Original Research Article

Indian Journal of Pathology: Research and Practice
Volume 7 Number 1, January 2018
DOI: http://dx.doi.org/10.21088/ijprp.2278.148X.7118.16

Evaluation of Computed Tomography Guided Percutaneous Fine Needle Aspiration Cytology in the Diagnosis of Lung Lesions

Shashidhar M.R.*, Sushma H.M.**

*Assistant Professor, Dept. of Pathology, Yenepoya Medical College, Mangalore, Karnataka 575022, India. **Assistant Professor, Dept. of Pathology, A.J Institute of Medical Sciences, Mangalore, Karnataka 575004, India.

Abstract

Introduction: Computed Tomography (CT) guided percutaneous fine-needle aspiration cytology (FNAC) of suspicious lung lesions is a widely accepted diagnostic method with relatively low cost, negligible mortality and limited morbidity. CT guided FNAC is helpful in distinguishing between benign and malignant lesions and confirming the diagnosis which would help the clinicians in deciding the therapeutic management. *Aims and Objectives:* The purpose of this study is to evaluate the pathological spectrum of lung lesions through CT guided FNAC. *Material and Methods:* This is a retrospective study which was carried out in the department of Pathology, Yenepoya Medical College, Mangalore. Fifty patients having lung space occupying lesion (SOL) on chest X-ray and CT scan were selected for the procedureand were included in the study. *Results:* Out of 50 cases, 37 were males and 13 females. Age range was from 25 to 80 years with mean age of 58.8 yrs. Majority were Non Small Cell Lung Carcinoma (NSCLC) (13 cases, 26%), of which 3 were suggestive of primary adenocarcinoma and one was a case of squamous cell carcinoma(SCC), followed by 8 cases of adenocarcinoma (16%) (Figure 1) , 2 cases of squamous cell carcinoma (4%), 2 cases of small cell carcinoma (4%), 4 cases of poorly differentiated carcinoma(8%) and one case each of metastatic carcinoma, neuroendocrine origin and fungus (Aspergillosis). *Conclusion:* There is increasing role of cytology in diagnosing both neoplastic and non-neoplastic lesions of lung. Performing FNAC is much easier and helps in prompt diagnosis and management of patients.

Keywords: Lung; Aspiration; Adenocarcinoma; Aspergillosis.

Introduction

Computed Tomography (CT) guided Fine needle aspiration cytology (FNAC) of suspicious lung lesions is a widely accepted diagnostic method with relatively low cost, negligible mortality and limited morbidity [1]. FNAC was first used by Martin & Ellis as a diagnostic tool.

In 1976 Haaga & Alfidi reported CT guided biopsy and it has proven its effectiveness and accuracy ever since. CT guided FNAC is helpful in distinguishing between benign and malignant lesions and confirming the diagnosis which would help the clinicians in deciding the therapeutic management [2].

Most primary lung cancers are carcinomas that are derived from epithelial cells. The primary lung carcinomas are small-cell lung carcinoma (SCLC) and non-small-cell lung carcinoma (NSCLC).

One of the major advantages of CT guided FNAC is distinguishing the types of tumor like SCLC or lymphoma,which can be treated by chemotherapy, from NSCLC which needs surgery. By diagnosing the tumor subtype, specific therapy for the particular tumor can be initiated without delay. Treatment and long-term outcomes depend on the type of cancer, the stage (degree of spread), and the general health condition of the patient [3]. CT guided FNAC is an almost painless non-operative procedure as compared to biopsy for diagnosis of lung lesions. The single major complication of this procedure is pneumothorax, which occurs rarely. The presence of a pathologist at the time of the procedure leads to decrease in the number of needle passes and increase in adequacy of the material [4].

Fear of neoplastic implantation in the needle track may have inhibited its use initially, but have proven groundless [5,6].

Corresponding Author: Sushma H.M., Assistant Professor, Dept. of Pathology, A.J Institute of Medical Sciences, Mangalore, Karnataka 575004, India.
E-mail: hmsush@yahoo.co.in

(Received on 10.11.2017, **Accepted on** 16.11.2017)

Aims and Objectives

The purpose of this study is to evaluate the pathological spectrum of lung lesions through CT guided FNAC.

Materials and Methods

The study included CT-guided FNAC from lung lesions of 50 patients of different age groups and both genders. This was a retrospective and descriptive study conducted during a period of two years from 2015 to 2017 in the Department of Pathology, Yenepoya Medical College and Hospital , Mangalore, Karnataka.

Pre procedure investigations were done and informed consent was obtained as per the institution protocol. A spinal needle (22 gauge needle) was used for the procedure. Needle tip position was confirmed with additional limited CT scans before the sample for cytology was obtained. The aspirate was obtained by to & fro movement of needle within the mass. Air dried smears were stained with Leishman stain and alcohol fixed smears were Papanicolaou stained following which microscopic evaluation was done.

Results

The present study included 50 CT guided lung FNAC cases of which 37 were males and 13 were females with a male to female ratio of 2.8:1. The age range was between 25 to 80 years [Table 1]. The mean age of the patients was 58.5 years.Majority of the patients presented with a solitary lesion .

Of the total 50 cases, 88% were diagnosed as neoplastic and the rest 12% tuned out to be non neoplastic lesions . Few cases of primary tumor of lung showed metastasis to the adrenal gland, bone and liver. Cases of Pancoast tumor and Superior Vena Cava syndrome were also noted.

Out of the total 50 cases, majority were NSCLC (13 cases, 26%), of which 3 were suggestive of adenocarcinoma and one was a case of squamous cell carcinoma(SCC), followed by 8 cases of adenocarcinoma (16%) [Figure 1], 2 cases of squamous cell carcinoma (4%), 2 cases of small cell carcinoma (4%), 4 cases of poorly differentiated carcinoma(8%) and one case each of metastatic carcinoma, neuroendocrine origin and fungus (Aspergillosis) [Figure 2] (2% each) [Table 2].

Table 1: Age distribution

Age group (in years)	No of cases	Percentage (%)
20-30	1	2
31-40	3	6
41-50	6	12
51-60	20	40
61-70	16	32
71-80	4	8
Total	50	100

Table 2: Frequency of lung lesions & gender distribution

Type of lesion	Frequency	Percentage (%)	Male	Female
NSCLC (3 cases suggestive of adenocarcinoma and 1 case of SCC)	13	26	10	3
Adenocarcinoma	8	16	4	4
SCC	5	10	5	0
Small cell carcinoma	2	4	2	0
Poorly differentiated carcinoma	4	8	4	0
Positive for carcinoma	3	6	3	0
Suspicious for malignancy	1	2	1	0
Unsatisfactory	5	10	3	2
Inflammatory	5	10	4	1
Metastasis	1	2	0	1
Atypical	1	2	1	0
Neuroendocrine origin	1	2	1	0
Fungus (Aspergillosis)	1	2	1	0

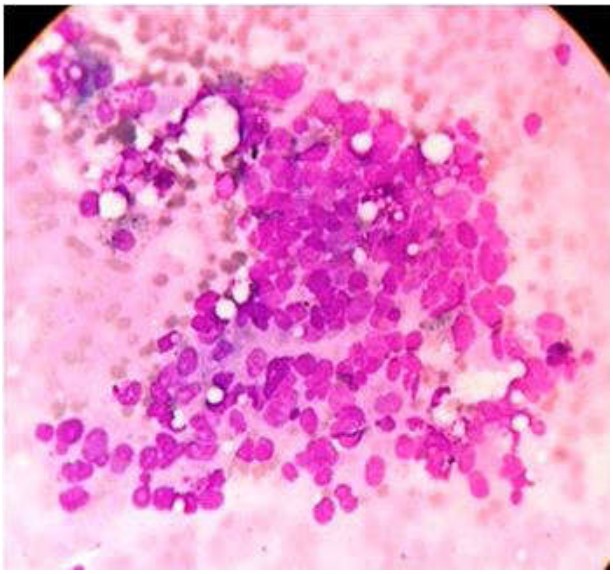

Fig. 1: Smears showing tumor cells in acinar pattern with eccentric nuclei and vacuolated cytoplasm favouring adenocarcinoma (40x)

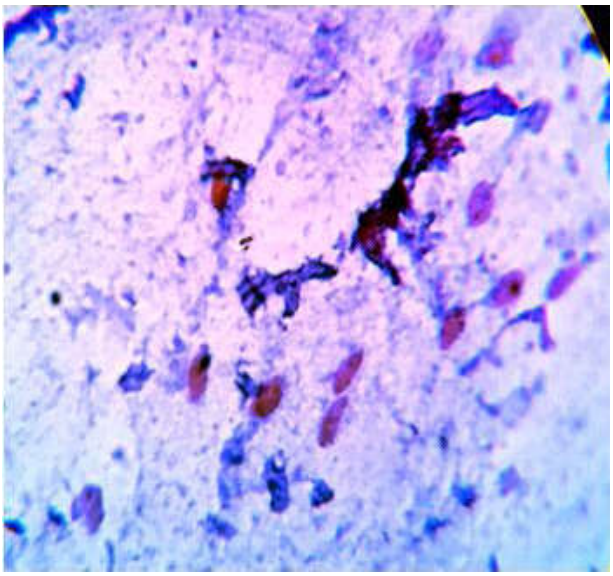

Fig. 2: Fragments of Aspergillus fungus showing acute angle branching with abundant necrotic background (40x)

Discussion

In our study, the mean age was 58.5 years, which was similar to studies by Mondal et al [7] and Singh et al [8] as shown in Table 3. The present study showed a male preponderance [75%] which was comparable to studies by Saha et al [9] (78.9%) and Tan et al [10] (71.1%). However, Singh R et al [2] showed a lower male preponderance (52%) [Table 4]. Among females, the most common malignancy was adenocarcinoma.

In our study a 22 gauge spinal needle was used which contributed to the diagnostic accuracy of 89%, whereas a study done by Prashanth et al [11] used both thinner (20-22 gauge) and thicker needles (16-18 gauge) and observed slight improvements in diagnostic accuracy with the thicker needle (94%) along with minor complications (minimal pneumothorax). According to the study, radiologists can use needles of thickness which they are comfortable with without any major changes in either diagnostic yield or complication rates [Table 5].

Out of the total 50 cases, majority were neoplastic lesions comprising 88%. Non neoplastic lesions (including inflammatory and infectious) comprised of only 12%.This was comparable to a study done by Mondal et al [7] [Table 6].

Table 3: Mean age comparison between different studies

Study	Mean age (in years)
Present study	58.5
Mondal et al[7]	56.6
Singh et al[8]	56.4
Saha et al [9]	56.8

Table 4: Comparison of gender predominance between different studies

Study	Male (%)
Present	75
Tan et al [10]	71
Saha et al [9]	78
Singh R et al [2]	52

Table 5: Comparison of diagnostic accuracy with different needle gauges between two studies

Study	22 gauge	16-18 gauge
Present	89%	-
Prashanth et al [11]	86%	94%

Table 6: Comparison of tumor distribution between different studies

Study	Neoplastic (%)	Non neoplastic (%)
Present study	88	12
Mondal et al [7]	91	8
Singh R et al [2]	65	34
Tan et al [10]	64	36

Table 7: Comparison of Occurrence of Tumors

Type		Present study (%)	Vashist et al[5] (%)	Sarker et al[13] (%)	Jayashankar et al[14] (%)
Non small cell	Adenocarcinoma	40	26.76	28.2	43
Carcinoma	SCC	28	22.53	20	51
Small cell carcinoma		4	5.6	10.6	3

As the treatment modalities are based on histological subtypes and molecular studies, there is a need to classify lung tumors into NSCLC and SCLC with further categorization into squamous cell carcinomas and adenocarcinomas. Intensive chemotherapy is advised for SCLC whereas NSCLCs are to be treated surgically.

CT guided FNAC can accurately distinguish these categories and help in better planning and early management of these patients [4].

In the present study NSCLCs comprised of 27% (adenocarcinoma+squamous cell carcinoma) which is similar to the study done by Vashist et al [4] and Sarker et al [12]. In the present study SCLCs comprised of 4% of the total cases which was comparable to the studies done by Vashist et al [4] and Jayashankar et al [13] [Table 7].

Fungal infections are also important lesions other than malignancy. In the present study one case presented with a solitary lesion in the base of the lung which turned out to be Aspergillosis, but special stain [Periodic Acid Schiff (PAS)] could not done due to sparcity of cellular material.

In five cases (10%), samples were inadequate in our study, which was similar to study done by Vashist et al and others studies [5] (9-25%) which is concordant with our studies. The unsatisfactory results may be due to tumor location, lack of patient compliance, faulty technique and necrosis [6].

Conclusion

CT guided FNAC is a simple, safe and reliable method for distinguishing between benign and malignant lesions of the lung. The diagnostic yield is excellent for larger and superficial lesions and it can replace trucut biopsy in diagnosis of lung lesions.

References

1. Shahi RR, Singh MS et al. CT-Guided Percutaneous Fine Needle Aspiration Cytology of Pulmonary Mass. Medical Journal of Shree Birendra Hospital. 2012;11(1).
2. Singh R, Mallik M, Rai H. K et al. CT Guided FNAC of lung mass – A retrospective study of Disease Spectrum. Int J Med Res Rev. 2016;4 (7):1088-1091.doi: 10.17511/ijmrr.2016.i07.02.
3. Modi MB, Rathva MR, Shah NR et al. Role of FNAC in Lung carcinoma and its Histo-Cytological Correlation. J Lung PulmRespirRes. 2016;3(4):00090. DOI: 10.15406/jlprr.2016.03.00090
4. Vashist N, Namadev S, Sukheeja D et al. Role of FNAC in diagnosing lesions of lung:A one year case series.International Journal of Current Research. 2016; 8(11):42284-42287.
5. Orell SR, Sterett GF, Walters MN et al. Manual and Atlas of Fine Needle Aspiration Cytology. 3rd ed. Edinburgh. Churchill Livingstone. 1999.
6. Madan M, Bannur H et al. Evaluation of Fine Needle aspiration Cytology in the Diagnosis of Lung Lesions.Turkish Journal of Pathology. 2010;26(1):1-6.
7. Mondal SK, Nag D, Das R et al. Computed tomogram guided fine-needle aspiration cytology of lung mass with histological correlation : A study in Eastern India. South Asian J Cancer. 2013;2(1):14-8. doi: 10.4103/2278-330X. 105881.
8. Singh JP, Garg L, Setia V, Computed tomography guided fine needle aspiration cytology in difficult thoracic mass lesions-not approachable by USG. Indian J radiology. Imaging. 2004:14:395-400.
9. Saha A, Kumar K, Choudhuri MK. Computed tomography-guided fine needle aspiration cytology of thoracic mass lesions: A study of 57 cases. J Cytol. 2009;26(2):55-9. doi: 10.4103/0970-9371.55222.
10. Tan KB, Thamboo TP, Wang SC et al. Audit of transthoracic fine needle aspiration of the lung: cytological subclassification of bronchogenic

carcinomas and diagnosis of tuberculosis. Singapore Med J. 2002; 43(11):570-5.

11. Prashant, C Ramachandra et al. Feasibility, Safety, and Efficacy of the CT Guided Fine Needle Aspiration Cytology (FNAC) of Lung Lesions: Indian Journal Of Medical &Paediatric Oncology. 2007;28(2).
12. Sarker MR, Hossain MS, Farooq S. Experience of CT-guided FNAC from Lung lesion: A Study of 330 Cases. KYAMC Journal. 2015;6(1).
13. Jaya Shankar E, Pavani B, Chandra E et al. Computed Tomography Guided Percutaneous Thoracic: Fine Needle Aspiration Cytology in Lung and Mediastinum. J CytolHistol. 2010;1:107. doi:10.4172/2157-7099.1000107