Journal of Pathology of Nepal (2022) Vol. **12**, 1917 - 1922

Journal of
PATHOLOGY
of Nepal
www.acpnepal.com

Original Article

Histopathological spectrum of intrathoracic lesions

Mridula Kamath[1], Padma Shetty[1]

[1]*Department of Pathology, Rajiv Gandhi University of Health Sciences, India*

Keywords:

Biopsy;
Histopathology;
Intrathoracic lesions;
Lung cancer;

ABSTRACT

Background: Any suspicious lesion in the chest on radiology needs further workup. Conventional bronchoscopy or CT-guided fine needle aspiration may help in evaluating these suspicious lesions.

Materials and methods: The study was carried out in the pathology department of a tertiary care hospital over a period of 2 years. Clinical details were taken from the records. Samples were processed by routine histological techniques and stained with hematoxylin and eosin.

Results: A total of 100 cases were analyzed. Most of the lesions were in the lungs (97%), 2% in the pleura, and 1% in the mediastinum. The most common malignancy was squamous cell carcinoma (29%) followed by adenocarcinoma (24%) and small cell lung carcinoma (9%). The most common benign lesions were tuberculosis (4%), organizing pneumonia (3%), and bronchiectasis (2%).

Conclusions: The present study concludes that histopathological examination gives maximum accuracy in diagnosing a patient with suspicious intrathoracic lesions so that the patient can be started on treatment immediately.

Correspondence:
Dr. Mridula Kamath, MD
Department of Pathology,
Rajiv Gandhi University of Health Sciences, India.
ORCID ID: 0000-0002-2075-7997
Email: mridulakamath24@gmail.com

Received : October 5, 2020 ; **Accepted :** February 28, 2022

Citation: Kamath M, Shetty P. Histopathological spectrum of intrathoracic lesions. J Pathol Nep 2022;12(2): 1917-22. DOI: 10.3126/jpn.v12i2.31815

INTRODUCTION

The thorax is an elastic, osseocartilaginous cage designed primarily to increase and decrease intrathoracic pressure, which helps air enter the lungs during inspiration and expel during expiration. Lungs occupy a major portion of the thorax and are covered by the pleura.[1] Pathology in the thoracic cavity causes severe distress and may affect the lifestyle of the patient. Both benign and malignant lesions contribute significantly to intrathoracic mass lesions.[2] Around the world, lung cancer is the leading cause of cancer-related mortality. In 2000, approximately 1.2 million new

cases have been estimated. [3] Non-small cell lung carcinoma (NSCLC) comprises about 85% of all lung cancers.[4]

Mediastinum, the space between the lungs in the thoracic cavity also shows a variety of lesions like thymomas, cystic tumors, neurogenic tumors, and teratomas. These can be diagnosed either by complete resection or by small biopsies.[5]

A biopsy is a rapid, sensitive, and inexpensive procedure for diagnosing benign and malignant lesions.[6] For specific diagnosis of benign or malignant lesions histologic specimens are preferred.[7] Although resection is ideal, small biopsies including transbronchial, endobronchial, and core needle biopsies are used for diagnosing intrathoracic lesions.[8] These small biopsies are a pathologist's nightmare due to diagnostic limitations caused by partial sampling.[9] Needle biopsy can preserve the tissue architecture for histologic evaluation and allows numerous immunohistochemistry (IHC) stains.[10]

This study was conducted to evaluate the histopathologic spectrum of intrathoracic lesions and to know the pathologic diagnosis.

MATERIALS AND METHODS

This is a prospective study done over two years. A total of 100 biopsies of intrathoracic lesions from patients of all age groups sent to the department of pathology were considered. Clinical details were taken from records. The specimens of intrathoracic lesions were sent in formalin to the department of pathology and processed. Specimens received from the forensic department were excluded.SPSS version 21 was used for the statistical analysis.

RESULTS

In this study, the age of the patients ranged from 22-88 years. Most of the patients were in the age group of 61-70 years while the least affected was less than 40. Of the 100 cases, the majority were males (77%). The male-to-female ratio was 3.3: 1.

In this study, 97 cases were found in the lungs, 2 in the pleura, and 1 in the mediastinum. In the lungs, the lesions were centrally located in 53 cases, peripherally located in 33 cases and 11 cases showed diffuse involvement of the affected lung. Of the 88 patients with intrathoracic lesions, 36 patients were smokers and 52 were non-smokers. The Chi-square test showed a p-value of 0.007, suggesting that smoking is a significant parameter in malignant lesions (Table 1).

Table 1: Distribution of lung lesions among smokers and non-smokers

	Benign	Malignant	Total
Smokers	3 (15.0%)	33 (48.5%)	36 (40.9%)
Non –smokers	17 (85.0%)	35 (51.5%)	52 (59.1%)
Total	**20/88**	**68/88**	**88**

Table 2: Subtype of lung carcinomas among smokers and nonsmokers

Subtype of lung carcinoma	Smokers	Non-smokers
SCC	18 (54.6%)	11 (31.4%)
Adenocarcinoma	7 (21.2%)	18 (51.5%)
SCLC (including combined carcinoma)	7 (21.2%)	2 (5.7%)
Adenosquamous carcinoma	1 (3.0%)	2 (5.7%)
Metastasis	-	2 (5.7%)
Total	**33/68**	**35/68**

In this study, 33 smokers and 35 non-smokers had malignant lesions. Among the smokers, the most common malignancy was squamous cell carcinoma (SCC) (54.6%) followed by adenocarcinoma and SCLC (21.2% each). The most common malignancy seen among non-smokers was adenocarcinoma (51.5%) followed by SCC (31.4%) (Table 2).

Table 3: Distribution of benign and malignant lesions in different locations

	Lung	Pleura	Mediastinum	Total
Benign	18 (21.2%)	1 (50%)	1 (100%)	20 (22.7%)
Malignant	67 (78.8%)	1 (50%)	0 (0%)	68 (77.3%)
Total	85/88	2/88	1/88	88

The majority of cases were malignant, the most common being SCC (29%), followed by adenocarcinoma (24%), SCLC (9%), and adenosquamous carcinoma (3%). One case of AIS and combined carcinoma was seen, with combined carcinoma showing features of both SCLC and SCC. Among the benign lesions, tuberculosis was more common (4%), followed by organizing pneumonia (3%), bronchiectasis, and reactive bronchial epithelium (2% each). One case each of usual interstitial pneumonia, lung abscess, aspergillosis, and chronic bronchiolitis was seen. 2 patients showed a combination of lesions like follicular bronchiolitis with bronchiectasis and congenital adenoid malformation with bronchiectasis and mucormycosis. Among the 2 pleural lesions, one was benign and diagnosed as neurofibroma while the other showed metastasis from esophageal carcinoma. One mediastinal lesion obtained was from the thymus and was diagnosed as thymoma - B1 type.

DOI : 10.3126/jpn.v12i2.31815

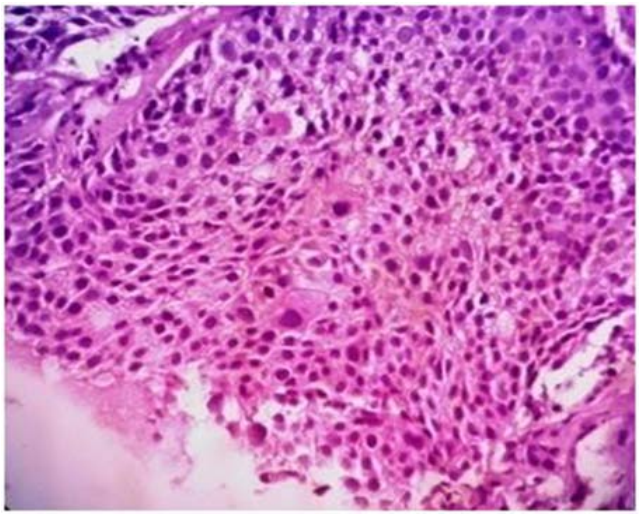

Figure 1: *Well-differentiated squamous cell carcinoma showing single-cell keratinization (H & E stain, X100)*

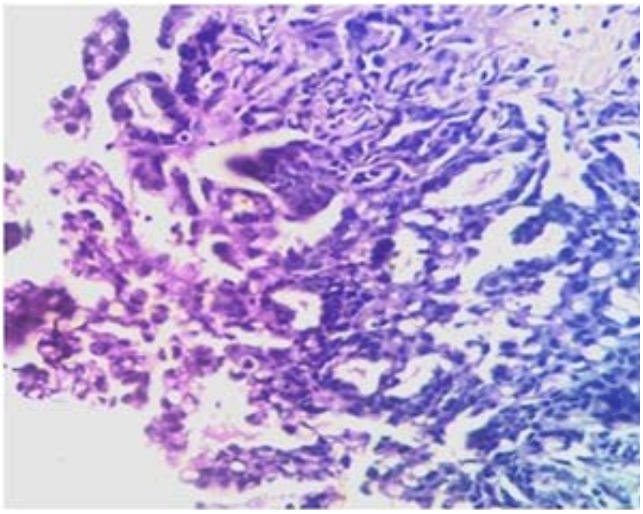

Figure 3: *SCLC showing tumor cells smaller than the size of lymphocyte with scant cytoplasm (H&E stain, X400)*

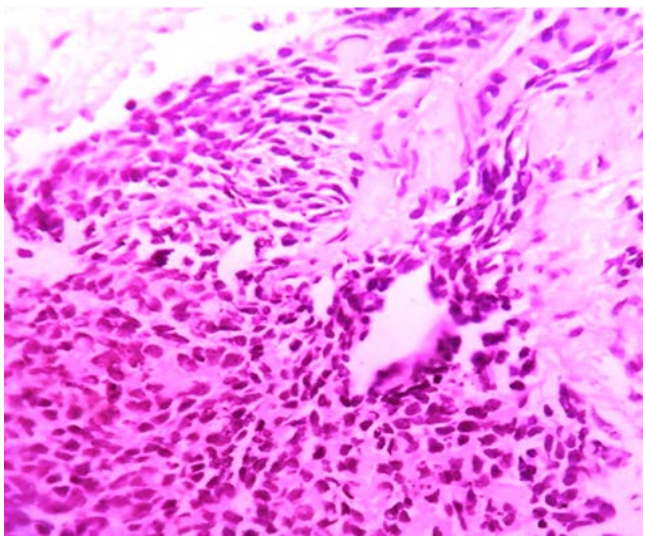

Figure 2: *Adenocarcinoma showing gland formation (H & E, X100)*

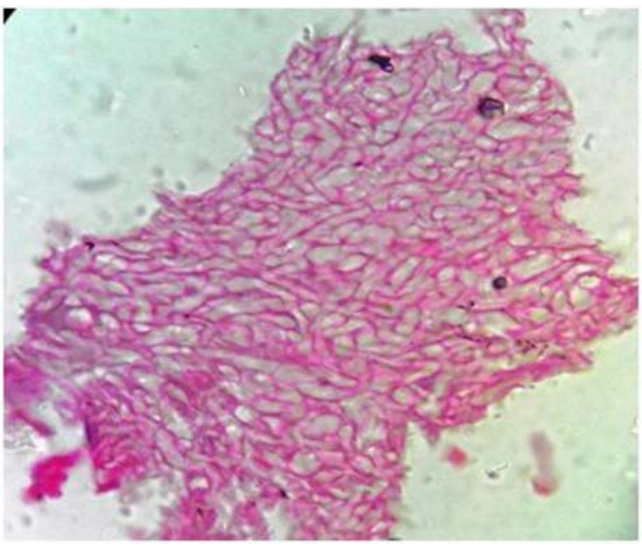

Figure4: *Aspergillus showing septation and acute angle branching (PAS stain, X400)*

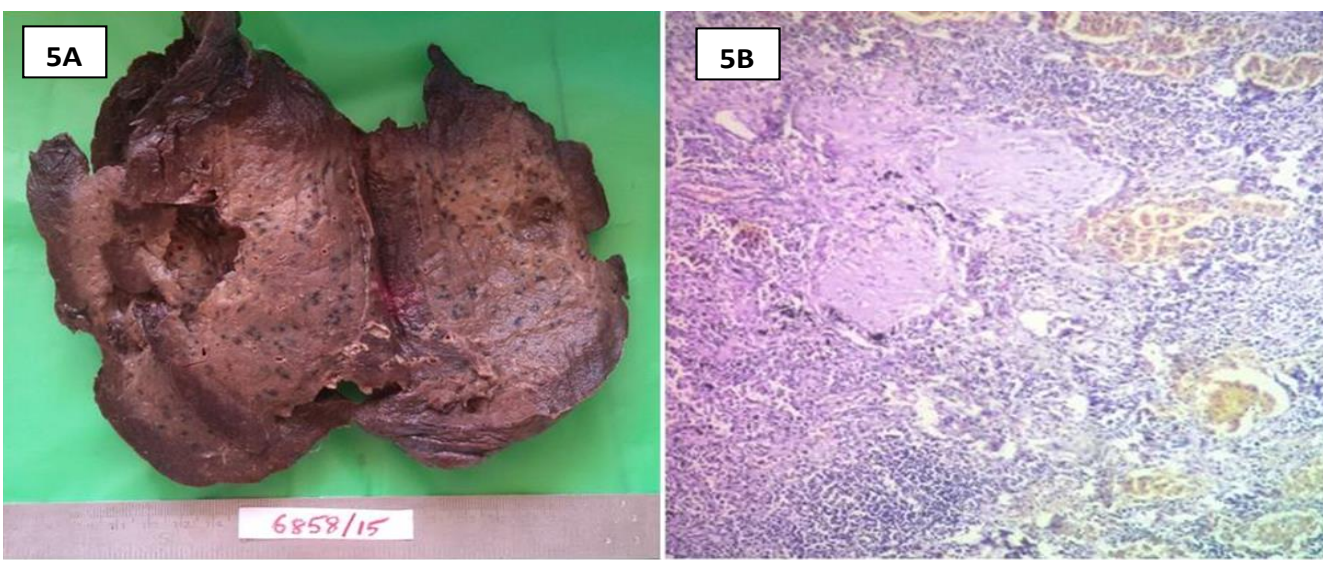

Figure5:*A) Lobectomy specimen showing firm areas suggestive of pneumonia.B) Histopathology showing interstitial inflammation and granulation tissue*

DOI : 10.3126/jpn.v12i2.31815

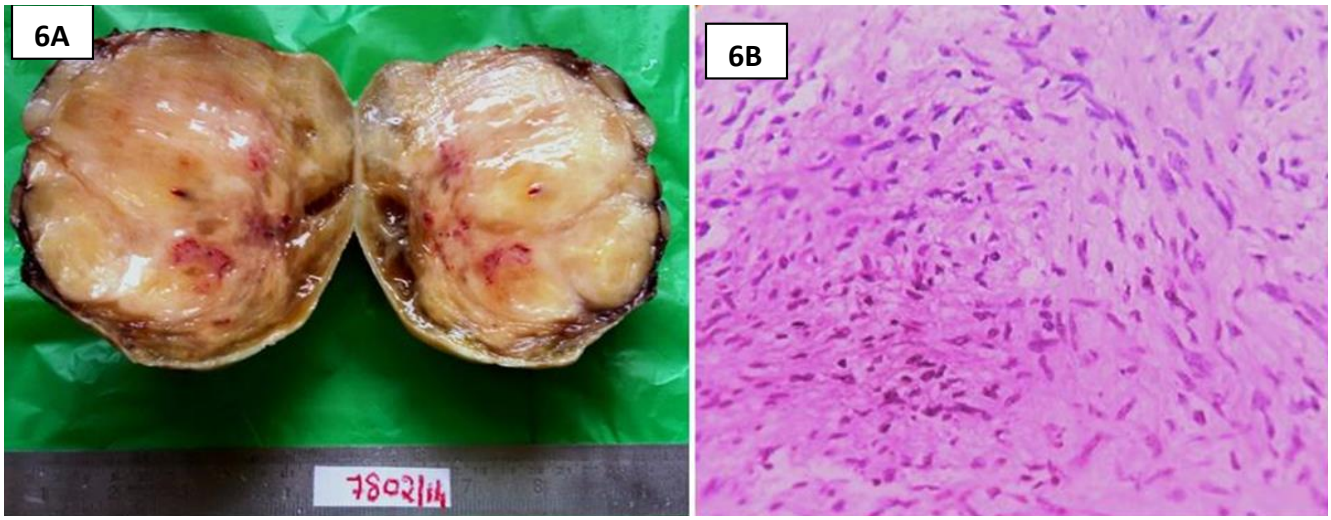

Figure 6: *A) Gross specimen of neurofibroma presenting as circumscribed pleural mass. B) Histopathology showing bland spindle-shaped cells with wavy nuclei arranged in fascicles (H& E stain, X400)*

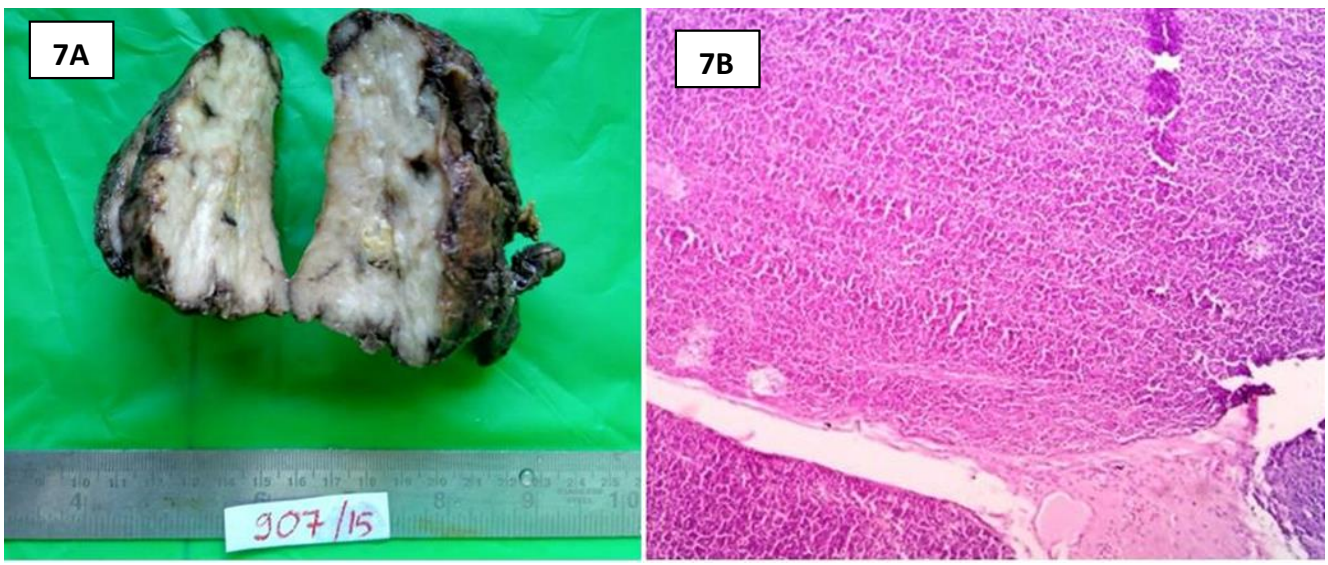

Figure 7: *A) Encapsulated thymoma showing fibrous capsule and septa. B) Histopathology showing lobules of small lymphocytes separated by fibrous septa suggestive of type B1 thymoma (H&E stain, X40)*

DISCUSSION

Core needle biopsy (CNB) helps in separating benign and malignant lesions and increases the specific diagnosis of benign lesions which is the major advantage over FNA. Demand for subclassification of NSCLC is driven by oncologists due to the development of targeted therapies that varies with the histologic subtype. In most of the small biopsies, H& stained sections remain the gold standard in subclassifying NSCLC. IHC studies in poorly differentiated NSCLC are useful and accurate.[8]

SCC, adenocarcinoma, small cell lung carcinoma, and large cell carcinoma are the 4 major histologic subtypes that can be further subclassified into specific subtypes. Adenocarcinoma in situ (AIS) is the recently added precursor lesion in adenocarcinomas and the term bronchoalveolar carcinoma is obsolete. The present study deals with the various lesions found in the lungs, pleura, and mediastinum. This study also analyses the association of smoking as a risk factor in lung carcinomas

In the present study, the age of the patients varied from 22-88 yrs. The maximum number of cases in the present study was found in the age group of 61-70 yrs. This was concurrent with other studies such as Hanna Naqvi et al[6], Jens Eckardt et al[12], Yun Gong et al[13,] and J.M Anderson et al.[8]

In the present study of 100 cases, the majority were males (77%) and 23 (23%) were females with a male-to-female ratio of 3.3: 1 which was consistent with other studies like Hanna Naqvi et al[6], Jens Eckardt et al[12], Pierre Loubeyre et al.[10] In contrast, Yun Gong et al[13] had predominantly females (51.1%) in their study population. Incidence in males was more commonly seen in our study as they form a major population of smokers in our region.

DOI : 10.3126/jpn.v12i2.31815

In the present study, the majority of the cases were found in the lungs (97%), followed by pleura (2%) and mediastinum (1%) which was concurrent with other studies such as Hanna Naqvi et al[6], Jens Eckardt et al[12] and Pierre Loubeyre et al[10]. Hanna Naqvi et al[6] did not find any pleural tumors but had 6 vertebral lesions whereas Pierre Loubeyre et al[10] had 2 chest wall lesions but no vertebral lesions. Jens Eckardt et al[12] have combined the pleural and mediastinal tumors. In our study, we further subdivided the locations of lung lesions. 53 lesions were centrally located, 33 lesions in the periphery, and 11 lesions showed diffuse involvement of the lung.

In our study, the majority of the cases were found in the lungs which were concurrent with studies done by Hanna Naqvi et al[6], Jens Eckardt et al[12], and Pierre Loubeyre et al[10]. However, the second most common site in these studies was mediastinum while in our study it was the pleura. Among the lung lesions, the majority were malignant (78.8%) similar to the above-mentioned studies. The most common malignancy in our study was SCC which was similar to the study done by Kulshrestha R et al[9], ZahirifardS et al[14], and Arslan S et al[15] but in contrast to other western data where adenocarcinoma was found to be more common. This is probably due to an increase in the incidence of smoking among the Indian population. This is supported by the evidence that SCC was the most common malignancy among the smokers in our study.

The 2nd most common type of malignancy found was adenocarcinoma. This was similar to studies done by ZahirifardS et al[14] and Arslan S et al[15]. Kulshrestha R et al[9] found an equal incidence of adenocarcinoma and SCLC in their study. This is in sharp contrast to other studies done in western countries where SCC was the 2nd most common type of lung carcinoma. However, the difference between the 2 types of carcinomas is very small. We further subclassified the adenocarcinoma into its subtypes and found 7 cases of solid type, 5 cases of acinar, 4 papillary, 3 mucinous, 2 micropapillary, and 1 lepidic type. Two cases of poorly differentiated adenocarcinoma were seen which were confirmed by special stains but couldn't be subclassified.

One case of adenocarcinoma in situ was observed where the size of the tumor was 2.8cm size with pure lepidic growth. This incidence was similar to the study by Mondal et al[16] and ZahirifardS et al.[14] However since AIS or minimally invasive adenocarcinoma (MIA) could not be reported in small biopsies, they have followed the old classification and given the term Bronchoalveolar carcinoma.

In our study, 9% of SCLC were observed, of which 1% was combined with small and squamous cell carcinoma. This was the 3rd common subtype in our study. This was similar to the study done by Mondel et al.[16] Kul SR et al[9] found an equal incidence of adenocarcinoma and SCLC. Arslan S et al[15] and Anderson JM et al[8] have an additional subclassification NSCLC, NOS making SCLC the 4th most common subtype in their study. 1 case of combined SCLC observed in our study showed features of both SCLC and SCC.

Adenosquamous carcinoma was found in 3% of the cases in our study. A diagnosis of adenosquamous was given when at least 10% of the tissue showed the other subtype. A study done by Arslan S et al[15] found 0.4% of malignant cases of this subtype. Other studies have not specified this subtype.

2% of the cases were metastatic tumors. One case had carcinoma of the esophagus which metastasized to the pleura while the other was a known case of anaplastic lymphoma which metastasized to the lungs. This was similar to studies done by Arslan S et al[15]. However, Zahirifard et al[14] had a higher percentage of metastasis in their study.

Among the benign lesions, tuberculosis was the most common. The majority of these patients presented with cough with expectoration and breathlessness. This was similar to the study done by Gangopadhya et al[17], Kulkarni V et al[18,] and Arslan S et al[15]. In a study done in Japan by Tsukada et al[19,] tuberculosis was the 3rd common cause, 1st being localized infections. This shows that tuberculosis, even to date is more prevalent in India.

Organizing pneumonia was seen in 3% of cases and was the 2nd commonest benign lesion in our study. 1 of these cases was erroneously diagnosed as poorly differentiated carcinoma on biopsy. This patient was suspected to be having a malignant lesion on radiology. On lobectomy, this was found to be a benign lesion. The pneumocyte hyperplasia and dense inflammation give a wrong impression of malignancy. The incidence of pneumonia in our study was in concordance with Arslan S et al[15], and Kulkarni V et al[18] wherein pneumonia was the 2nd most common benign lesion. Tsukada et al[19] found only 2 cases of pneumonia out of 43 benign cases. 1 case of UIP was seen in our study similar to Tsukada et al[19] who had 2 cases of interstitial pneumonia.

Bronchiectasis was seen in 2% of the cases in our study. 1 case with congenital adenomatoid malformation had bronchiectasis with mucormycosis while 1 case with bronchiectasis also had features of follicular bronchiolitis. Li et al[20] had 1 case of bronchiectasis while Arslan S et al[15] had 1 case of follicular bronchitis in their studies.

Of the 4 cases with a suspicious malignant lesion on radiology, 2 cases showed reactive bronchial epithelium and 1 case had chronic bronchiolitis, and 1 case showed only nonspecific inflammatory changes. Other studies have not subclassified benign lesions under these categories. Studies by Anderson JM et al[11] and Gangopadhyay et al[17] have a separate category for benign lesions not further specified.

In our study, we had 1 case of lung abscess. Anderson et al[11] and Gangopadhyay et al[17] had 1 and 2 cases each respectively. 1 case was diagnosed as aspergillosis on BAL as well as on biopsy. Gangopadhyay et al[17] and Loubeyre et al[10] had 1 and 2 cases of aspergillosis in their study.

DOI : 10.3126/jpn.v12i2.31815

There were 2 pleural tumors in our study, 1 of which was neurofibroma and the other was metastatic SCC from the esophagus. Gong et al[13] also had 1 case of neurofibroma in their study.

1 mediastinal case of thymoma was observed in our study similar to Gong et al[13] and Hanna Naqvi et al[6]. Loubeyre et al[10] found 3 cases of thymoma in their study. The histopathology of the thymoma patient in our study was observed to be of the B1 subtype.

CONCLUSIONS

Imaging modalities and cytologic examinations help evaluate and diagnose patients with intrathoracic lesions. A definitive diagnosis is given by histopathological examination. Due to the development in the field of lung cancer treatment by the advent of targeted therapy, the pathologist needs to subtype the carcinomas. Small biopsies pose a great deal of difficulty as the adequacy of the tissue becomes an issue. Special stains and IHC are of major help in the cases of poorly differentiated carcinomas and scantily cellular samples.

The present study concludes that histopathological examination gives maximum accuracy in diagnosing a patient with suspicious intrathoracic lesions so that the patient can be started on treatment immediately.

REFERENCES

1. Chaurasia BD. Volume 1 of Human Anatomy: regional and applied dissection. 4th edition. New Delhi: CBS publishers and distributors; 2004
2. Gupta S, Bhalotra B, Jain N. Spectrum of intrabronchial mass lesions and role of flexible bronchoscopy in their diagnosis: A series of 74 cases. Indian J Chest Dis Allied Sci. 2010;52: 79-82 Crossref
3. Travis W.D., Brambilla E., Muller-Hermelink H.K., Harris C.C. (Eds.): World Health Organization Classification of Tumours. Pathology and Genetics of Tumours of the Lung, Pleura, Thymus, and Heart. IARC Press: Lyon 2004
4. Molina JR, Yang P, Cassivi SD et al. Non-small cell lung cancer: epidemiology, risk factors, treatment, and survivorship. Mayo Clin Proc. 2008;83: 594-94. Crossref
5. Akashi A, Hazama K, Miyoshi S et al. An analysis of video-assisted thoracoscopic resection for mediastinal masses in 150 cases. Surg Endosc. 2001;15:1167-70. Crossref
6. Naqvi H, Edhi M, Aslam M et al. Spectrum of intra-thoracic lesion detected by computed tomography guided fine needle aspiration biopsy. International Archives of Medicine. 2013; 6: 1-5. Crossref
7. Novaes FT, Cataneo DC, Junior RLR et al. Lung cancer: histology, staging, treatment and survival. J Bras Pneumol. 2008; 34: 595-600. Crossref
8. Mukhopadhyay S. Utility of small biopsies for diagnosis of lung nodules: doing more with less. Mod Pathol. 2012;25:S43-57. Crossref
9. Kulshrestha R, Menon BK, Vijayan VK et al. Role of a pattern-based approach in interpretation of transbronchoscopic lung biopsy and its clinical implications. Indian J Chest Dis Allied Sci. 2012; 54: 9-17. Crossref
10. Loubeyre P, Copercini M, Dietrich P-Y. Percutaneous CT-Guided Multisampling Core Needle Biopsy of Thoracic Lesions. Am J Roentgenol. 2005;185:1294-8. Crossref
11. Anderson JM, Murchison J, Patel D. CT guided lung biopsy: factors influencing diagnostic yield and complication rate. Clin Radiol 2003; 58: 791-97. Crossref
12. Eckardt J, Petersen HO, Hakami-Kermani A et al. Endobronchial ultrasound-guided transbronchial needle aspiration of undiagnosed intrathoracic lesions. Interact Cardiovasc Thorac Surg. 2009;9:232-5. Crossref
13. Gong Y, Sneige N, Guo M et al. Transthoracic Fine-Needle Aspiration vs Concurrent Core Needle Biopsy in Diagnosis of Intrathoracic Lesions: A Retrospective Comparison of Diagnostic Accuracy. Am J Clin Pathol. 2006;125:438-44. Crossref
14. Zahirifard S, Bakhshayesh-Karam M, Mohammadi F et al. Thoracic CT-Guided Needle Biopsy: A Report of 150 Cases. Tanaffos. 2002;1:51-5.URL: SID.ir | Thoracic Ct-Guided Needle Biopsy: A Report Of 150 Cases
15. Arslan S, Yilmaz A, Bayramgurler B et al. CT-guided transthoracic fine needle aspiration of pulmonary lesions: accuracy and complications in 294 patients. Signature: Med Sci Monit. 2002;8:493-97. PMID: 12118196
16. Mondal S, Nag D, Osta M 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;2:14. Crossref
17. Chakrabarti I, Giri A, Gangopadhyay M et al. Computed tomography guided fine needle aspiration cytology of mass lesions of lung: Our experience. Indian J Med Paediatr Oncol. 2011;32:192. Crossref
18. Kulkarni V, Menghani R, De, Bhake A. Utility of Transthoracic Fine Needle Aspiration Cytology in Diagnosis of Pulmonary Lesion. J Contemp Med Dent. 2014;2:43-7. Crossref
19. Pirozynski M. Bronchoalveolar lavage in the diagnosis of peripheral, primary lung cancer. Chest. 1992;102(2):372-4. Crossref
20. Wongsurakiat P, Wongbunnate S, Dejsomritrutai Wet al. Diagnostic value of bronchoalveolar lavage and post bronchoscopic sputum cytology in peripheral lung cancer. Respirology. 1998;3:131-7. Crossref