Warpe BM et al. GAIMS J Med Sci 2024;4(2) (Jul-Dec):104-109
Online ISSN: 2583-1763

Case Series

Clinico-Radiological study with Bronchoscopic and Histopathological Correlation of Lung Tumours

Bhushan M. Warpe[1], Shweta S. Joshi[1], Vibha D. Patel[1],

Kinjal B. Karamta[1], Bhavin S. Sharma[1], Priyal S. Patel[1], Kalpesh B. Patel[2]

[1] Department of Pathology, [2] Department of Respiratory Medicine, Gujarat Adani Institute of Medical Sciences and G.K. General Hospital, Bhuj, Kachchh, Gujarat

*Correspondence: Dr. Vibha D. Patel (Email: vibhapatel2896@gmail.com)

ABSTRACT

Lung cancer is the leading cause of cancer-related deaths worldwide. Many patients tend to have a very poor prognosis due to being diagnosed at an advanced stage especially in densely populated nations. The current study presents a case series of lung tumors. All the lung tumors presented as endobronchial mass; however histopathological diagnoses were different in each of the lung tumors after bronchoscopic guided lung mass biopsies. The first case was small cell lung cancer (SCLC) with endobronchial growth in a 64-year-old male. Bronchoscopy was suggestive of Left vocal cord palsy. The tiny nodule was seen over both cords with nodule present over carina. Chest CT scans revealed a well-defined irregularly shaped mass lesion with spiculated margin seen in the left lower lobe. The analysis of a biopsy specimen obtained from the tumor resulted in a diagnosis of SCLC. The second case was of non- small cell lung cancer (NSCLC) with endobronchial growth in a 77-year-old male. CECT reveals a right upper lobe malignant mass lesion with mediastinal invasion with mediastinal metastatic nodes. Bronchoscopy revealed a right upper lobe malignant mass. Histopathological examination revealed features consistent with NSCLC of Squamous cell carcinoma. The third case was a 58- year-old male whose CECT Thorax revealed a malignant pulmonary mass lesion in the left hilar region. Bronchoscopy was suggestive of endobronchial growth present in Left main bronchus around 1.5 cm from the carina. Tissue taken from the Left Hilar mass showed features of NSCLC-Adenocarcinoma carcinoma of the lung.

Keywords: SCLC, NSCLC, Lung tumors, Bronchoscope

INTRODUCTION

The 5-year survival rate for advanced lung cancer is inferior. It accounts for nearly 5% and 15% in developing and developed countries, respectively. Also, 1-5 million deaths occur annually worldwide with the death rate being 2.5 million in developing countries. Every year in India, approximately 63,000 lung cancer cases are reported.[1-3]

The classification of primary malignant tumors of the lung according to The World Health Organization (WHO) categorizes lung tumors into non-SCLC (NSCLC) and small cell lung cancers (SCLC).

Nearly 80% of lung tumors are NSCLC. The classification of lung cancer was updated by WHO in 2015 to include adenocarcinoma (ADC), squamous cell carcinoma (SCC), large cell carcinoma (LCC), NSCLC-not otherwise specified (NSCLC-NOS), and other categories. The information provided contributes to the understanding of genetic research, which can help patients receiving targeted therapy. It is crucial to accurately classify NSCLC in order to determine the appropriate targeted therapy, as ADC cases tend to respond better to treatment and have a positive prognosis compared to SCC cases.[1,3] In this case series; we describe the clinical, radiological, bronchoscopic and histopathological features of such lung tumor cases.

CASE HISTORY

Case 1:

A 64-year-old male presented to hospital with chief complaints of breathlessness, cough with expectoration, and bodily pain for 25 days. The cough was brownish in colour and mucous in consistency. There was no history of fever, chest pain, and any allergy. On arrival, the patient was vitally stable. Vitals: Temperature- Normal, Pulse rate- 78/min, RR- 17/min, BP- 110/76 mmHg, SPO2- 96 % on room air. Systemic examination: RS- Air entry decreased on Left side, CVS-S1, S2 normal, P/A- soft, non-tender abdomen, no organomegaly, CNS- clinically stable. On admission, all the blood reports were normal. X-ray chest (PA) view showed the findings as shown in (Figure 1) suggestive of consolidation in the Left lower lobe.

During admission, CECT Thorax was done suggestive of 35x32x34 mm sized well- defined, irregularly shaped, moderately and heterogeneously enhancing solid, soft tissue density mass lesion with spiculated margin in the left side of lower lobe (Malignant mass). They advised for Biopsy after Bronchoscopy.

Bronchoscopy: The tiny tumor nodule was seen over both cords with widened nodule present over the carina. The right cord was mobile. Left vocal cord palsy noted. Trachea: Normal. The left main bronchus was obliterated by mass, so the scope could not be negotiated further (Figure 2). Right main bronchus: Normal. A bronchoscopic guided biopsy was taken from it. The clinical impression was Left lobe mass malignancy.

Histopathological examination (Figure 3) of small cell carcinoma: Microphotograph showed fibro-collagenous tissue. Epithelium lined by respiratory epithelium. Stroma showed malignant small round tumor cells arranged in cords and in a dispersed pattern. Tumor cells showed overlapping and pleomorphism, hyperchromatic nuclei, salt and pepper chromatin, scanty cytoplasm, high N: C ratio, and areas of crushing artefact.

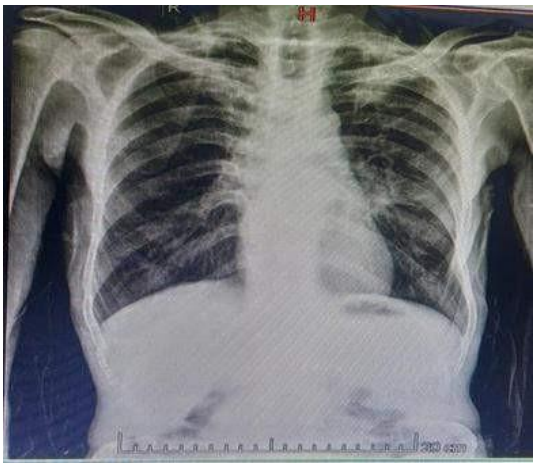

Fig 1. Radiological image: Consolidation in the left side of lower lobe (X-ray: PA view)

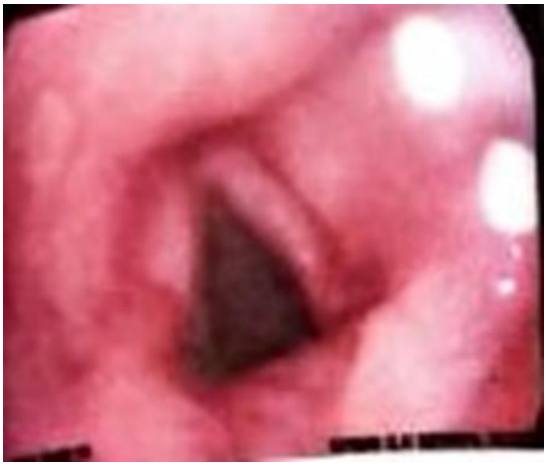

Fig 2. Bronchoscopic image: Tiny nodules are seen over both vocal cords.

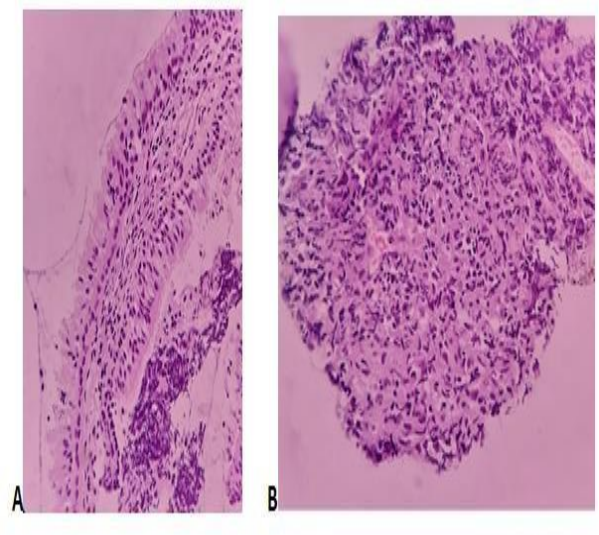

Fig 3. A) Epithelium lined by respiratory epithelium (H&E, X400).

B) Stroma shows malignant small round tumor cells (H&E, X400)

Case 2:

A 77-year-old male presented with a complaint of change of voice, which was insidious in onset and gradually progressive, not associated with pain, not associated with difficulty in swallowing. On arrival patient was vitally stable, Pulse rate of 80/min, BP 138/82 mmHg, RR 16/min, Temperature normal and SPO2 of 98% on room air.

CECT revealed the Right upper lobe malignant mass lesion with mediastinal invasion with mediastinal metastatic nodes. CECT Thorax revealed a Fibro-cavitary lesion in the apical and posterior segment of the right side of upper lobe, which appeared to be communicating with the right side of main bronchus. On post-contrast images medially, the lesion completely invaded the trachea, right main bronchus [Figure 4(A)]. There were multiple heterogeneously enhancing enlarged nodes in pre-tracheal, right paratracheal, subcarinal, and pre-vascular stations which were not seen separately from the lesion (metastatic nodes); the largest was of size, 2.5x3.1cm stationed at the right paratracheal station [Figure 4(B)]. The bronchoscopy report reveals a right upper lobe - malignant mass. Right main bronchus was anatomically destroyed by endobronchial mass (Figure 5).

Histopathological examination: Received multiple small tissue bits, grey-brown in colour; Total measure 0.6x0.5x0.3cm. The section showed fibro-collagenous tissue lined by bronchial epithelium. Stroma shows large polygonal malignant cells arranged in sheets having a high N:C ratio, moderate pleomorphism, hyperchromatic nuclei, few having prominent nucleoli. [Figure 6(A) & 6(B)]. PAS stain was non- contributory for mucinous component, thus ruling out adenocarcinoma. So, features were consistent with NSCLC-Squamous cell carcinoma.

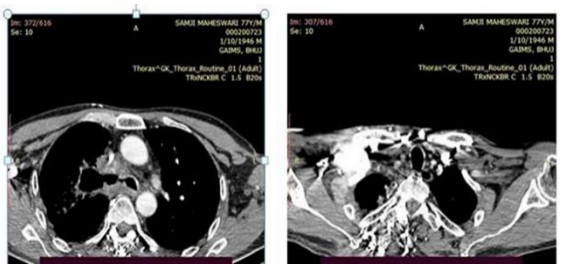

Fig. 4. A) Fibro-cavitary lesion in the apical and posterior segment of the right upper lobe

B) Multiple heterogeneously enhancing enlarged nodes are seen in pre- tracheal, right paratracheal, subcarinal, and pre-vascular stations not seen separately from the lesion likely to represent metastatic nodes

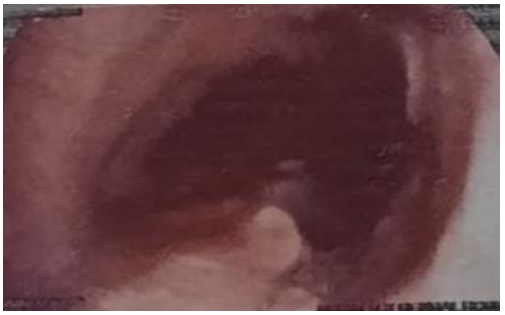

Fig. 5. Anatomically destroyed endobronchial growth on bronchoscopy

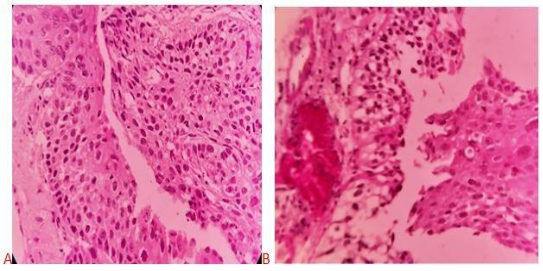

Fig. 6. (A&B): Large polygonal malignant squamous cells are arranged in sheets having high N: C ratio, moderate pleomorphism, hyperchromatic nuclei few having prominent nucleoli (H&E, X400)

Case 3:

A 58-year-old male presented with complaints of cough with expectoration which was whitish in color and watery in consistency, associated with complaints of decreased sleep and generalized weakness with body aches for 15 days. There was no history of fever, hemoptysis, or any allergy. All routine blood investigations were done and found normal. Sputum was negative. BAL fluid was negative for malignancy.

CECT Thorax revealed a malignant pulmonary mass lesion of 65x69 mm in the left hilar region with a complete cut off of the left sided main bronchus & collapse of the left side of lung.

Bronchoscopy was suggestive of endobronchial growth present in Left main bronchus around 1.5 cm from the carina. The scope couldn't negotiate further. Vocal cord and Trachea: Normal. Carina: Sharp. Clinical Impression: Left hilar mass likely neoplastic (Figure 7).

Tissue was taken from the Left Hilar mass after biopsy. It showed fibro- collagenous tissue lined by bronchial epithelium. Stroma showed malignant adenocarcinoma cells arranged in sheets having a high N: C ratio, moderate pleomorphism, hyperchromatic nuclei few having prominent nucleoli, and vacuolated cytoplasm. Few areas of hemorrhage with moderate mixed inflammation were seen. Tumor cells showed PAS positivity (mucin). The features were consistent with NSCLC-Adenocarcinoma of the lung (Figure 8).

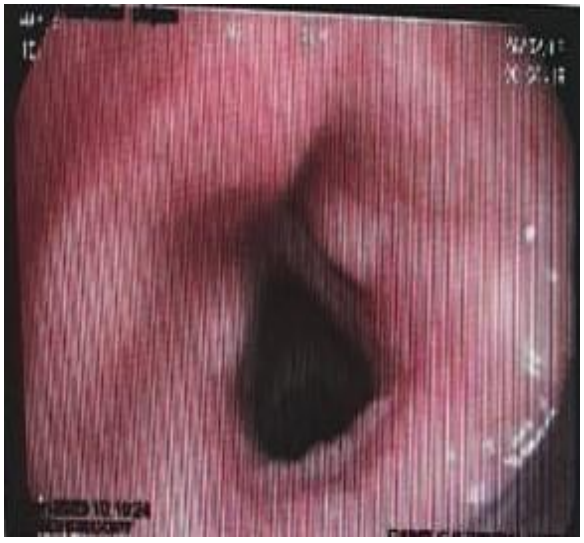

Fig. 7: Bronchoscopy showing endobronchial growth present in Left main bronchus around 1.5 cm from the carina

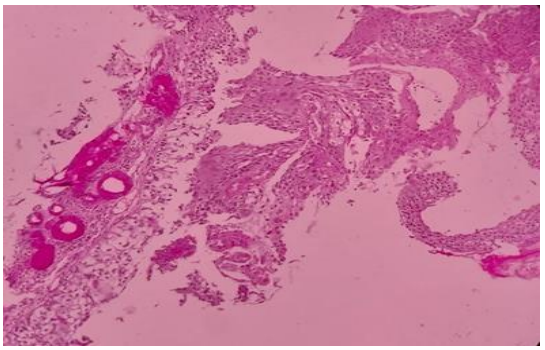

Figure 8: Micrograph showing malignant adenocarcinoma cells arranged in sheets having a high N:C ratio, moderate pleomorphism, hyperchromatic nuclei few having prominent nucleoli, and cytoplasm is vacuolated. (PAS, X400)

DISCUSSION

Smoking is the most important risk factor for lung cancer. When cigarettes became the major tobacco product manufactured in the 1900s, lung cancer became more common. The likelihood risk for lung carcinoma rises with increase in smoking years or number of cigarette packs smoked everyday.[1,2]

Lung cancer is a common carcinoma due to occupational smoke exposure in industrialized belts. Industrial or manufacturing use of asbestos has been linked to increased rates of mesothelioma and lung cancer. Other occupational exposures associated with lung cancer include the use of arsenic and arsenic compounds (fungicides, outdoor wood preservatives, pesticides, herbicides, etc.), exposure to beryllium and beryllium oxide (X-ray and radiation technology, etc.), inhaled chemicals including cadmium, silica, nickel compounds, vinyl chloride, chromium compounds, mustard gas, carbon products and chloromethyl esters, and diesel exhaust.[1,3]

Small-cell lung carcinomas (SCLC) have neuroendocrine features and arise from cells programmed to differentiate along these lines. SCLC is most severe form of lung cancer that is strongly associated with smoking and has early dissemination, however responds well to chemotherapy.[4] Lung cancer is currently the most frequent cause of cancer mortality and the most frequently diagnosed major cancer worldwide.[5] Although SCLC is among the most common primary lung cancer histological types, endobronchial extension is very rare.

A clinical differential diagnosis of endobronchial lesions may include diverse conditions, such as non-malignant tumours, primary lung carcinoma other than adenocarcinoma and endo-bronchial metastasis of cancer from extra- pulmonary organs.[6]

The diverse group of NSCLC tumors comprise nearly 85 percent of newly diagnosed lung cancers. Tobacco use continues to be the most important risk factor for this illness's development, but air pollution and radon exposure also has a role.[7] Despite improvements in diagnosis, staging, and treatment; the five-year survival for these lung cancers is dismal (range, 10-20%). This is due to poor prognosis of patients and advanced stage of clinical presentation.

Nevertheless, An early-stage lung cancer patient tend to have better five- year survival of more than 70%. Thus screening and detection of early-stage lung cancer are crucial to improving survival by timely biopsies. Screening with low- dose computed tomography has demonstrated to reduce mortality by 20% in the high-risk population even if it is not sensitive enough to detect small tumours arising in the central airway.[8]

The radiographic presentations of endobronchial lesions exhibit significant variability. Common findings include lobar or segmental atelectasis and pneumonic infiltration. Differential diagnoses for endobronchial mass lesions encompass benign tumors, metastases to the bronchus from extrapulmonary cancers, and primary lung carcinoma. Moreover, CT imaging of the lungs often reveals mass-like pulmonary opacities, typically caused by infections associated with endobronchial lesions. These opacities may include mucus plugs distal to a centrally obstructing lesion, commonly due to fungal or tuberculosis infections.[6]

Historically, computed tomography (CT) has been relied upon for non-invasive staging. While CT offers detailed anatomical information, it also presents several inherent limitations. To improve prognosis, every effort should be made to diagnose lung cancer at its earliest stage. CT-scans of Lung can be useful for the diagnosis and for revealing the extent of mediastinal invasion and mediastinal nodal metastases.[7-9]

Bronchoscopic examinations play a crucial role in diagnosing endobronchial lesions since most lesions are visible within the bronchoscopic field. However, in certain cases, the presence of necrotic material can make it challenging to obtain an adequate biopsy specimen for accurate diagnosis. Therefore, obtaining a pathological diagnosis through bronchoscopic biopsy specimens is essential for establishing a precise diagnosis.[6-7]

Accurate staging of NSCLC is crucial as it precisely determines the disease's extent, guiding treatment decisions and prognosis estimation. In cases without distant metastases, the involvement of mediastinal lymph nodes becomes the primary prognostic factor, significantly impacting treatment approaches.

This also facilitates reliable comparisons across studies.[10] Computed tomographic (CT) scanning of the upper abdomen and thorax has an important role in the staging of bronchial carcinoma before definitive treatment from biopsied material.

Squamous and SCLC occur mainly from the central airways. Lung adenocarcinomas (including bronchioloalveolar cancer) are peripheral in location.

Adenocarcinomas arise from progenitor cells found in the bronchioles (Clara cells) or alveoli (Type II pneumocytes), or from mucin-producing cells. It is currently the most prevalent form of lung cancer globally, and its number is increasing rapidly. It is by far the commonest form in women, never smokers, and young people.[1-3]

Large cell lung cancer represents undifferentiated forms of the other NSCLC types and these tumors arise from metaplastic changes resulting from smoking. Tumor cells of large cell lung carcinoma do not have discernible morphology of malignant squamous cells or adenocarcinoma cells.[3,11]

CONCLUSIONS

Bronchoscopy is the usual initial investigation of choice in patients with suspected endobronchial carcinoma. After confirming a positive diagnosis, many patients undergo staging through computed tomography (CT) scans to evaluate the disease's extent and its potential for comprehensive treatment. While tissue biopsy remains the most reliable method for diagnosing malignant or premalignant airway conditions, bronchoscopy followed by guided biopsy is often considered the safest and most precise approach to assess both central and distal airway mucosa. Multi-disciplinary teamwork yields faster diagnosis with prompt initiation of treatment.

REFERENCES

1. Zappa C, Mousa SA. Non-small cell lung cancer: current treatment and future advances. Transl Lung Cancer Res. 2016;5(3):288-300.

2. Sharma T, Das P, Panigrahi R, Rao CM, Rath J. Immunocytochemical Evaluation of TTF-1, Napsin-A, and p-63 for Subtyping of Non-Small Cell Lung Carcinoma and Clinicopathological Correlation. J Cytol. 2022;39(4):180-87.

3. Minna JD, Roth JA, Gazdar AF. Focus on lung cancer. Cancer cell. 2002;1(1):49-52.

4. Jackman DM, Johnson BE. Small-cell lung cancer. The Lancet 2005;366(9494):1385-96.

5. Van Klaveren RJ, Habbena JDF, Pedersen JH, de Koning HJ, Oudkerk M, Hoogsteden HC. Lung cancer screening by low-dose spiral computed tomography. Eur Respir J 2001;18:857–66.

6. Kurishima K, Kagohashi, K, Miyazaki, K, Tamura, T, Ohara, G, Kawaguchi, M, Satoh H. Small cell lung cancer with endobronchial growth: A case report. Oncology Letters 2013; 6(2):553-55.

7. Gridelli C, Rossi A, Carbone DP, Guarize J, Karachaliou N, Mok T, *et al.* Non-small-cell lung cancer. Nat Rev Dis Primers 2015; 21(1):15009.

8. Andolfi M, Potenza R, Capozzi R, Liparulo V, Puma F, Yasufuku K. The role of bronchoscopy in the diagnosis of early lung cancer: a review. Journal of thoracic disease. 2016;8(11):3329.

9. Lee D, Rho JY, Kang S, Yoo KJ, Choi HJ. CT findings of small cell lung carcinoma: Can recognizable features be found? Medicine (Baltimore). 2016;95(47):e5426.

10. De Leyn P, Lardinois D, Van Schil PE, Rami-Porta R, Passlick B, Zielinski M, *et al*. ESTS guidelines for preoperative lymph node staging for non-small cell lung cancer, European Journal of Cardio-Thoracic Surgery. 2007;32(1):1–8.

11. Laroche C, Fairbairn I, Moss H, Pepke-Zaba J, Sharples L, Flower C, Coulden R. Role of computed tomographic scanning of the thorax prior to bronchoscopy in the investigation of suspected lung cancer. *Thorax.* 2000;55(5):359-63.

Source of support: Nil

Conflict of interest: None declared

How to cite: Warpe BM, Joshi SS, Patel VD, Karamata KB, Sharma BS, Patel PS et al. Clinico-Radiological Study with Bronchoscopic and Histopathological Correlation of Lung Tumours. GAIMS J Med Sci 2024;4(2):104-09.

https://doi.org/10.5281/zenodo.12754296