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COMPARATIVE STUDY OF CLINICORADIOLOGICAL PROFILE, BRONCHOSCOPIC APPEARANCE AND HISTOPATHOLOGICAL FINDINGS OF LUNG CARCINOMA

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Abstract

BACKGROUND:

Lung cancer is a significant public health concern, causing considerable number of deaths globally. The diagnostic methods for lung cancer include physical examination, imaging, bronchoscopy and histopathology examination for defining specific subtypes and molecular testing to identify specific genetic mutations or biomarkers to guide the best treatment option. To date, bronchoscopic technologies can be considered the safest and most accurate tools to evaluate both central and distal airway mucosa.

OBJECTIVE:

The aim of this study was to compare the clinicoradiological profile and bronchoscopic appearance in different histologic subtypes of lung malignancies.

METHODS:

This is a retrospective observational study in 63 patients with biopsy or cytology proven lung cancer through conventional flexible and rigid bronchoscopic biopsy and bronchial wash from March 2020 to March 2023. The clinicoradiological profile and bronchoscopic appearance of lesion visualised while performing bronchoscopy were determined and compared with each other.

RESULTS:

Among the 63 patients, majority of patients belonged to 61-80 years age group. However, carcinoid tumor was significantly common in 21-40 years age group. The main symptoms were cough, loss of weight and chest pain. 57.1% were diagnosed as squamous cell carcinoma, 28.6% were adenocarcinoma, 11.1% were carcinoid tumor. The most common radiological presentation was mass in 58.1% followed by non resolving consolidation in 36.5%, collapse in 34.9%.

The common bronchoscopic findings noted were an ill-defined mass in 36.5%. 20 out of the 36 patients of Squamous Cell Carcinoma had presented as an ill-defined mass on bronchoscopy. 50% of the adenocarcinoma patients and 28% of Squamous Cell Carcinoma patients had bronchoscopic finding of an external compression/narrowing of lumen. All the 7 cases of carcinoid tumor had a polypoidal appearance on bronchoscopy which was significant.

CONCLUSION:

Carcinoid tumor was commonly seen in younger study population of 20-40 years age group and had a classical polypoid, lobulated appearance on bronchoscopy. The physical appearance of the lesion during bronchoscopy may provide a clue to the histological subtype in lung malignancy.

Keywords: Lung cancer, Bronchoscopic appearance, Clinic oradiological profile.

Introduction

Lung cancer had become one of the leading causes of preventable death worldwide at the end of 20th century. [1][2] It is the leading cause of cancer death (18.0% of total cancer deaths) and the second most commonly diagnosed cancer in both genders worldwide [3][4].

Flexible and rigid bronchoscopies are important diagnostic modalities in lung cancer [5][6] and has a critical role in management and prognostication [4]. The first bronchoscopy was performed by Gustav Killian in 1887, Germany. In the early 20th century, Chevalier Jackson, designed the modern rigid bronchoscopies. In



INTERNATIONAL JOURNAL OF RESEARCH SCIENCE & MANAGEMENT

1960s, the FOB was developed by S. Ikeda and has become the mainstay of investigations in the evaluation of patients suspected of lung cancer [7].

Bronchoscopy guided biopsy, needle aspirations and bronchial aspirate cytology have a definitive role in lung malignancy diagnosis [8][9][10]. The physical appearance of malignant lesions during bronchoscopy may differ across the various histological subtypes of lung malignancy [11][12][13]. The studies comparing the bronchoscopic appearance in different histological subtypes of lung malignancies are sparse especially in India [14][15].

This study was aimed to determine the clinicoradiological profile and bronchoscopic appearance of various histologic subtypes of lung malignancies using flexible and rigid bronchoscopy.

Materials And Methods

This retrospective observational study was conducted in the Department of Pulmonary Medicine and Department of Cardiothoracic surgery SDS TRC and Rajiv Gandhi Institute of Chest Diseases, a tertiary chest institute in South India. After obtaining the institutional ethics committee clearance, the medical records of all patients of age more than 18 years with biopsy or cytology proven lung cancer through conventional bronchoscopic (flexible and rigid) methods between March 2020 to March 2023 were selected and analyzed. Co-infection with pulmonary tuberculosis patients were excluded. The clinicoradiological profile including age, gender, smoking history and bronchoscopic appearance of the lesion visualized were determined and compared between the histologic subtypes using appropriate statistical tools.

Results

From March 2020 to March 2023, a total of 63 patients with biopsy or cytology proven lung cancer through conventional flexible and rigid bronchoscopic methods were included in the study. Among the 63 patients, 57.1% (n=36) were diagnosed as squamous cell carcinoma, 28.6% (n=18) adenocarcinoma, 11.1% (n=7) carcinoid tumor, 1.6% (n=1) small cell carcinoma and 1.6% (n=1) as lymphangioma carcinomatosis.

Bronchoscopic procedure for diagnosis used were Transbronchial lung biopsy in 88.9% (n=56), bronchial wash in 9.5% (n=6) and Transbronchial needle aspiration in 1.6% (n=1).

The mean age of the study population at the time of diagnosis was 57.9 years. Majority, 47.6% (n=30) of patients belonged to 61-80 years [table 1]. Carcinoid tumor was significantly common in 21-40 years age group, adenocarcinoma more common in 40-80 years and squamous cell carcinoma more in the elderly population of 60-80 years (p value < 0.001 chi square test).

Majority of patients were males 74.6% (n=47) and females were 25.4% (n=16). The main symptoms were cough 87.3% (n=55), loss of weight 49.2% (n=31) and chest pain in 41.3% (n=26). 23.8% (n=15) population had hemoptysis, 36.5% (n=23) had fever, 30.2% (n=19) had compressive symptoms like hoarseness of voice, swelling of face and neck. Breathlessness present in 23.8% (n=15). Duration of clinical symptoms to time of diagnosis was less than 1 month in 31.7% (n=20), 1 to 3 months in 34.9% (n=22) and 33.3% (n=21) presented after 3 months of onset of disease. 41.3% (n=26) of study population had smoking index of >300, 15.9% (n=10) has SI of 100-300 and 42.9% (n=27) were non-smokers or had SI < 100, 23.8% (n=15) of patients had underlying COPD.

The most common radiological presentation was mass in 58.1% (n=36) followed by non-resolving consolidation in 36.5% (n=23), collapse in 34.9% (n=22), associated pleural effusion in 25.4% (n=16), metastatic nodules in 22.2% (n=14), mediastinal lymph nodes in 22.2% (n=14), cavity in 12.7% (n=8). The radiological findings were not found to be significantly different in any histological subtypes of lung cancers.

The most common lobes involved were right upper lobe 27% (n=17), followed by left upper lobe 23.8% (n=15), right middle lobe 20.6% (n=13) and 28.6% (n=18) involved either lower lobes. The common bronchoscopic findings noted were an ill-defined mass [Figure 1A] in 36.5% (n=23), white glistening mass in 20.6% (n=13), polypoidal growth in 11.1% (n=7), lobulated surface in 11.1% (n=7), external compression and narrowing of lumen in 30.2% (n=19), mucosal necrotic areas were noted in 12.7% (n=8), hyperemic mucosa in 23.8% (n=15) and 50.8% lesions (n=32) had bleeding to touch. 20 out of the 36 patients of SCC had presented as an ill-defined mass on bronchoscopy (p = 0.003 significant, chi square test). All the 7 cases of carcinoid tumor



INTERNATIONAL JOURNAL OF RESEARCH SCIENCE & MANAGEMENT

[Figure 1B] had a polypoidal appearance on bronchoscopy which was statistically significant (chi square test $p < 0.001$) along with lobulated surface ($p = 0.006$). 50% ($n = 9$) of the adenocarcinoma patients had a bronchoscopic finding of an external compression/narrowing of lumen and 28% ($n = 8$) of SCC had lumen narrowing on bronchoscopy. (chi square test significant, $p = 0.008$) [table 2] 66% ($n = 24$) cases of SCC and 71% ($n = 5$) cases of carcinoid were bleeding to touch when approached by a bronchoscope (chi square test significant, $p = < 0.001$)

Discussion

Technological advances in bronchoscopy continue to improve our ability to perform minimally invasive, accurate evaluations of the tracheobronchial tree and to perform an ever-increasing array of diagnostic, therapeutic and palliative interventions. Flexible bronchoscopes allows investigator to inspect 4th-6th order bronchi and is safe with a complication rate of 0.12% and a mortality rate of 0.04%. Rigid scope may be preferable in exploring patients with tracheal narrowing in whom the flexible scope may produce critical airway narrowing. It provides superior suction; facilitate assessment and biopsy of potentially hemorrhagic lesions and the debulking of large tumors.

In a study done by Ananth Mohan et al[16], where clinical profile of lung cancer was studied over 10 years in North India, adenocarcinoma (34%) was the most common type of lung cancer followed by SCC (28.6%). The more common occurrence of squamous cell carcinoma in our study may be attributable to the bidi smoking and biomass fuel exposure among the rural population when compared to many Asian and Western studies that documented a rising prevalence of adenocarcinoma. Also the bronchoscopic procedures are used commonly for centrally located tumors like SCC rather than for peripherally located tumors like AC.

The present study was comparable to a study done by D.K.Rai et al[17], in which the mean age of study patients was 55.26 years. Males were predominant in study population and majority of patients were smokers. The mean age noted in our study is 57.9 years and the sample population was predominantly males.

In a study done by Shabnam et al[18], assessing the clinical profile, cough was the most common presenting symptom (87.5%) that was seen in our study also like other numerous studies.

In the study done by Sandeep et al[19], mass lesion was the common radiological presentation (52%) involving predominantly upper lobe (50%) that is similar to the present study.

Bhaskara Kurup et al[20] did a similar study comparing the endoscopic appearance with histopathology. They found out that endobronchial growths for SCC and non-specific findings like external compression for AC was the common endoscopic appearances respectively.

Carcinoids have been described as well vascularized polypoid structures with lobulated surface, raspberry colored in many articles similar to our finding.

Limitations

This is a single centre study with a small study population.

Conclusion

The gross appearance of the lesion or growth observed during bronchoscopy may give a clue to the probable histopathological subtype. Carcinoid tumors are common in younger age groups with squamous cell carcinoma in elderly population. Squamous cell carcinoma presented as an ill-defined endobronchial mass in majority cases that easily bleeds to touch while many adenocarcinoma cases presented as an external compression in bronchoscopy that may be indicative of its presence in peripheral airways. The carcinoid tumor had presented as a classical polypoidal growth with lobulated surface that bleeds easily.

List Of Abbreviations

FOB-Fibre Optic Bronchoscope
 SCC-Squamous cell carcinoma
 AC-Adenocarcinoma



Declaration

All authors state that the work has not been submitted to another journal or published elsewhere.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the institutional ethical committee of SDS TRC and Rajiv Gandhi Institute of Chest Diseases, Bangalore.

HUMAN AND ANIMAL RIGHTS

The study conducted and the procedures used in the study comply with the ethical principles of the Declaration of Helsinki.

CONSENT FOR PUBLICATION

Consent was waived as it is a retrospective observational study.

AVAILABILITY OF DATA AND MATERIAL

All the data and supporting information is provided within the article

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Figures And Tables

Age group	Adeno carcinoma	Carcinoid	Lymphangioma carcinomatosis	SCC	Small cell carcinoma
<20 years	0	1	0	0	0
21-40 yrs	3	5	0	1	0
41-60 yrs	7	1	0	13	1
61-80 yrs	7	0	1	22	0
>80 years	1	0	0	0	0

Table 1: Age distribution of the study subjects

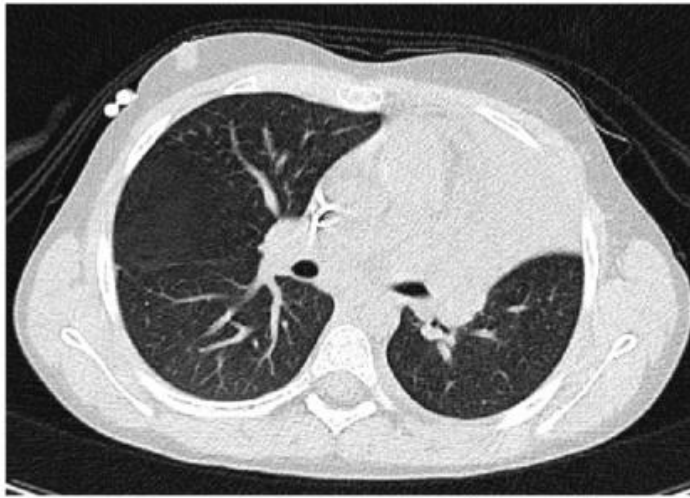


Figure 1 A) CT showing mass lesion



B) bronchoscopic appearance of

carcinoid

Table 2: Bronchoscopic appearance

HP REPORT	WHITE GLISTENING MASS	ILL DEFINED MASS	POLYPOIDAL	LOBULATED	EXTERNAL COMPRESSION/ NARROWING OF LUMEN	NECROTIC AREA	MUCOSA APPEARANCE HYPEREMIA	BLEEDING TO TOUCH
Adeno Carcinoma	1(5.5%)	3 (16.6%)	0(0%)	0(0%)	9(50%)	1(5.5%)	5(27.7%)	3(16.6%)
CARCINOID	3(42.8%)	0(0%)	7(100%)	4(57.1%)	0(0%)	0(0%)	1(14.2%)	5(71.4%)
SCC	9(25%)	20(55.5%)	0(0%)	3(8.2%)	8(22.2%)	7(19.4%)	7(19.4%)	24(66.6%)
LCC	0(0%)	0(0%)	0(0%)	0(0%)	1(100%)	0(0%)	1(100%)	0(0%)
Small Cell Carcinoma	0(0%)	0(0%)	0(0%)	0(0%)	1(100%)	0(0%)	1(2.7%)	0(0%)
Total	13	23	7	7	19	8	15	32
P-value	0.179	0.003	0.001	0.006	0.008	0.454	0.134	0.001