

## Original Research Article

# Significance of tissue microbiopsies in fine needle aspiration cytology

A. R. Jaswanthini<sup>1\*</sup>, D. Vishnu Prathap<sup>2</sup>, K. Swaminathan<sup>3</sup>

<sup>1</sup>Department of Pathology, Government Medical College, Omandurar Government Estate, Chennai, Tamil Nadu, India

<sup>2</sup>Department of Pathology, Government Villupuram Medical College, Villupuram, Tamil Nadu, India

<sup>3</sup>Department of Pathology, Tirunelveli Medical College, Tirunelveli, Tamil Nadu, India

**Received:** 06 May 2018

**Revised:** 10 May 2018

**Accepted:** 13 May 2018

**\*Correspondence:**

Dr. A. R. Jaswanthini,

E-mail: [drjaswanthini@gmail.com](mailto:drjaswanthini@gmail.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

**Background:** Fine Needle Aspiration Cytology smears prepared through conventional method, often contain well preserved viable tissue fragments which are intact (Tissue Micro biopsies). They will provide information on the tissue architecture and contribute to the tumour ontogeny.

**Methods:** A prospective study of significance of tissue micro biopsies in FNAC were studied and interpreted in the Cytopathology laboratory of Department of Pathology, Tirunelveli Medical College, Tirunelveli. 100 cases with clinically palpable Swellings were studied.

**Results:** Out of 100 cases, 82% of cases were coming under the category of conventional FNAC, 10% of the cases were USG guided and 8% were falling under CT guided FNAC. The organs with highest yield of micro biopsies were lymph nodes 34 cases (34%) followed by breast 24 cases, thyroid 11 cases, lung 8 cases, salivary gland 7 cases, liver and bone and soft tissue 4 cases each, abdominal mass 3cases, pancreas 2 cases, and single case each of ovary, spleen, anterior mediastinum. Of the total 100 cases, 56% of the cases were malignant and 44% of the cases were benign. Among the 56 malignant tumours 41(73.2%) cases were primary tumours and 15cases (26.8%) were metastatic tumours.

**Conclusions:** FNA smears containing micro biopsies help in diagnosis, typing of tumour and predicting possible primary sites in cases of metastatic tumours which were not possible by cytology alone. Hence, this technique can be used to increase the diagnostic accuracy of FNAC if put into practice.

**Keywords:** FNAC, Micro biopsies

### INTRODUCTION

In the diagnosis of clinically suspected malignant lesions Fine needle aspiration cytology is one of the first lines of investigations. At present in oncology practice, it is an indispensable tool, both as a modality of pre-therapeutic investigation and also in identifying recurrences. Lesions located superficially are aspirated by palpation. Radiological imaging modalities like ultrasonography and computed tomography guide fine needles to lesions

not palpable or deep-seated lesions. Orell SR et al, are of the opinion that, if the treatment of the lesion involves neoadjuvant preoperative chemo or radiotherapy, then cytodiagnosis must be equivalent to a histological tissue diagnosis, i.e. providing grade for malignancies and histo-genetic tumour type.<sup>1</sup> With this background, the main focus was on the assessment of significance of tissue micro biopsies. Micro biopsies are defined as well preserved viable tissue fragments obtained on cytology smears.<sup>2</sup> They will provide information on the tissue architecture and thereby contribute to the tumour

ontogeny. This study was done to assess the significance of the presence of micro biopsies in conventional/guided FNAC in giving a more precise diagnosis.

**METHODS**

**Source**

All the patients who reported to the department of pathology with a requisition to perform FNAC with clinically detectable swelling were included in the study. The out patients referred from Surgical OPD, Medicine OPD, ENT and other OPDs and inpatients of medicine, surgery, gynaecology, respiratory medicine and orthopaedics department were part of the study. A total of 100 cases were included in the study. Fine needle aspiration was carried out in the cytopathology laboratory.

**Inclusion criteria**

All patients who presented with clinically palpable swelling irrespective of age and sex.

**Exclusion criteria**

The patients who had not given a written informed consent.

**Procedure**

Informed written consent was obtained from each patient prior to FNAC. After obtaining the consent and giving a brief explanation about the procedure to the patient, aspiration was done with the patient in supine or sitting position. Under aseptic precautions, lesions were aspirated with 22-23 gauge disposable needles except in cases of bone lesions where 18 gauge needles were used. Deep seated lesions were aspirated under computed tomography (CT) or Ultrasonography (US) guidance. The needle with syringe was inserted into the lesion. Three to four to and for movements were performed quickly. Under negative pressure, material gets collected in the needle. After collection of material, negative pressure was released, needle with syringe holder was removed. The material was spread over clean labelled slides. The smears prepared were fixed in 95% ethyl alcohol, stained with hematoxylin and eosin (H and E). Whenever fluid was aspirated the whole content was aspirated and centrifuged and smears then made with the sediment and stained with H and E. In such cases whenever a residual mass was observed, it was re-aspirated. In case of multiple nodules, more than one aspirate were done from prominent nodules. No serious complication occurred in our study.

**Interpretation**

The smears were examined microscopically for the presence of well preserved viable tissue fragments,

disregarding the loose tumour cells in the background. The cytopathology report was then given according to the standard reporting format.

**RESULTS**

Out of 100 cases with Clinically palpable Swellings it was noted that 82% of cases were coming under the category of conventional, 10% of the cases were under USG guided and 8% were falling under CT guided FNAC types.

The organs with highest yield of micro biopsies were lymph nodes, 34 cases (34%) followed by breast 24 cases, thyroid 11 cases, lung 8 cases, salivary gland 7 cases, liver and bone and soft tissue 4 cases each, abdominal mass 3cases, pancreas 2 cases, and single case each of ovary, spleen, anterior mediastinum (Table 1).

**Table 1: Distribution of the sample based on the site of FNAC.**

Organ	No. of cases	%
Lymph node	34	34%
Breast	24	24%
Thyroid	11	11%
Lung	8	8%
Salivary gland	7	7%
Bone and soft tissue	4	4%
Liver	4	4%
Abdominal wall swelling	2	2%
Pancreas	2	2%
Ovary	1	1%
Abdominal mass	1	1%
Anterior Mediastinal mass	1	1%
Spleen	1	1%
Total	100	100%

**Table 2: Distribution of sample based on nature of lesion.**

Type	No. of cases	Percentage
Malignant	56	56
Benign	44	44

Of the total 100 cases, 56% of the cases were malignant and 44% of the cases were benign. Among the 56 malignant tumours 41 (73.2%) cases were primary tumours and 15 cases (26.8%) were metastatic tumours (Table 2).

Among the benign lesions of breast which included mastitis, gynaecomastia, fibro adenoma and ductal hyperplasia without atypia, fibro adenoma were commonly reported and it constitutes 16.6%. And among the malignant tumours ductal carcinoma of breast were most commonly reported and it constituted around 41.6%. Other lesions reported were phyllodes (4.16%),

mastitis (12.5%), and ductal hyperplasia without atypia (12.5%), atypical ductal hyperplasia (4.16%), Gynaecomastia (4.16%) and mucinous carcinoma of breast (4.16%). Among the lymph node lesions, 15 cases were benign which included 10 cases of granulomatous lymphadenitis and five cases of reactive lymphadenitis. Malignant lesions were 19 cases of which 7 cases were as

primary lymphoma and 12 cases were diagnosed as metastatic carcinomatous deposits. Among the 11 cases of thyroid lesions 6 were benign, 4 cases were primary and 1 case were metastasis from laryngotracheal primary. There were 7 cases of salivary gland lesions, 4 cases of bone and soft tissue lesions and 2 cases from abdominal wall swelling (Table 3).

**Table 3: Comparison between benign and malignant lesions based on micro biopsies.**

Site of FNAC		Benign lesions	Primary tumour	Metastatic tumour
Conventional procedure	Lymph node	15	7	12
	Breast	13	11	0
	Thyroid	6	4	1
	Bone and soft tissue	1	3	0
	Abdominal wall swelling	1	0	1
	Salivary gland	7	0	0
Guided procedure	Lung	0	8	0
	Liver	0	3	1
	Ovary	0	1	0
	Abdominal mass	0	1	0
	Spleen	1	0	0
	Pancreas	0	2	0
	Anterior mediastinum	0	1	0

**DISCUSSION**

Micro biopsies are often not recognised while evaluating smears in cytology in favour of other areas where cells are sparsely dispersed and diagnostic. But carefully examining the periphery of these tissue fragments, they provide important clues to the microhistology of the lesions. Mravunac M et al, Nosanchuk JS et al and Verbeek DH et al, have shown variety of techniques of processing and evaluation of micro biopsies from cytology smears.<sup>3-5</sup> But we applied our own procedure, whereby slides containing micro biopsies were examined on all the smears, the pattern of micro biopsy was examined and analysis of the significance of micro biopsies in the diagnosis of cytology smears were done. Few cases were followed up for histopathological correlation and the diagnosis correlated well with cytology reports.

**Type of lesion**

When assorted according to the type of malignancy diagnosed on the basis of microbiopsies, ductal carcinoma of breast was found to be the most common diagnosis 11 cases (19.6%), followed by lymphoproliferative disorders of lymph node 7 cases (12.5%) and 6 cases of adenocarcinoma (10.7%). Among the primary malignant tumour breast carcinoma 11 cases were the most common case reported with the help of microbiopsies and in metastatic tumour lymph node 12 cases were the most common site reported with the help

of microbiopsies. In the study done by Mravunac et al, lungs were the most common primary site 14 cases (17.3%) and in metastatic deposits lymph node were the most common site 19 cases (23.5%) which is comparable to our present study.

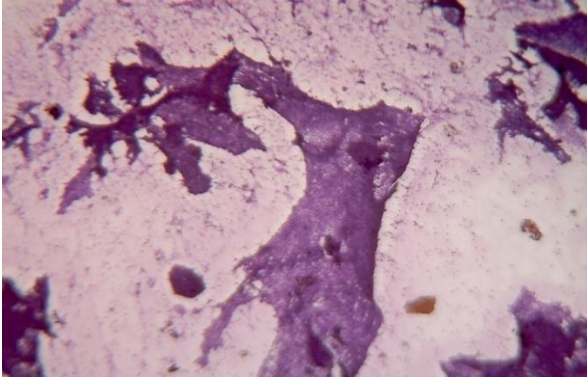
**Analysis of significance of microbiopsies in breast lesions**

The benign lesions of breast that were reported with the help of tissue microbiopsy include mastitis, gynaecomastia, and fibroadenoma, ductal hyperplasia without atypia and fibroadenoma which constituted 16.6%. Among the malignant tumours ductal carcinoma of breast were commonly reported and it constituted around 41.6%. Our findings were well correlated with Tiwari et al, Sunita Saxena et al, Ariga et al and Iyer SP, Chakrabarti N.<sup>6-10</sup> Tissue microbiopsy demonstrates the architecture and pattern of arrangement of cells in addition to morphology of cells.

Figure 1 shows the monolayered sheet of cells in the micro biopsy showing typical antler horn pattern and presence of myoepithelial cells in a case diagnosed as fibroadenoma of breast.

In atypical ductal hyperplasia the tissue microbiopsy fragments revealed cohesive clusters of atypical ductal epithelial cells. In the absence of microbiopsy the cases can be misdiagnosed especially when the aspirate from the lesion is hemorrhagic which will show only

hemorrhagic smear with few clusters and many scattered ductal epithelial cells. Since Tissue microbiopsy demonstrates the architecture and pattern of arrangement of cells in addition to morphology of cells, it helps differentiating usual ductal hyperplasia from atypical ductal hyperplasia.

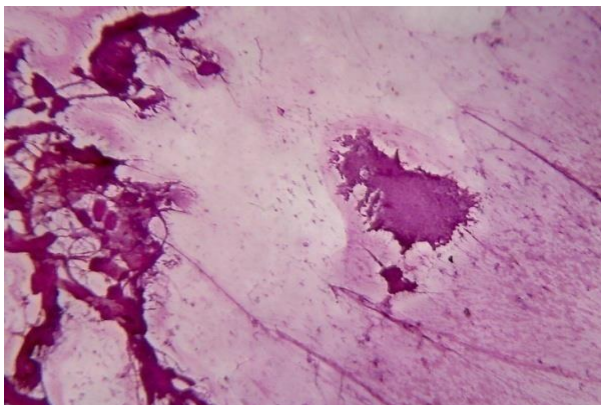


**Figure 1: Fibroadenoma of breast, H and E, scanner 40x.**

#### ***Analysis of significance of microbiopsies in lymph node lesions***

According to Hirachand S et al, study the primary is most often from the oral cavity with squamous cell carcinoma being the most common type.<sup>11-14</sup>

In present study too metastatic deposits in lymph node are most common and among these squamous cell carcinoma is the most common type of metastatic deposits diagnosed with the help of tissue microbiopsies in FNAC of lymph node lesions.



**Figure 2: Lymphnode-metastatic deposits from squamous cell carcinoma, H and E, scanner 40x.**

Figure 2 Smears showed tissue microbiopsy showing clusters of keratinizing malignant squamous cells with evidence of keratin formation; cells had distinct cell borders, hyperchromatic nucleus with coarse chromatin in a case diagnosed as squamous cell carcinomatous deposits in lymph node.

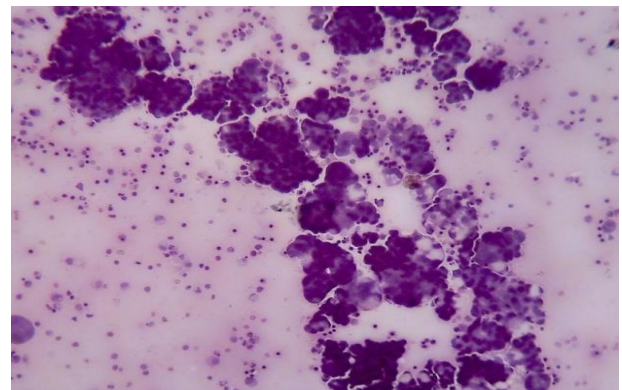
#### ***Role of microbiopsies in the diagnosis of granulomatous lymphadenitis***

Among the 15 benign cases, granulomatous lymphadenitis is most commonly diagnosed with the help of tissue microbiopsies. If FNAC is done in a cold abscess and if the aspirate is only pus or fluid, diagnosis of granuloma may be missed. In those cases when tissue microbiopsies are aspirated along with the pus or fluid it aids in the diagnosis.

#### ***Analysis of significance of microbiopsy in lesions of guided FNAC***

Under guided FNAC, by providing a larger sampling area FNAC is less likely to miss early malignant pocket of cells. As compared to the study by Spencer JA, diagnosis of ovarian malignancies is important preoperatively.<sup>15</sup> Diagnosing cystic ovarian neoplasm pose a diagnostic challenge to all pathologist. Aspirate mostly is a fluid and commenting whether it is benign or malignant is not possible. But when a tissue core is aspirated in a routine guided FNAC, it helps in providing the architecture of the tumour and cytomorphology of cell clusters.

In one of our cases the diagnosis of malignancy was not given during the previous two aspirations due to fluid nature of the aspirate. A third aspiration with a tissue microbiopsy helped to establish a diagnosis of malignancy and so appropriate therapeutic measures were initiated and the patient is doing well.



**Figure 3: Ovarian mucinous adenocarcinoma, H and E, low power 100x.**

Figure 3 shows mucinous cystadenocarcinoma with tissue microbiopsy showing clusters of mucinophages and cells having high nuclear-cytoplasmic ratio, moderate amount of cytoplasm, vesicular nucleus with conspicuous nucleoli.

#### ***Histopathology correlation***

Out of 100 cases of FNAC, only 45 cases were followed up for histopathological correlation. In the 45 cases, 9



cases were ductal carcinoma breast, 8 cases were metastatic carcinomatous deposits in lymph node, 7 cases were Caesearing granulomatous lymphadenitis, 5 cases were lymphoma, 3 cases each of follicular thyroid neoplasm, fibroadenoma of breast and pleomorphic adenoma of salivary gland, 2 cases each of Reactive lymphadenitis and hashimos thyroiditis and 1 cases each of papillary carcinoma thyroid, gastrointestinal stromal tumour and primary mucinous adenocarcinoma of ovary. In all these cases histopathology report correlated with cytology samples with microbiopsies. Thus, it is important in obtaining a tissue microbiopsy in routine FNAC which helps in correct diagnosis of malignancies by providing architectural pattern as well as cytomorphology of cells in microbiopsy clusters.

## CONCLUSION

The scope of FNAC as a diagnostic tool of malignant lesions is ever increasing. Certain pitfalls are there in conventionally assessed FNA smears. Often, they contain very less quantity of tissue material and relative absence of recognizable tissue architecture in cytology smears often makes diagnosis very difficult. Application of ancillary techniques like ICC helps in arriving at the definitive diagnosis in such cases. However, this is time consuming and expensive. Hence, these shortcomings are overcome by focussing on the tissue microbiopsies in order to see what additional information they could provide. Apart from cytological features, microbiopsies provided additional information on the tissue architecture, thus aiding in diagnosis, tumour typing, and also in predicting possible primary sites in metastatic tumours. Hence whatever be the types of FNAC, conventional, CT or USG guided, FNAC aspirate with tissue micro biopsy is an effective tool in evaluating and diagnosing suspected lumps or masses.

## ACKNOWLEDGEMENTS

Authors would like to thank Dean, Tirunelveli Medical College, for permitting them to undertake this study. They express their profound sense of gratitude to Dr. K. Shantaraman, MD, Head of Department of Pathology, for his valuable advice, constant guidance and motivation in the preparation of this work.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

- Orell S.R, Strerrett GF, Whitaker D. Fine needle aspiration cytology. 4<sup>th</sup> Ed. Churchill Livingstone; 2005:409-432.

- Verbeek ME, Boon A, Drent PJ. Exploration, aggressive behaviour and dominance in pair-wise confrontations of juvenile male great tits. Behaviour. 1996 Jan 1;133(11):945-63.
- Mravunac M, Verbeek D, Van Heusden C, Reuterink A, Hop G, Smedts F. Applications of the microbiopsy technique in non-cervical cytology: where cytology and histology meet. Histopathology. 1998;33:174-82.
- Nosanchuk JS, Posso M. Salvaging the too thick fine-needle aspirate smear. Diag Cytopathol. 1993;9:232-33.
- Verbeek DH, Smedts F, Wijnen-Dubbers CW, Mravunac M. Histologic processing of thick tissue specimens from cytology slides-a novel new technique. Acta Cytol. 1996;40:1198-204.
- Tiwari M. Role of fine needle aspiration cytology in diagnosis of breast lumps. Kath Univer Med J. 2007;5:215-7.
- Saxena S, Rekhi B, Bansal A, Bagga A, Murthy NS. Clinico-morphological patterns of breast cancer including family history in a New Delhi hospital, India-A cross-sectional study. World J Surg Oncol. 2005 Dec;3(1):67.
- Ariga R, Bloom K, Reddy VB, Kluskens L, Francescatti D, Dowlath K, et al. Fine-needle aspiration of clinically suspicious palpable breast masses with histopathologic correlation. Am J Surg. 2002 Nov 1;184(5):410-3.
- Iyer SP, Gore MA. Epidemiology of benign breast diseases in females of childbearing age group. Bombay Hospital J. 2000;42(1):141-6.
- Khemka A, Chakrabarti N, Shah S, Patel V. Palpable breast lumps: Fine-needle aspiration cytology versus histopathology: A correlation of diagnostic accuracy. The Inter J Surg. 2009;18(1):1-20.
- Hirachand S, Lakhey M, Akhter P, Thapa B. Evaluation of fine needle aspiration cytology of lymph nodes in Kathmandu medical college, teaching hospital. Kathmandu Univ Med J. 2009;7:139-42.
- Hoft S, Muhle C, Brenner W, Sprenger E, Maune S. Fine-needle aspiration cytology of the sentinel lymph node in head and neck cancer. J Nucl Med. 2002;43:1585-90.
- Bagwan IN, Kane SV, Chinoy RF. Cytologic evaluation of the enlarged neck node: FNAC utility in metastatic neck disease. Int J Pathol. 2007;6:2.
- Alam K, Khan A, Siddiqui F, Jain A, Haider N, Maheshwari V. Fine needle aspiration cytology (FNAC): a handy tool for metastatic lymphadenopathy. Int J Pathol. 2010;10:2.
- Spencer JA. A multidisciplinary approach to ovarian cancer at diagnosis. Br J Radiol. 2005;78:S94-S102.

**Cite this article as:** Jaswanthini AR, Prathap DV, Swaminathan K. Significance of tissue microbiopsies in fine needle aspiration cytology. Int J Res Med Sci 2018;6:2303-7.