ISSN 2822-2032 (Print) 2822-2040 (Online)

Medical Journal of Eastern Nepal

Volume 01, Number 01, Issue 01, June 2022, 11-14

Original Article

HISTOPATHOLOGIC ANALYSIS OF CT-GUIDED CORE NEEDLE BIOPSY IN RADIOLOGICALLY DETECTED SUSPICIOUS MEDIASTINAL AND LUNG MASS: TWO YEARS' STUDY IN TERTIARY HOSPITAL.

***Ujwal Rai[1], Umesh Kumar Sharma[2], Birendra Kumar Yadav[3]**

[1] Department of Pathology, [2] Department of Radiology, [3] Department of Onocology, B&C Medical College Teaching Hospital and Research Center, Birtamode, Jhapa, Nepal

Submitted: 01-March-2022 Revised: 11-March-2022 Accept: 14-March-2022

DOI: https://doi.org/10.3126/mjen.v1i1.45855

ABSTRACT

Background:
Pulmonary nodule ranges from infective to neoplastic lesion and thus at times remain diagnostic challenge for the management of patient. Therefore, proper diagnosis is very essential for appropriate treatment. Biopsy and FNAC plays important role in diagnosing these cases. After 2004 with establishment of therapeutic implication of distinguishing histologic subtypes of lung carcinoma with immunohistochemistry, lung biopsy has become inevitable even for molecular analysis as well. We studied our institution's experience with percutaneous CT guided biopsy of lung nodules to determine the impact of this procedure in diagnosis of disease.

Methods:
This is hospital based descriptive study, of two years' duration (March 2019 to April 2021), carried out at Department of Pathology, B&C Medical College Teaching Hospital and Research Centre Pvt. Ltd., Birtamode, Jhapa. Total 97 cases of CT guided biopsy were performed. Histopathologic analysis was performed and data were analyzed.

Results:
The most common malignancy diagnosed was Non-small cell carcinoma (NSCC), lung comprising 43.7% which required further immunohistochemistry testing for subcategorization. All infective cases were of Tuberculosis constituting 9.37% of all the cases. Benign cases were of mature cystic teratoma, thymoma and fibroma.

Conclusions
Nowadays biopsy of lung in suspicious lesion is mandatory to establish diagnosis for appropriate management, moreover in malignancy cases for which most of the cases require immunohistochemistry and molecular analysis.

Keywords: CT biopsy, Lung biopsy, mediastinal mass

***Corresponding Author:**
Ujwal Rai
Email: ujwal1235@gmail.com
ORCID: https://orcid.org/0000-0002-0945-002X

Citation
Rai U, Sharma U K, Yadav B K, Histopathologic Analysis of CT-Guided Core Needle Biopsy in Radiologically Detected Suspicious Mediastinal and Lung Mass: Two Years' Study in Tertiary Hospital, MJEN. 2022 June; 1(1):11-14.

INTRODUCTION

There is mark increase in detection of lung and mediastinal lesions with advancement of diffusion spiral CT, and PET scan.[1]Challenge remains appropriate diagnosis from neoplastic to non-neoplastic like infective pathology for proper treatment of the patient. According to recent data published by WHO the most common newly diagnosed cancer case is of breast (2.26 million) followed by lung cancer (2.21 million). Whereas, lung cancer is the most common cause of cancer death accounting 1.8 million deaths whole over the world.[2]

Major therapeutic advances have since taken place in the lung cancer field, after 2004. The implications for pathological diagnosis and molecular testing for specific targeted therapy based treatment have revolutionized lung cancer management. Studies have shown that Pemetrexed, is far effective adenocarcinoma or Non Small Ceell Carcinoma, Not otherwise specified (NSCC, NOS) than those with Squamous Cell Carcinoma. Patients with SCC have a higher risk of life-threatening hemorrhage if treated with bevacizumab. Lung adenocarcinoma in advanced stage is now managed according to molecular status i.e. adenocarcinoma with Epidermal Growth Factor receptor (EGFR) mutation is treated with EGFR tyrosine kinase inhibitors and with anaplastic Lymphoma Kinase (ALK) mutation with ALK inhibitors crizotininb as first-line therapy. Because therapeutic targets are now increasingly being identified demanding firm appropriate diagnosis demanding immunohistochemistry and molecular analysis.[3,4]

Similarly, infective pathology pulmonary tuberculosis is very common is South Asia which at times mimics malignancy both clinically and radiologically and remains diagnostic challenge in cases where Acid Fast Bacilli Tuberculosis (TB) bacilli could not be detected in sputum.

With the background of importance in diagnosis, adequate and appropriate sampling is a must. Mediastinal mass other than lungs are not that frequent but are of diagnostic challenge.

There are various techniques to obtain mediastinal biopsy like bronchoscopy biopsy, surgical biopsy (usually by video-assisted thoracoscopic surgery and percutaneous needle biopsy.[5] CT guided biopsy is a common radiological procedure performed throughout the world especially for peripheral lung lesions and failed bronchoscopy biopsies.

METHODS

This was a prospective cross-sectional study of 97 cases that underwent CT guided core needle biopsy over a period of two years (2019-2021) in B&C Medical College Teaching Hospital and Research Center, Jhapa, Nepal. All the patients who underwent mediastinal CT guided core needle biopsy were included in the study.

Table 1: Indications for CT guided chest biopsy

1.	Multiple nodules in a patient without known neoplastic disease or in prolonged remission.
2.	New or enlarging solitary nodule or mass.
3.	Undiagnosed mediastinal mass.
4.	Diagnosis of hilar masses following negative bronchoscopy.
5.	Biopsy or re-biopsy of malignancy for targeted therapy.

CT guided core needle biopsies were performed in radiologically detected mediastinal mass indicated **(Table 1)** for histopathological analysis conjunction with immunohistochemistry, special stain and molecular analysis.

CT guided biopsy was performed under aseptic condition after proper pre-procedural evaluation with required laboratory reports and history to rule out contraindication for the procedure. Consents were taken from patient after explanation of possible complications. Standard technique by Consultant Radiologists: the patient was placed within the CT scanner and a suitable position for biopsy was ascertained. Appropriate site was marked and distance of lesion was accounted in scanning. Local anesthetic was infiltrated into the subcutaneous tissues and 18G co-axial core biopsy needle was placed within the lesion under guidance of CT scan.

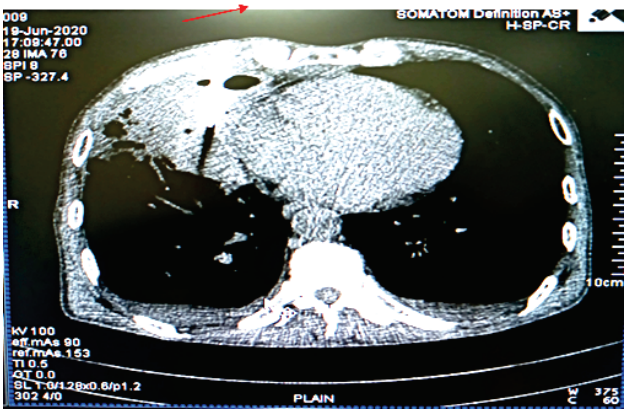

Figure 1: CT scan showing mass in middle lobe of right lung with red arrow showing biopsy needle within the mass.

Usually, one to three samples were taken, depending on discussion between radiologist and pathologist to analyze the sample at the time of the biopsy to check for adequacy. The biopsy cores were carefully handled with the help of syringe needle into 10% buffered formalin to avoid crushing artifacts. Post procedure observations of patients were mandatory to look for complications. The biopsy cores were sent in 10% buffered formalin for histopathological analysis. Tissue were fixed in formalin for 8-12 hours and processed for Hematoxylin and Eosin (H and E) sections. H and E sections were evaluated and sent for

special stains, IHC and molecular analysis wherever required. Special stains for AFB (TB), i.e. ZN stain were performed in cases suspicious for tuberculosis like findings of Granulomas and necrosis.

RESULTS

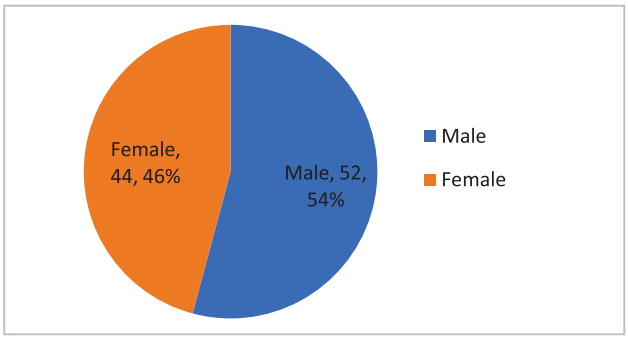

Figure 2: Gender Distribution

Table 2: Age Distribution

Age group (Year)	Frequency	Percentage (%)
<20	1	1.04
20-30	2	2.08
31-40	2	2.08
41-50	10	10.42
51-60	29	30.21
61-70	48	50
>80	4	4.17
Total	**96**	**100**

Table 3: Histopathological disease spectrums

Histological diagnosis	No. of cases	Percentage (%)
Adenocarcinoma	21	21.87
Squamous Cell Carcinoma	15	15.63
Non-Small Cell Lung Carcinoma, NOS	42	43.75
Small Cell Carcinoma	3	3.13
Fibroma	2	2.08
Mature Cystic Teratoma	1	1.04
Thymoma	3	3.13
Pulmonary TB	9	9.37
Total	**96**	**100**

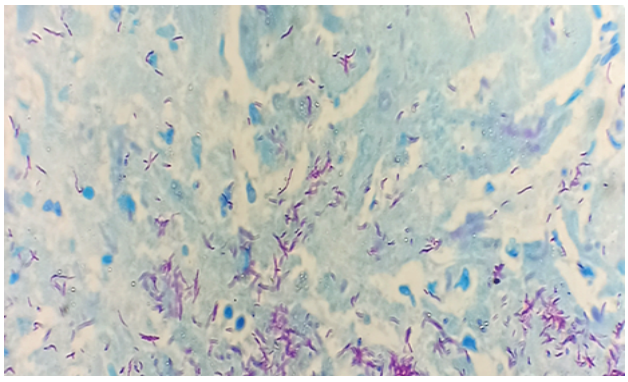

Figure 3: ZN stain showing Acid Fast Bacilli

Table 4: Histopathological diagnosis of nature of disease

Nature of disease	No. of cases	Percentage (%)
Neoplastic	87	90.63
Infective	9	9.37
Total	**96**	**100**

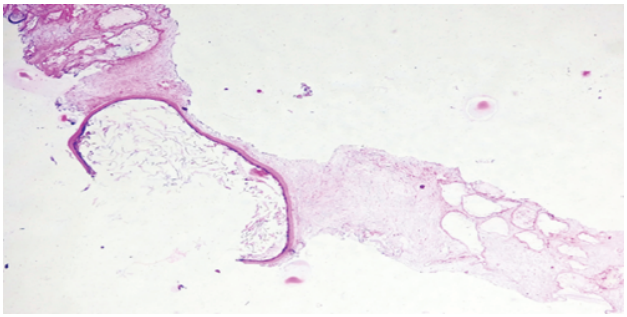

Figure 4: H and E section showing components of Mature cystic teratoma

Table 5: Spectrum of Neoplastic disease

Diagnosis	No. of cases	Percentage (%)
Malignant	81	93.10
Benign	6	6.90
Total	**87**	**100**

Total case in our study population were ninety-six (96) in which 52 (54.16%) were male and 44 (45.83%) were female with M: F ratio of 1.18:1**(fig.2).** Age of the patient ranged from 15 to 86 years old.

Out of ninety-six (96) cases in our study, 92 were biopsy of lung mass and four (4) of anterior mediastinal mass. Six (6) i.e. 6.25% cases required repeat biopsy due to inadequacy. Maximum number of cases was found in age group between 60-70 years, comprising 50% i.e. 48 in number of total cases. Only one case below 20 years was undergone biopsy which was diagnosed as mature cystic teratoma.

Among ninety-six (96) study cases undergone CT guided biopsy, eighty-seven (87) cases were diagnosed neoplastic out of which eighty-one were malignant, six were diagnosed benign and rest of the nine (9) cases were found to be infective. **(Table 3-5).**

Malignant eighty one cases in our study, Non-Small Cell Lung Carcinoma, NOS was the most common histopathological Hematoxylin and Eosin (H&E) diagnosis constituting 43.75% (42) of total 96 cases. Remaining thirty nine (39) out of eighty one malignant cases were Adenocarcinoma 21 (21.87%), Squamous cell carcinoma 15 (15.63%) and Small cell carcinoma 3 (3.13%) in our study cases

Meanwhile In our study population six (6) cases were diagnosed as benign constituting of thymoma 3(3.13%) followed by fibroma 2 (2.08%) and mature cystic teratoma 1(1.04%).

The remaining nine (9) infective cases were all found to be pulmonary tuberculosis constituting 9.37% of all cases.

DISCUSSION

The deaths in lung cancer in spite of advancement in treatment is mainly due to late presentation of disease mostly at advanced stage.[6] Thus awareness for early diagnosis and management is important to increase long term survival of the patients. Lung cancer is most common cancer detected in Nepal followed by cervical cancer as per 2021 publication of Global cancer observatory.[7]

Pulmonary Tuberculosis is common in Nepal with newly diagnosed 69,000 cases in 2018 with 1.6 times increase in TB burden as previously estimated.[8] At times, asymptomatic Pulmonary Tuberculosis mimics lung cancer in imaging as per study other study.[9] Similar finding in our study that all infective cases of suspicious lung lesion were of Pulmonary Tuberculosis accounting 9.37%.

With advancement of lung cancer treatment, specific cancer diagnosis is mandatory nowadays for cancer specific chemotherapy.[10] In our study most common malignant case 42 (43.75%) was Non-Small Cell Lung Carcinoma, NOS demanding further immunohistochemistry and molecular analysis. Remaining cases were Adenocarinoma 21 (21.87%), Squamous Cell Carcinoma 15(15.6%) and Small Cell Carcinoma 3 93.13%). The biopsy samples were subjected to immunohistochemistry and molecular analysis wherever necessary for definite subcategorization and treatment purpose.

Benign tumor comprised 6(6.9%) of neoplastic disease constituting Mature Cystic Teratoma 1, Thymoma 3 and Fibroma 2 cases. Mature cystic teratoma was found in fifteen years old male presented with huge mediastinal mass. Thymoma and fibroma cases were found in patients aged 40 years and above.

CONCLUSION

Biopsy of suspicious lung lesion is important to establish neoplastic or infective etiology. Moreover, it is now mandatory in malignant lesion as specific malignant tumor diagnosis is necessary for appropriate and targeted chemotherapy which requires tissue for molecular analysis and immunohistochemistry wherever necessary. CT guided core needle biopsy is very helpful in peripherally located lesion and when bronchoscopy biopsy is negative.

Funding: None
Conflict of interest: None
Ethical approval: Yes

REFERENCES

[1] Anzidei M, Porfiri A, Andrani F, Di Martino M, Saba L, Catalano C, et al. Imaging-guided chest biopsies: techniques and clinical results. Insights Imaging. 2017;8(4): 419-28.
[2] Ferlay J, Colombet M, Soerjomataram I, Parkin DM, Pineros M, Znaor A, et al. Cancer statistic for the year 2020: An overview. Int J Cancer. 2021;149(4):778-89.
[3] Travis WD, Brambilla E, Nicholson AG, Yatabe Y, Austin JHM, Beasley MB, et al. The 2015 World Health Organization Classification of Lung Tumors: Impact of Genetic, Clinical and Radiologic Advances since the 2004 Classification. J Thorac Oncol [Internet]. 2015;10(9):1243-60. Available from: http://dx.doi.org/10.1097/JTO.0000000000000630
[4] Travis WD, Brambilla E, Burke AP, Marx A, Nicholson AG, editors. WHO Lung and Thymus(2015).pdf. 4th ed. International Agency for Research on Cancer. 69372 Lyon Cedex 08, France; 2015. 16-21 p.
[5] Wu CC, Maher MM, Shepard JAO. CT-guided percutaneous needle biopsy of the chest: Preprocedural evaluation and technique. Am J Roentgenol. 2011; 196(5):511-4.
[6] Koss L, Melamed M. Koss Diagnostic Cytology and its histopathologic basis Vol II. 5th ed. LIPPINCOTT WILLIAMS & WILKINS; 2006. 919-48 p.
[7] WHO. The Global Cancer Observatory: Nepal factsheet [Internet]. Vol. 505, International Agency for Research on Cancer. 2021. Available from: https://gco.iarc.fr/today/data/factsheets/cancers/10_8_9-Colorectum-fact-sheet.pdf
[8] Kementerian Kesehatan RI. National TB Prevalence Survey. Vol. 000. 2014.
[9] Lang S, Sun J, Wang X, Xiao Y, Wang J, Zhang M, et al. Asymptomatic pulmonary tuberculosis mimicking lung cancer on imaging: A retrospective study. Exp Ther Med. 2017;14(3):2180-8.
[10] Brambilla E, Travis WD, Colby T V., Corrin B, Shimosato Y. The new World Health Organization classification of lung tumours. Eur Respir J. 2001;18(6):1059-68.