



Pulmonary Medicine

RADIOLOGICAL, PATHOLOGICAL AND IMMUNOHISTOCHEMISTRY PROFILE OF PATIENTS DIAGNOSED WITH LUNG CANCER AT A TEACHING HOSPITAL

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ABSTRACT **Background:** Lung cancer remains the leading cause of cancer-related mortality worldwide, with increasing incidence in low- and middle-income countries. Early diagnosis and timely intervention are critical for improved outcomes. This case series explores the clinical presentation, diagnostic pathways, and management challenges of lung cancer in a peripheral healthcare setting. **Methods:** We analyzed ten cases of histopathologically confirmed lung malignancies diagnosed over a 12-month period at a tertiary care center. Clinical data, radiological findings, histopathological subtypes, treatment modalities, and follow-up details were recorded and analyzed. **Results:** The study included 3 females and 7 males, with a mean age of 59.4 years. Common presenting symptoms were cough (100%), weight loss (80%), and hemoptysis (50%). Adenocarcinoma was the most prevalent histological subtype (30%), followed by squamous cell carcinoma (20%), small cell carcinoma (10%), and lymphoma (20%). All cases were diagnosed at advanced stages (Stage IIIB or IV). Immunohistochemistry was essential for definitive diagnosis. Treatment primarily involved platinum-based chemotherapy. Due to infrastructural constraints, molecular testing and radiotherapy were not feasible. One patient succumbed during the diagnostic workup, and one was lost to follow-up. **Conclusion:** This case series highlights the diagnostic and therapeutic challenges of managing lung cancer in peripheral settings. Late-stage presentation, limited access to diagnostic modalities, and absence of advanced treatments remain significant barriers. Strengthening referral systems, implementing early detection strategies, and expanding diagnostic infrastructure are essential for improving lung cancer care in resource-limited regions.

KEYWORDS :

INTRODUCTION

Lung cancer continues to be the leading cause of cancer-related death globally, with a rising burden in both urban and rural healthcare environments. As per the Global Cancer Statistics (GLOBOCAN) 2020, lung cancer constituted around 11.4% of all new cancer diagnoses and was accountable for 18% of all cancer-related fatalities worldwide [1]. Notwithstanding considerable progress in diagnostic and therapeutic approaches, lung cancer remains a significant challenge in low-resource environments, where late presentation, restricted access to advanced imaging and biopsy methods, and limited availability of molecular testing negatively affect patient outcomes.

Patients in peripheral health institutions often exhibit advanced-stage illness as a result of delayed diagnosis and inadequate screening initiatives. Histological subtyping and immunohistochemistry (IHC) are essential for the identification of lung cancer variations, including

Case Series

S. No.	AGE / SEX	Imaging done	Invasive diagnostic procedure	Histopathology Report	Tumor marker
1	73/F	4.8*4.8*6.4cm sized soft tissue density with smooth margins in right upper lobe with abrupt cutoff involving segmental bronchus	Pleural fluid cytology	Adenocarcinoma	TTF-1 and NAPSIN-A
2	65/F	Round, heterogenous, mediastinal mass. Right sided moderate pleural effusion	USG guided biopsy	Small cell carcinoma	CK, TTF-1 and synaptophysin, ki67 index is 80%
3	72/F	Right perihilar spiculated necrotic mass of dimensions 50 x 40 x 29 mm in the precarinal and extending upto the right perihilar region.	Truecut biopsy	Squamous cell carcinoma	p40 and p63
4	71/M	Brain and skeletal mets secondary to neoplastic foci in right upper lobe ? Non small cell lung carcinoma	CT guided biopsy	Non-small cell carcinoma	CK, EMA, C-kit, CK7, Pax-8

adenocarcinoma, squamous cell carcinoma, and small cell carcinoma. These categories profoundly impact treatment choices, particularly with the emergence of targeted treatments and immunotherapy [2].

The epidemiology of lung cancer indicates that primary risk factors include smoking, environmental exposure to toxins, and genetic predisposition. In resource-limited environments, occupational risks include exposure to biomass fuel, vehicular emissions, and industrial contaminants are increasingly acknowledged as possible factors in the occurrence of lung cancer [3,4]. This case series details 10 individuals diagnosed with lung cancer at a peripheral healthcare center, including their clinical features, radiological findings, diagnostic evaluations, and histological outcomes. This research aims to elucidate the problems and range of lung cancers faced in resource-constrained environments, emphasizing the need of early detection and customized treatment approaches.

5	69/M	Area of opacification in left upper and lingular lobe, fibrotic densities in right ul, b/l LL, subtle GGOs in b/l LL	CT guided biopsy	squamous cell carcinoma	p63, p40, immunonegative for TTF-1, Napsin-A, CK-7, CK-20
6	76/M	Multiple metabolically active b/l variable sized conglomerated and discrete subsolid and solid pulmonary nodular opacities	Transbronchial lung biopsy	Adenocarcinoma	TTF-1 and Napsin-A
7	54/M	Dense area of consolidation in right lower lobe and contiguously involving right upper lobe. Mediastinal lymph node enlargement	Truecut biopsy	Non Hodgkin's lymphoma	CD20, CD 43, BCL2
8	24/M	V-Y pattern with consolidation, cystic bronchiectatic and cavitary changes in right upper lobe.	Cervical LN Biopsy	Classical Hodgkin's lymphoma	CD30, CD3,CD23 and OCT-2
9	82/M	Large isodense soft tissue lesion on size 7.7x5.5 cm is noted in the left lingular lobe.	CT guided biopsy	Adenocarcinoma	TTF-1 and Napsin A
10	63/M	Well defined soft tissues density lesion causing abrupt cutoff of bronchus in right upper lobe.	CT guided biopsy	Non small cell carcinoma	CK, EMA, C-kit, CK7, Pax-8

DISCUSSION

Lung cancer is associated with the greatest incidence of cancer-related mortality and significant morbidity globally. In 2020, according to the GLOBOCAN report, 1.8 million deaths as well as 18% of all cancer-related fatalities worldwide were attributable to lung cancer alone [1]. Notwithstanding technological advances in diagnostic and treatment modalities over the last two decades, patient outcomes continue to be poor, especially in resource-constrained settings, in developing countries characterized by long diagnostic delays, difficulties in accessing specialized cancer care, delay in suspicion and early referral to appropriate healthcare facilities [2,3]. While several cancer institutes have been established over the last 15 years in India, paucity of skilled healthcare professionals in cancer care, including ancillary healthcare (nursing, vocational, etc.), and insufficient support to live saving chemotherapeutic drugs continues to affect cancer outcomes in our country. This case series examines 10 individuals with pulmonary malignancies at a peripheral health institute (Private Medical college and hospital), emphasizing critical elements of lung cancer presentation, diagnosis, and therapy in these contexts.

Epidemiology And Demographics

Lung cancer primarily affects adults over the age of 60, a pattern shown in our case series, where 8 out of 10 patients were aged 60 years and above. The growing worldwide prevalence of lung cancer in women, particularly non-smokers, is gaining recognition, perhaps attributed to indoor and outdoor pollution and other environmental exposures, besides the influence of genetic predisposition. [4,5]. Seventy percent of patients in this case series were females, which diverges from conventional statistics but corroborates patterns in gender-specific vulnerability.

An essential component of this series is the diversity of variables as predisposing factors. Cigarette smoking is the primary risk factor in developed nations, however in rural or resource-constrained areas, exposure to biomass fuel, second-hand smoke, and environmental contaminants including dust and industrial emissions significantly contribute. [6,7] In our group, 20% of patients were smokers, and an additional 20% had recorded exposure to biomass fuels. Nevertheless, most individuals had no discernible risk factors, indicating multifactorial predisposition, including the effects of genetics and chronic exposure to ambient air pollution—a rising issue in industrial areas [8,9].

Clinical Manifestation And Diagnostic Challenges

Clinically, the majority of patients had persistent cough, significant weight loss(>10%), and dyspnea unexplained by other causes—characteristics often linked to advanced-stage malignancy[10]. The median interval from onset of symptom to time of first diagnosis varied between 3 to 6 months, underscoring moderate diagnostic delays. Contributing variables were restricted access or high waiting time to diagnostic imaging, insufficient awareness, and underutilization of screening programs [11]. Indeed, none of the patients were identified by screening, highlighting the critical need for the adoption of low-dose CT screening techniques for high-risk groups, as advocated by many worldwide recommendations [12].

Imaging was crucial as a first step towards the suspicion of cancer. India hosts several renowned cancer screening institutes dedicated to early detection and prevention of cancer. Major Cancer Screening Institutes in India: Tata Memorial Centre (TMC), Mumbai, National Cancer Institute (NCI), Jhajjar (AIIMS), ICMR-National Institute of Cancer Prevention and Research (NICPR), Noida and many others.

CT abnormalities, including spiculated mass lesions, ground-glass opacities, and bronchial obstruction, were pivotal in directing the biopsy. Diagnostic confirmation was mostly dependent on histopathological and immunohistochemical studies. Peripheral facilities often lack internal pathology capabilities, leading to further delays in diagnosis and staging [13].

Histopathological Trends

Histological analysis identified adenocarcinoma as the major subtype, comprising 30% of cases, followed by squamous cell carcinoma at 20%, small cell carcinoma at 10%, and lymphomas at 20%. The increasing prevalence of adenocarcinoma, especially in non-smokers, corresponds with worldwide patterns and may indicate environmental or genetic influences [14]. Immunohistochemistry (IHC) was crucial in distinguishing tumor subtypes. TTF-1 and Napsin-A positive corroborated the diagnosis of adenocarcinoma, although p63 and p40 indicated squamous differentiation, in accordance with WHO 2021 categorization guidelines [15].

Two examples of lymphoma with pulmonary symptoms are particularly noteworthy. Pulmonary involvement in lymphoma is uncommon but increasingly acknowledged, particularly in immunocompromised persons. Precise diagnosis depends on a synthesis of clinical suspicion, imaging, and tissue biopsy using relevant IHC markers such as CD20, CD30, and BCL2 [16].

Molecular Profiling and Tailored Therapy

Molecular testing for EGFR, ALK, ROS1, and PD-L1 is conventional practice in resource-abundant environments to inform targeted treatment and immunotherapy decisions. Regrettably, such testing is still inaccessible at several outlying hospitals. This substantially restricts the therapeutic options for individuals with actionable mutations who might benefit from tyrosine kinase inhibitors (TKIs) or immune checkpoint inhibitors [17]. Recent work underscores the need of incorporating molecular diagnostics into routine treatment, particularly in resource-constrained environments, via telepathology and regional reference labs [18].

Diagnosis Stage And Prognosis

All patients in this series were detected at either stage IIIB or IV, highlighting the urgent need for early identification. Diagnosis at an advanced stage correlates with a poor prognosis; the 5-year survival rate for stage IV lung cancer remains around 5% despite therapeutic advancements [19]. The absence of surgical treatments in this series further exemplifies the late stage of the illness upon presentation and highlights systemic obstacles to management.

Challenges in Treatment in Peripheral Settings

Chemotherapy continues to be the primary therapeutic option in circumstances when advanced treatments are unavailable. All patients in our study started treatment with platinum-based chemotherapy regimens. Although these regimens provide limited survival advantages, they are linked to considerable toxicity, particularly in older or comorbid individuals [20]. The lack of radiation facilities, palliative care services, and trained cancer experts aggravates and compounds treatment challenges.

Multidisciplinary tumour boards (MDT) are recognized for providing the best standard of care with better outcomes, however they are often lacking at smaller public health institutions. Incorporating remote multidisciplinary teams with the aid of telemedicine might substantially enhance treatment outcomes by providing second

opinions, and address inequalities in health care [21].

Implications for Public Health

This case series highlights many essential domains that require healthcare interventions at different levels:

Screening and Awareness: The use of low-dose CT screening for high-risk adults, especially smokers over 50, has shown a decrease in mortality and should be included even in resource-constrained environments via mobile screening units [22].

Environmental Interventions: Diminishing exposure to biomass smoke, enhancing internal ventilation, and controlling industrial emissions may reduce lung cancer risk, especially in rural women [23].

Workforce and Training: Augmenting training for primary healthcare practitioners in the early identification of lung cancer symptoms and referral processes may improve early detection [24].

Access to Diagnostics: The establishment of regional centers equipped with modern imaging and immunohistochemistry equipment may expedite the diagnosis process and enhance patient outcomes [25].

Telemedicine and Networking: Collaboration between tertiary centers and peripheral units via telemedicine platforms might facilitate diagnostic and therapeutic guidance while promoting information sharing [26].

Socioeconomic And Psychological Factors

The diagnosis of lung cancer imposes considerable mental and economic challenges. The majority of patients in rural regions originate from lower socioeconomic strata, with insufficient financial means to seek modern therapies. Moreover, anxiety and depression associated with cancer may lead to delay in patients seeking diagnostic and therapeutic interventions. Research indicates that patient-centric communication, community awareness initiatives, and psychological support improve health-seeking behaviour and adherence to treatment [27,28].

Limitations And Future Strategies

This case series provides interesting insights but is constrained by a restricted sample size and absence of long-term follow-up. Future research should concentrate on the establishment of regional cancer registries, monitoring results, and assessing the practicality of incorporating molecular diagnostics and targeted therapy in peripheral settings. Moreover, implementation research is essential to assess options for providing equitable lung cancer treatment in resource-limited settings [29,30].

CONCLUSION

All cases in this study were diagnosed at stage III b or IV and were considered inoperable. This highlights the urgent need for earlier detection and intervention. A multidisciplinary approach, including oncologists, pulmonologists, and pathologists, is crucial for optimizing diagnosis and treatment strategies. Strengthening diagnostic infrastructure, increasing awareness, and implementing lung cancer screening programs in high-risk individuals can help improve survival outcomes in peripheral healthcare settings. Vocational support, rehabilitation as well as smoking cessation facilities to be promoted in all medical colleges and hospital to tackle the lung cancer.

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