	10ml	Gy Wh	H	H	H	Di	Di	Di	Benign D Epi Ce	Benign D Epi
48	CP/20/11	58A, 58B	42	F	Breast	5X5	Mastitis	2ml	Red	M	M	M	Loose Cl, Sh	Sh, D	Sh, D	Pleo	Pleo
49	CP/21/11	59A, 59B	50	F	Cervical Lymph node	3X3	Ca Buccal Mucosa	4ml	Gy Wh	M	M	M	Loose Cl, Di	Sh, Sq P	Sh, Sq P	Poly, Pleo	L, Pleo
50	CP/22/11	60A, 60B	60	F	Cervical Lymph node	6X3	Ca Floor of Mouth	3ml	Gy Wh	M	M	M	Di	Sh, Sq P	Sh, Sq P	Poly, Pleo	L, Pleo

51	C/1822/11	61A, 61B	50	M	Left Thigh	8X8	Lipoma	1ml	Gy Wh	M	M	M	Di	Di	Di	Mature Sq Ce	Nt, aNt sq Ce
52	CP/23/11	62A, 62B	60	F	Breast	8X6	Phyllodes tumour	4ml	Yellow	M	M	M	Cl	Cl, Sh	Cl,Sh	Spindle Ce, ductal Epi Ce	L
53	CP/24/11	63A, 63B	20	M	Left Cervical Region	2X2	lymphadenitis	2ml	Gy Wh	H	H	H	Di	Di	Di	Nt, aNt sq Ce	Nt, aNt sq Ce
54	C/1928/11	64A, 64B	55	F	Breast	6X4	Ca Right Breast	2ml	Red	M	M	M	Cl, Sh, Di	Sh	Sh	L Atypical Ce	Atypical Sq Ce
55	C/1964/11	65A, 65B	50	F	Thyroid	2X2	Ca Thyroid	2ml	Red	No Ce identified in all 3 slides							
56	C/1973/11	66A, 66B	45	M	Inguinal Lymph Node	2X2	Ca Penis	2ml	Gy Wh	H	H	H	Discrete	Sh, Sq P	Sh, Sq P	Atypical Sq Ce	Atypical Sq Ce
57	C/1974/11	67A, 67B	48	M	Thyroid	5X4	Soltary nodule thyroid	3ml	Brown	M	M	M	Sh, Follicular, Di	Fo, Di	Fo, Di	Benign Fo Ce	Benign Fo Ce
58	C/1976/11	68A, 68B	56	M	Cervical Lymph node	2X1	? TB, ? Secondaries	2ml	Gy Wh	H	H	H	Di	Sh, Sq P	Sh, Sq P	Atypical Sq Ce	Atypical Sq Ce
59	CP/25/11	69A, 69B	28	F	Breast	4X4	Fibrocystic disease	6ml	Brown	H	H	H	Di	Di	Di	Occ benign D Epi Ce	Occ benign D Epi Ce
60	C/2089/11	70A, 70B	65	M	Lung	5X4	Ca Lung	10ml	Red	H	H	H	Papillary, G	G, Papillary	G, Papillary	R-O	Cuboidal
61	C/2091/11	71A, 71B	45	F	Liver	10X8	Secondaries in Liver	1ml	Red	H	H	H	Loose Cl, Di	G, Papillary	G, Papillary	Pleo	Pleo
62	C/2085/11	72A, 72B	16	M	Left Cervical Region	2X2	Lymphadenitis	2ml	Gy Wh	H	H	H	Di	Di	Di	Nt, aNt sq Ce	Nt, aNt sq Ce
63	C/2092/11	73A, 73B	43	M	Cervical Lymph node	4X4	? Tonsillar Malignancy	3ml	Yellow	M	M	M	Loose Cl, Di	Sh	Sh	L	L
64	C/2233/11	74A, 74B	35	F	Breast	5X3	Fibroadenoma	2ml	Yellow	M	M	M	Loose Cl, Sh	Sh, D	Sh, D	Pleo	Pleo
65	C/2234/11	75A, 75B	52	M	Mass per abdomen	8X6	? Malignancy	2ml	Red	M	M	M	Cl, Di	Sh, Fasicles	Sh, Fasicles	Spindle Ce	Spindle Ce
66	C/2295/11	79A, 79B	75	M	Liver	4X3	? Hepatoma	2ml	Red	H	H	H	Sh, Cohesive Cl, Di	Sh, Cl with lumina	Sh, Cl with lumina	L	L
67	C/2328/11	80A, 80B	65	F	Breast	7X6	Ca Breast	1ml	Red	H	H	H	Cl, Sh, Di	Cl, Tubules	Cl, Tubules	Monomorphic	Monomorphic
68	C/2392/11	82A, 82B	35	F	Cervical Lymph node	6X3	Abscess	30ml	Red	M	M	M	Cl, Di	Sh, inter ce bridges	Sh, inter ce bridges	Pleo	Pleo
69	CP/26/11	84A, 84B	35	F	Breast	6X5	Ca Breast	6ml	Gy Wh	M	M	M	Sh,Cl, G	Acinar, Sh	Acinar, Sh	R-O	Cuboidal
70	CP/27/11	85A, 85B	30	F	Breast	10X6	Ca Breast	2ml	Red	H	H	H	Cl, Sh	Sh	Sh	Pleo	L, Pleo
71	C/2652/11	86A, 86B	48	F	Cervical Lymph node	4X4	Ca Right lower alveolus	5ml	Yellow	M	M	M	Di	Sh, Sq P	Sh, Sq P	R-Poly	L, Poly
72	C/208/12	89A, 89B	73	M	Shoulder Joint	12X10	Cystic swelling	20ml	Y viscous	S	H	H	Di	Di	Di	Inf Ce	Inf Ce
73	CP/28/12	90A, 90B	17	M	Right Cervical Region	4X4	Lymphadenitis	10ml	Gy Wh	M	M	M	Di	Di	Di	Nt, aNt sq Ce	Nt, aNt sq Ce
74	CP/29/12	91A, 91B	35	M	Thyroid	5X4	Goitre	4ml	Brown	M	M	M	Fo, Di	Fo	Fo	Benign Fo Ce	Benign Fo Ce
75	C/365/12	92A, 92B	50	F	Cervical Lymph node	4X3	? Tuberculosis	4ml	Gy Wh	M	M	M	Di	Sh, Sq P	Sh, Sq P	R-Poly	L, Poly
76	C/366/12	93A, 93B	55	F	Lung	4X3	Bronchogenic Ca	2ml	Red	M	M	M	Loose Sh, G, Di	G, D	G, D	R	Collumnar Ce
77	CP/30/12	100A,100B	30	F	Cervical Lymph node	3X2	lymphadenitis	2ml	Gy Wh	M	M	M	Di	Sh, Sq P	Sh, Sq P	R-Poly	L, Poly
78	CP/31/12	101A,101B	65	M	Thyroid	5X3	Cystic lesion neck	6ml	Brown	S	M	M	Fo, Di	Papillary	Papillary	Thyroi Fo Ce	Mild Pleo
79	C/671/12	102A,102B	36	F	Cervical Lymph node	4X4	? Malignancy	3ml	Yellow	M	M	M	Di	Sh, Sq P	Sh, Sq P	R-Poly	L, Poly
80	C/754/12	103A,103B	50	M	Retroperitoneal mass	8X6	? Sarcoma	3ml	Red	S	M	M	Cl, Di	Fasicles, Antony A	Fasicles, Antony A	Spindle Ce	Spindle Ce
81	C/814/12	104A,104B	37	F	Breast	6X4	Ca Breast	1.5ml	Red	H	H	H	G, Cl	Sh, G	Sh, G	Pleo	Pleo
82	C/901/12	105A,105B	50	M	Salivary Gland	6X5	? Carcinoma	1ml	Red	H	H	H	Acinar, Cl, Papillary	Acinar, Cribriform	Acinar, Cribriform	R	R-Cuboidal
83	C/912/12	106A,106B	36	F	Cervical Lymph node	3X2	? Metastsis	2.5ml	Yellow	H	H	H	Di	Sh, Sq P	Sh, Sq P	R-Poly	L, Poly
84	C/925/12	107A,107B	40	F	Salivary Gland	3X2	Pleomorphic adenoma	2ml	Brown	S	S	S	Loose Sh	Di	Di	Acinar Ce	Acinar Ce
85	C/975/12	108A,108B	45	F	Thyroid	4X3	Multinodular Goitre	8ml	Brown	M	M	M	Cl	Fo	Fo	Benign Fo Ce	Benign Fo Ce
86	C/987/12	109A,109B	48	M	Thyroid	3X3	Colloid Goitre	3ml	Brown	S	S	S	Fo	Fo	Fo	Benign Fo Ce	Benign Fo Ce
87	C/988/12	110A,110B	35	F	Thyroid	3X3	Nodular Goitre	5ml	Brown	S	S	S	Fo	Fo	Fo	Benign Fo Ce	Benign Fo Ce
88	C/1000/12	111A,111B	75	M	Lung	3X3	Ca Lung	2ml	Red	M	M	M	Sh, G	G	G	R-O	Pleo
89	C/1045/12	112A,112B	50	F	Thyroid	10X4	Ca Thyroid	15ml	Yellow	M	M	M	Fo, Cl	Fo	Fo	Benign Fo Ce	Benign Fo Ce
90	CP/32/12	113A,113B	40	F	Cervical Lymph node	6X3	? Metastsis	4ml	Yellow	H	H	H	Di	Sh, Sq P	Sh, Sq P	R-Poly	L, Poly
91	CP/33/12	114A,114B	28	M	Spleen	3X3	? Metastsis	3ml	Red	H	H	H	Cl, Sh, Cribriform	Sh, G, SDB	Sh, G, SDB	L, Pleo	L, Pleo
92	C/706/12	115A,115B	75	F	Cervical Lymph node	3X2	? Metastsis	2.5ml	Gy Wh	S	S	S	Di	Sh, Sq P	Sh, Sq P	R-Poly	L, Poly
93	C/1172/12	116A,116B	65	M	Cervical Lymph node	3X3	? Malignancy	2ml	Gy Wh	M	H	H	Cl, Attempted G	G, Di	G, Di	R-O, Pleo	R-O
94	C/1211/12	117A,117B	87	M	Kidney	6X5.5	? Renal cell carcinoma	2ml	Red	M	M	M	Cl, Papillary	G	G	L, R	
95	C/1212/12	118A,118B	40	M	Cervical Lymph node	2X2	? Metastsis	3ml	Gy Wh	H	H	H	Di	Sh, Sq P	Sh, Sq P	R-Poly	L, Poly
96	C/1318/12	119A,119B	60	F	Salivary Gland	4X4	Carcinoma	1ml	Red	H	H	H	Sh, Cl, Microacinar	Microacinar, Ductal, G	Microacinar, Ductal, G	R-Poly	R-Poly

	Cytoplasm			Nuclear Features			Background			Re	Ct	
CB B	Smear	CB A	CB B	Smear	CB A	CB B	Smear	CB A	CB B			Smear
20	21	22	23	24	25	26	27	28	29	30	31	32
Pl	M E, F V	M E, F V	M E, F V	L N, Pr Ni	AK,↑N:C, I Bo	AK,↑N:C, I Bo	Hm, MNG	Hm, MNG	Hm, MNG	A	M	Malignant Mesenchymal T
L, In Bo	M E	M E	M E	Pl, Hc	Pl, Hc, I Bo	Pl, Hc, I Bo	Hm	Hm	Hm	I	M	Adeno Ca
Poly	M	M E	M E	↑N:C, Hc	Hc	Hc	N Debries	Inf	Inf	I	M	SCC Deposits
Inf Ce	-	-	-	-	-	-	Fb Material	Fb Material	Fb Material	A	I	Acute Inf Process - Abscess
L	M	M E	M E	Hc, I Bo	Hc, I Bo	Hc, I Bo	Inf, Nec	Nec, Inf	Nec, Inf	I	M	SCC Deposits
In Bo	S-M C	S-M C	S-M C	Hc N	Hc N, I Bo	Hc N, I Bo	E Material	E Material	E Material	I	M	Carcinomatous Deposits
R, In Bo	S - M	E	E	-	Vs N, Inc Ni	Vs N, Inc Ni	Colloid, RBC	Colloid, RBC	Colloid, RBC	A	I	Suppurative thyroiditis
In Bo	Ab	M-Ab	M-Ab	Mi AK, F Cr	R-O, F Gr Cr, N Gv	R-O, F Gr Cr, N Gv	Fb Meterial, RBC	Vasc Str, Basal Ce	Vasc Str, Basal Ce	I	B	Monomorphic adenoma
R-O-Tri	-	S-M, E	S-M E	-	R-O, Vs, Pr Ni	R-O, Vs, Pr Ni	-	Inf	Inf	CB	M	Acute Inf Process
In Bo	M	M E	M E	Mi Pleo, S-P Cr	Vs N, Pr E Ni	Vs N, Pr E Ni	Inf	Inf, RBC	Inf, RBC	A	M	Neuroendocrine tumour
L, R-Poly	M E	M E	M E	L N, Pr Ni	L N, Pr Ni	L N, Pr Ni	lymphocytes	lymphocytes, RBC	lymphocytes, RBC	A	M	Seminoma
O-Spindle	S	S-M	S-M	Vs N	Vs N	Vs N	Hm	Well formed capillaries, Hm	Well formed capillaries, Hm	I	B	Angiomatous Hamartoma
In Bo	Ab C	M-Ab	M-Ab	AK,Vs N, Pr Ni	AK,Vs N, Pr Ni	AK,Vs N, Pr Ni	Inf, RBC	Inf, RBC	Inf, RBC	I	M	SCC Deposits
Poly	M	M E	M E	↑N:C, Hc	Hc	Hc	N Debries	Inf	Inf	I	M	SCC Deposits
L Ce	Ab dense E	Ab E	Ab E	I Bo, Hc, Pr Ni	I Bo	I Bo	Nec, Cyst Mac	Inf Ce, Nec	Inf Ce, RBC	I	M	SCC Deposits
Inf Ce	-	-	-	-	-	-	Nec	Nec	Nec	A	I	Tubercular Abscess
Cyst Mac	Ab	Ab	Ab	R Vs N	R Vs N	R Vs N	Colloid	Colloid, Cyst Mac	Colloid, Cyst Mac	A	B	Colloid Cyst
Lymphocytes	S	S	S	R, Hc	R, Hc	R, Hc	Protein material	Tiny vessels lined by endothelium	Tiny vessels lined by endothelium	I	B	Lymphangioma
R-Poly	S-M E C	S E C	S E C	Hc	↑N:C, Hc, I B	↑N:C, Hc, I B	Anucleate Sqames,RBC	RBC	RBC	I	M	SCC Deposits
Pleo	E C	E C	E C	I Bo, Micro Ni	I Bo, Pr Ni	I Bo, Pr Ni	Fb Material, RBC	Prot Material	Prot Material	A	M	Adeno Ca
Cyst Mac	Ab	Ab	Ab	R Vs N	R Vs N	R Vs N	Colloid, Cyst Mac	Colloid, Cyst Mac	Colloid, Cyst Mac	A	B	Colloid Cyst
Inf Ce	M	M	M	Vs N	R N, Bland Cr	R N, Bland Cr	Sq Ce, Cyst Mac	Inf Ce	Inf Ce	A	B	Fibrocystic disease
Poly	M	M	M	Hc N,	Hc N, I Bo	Hc N, I Bo	Inf Ce, RBC	Inf Ce, RBC	Inf Ce, RBC	I	M	Suspecious of malignancy
Pleo	S	S	S	↑N:C, AK, Pr Ni	↑N:C, AK, Pr Ni	↑N:C, AK,Pr Ni	Hm, Nec	Hm	Hm	A	M	Ductal carcinoma - Breast
-	Dense E	-	-	Coarse Cr, perinuclear halo	-	-	Hm, Calcification	Hm, Osteoid	Hm, Osteoid	CS	M	Osteosarcoma
ymphocytes	-	-	-	-	-	-	Lymphoglandular bodies	Prot Material	Prot Material	I	B	Lymphatic cyst
Benign D Epi	M	M	M	R, Vs N	R N, Bland Cr	R N, Bland Cr	Inf Ce, Cyst Mac	Inf Ce, Cyst Mac	Inf Ce, Cyst Mac	A	B	Fibrocystic disease
Sperms	-	-	-	-	-	-	Leucin crystals	Leucin crystals	Leucin crystals	A	B	Spermatocele
Pleo	M	S	S	Mild AK	↑N:C, Hc, I B	↑N:C, Hc, I B	Ce- N debris, RBC	Hm	Hm	A	M	Ductal carcinoma - Breast
Pleo	Dense E	S E C	S E C	↑N:C, Hc	↑N:C, Hc	↑N:C, Hc	N debris, Inf	Hm, Inf Ce	Hm, InfCe	I	M	SCC Deposits
Pleo	M	M	M	Mild Ak	Mild AK, Hc N	Mild AK, Hc N	Inf Ce	Inf ce	Inf ce	I	M	SCC Deposits
Pleo	M	M	M	Vs N	Hc N, I B	Hc N, I B	Fibromyxoid, chondromyxoid stroma, RBC	Hm, Fibrous stroma	Hm, Fibrous stroma	A	B	Pleomorphic adenoma
L, Pleo	S-M	M	M	Hc N, I B	Hc N	Hc N	RBC, Hepatocytes	RBC, Hepatocytes	RBC, Hepatocytes	A	M	Metastatic Adenocarcinoma
L, Pleo	M	S	S	Vs N, Pr Ni	Vs N, Pr Ni	Vs N, Pr Ni	Inf Ce, Fib Mat	Hm, Inf Ce	Hm, InfCe	I	M	SCC Deposits
Sperms	-	-	-	-	-	-	Leucin crystals	Leucin cryst	Leucin cryst	A	B	Spermatocele
-	-	-	-	-	-	-	Hm	Hm	Hm	-	-	
M R Ce	-	M	M	-	R N, Vs Cr	R N, Vs Cr	RBC	Tiny vessels lined by endothelium	Tiny vessels lined by endothelium	I	B	Lymphatic cyst
Benign D Epi	M	M	M	R, Vs N	R, Vs N	R, Vs N	Inf Ce, Cyst Mac	Inf Ce, Cyst Mac	Inf Ce, Cyst Mac	A	B	Fibrocystic disease
-	-	-	-	-	-	-	Hooklets, Nec	Hm, Inf Ce	Hm, Inf Ce	CS	I	Hydatid Disease - Liver
-	-	-	-	-	-	-	Homogenous E Pro mat	Homogenous E Pro mat	Homogenous E Pro mat	A	I	Post inflammatory serous cyst
Benign Thyroid Fo Ce	M	M	M	R N, Vs Cr	R N, Vs Cr	R N, Vs Cr	Colloid, RBC	Colloid, RBC	Colloid, RBC	A	B	Colloid Goitre
Occ benign D Epi Ce	M	M	M	R N, Vs Cr	R N, Vs Cr	R N, Vs Cr	Inf Ce, Cyst Mac	Inf Ce, Cyst Mac	Inf Ce, Cyst Mac	A	B	Cystic Lesion - Breast
Benign Thyroid Fo Ce	M	M	M	R N, Vs Cr	R N, Vs Cr	R N, Vs Cr	Colloid, RBC	Colloid, RBC	Colloid, RBC	A	B	Colloid Goitre
Inl Ce	-	-	-	-	-	-	RBC, Ce debri	RBC, Ce debri	RBC, Ce debri	A	I	Acute Suppurative Mastitis
Cuboidal Ce	M	M	M	Intra N incl	Vs	Vs	S thick colloid, RBC	RBC	RBC	I	M	Papillary Carcinoma- Thyroid
Uniform	S	S	S	Isonucleosis	Isonucleosis	Isonucleosis	RBC	RBC	RBC	I	M	Tubular Ca - Right Breast
Benign D Epi	M	M	M	R, Vs N	R, Vs N	R, Vs N	Inf Ce, Cyst Mac	Inf Ce, Cyst Mac	Inf Ce, Cyst Mac	A	B	Fibrocystic disease
Pleo	M	S	S	Mild AK	↑N:C, Hc, I B	↑N:C, Hc, I B	Ce- N debris, RBC	Hm	Hm	A	M	Ductal carcinoma - Breast
L, Pleo	M	S	S	Vs N, Pr Ni	Vs N, Pr Ni	Vs N, Pr Ni	Inf Ce, Fib Mat	Hm, Inf Ce	Hm, InfCe	I	M	SCC Deposits
L, Pleo	M	S	S	Vs N, Pr Ni	Hc N	Hc N	Inf Ce	Hm, Inf Ce	Hm, InfCe	I	M	SCC Deposits

Nt, aNt sq Ce	Ab E	Ab E	Ab E	R N	R N	R N	Nec Mat	Nec Mat	Nec Mat	A	B	Keratinous cyst
L	M	Ab Vac C	Ab Vac C	Spindle	L N, I B, Vs, Pr Ni	L N, I B, Vs, Pr Ni	RBC, Inf Ce	Inf Ce, Pro mat	Inf Ce, Pro mat	A	B	Phyllodes tumour
Nt, aNt sq Ce	Ab E	Ab E	Ab E	R N	R N	R N	Inf Ce	RBC, Inf Ce, Pro mat	RBC, Inf Ce, Pro mat	A	B	Branchial cleft cyst
Atypical Sq Ce	M	M-Ab	M-Ab	Pl N, Pr Ni	L N, Pr Ni	L N, Pr Ni	Nec, RBC	Nec, RBC	Nec, RBC	I	M	Ca Breast
										-	-	
Atypical Sq Ce	Ab	Ab	Ab	Pl Hc N	Pl Hc N	Pl Hc N	Keratin Debris	RBC, Inf Ce	RBC, Inf Ce	I	M	SCC Deposits
Benign Fo Ce	M	M	M	R Vs N,	R Vs N,	R Vs N,	Colloid, Cyst Mac	Colloid, Cyst Mac	Colloid, Cyst Mac	A	B	Colloid Cyst
Atypical Sq Ce	Ab	Ab	Ab	Pl Hc N	Pl Hc N	Pl Hc N	Inf Ce	Inf Ce	Inf Ce	I	M	SCC Deposits
Occ benign D Epi Ce	M	M	M	R N, Vs Cr	R N, Vs Cr	R N, Vs Cr	Inf Ce, Cyst Mac	Inf Ce, Cyst Mac	Inf Ce, Cyst Mac	A	B	Cystic Lesion - Right breast
Cuboidal	M E	M E	M E	AK, Hc N, Pr Ni	I Bo, Hc N, Pr Ni	I Bo, Hc N, Pr Ni	Normal Bronchial Epi ce	RBC	RBC	A	M	Adeno Ca - Lung
Pleo	M E	S	S	I Bo,HcN,Pr Ni	I Bo, Hc N, Pr Ni	I Bo, Hc N, Pr Ni	Nec, Cyst Mac	RBC	RBC	A	M	Metastatic deposits in liver
Nt, aNt sq Ce	Ab E	Ab E	Ab E	R N	R N	R N	Inf Ce	Inf Ce	Inf Ce	A	B	Branchial cleft cyst
L	M E	S	S	AK, I Bo, ↑N:C	↑N:C, Hc N	↑N:C, Hc N	Keratin Debris	RBC	RBC	I	M	SCC Deposits
Pleo	M	S	S	Mild AK	↑N:C, Hc, I Bo	↑N:C, Hc, I Bo	Ce- N debris, RBC	Hm	Hm	A	M	Ductal carcinoma - Breast
Spindle Ce	S-M	S	S	Elongated N	Elongated N	Elongated N	RBC, Fibromyx mat	RBC	RBC	I	B	GIST
L	Ab E	Ab E	Ab E	Bizzare N, Intra N incl	Pleo N	Pleo N	RBC	Tumour giant cells, RBC	Tumour giant cells, RBC	A	M	HCC
Monomorphic	M E	M E	M E	Isonucleosis	Isonucleosis	Isonucleosis	RBC	RBC	RBC	A	M	Tubular Ca - Left Breast
Pleo	Ab	Ab	Ab	Hc N	Hc N, I Bo	Hc N, I Bo	Fibromyxoid stroma, RBC	RBC	RBC	I	M	SCC Deposits
Cuboidal	M	M	M	Vs N, Pr Ni	Vs N, Pr Ni	Vs N, Pr Ni	Inf Ce, RBC	Inf Ce, RBC	Inf Ce, RBC	A	B	Galactocele
L, Pleo	M	S-M	S-M	VsN,I Bo,Pr Ni	Vs N, I Bo, Pr Ni	Vs N, I Bo, Pr Ni	RBC	Nec, RBC	Nec, RBC	A	M	Ca Breast
L, Poly	M	M	M	↑N:C, Hc N	Hc N, I Bo	Hc N, I Bo	Nec, Inf ce	Inf Ce, RBC	Inf Ce, RBC	I	M	SCC Deposits
Inf Ce	-	-	-	-	-	-	Protein material	fibrin	fibrin	I	B	Bursitis
Nt, aNt sq Ce	Ab E	Ab E	Ab E	R N	R N	R N	Inf Ce	Inf Ce	Inf Ce	A	B	Branchial cleft cyst
Benign Fo Ce	M	M	M	R N, Vs Cr	R N, Vs Cr	R N, Vs Cr	Colloid, RBC	Colloid, RBC	Colloid, RBC	A	B	Colloid Goitre
L, Poly	M	M	M	↑N:C, Hc N	Hc N, I Bo	Hc N, I Bo	Nec, Inf ce	Inf Ce, RBC	Inf Ce, RBC	I	M	SCC Deposits
Collumnar Ce	S-M	M	M	Gr Cr, Pr Ni	Gr Cr, Pr Ni	Gr Cr, Pr Ni	RBC	RBC	RBC	A	M	Adeno Ca - Lung
L, Poly	M	M	M	↑N:C, Hc N	Hc N, I Bo	Hc N, I Bo	Nec, Inf ce	Inf Ce, RBC	Inf Ce, RBC	I	M	SCC Deposits
Mild Pleo	M	M	M	Mild AK	Mild AK, Ground glass N	Mild AK, Ground glass N	S thick colloid, RBC	RBC	RBC	I	M	? Papillary Carcinoma- Thyroid
L, Poly	M	M	M	↑N:C, Hc N	Hc N, I Bo	Hc N, I Bo	Nec, Inf ce	Inf Ce, RBC	Inf Ce, RBC	I	M	SCC Deposits
Spindle Ce	S	Verrocay bodies	Verrocay bodies	Elongated N	Elongated N	Elongated N	RBC	RBC	RBC	I	B	Schwannoma
Pleo	S-M	M	M	PleoVs N, PrNi	PleoVs N, PrNi	PleoVs N, PrNi	RBC	RBC	RBC	A	M	Ductal carcinoma - Breast
R-Cuboidal	M	M	M	Mild AK	Mild AK	Mild AK	RBC, Hyaline globules	RBC	RBC	I	M	Adenoid cystic carcinoma
L, Poly	M	M	M	↑N:C, Hc N	Hc N, I B	Hc N, I B	Nec, Inf ce	Inf Ce, RBC	Inf Ce, RBC	I	M	SCC Deposits
Acinar Ce	Ab	Ab	Ab	R N, Vs Cr	R N, Vs Cr	R N, Vs Cr	Cyst Mac, Prot mat	Cyst Mac, Pro mat	Cyst Mac, Pro mat	A	B	Simple cyst of Salivary Gland
Benign Fo Ce	M	M	M	R N, Vs Cr	R N, Vs Cr	R N, Vs Cr	Colloid, Cyst Mac	Colloid, Cyst Mac	Colloid, Cyst Mac	A	B	Colloid Cyst
Benign Fo Ce	M	M	M	R N, Vs Cr	R N, Vs Cr	R N, Vs Cr	Colloid, Cyst Mac	Colloid, Cyst Ma	Colloid, Cyst Mac	A	B	Colloid Cyst
Benign Fo Ce	M	M	M	R N, Vs Cr	R N, Vs Cr	R N, Vs Cr	Colloid, Cyst Mac	Colloid, Cyst Mac	Colloid, Cyst Mac	A	B	Colloid Cyst
Pleo	M	M	M	Hc N	Hc N	Hc N	Nec, RBC	RBC	RBC	A	M	Adenocarcinoma - Lung
Benign Fo Ce	M	M	M	R N, Vs Cr	R N, Vs Cr	R N, Vs Cr	Colloid, Cyst Mac	Colloid, Cyst Mac	Colloid, Cyst Mac	A	B	Colloid Cyst
L, Poly	M	M	M	↑N:C, Hc N	Hc N, I B	Hc N, I B	Nec, Inf ce	Inf Ce, RBC	Inf Ce, RBC	I	M	SCC Deposits
L, Pleo	Ab	M-Ab	M-Ab	↑N:C,VsN,PrNi	↑N:C,VsN,PrNi	↑N:C, VsN, PrNi	Inf ce	Inf Ce	Inf ce	I	M	Metastatic deposits from testis
L, Poly	M	M	M	↑N:C, Hc N	Hc N, I B	Hc N, I B	Nec, Inf ce	Inf Ce, RBC	Inf Ce, RBC	I	M	SCC Deposits
R-O	M	M	M	Vs Cr, Pr Ni	Vs Cr, Pr Ni	Vs Cr, Pr Ni	RBC	RBC	RBC	I	M	Adeno Ca Deposits
							Hm	Hm	Hm	A	M	Renal Cell Carcinoma
L, Poly	M	M	M	↑N:C, Hc N	Hc N, I B	Hc N, I B	Nec, Inf ce	Inf Ce, RBC	Inf Ce, RBC	I	M	SCC Deposits
R-Poly	Ab	Amphophilic, Ab	Amphophilic, Ab	R-Mild Pleo	R-Mild Pleo	R-Mild Pleo	Hm, Hyaline Globule	Hm	Hm	I	M	Acinic Cell Carcinoma

Diagnosis	
CB A	CB B
33	34
Mesenchymal T w MNG	Mesenchymal T w MNG
Adeno Ca	Adeno Ca
SCC Deposits	SCC Deposits
Acute Inf Process - Abscess	Acute Inf Process - Abscess
WD SCC Deposits	WD SCC Deposits
Adeno Ca	Adeno Ca
Suppurative thyroiditis	Suppurative thyroiditis
Basal cell adenoma	Basal cell adenoma
Seminoma - Testis	Seminoma - Testis
Carcinoid	Carcinoid
Seminoma	Seminoma
Hemangioma	Hemangioma
SCC Deposits	SCC Deposits
SCC Deposits	SCC Deposits
SCC Deposits	SCC Deposits
Tubercular Abscess	Tubercular Abscess
Colloid Cyst	Colloid Cyst
Lymphangioma	Lymphangioma
SCC Deposits	SCC Deposits
Adeno Ca	Adeno Ca
Colloid Cyst	Colloid Cyst
Fibrocystic disease	Fibrocystic disease
SCC Deposits	SCC Deposits
Ductal carcinoma - Breast	Ductal carcinoma - Breast
-	-
Lymphatic cyst	Lymphatic cyst
Fibrocystic disease	Fibrocystic disease
Spermatocele	Spermatocele
Ductal carcinoma - Breast	Ductal carcinoma - Breast
SCC Deposits	SCC Deposits
WDSCC Deposits	WDSCC Deposits
Pleomorphic adenoma	Pleomorphic adenoma
Metastatic Adenocarcinoma	Metastatic Adenocarcinoma
SCC Deposits	SCC Deposits
Spermatocele	Spermatocele
Inconclusive	
Lymphatic cyst	Lymphatic cyst
Fibrocystic disease	Fibrocystic disease
-	-
Post inflammatory serous cyst	Post inflammatory serous cyst
Colloid Goitre	Colloid Goitre
Cystic Lesion - Breast	Cystic Lesion - Breast
Colloid Goitre	Colloid Goitre
Acute Suppurative Mastitis	Acute Suppurative Mastitis
Papillary Carcinoma- Thyroid	Papillary Carcinoma- Thyroid
Tubular Ca - Right Breast	Tubular Ca - Right Breast
Fibrocystic disease	Fibrocystic disease
Ductal carcinoma - Breast	Ductal carcinoma - Breast
SCC Deposits	SCC Deposits
SCC Deposits	SCC Deposits

Keratinous cyst	Keratinous cyst
Phyllodes tumour	Phyllodes tumour
Branchial cleft cyst	Branchial cleft cyst
Metaplastc Ca	Metaplastic Ca
Inconclusive	
WDSCC Deposits	WDSCC Deposits
Colloid Cyst	Colloid Cyst
WDSCC Deposits	WDSCC Deposits
Cystic Lesion - Right breast	Cystic Lesion - Right breast
Adeno Ca - Lung	Adeno Ca - Lung
Metastatic Ductal Ca Breast	Metastatic Ductal Ca Breast
Branchial cleft cyst	Branchial cleft cyst
SCC Deposits	SCC Deposits
Ductal carcinoma - Breast	Ductal carcinoma - Breast
GIST	GIST
HCC	HCC
Tubular Ca - Left Breast	Tubular Ca - Left Breast
SCC	SCC
Galactocele	Galactocele
Ca Breast	Ca Breast
SCC Deposits	SCC Deposits
Bursitis	Bursitis
Branchial cleft cyst	Branchial cleft cyst
Colloid Goitre	Colloid Goitre
SCC Deposits	SCC Deposits
Adeno Ca - Lung	Adeno Ca - Lung
SCC Deposits	SCC Deposits
Papillary Carcinoma- Thyroid	Papillary Carcinoma- Thyroid
SCC Deposits	SCC Deposits
Schwannoma	Schwannoma
Ductal carcinoma - Breast	Ductal carcinoma - Breast
Adenoid cystic carcinoma	Adenoid cystic carcinoma
SCC Deposits	SCC Deposits
Simple cyst of Salivary Gland	Simple cyst of Salivary Gland
Colloid Cyst	Colloid Cyst
Colloid Cyst	Colloid Cyst
Colloid Cyst	Colloid Cyst
Adenocarcinoma - Lung	Adenocarcinoma - Lung
Colloid Cyst	Colloid Cyst
SCC Deposits	SCC Deposits
Yolk Sac Tumour deposits	Yolk Sac Tumour deposits
SCC Deposits	SCC Deposits
Adeno Ca Deposits	Adeno Ca Deposits
Renal Cell Carcinoma	Renal Cell Carcinoma
SCC Deposits	SCC Deposits
Acinic Cell Carcinoma	Acinic Cell Carcinoma