

**Original article:**

## Concordance of cytology and histopathology of intra-thoracic lesions

\*Dr.Prasanthi cherukuri<sup>1</sup>, Dr.B.V.Madhavi<sup>2</sup>

<sup>1</sup>Assitant Professsor, Gitam institute of Medical sciences and research,Visakhapatnam, A.P.

<sup>2</sup>Associate Professor, Gitam institute of Medical sciences and research,Visakhapatnam, A.P.

Corresponding author\*

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### Abstract:

**Introduction:** The imaging techniques combined with the use of thin needles has completely revolutionized the approach of percutaneous aspiration diagnosis of deep seated lesions. It provides precise anatomic imaging & location of the lesion, permits the correct planning of safe access route there by reducing the risk of complications.

**Aims and objectives:** To assess the sensitivity and specificity of fine needle aspiration cytology and needle core biopsy in the diagnosis of thoracic lesions under radiological guidance.

**Materials and methods:** A total number of 65 cases for which both ultrasound and CT guided aspirations were done in thoracic lesions in the department of Radiology were studied in the department of Pathology, NRI Medical College, during a period of two years.

**Results:** In the present study, a total 65 image guided aspirations (ultrasound and computed tomography) cases were done from various thoracic lesions. Of the 65 cases, 44 cases (67.7 %) were from lung, 9 cases ( 13.8 %) were from lymph nodes, 8 cases (12.3 %) were from vertebrae, two cases ( 3%) were from Rib, two cases ( 3 %) were from pleural nodule.

**Conclusion:** The present study confirms that FNAC can be used safely as an outpatient procedure with an accuracy of 95.8%, sensitivity of 96.7% and specificity of 91.66%. It offers the advantages of rapid diagnosis, cost effectiveness, avoids unnecessary surgical procedures and saves valuable time of the patient pathologist and consultant.

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### Introduction

Diagnostic cytology is the science of interpretation of cells that are exfoliated from epithelial surfaces or removed from various tissues.<sup>1</sup> Guided fine needle aspiration cytology is a safe diagnostic procedure in which any structure visualized can be reached quickly and precisely by a fine needle in any desired plane with constant visualization of the needle tip during insertion. It allows morphological evaluation of all doubtful lesions without time consuming and costly surgery, but without impairing the diagnostic reliability.

The imaging techniques combined with the use of thin needles has completely revolutionized the approach of percutaneous aspiration diagnosis of deep seated lesions. It provides precise anatomic imaging & location of the lesion, permits the

correct planning of safe access route there by reducing the risk of complications .Ultrasonography, Computed Tomography and Magnetic Resonance Imaging, provide excellent imaging of visceral organs. The selection of these techniques depends on safety, speed, comfort, cost and the smallest possible exposure to radiation. Fine needle aspiration cytology and biopsies can be performed on many different tissues and organs.

### Aims and objectives:

To assess the sensitivity and specificity of fine needle aspiration cytology and needle core biopsy in the diagnosis of thoracic lesions under radiological guidance.

**Materials and methods:**

A total number of 65 cases for which both ultrasound and CT guided aspirations were done in thoracic lesions in the department of Radiology were studied in the department of Pathology, NRI Medical College, during a period of two years. After obtaining the clinical and radiological data, the patient is subjected to FNAC and biopsy in the same sitting, taking the consent of the patient before undertaking the procedure.

**Results:**

In the present study, a total 65 image guided aspirations (ultrasound and computed tomography) cases were done from variousthoracic lesions. Of the 65 cases, 44cases (67.7 %) were from lung, 9 cases ( 13.8 %) were from lymph nodes, 8 cases (12.3 %) were from vertebrae, two cases (3%) were from Rib, two cases (3 %) were from pleural nodule.

Of these 44 Lung lesions malignant cases account to 29 (69%) cases. These malignant lesions were more common in males 52% than females 16.6%. The malignant lesions were more common in the 5<sup>th</sup> decade (42.8%).

Adenocarcinoma (30.9%) is the most common malignancy followed by squamous cell carcinoma which accounts for 14.2% of the cases. Three inflammatory lesions (7.1%) were diagnosed and

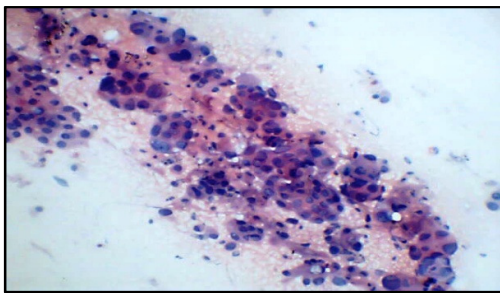
ten cases (23.8%) were unsatisfactory because of inadequacy or blood mixed aspirate.

Biopsy was not available for five cases, 27 cases for which biopsy was available correlated with histopathological diagnosis. Only one case which was diagnosed as inflammatory lesion on cytology was reported as moderately differentiated squamous cell carcinoma on histopathology.

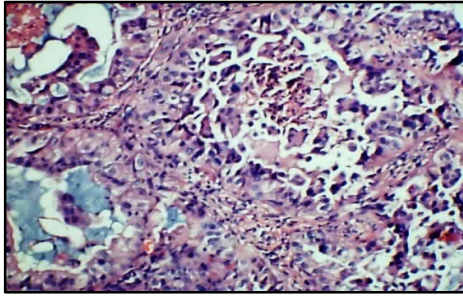
Aspiration from nine lymph nodes were done, out of which six were mediastinal lymph nodes and three were hilar lymph nodes. Biopsy was available for 8 cases out of which five cases showed carcinomatous deposits and three were granulomatous lesions.

Out of the 65 cases, vertebral lesions constituted 8 cases, out of which 5 cases were malignant and out of the 3 cases one was benign, one was inflammatory and another was inadequate. Out of the seven cases for which biopsy was available only one case which was diagnosed as inflammatory on cytology was found to be adenocarcinomatous deposit.

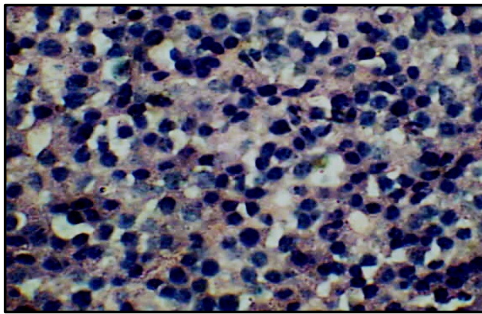
There were two (1.7%) pleural based lesions in the present study which showed adenocarcinomatous deposits and confirmed by histopathology. Two (1.7%) cases of rib lesions were reported of which one showed adenocarcinomatous deposits and the other showed squamous cell carcinomatous deposits.



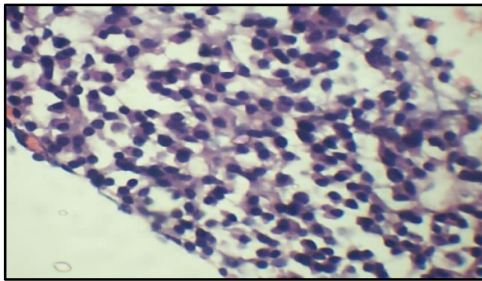
**Figure 1: Cytology- Adenocarcinoma of lung H&E (x100)**



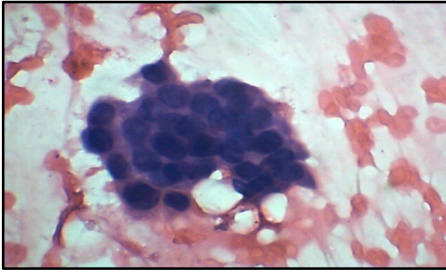
**Figure 2: Histopathology- Moderately differentiated Adenocarcinoma of lung.H&E (x100)**



**Figure 3: Cytology - Myeloma of Vertebrae - H & E (x400)**



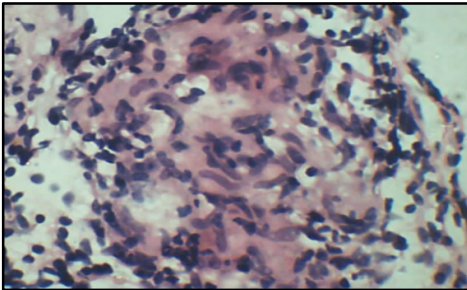
**Figure 4: Histopathology : Myeloma of vertebrae - H &E (x100)**



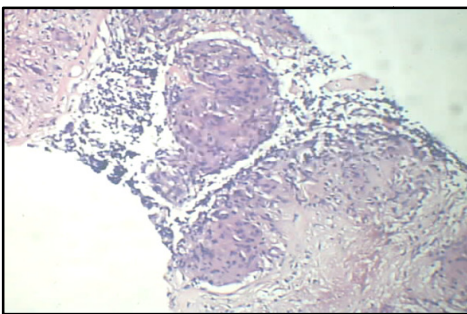
**Figure 5: Cytology - Adenocarcinoma of Pleural based lesion H & E(x400)**



**Figure 6: Histopathology- Pleural based lesion – Adenocarcinoma H & E (x100)**



**Figure 7: Cytology - Granulomatous lymphadenitis H&E (x400)**



**Figure 8: Histopathology- Tuberculous lymphadenitis H&E (x100)**

**Table – 1: Cytological diagnosis in lung lesions**

S.No	Cytological diagnosis	No of cases	%
1.	Adenocarcinoma	13	30.9
2.	Squamous cell carcinoma	06	14.2
3.	Bronchioloalveolar carcinoma	01	2.3
4.	Large cell anaplastic carcinoma	04	9.5
5.	Poorly differentiated carcinoma	05	11.9
6.	Inflammatory	03	7.1
7.	Unsatisfactory	10	23.8
8.	Total	44	100

**Table 2 : Cyto-histologic correlation in lung lesion**

S.No	Cytological diagnosis	FNAC	HPE	Correlated	Not Correlated	No HPE
1.	Adenocarcinoma	13	13	13	-	-
2.	Squamous cell carcinoma	06	04	04	-	02
3.	Bronchioloalveolar carcinoma	01	01	01	-	-
4.	Large cell anaplastic carcinoma	04	04	04	-	-
5.	Poorly differentiated carcinoma	05	02	02	-	03
6.	Inflammatory	03	03	02	01	-
7.	Unsatisfactory	10	-	-	-	-
8.	Total	44	27	26	-	-

**Table 3 : Cytological diagnosis in lung lesions – Comparative analysis**

	Madan et al(2010) (n=40)	Present study(2011) (n=44)
<b>Cytological diagnosis</b>	<b>No of cases (%)</b>	<b>No of cases (%)</b>
Adenocarcinoma	10 (25)	13 (30.9)
Squamous cell carcinoma	9 (22.5)	06 (14.2)
Broncioloalveolar carcinoma	02 (5)	01 (2.3)
Large cell anaplastic carcinoma	-	04 (9.5)
Poorly differentiated carcinoma	03 (7.5)	05 (11.9)
Inflammatory	13 (32.5)	03 (7.1)
Unsatisfactory	03 (7.5)	10 (23.8)

**Table – 4: Cytological diagnosis of lung lesions - comparative analysis**

<b>Cytological diagnosis</b>	Rc Adhikari et al(2010) (n= 81)	Present study(2011) (n = 42)
	<b>No of cases (%)</b>	<b>No of cases (%)</b>
Adenocarcinoma	12 (14.9%)	13 (30.9%)
Squamous cell carcinoma	18 (22.2%)	06 (14.9%)
Broncioloalveolar carcinoma	-	01 (2.3%)
Large cell anaplastic carcinoma	3 (3.7%)	04 (9.5%)
Poorly differentiated carcinoma	21 (26.0%)	05 (11.9%)
Inflammatory	3 (3.7%)	03 (7.1%)
Unsatisfactory	12 (14.9%)	10 (23.8%)
Others	12 (14.9%)	-

**Table 5: Comparative study of Statistical analysis of lung lesions**

	Mukherjee et al (2010) (n=94)	Santambrogio et al (1997) (n=220)	Present study (2011) (n=42)
Sensitivity	97.7%	98.5%	96%
Specificity	100%	100%	100%
Positive predictive value	100%	100%	100%
Negative predictive value	66.6%	97.6%	66.6%
Accuracy	95%	99.1%	96.2%

## Discussion

Imaging techniques do not always distinguish between benign and malignant lesions morphologically. A confirmed tissue diagnosis is essential for both treatment and staging of cancers. FNAC is a well established method of diagnosing neoplastic and inflammatory conditions of thoracic lesions.<sup>2</sup>

When the procedure is jointly done by a pathologist and theradiologist, the accuracy rate of obtaining a good sample is very high. The immediate assessment of the specimen by the on-site cytopathologist, along with further aspirations when necessary, improves the adequacy rate of the technique.<sup>3</sup>

Lung was the most common organ aspirated in the present study which accounted to 36.5% of the cases. The predominant lesion found in the present study was malignant lesion 69.0% which was similar to a study done by Madanet al<sup>6</sup> in which the malignant lesions accounted to 60%.

Among the malignant cases most cases (82.7%) were in the age group of 40-70 years, and 58.6% were males. This was similar to a study done by Mukherjee et al<sup>5</sup> where the malignant cases in the age group of 40-70 years accounted to 76%. Adenocarcinoma constituted 30.9% which was slightly more than the study done by Madanet al<sup>6</sup> where adenocarcinoma constituted 25% of the cases and adenocarcinoma was more prevalent than squamous cell carcinoma which correlated with the present study.<sup>6</sup>

The prevalence of malignancy was 69% where Adenocarcinoma constitutes 30.9% and Squamous cell carcinoma accounts for 14.2 % of the cases. In contrast, study done by RC Adhikari et al<sup>5</sup> showed higher prevalence of squamous cell carcinoma than adenocarcinoma. The prevalence of adenocarcinoma can be explained because of the increased incidence of adenocarcinoma in the last

two decades.<sup>6</sup> Out of the 44 cases of lung lesion included in the present study, only 27 cases (64.28 %) biopsy was available and cytology correlated with biopsy in 26 cases. This was similar to a study done by Sackett et al<sup>8</sup> in which out of 231 cases, in 225 cases (97.5%) there was correlation between cytological and histopathological diagnosis.

In the present study, only in one case there was discordance between cytological and histopathological diagnosis. Cytologic diagnosis in that case was given as non specific inflammatory lesion and as squamous cell carcinoma on histopathology. This was probably because of sampling error in cytology material.

10 cases (23.8%) were unsatisfactory for evaluation in which there was no diagnostic cellular material or the sample was degenerated for evaluation. 5 cases (11.9%) biopsy was not available as the patients were directly sent for radiotherapy or chemotherapy. Out of the 27 cases for which cyto-histologic correlation was done 24 cases were found to be true positive, two cases were true negative and one case was false negative. In the present study, the sensitivity was 96%, specificity was 100% and diagnostic accuracy was 96.2%. Similarly study done by Mukherjee et al<sup>5</sup> showed no false positives and a sensitivity of 97.7% and a specificity of 100% and an overall accuracy of 95% was observed. Study done by Santambrogio et al<sup>10</sup> also showed a sensitivity of 98.5% and a specificity of 100%. Positive predictive value of 100% and negative predictive value of 97.6% and an accuracy of 99.1% was observed.

Lymph nodes are common sites of metastasis for different cancers. The urgent diagnosis of lymphadenopathy is of paramount importance to differentiate between inflammatory lesions or metastatic or primary neoplastic tumour.<sup>10</sup> Lymphnodal aspirations has a very important role in the diagnosis of malignant

lymphadenopathies especially in a developing country like ours where the cost of hospital stay and surgical procedures cannot be borne by the patient.<sup>7</sup>

Metastatic deposits of adenocarcinoma have also been found on vertebrae, pleura and rib.

Adenocarcinomas are neoplasms derived from glandular tissues. The most frequent appearance of adenocarcinoma is columnar cells forming acinar structures which recapitulate the gland formation within the normal organ.<sup>8</sup> The typical adenocarcinoma shows focal mucin production, within either the cytoplasm or lumen. While the morphologic pattern of most adenocarcinomas is not specific for site of origin, some primary sites have characteristic features that lead to their recognition on fine needle aspiration or needle core biopsy specimens. Adenocarcinomas are also the most

frequent type of carcinoma presenting as secondary deposits with an unknown primary.

#### **Conclusion:**

The present study confirms that FNAC can be used safely as an outpatient procedure with an accuracy of 95.8%, sensitivity of 96.7% and specificity of 91.66%. It offers the advantages of rapid diagnosis, cost effectiveness and saves valuable time of the patient, pathologist and consultant. It may avoid unnecessary surgical procedures in some cases and at times it may help the surgeon in preoperative planning. It can be used as an adjunct to histopathological diagnosis. Fine needle aspiration cytology is a reliable, sensitive and specific method with high diagnostic accuracy for the diagnosis of malignant lesions. It can be used as a pre-operative procedure for the management of all thoracic lesions.

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