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ROLE OF FIBREOPTIC BRONCHOSCOPY AND THORACIC COMPUTERISED TOMOGRAPHY IN THE DIAGNOSTIC WORK UP OF CASES OF MODERATE TO SEVERE HAEMOPTYSIS ADMITTED IN A TERTIARY HOSPITAL.

Pulmonary Medicine

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ABSTRACT

Haemoptysis is expectoration of blood from the respiratory tract. CT thorax and FOB both are used for evaluating the etiology of haemoptysis separately.

AIMS AND OBJECTIVES: Diagnosis of etiology in moderate to severe hemoptysis. To define the role of bronchoscopy and computerized tomography in determining the etiology of haemoptysis.

Results: In our study we found that the etiology of haemoptysis is bronchiectasis 27.2% cases, chronic bronchitis in 20.4%, lung carcinoma 21.3%, sputum smear negative tuberculosis in 8.7%,vasculitis in 4.9%, cryptogenic in17.5%. In our study etiology of haemoptysis were diagnosed by CT in 66(64%) cases and by FOB in 25(24%) cases and when we combined CT and FOB then total 77(74.7%) cases were diagnosed

Conclusion: CT and FOB are complementary each other in diagnosis of haemoptysis. While one can help in localizing the disease site other can help arriving at definite diagnosis of haemoptysis.

KEYWORDS

Haemoptysis, Computed Tomography, Bronchoscopy or FOB

Haemoptysis is expectoration of blood from the respiratory tract, a spectrum that varies from blood streaking of sputum to large amount of pure blood. It is reported in 7-15% of patients evaluated in chest clinic.[1] In most cases haemoptysis is a self-limiting, but in fewer than 5% it may be severe or massive, representing a life-threatening condition that warrants urgent investigation and treatment.[2]Bronchial circulation accounts for 10% of pulmonary blood supply, it is the source of bleeding in majority of cases. Blood originating from the pulmonary circulation can be either localized lung disorder like bronchial adenoma, sequestrated lobe, pulmonary arteriovenous malformation, also it may be a presentation of diffuse alveolar haemorrhage in pulmonary vasculitis as in SLE[3]. However in approximately 10%-30% of the patients, the cause remains indeterminate[4]. The diagnosis of the cause of hemoptysis is often difficult, more so in patients presenting with a normal chest X-ray. Such patients constitute 20-30% of those with hemoptysis[5]. They are classified as idiopathic or cryptogenic hemoptysis, and subtle airway or parenchymal diseases presumably responsible for the bleeding.Studies have been reported in western and Indian literature to evaluate such patients using either Computed Tomography (CT of chest) or FOB. The present prospective study was performed to evaluate role of both these modalities in arriving at a diagnosis of the cause of haemoptysis.

AIMS AND OBJECTIVES:

- Diagnosis of etiology in moderate to severe hemoptysis .
- To define the role of bronchoscopy and computerized tomography in determining the etiology of haemoptysis.

MATERIALS AND METHODS:

1) **Study design** - Observational prospective cross sectional study in a Hospital based population
2) **Study setting-**West Bengal and its neighborhood
3) **Sample size**-desired 100 patient
4) **Contro**l- no control is required.
5) **Place of study**- in the Department of Pulmonary Medicine, IPGMER.
6) **Period of study-**one and half years from September 2016 to March 2018
7) **Study population**- Adult cases with hemoptysis admitted in department of Pulmonary Medicine maintaining inclusion and exclusion criteria.

8) INCLUSION CRITERIA

- age more than 18years
- patients presenting with moderate to severe haemoptysis

9) EXCLUSION CRITERIA:

- Age less than 18 years
- Presence of coagulopathy
- Sputum positive pulmonary tuberculosis
- Upper respiratory tract source of bleed
- Bronchoscopy.
- Patients not giving consent for fibreoptic bronchoscopy.
- Patients presenting with mild haemoptysis, not requiring hospitalization.

Data Collection - All patients admitted in hospital with moderate to severe haemoptysis first underwent through history taken and clinical examination .After stabilization and after control of haemoptysis all study population underwent CT Thorax and after that decided for FOB. Patients who are diagnosed malignancy by CT-guided procedure, were not subjected to FOB.

Informed consent in written format taken in all cases.

STATISTICAL ANALYSIS:
Data was collected in MS Excel and was analysed with the help of MS Excel.

Data was presented with the help of tables, charts and diagrams. Results were presented as percentage.

18) Conflict of Interest: none.

RESULT ANALYSIS:
The results of our study are briefed as follows:
During our study period, total 103 patients with moderate to massive haemoptysis, from different age group, were evaluated. Most of the patients were from 65-80 yrs (32%), followed by the age group of 51-65yrs (25.2%). Mean age of the patients was 56.2 ±1.5 years.

When we plotted the total number of patients against chest X ray finding, it was found that 75.7% cases abnormal CXR findings and 24.2% normal finding.

- **Etiology of Haemoptysis:** (TABLE 1)

Etiology of haemoptysis	No. (%)
Bronchiectasis	28 (27.2)
Bronchogenic Carcinoma	25 (24.2)
Chronic Bronchitis	14 (13.6)
Pulmonary Tuberculosis	13 (12.6)
Pulmonary Vasculitis	5 (4.9)
Cryptogenic	18 (17.5)

In our study most common cause Bronchiectasis (27.2%), others are Chronic Bronchitis (13.6), Bronchogenic Carcinoma (24.2%). In 17.5% population etiology was not found, Cryptogenic (TABLE1, FIG1).

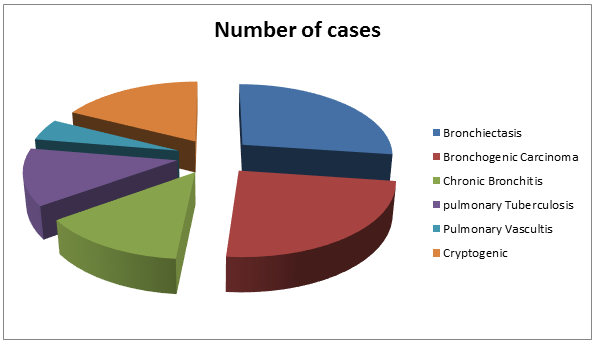

FIG1- ETIOLOGY OF BRONCHIECTASIS

In our study when we plotted distribution of study population according to age and etiology ,we found that most of the patients of bronchiectasis are 36to50years (10%) and51-65years(10%), Bronchogenic Carcinoma found in 65-80 yrs(71.4), chronic bronchitis mostly found in 65-80 years(56%), Pulmonary Vasculitis patients are in younger age group(21-35 yrs) 4%. But sputum negative Pulmonary Tuberculosis had no such age distribution (TABLE 2).

- **Distribution of study population according to age and etiology of haemoptysis (N=103)(TABLE 2)**

Age group	Etiology						Total
	A	B	C	D	E	F	
	No (%)	No (%)	No (%)	No (%)	No (%)	No (%)	
21-35 years	6(21.4)	0	2(8)	3(23)	4(80)	4(22)	15
36-50 years	10(35.7)	2(14.2)	2(8)	4(30)	1(20)	6(33)	23
51-65 years	10(35.7	2(14.2)	7(28)	3(23)	0	4(22.2)	29
65-80 years	2(7)	10 (71.4)	14(56)	3(23)	0	4(22.2)	36
Total	28	14	25	9	5	18	103

A-Bronchiectasis, B-Bronchogenic Carcinoma, C-Chronic Bronchitis, D-Pulmonary Tuberculosis, E- Pulmonary Vasculitis, F-Cryptogenic.

- **Distribution of study population according to CT pattern of CT thorax in diagnosing etiology of haemoptysis (N=103) (TABLE 3)**

CT PATTERN	A	B	C	D	E	F
Bronchiectasis	28	0	0	0	0	0
Emphysema including peribronchial thickness	11	8	5	0	0	0
Alveolar infiltration,tree in bud	0	0	0	13	0	0
Mediastinal LN	0	15	0	5	0	0
GGO	5	6	3	7	3	5
Consolidation	0	2	0	2	3	0
Mass central	0	10	0	0	0	0
Mass peripheral	0	15	0	0	0	0
Cavity	0	3	0	4	0	0
NORMAL	0	0	0	0	0	13

CT features of bronchiectasis were present in 28 cases. Bronchiectasis diagnosed by the HRCT alone. Mass lesions were seen in 25 cases in which 10 cases were with central mass lesion and 15 cases were peripheral. Mediastinal LN was involved in 15 cases of bronchogenic carcinoma, and 5 in pulmonary tuberculosis. Emphysema and increased peribronchial thickness were associated with bronchiectasis, chronic bronchitis, bronchogenic carcinoma(TABLE 3).Alveolar infiltration, tree in bud were in most of the cases of sputum negative pulmonary tuberculosis.

- **Distribution of study population of Bronchogenic Carcinoma according to CT guided procedure**

In our study Bronchogenic Carcinoma cases were diagnosed by CT GUIDED PROCEDURE in 15 cases, in which 5 cases were by CT guided FNAC and 10 cases were by CT guided BIOPSY.

FOB procedure was done in 88 cases excluding peripherally situated lung mass which were diagnosed by CT guided FNAC and biopsy. In Bronchogenic Carcinoma 10(11%) cases were diagnosed by FOB in which 2 cases BAL fluid M cells were positive and by brush cytology 5 cases were positive and by biopsy 8 cases were diagnosed. In 13(14.77%) cases Mycobacterium Tuberculosis were diagnosed by BAL fluid CBNAAT, and 2(2.27%) cases were PEARL stain positive and diagnosed as diffuse alveolar haemorhage. In 53 cases site of bleeding was detected in FOB. (TABLE5)

- **Distribution of study population according to FOB findings and procedure (TABLE 5)**

FOB	A	B	C	D	E	F
SITE OF BLEEDING	11	10	9	10	5	8
BAL FLUID	0	2	0	13	2	0
BRUSH CYTOLOGY	0	5	0	0	0	0
BIOPSY	0	8	0	0	0	0

- **Distribution of study population according to helpfulness of different diagnostic tests in diagnosing different etiology of haemoptysis (N=103)(TABLE 6)**

Etiology of Hemoptysis	CT thorax	FOB	CT AND FOB
A	28	0	28
B	15	10	25
C	6	0	6
D	13	13	13
E	5	2	5
F	0	0	0
TOTAL	66	25	77

In our study etiology of haemoptysis was diagnosed by CT thorax in 66(64%) cases and by FOB in 25(24%) cases and when we combined CT and FOB then total 77(74.5%) cases. Bronchiectasis all cases are diagnosed by HRCT solely. 13 cases of sputum negative Tuberculosis were diagnosed by FOB and CT. Total 5 cases pulmonary vasculitis diagnosis was helped by CT in 5 cases and FOB in 2 cases by performing PERLS PRUSSIAN BLUE stain in BAL fluid. (TABLE6).In 18 cases diagnosis were not possible by CT and FOB both.

DISCUSSION:

Our study was done with total 103 patients admitted in a tertiary care hospital.

DEMOGRAPHIC FACTORS:

In our study most of the patients were from 65-80 yrs (32%), followed by the age group of 51-65yrs (25.2%). Most of the patients with moderate to severe haemoptysis, in my study, were from 65-80 years age group, followed by the age group 51-65 years. Similar results were reported by Tinku Joseph etal. in which maximum number of patients were in age groups 51-60 yrs followed by 41-50 yrs[6], however Rajendra Prasad et al, in a study found mean age 35.5±13.9 years[7].

In our study we found that males (68%) were more affected than females(32%) which is at par to the findings in other studies like, M Thirumaran et al, in his study reported male preponderance of 60%[9].

ROLE OF CT IN DIAGNOSING ETIOLOGY:

To diagnosis etiology of haemoptysis CT was helpful by recognition of pattern. After analysing the data of bronchiectasis, CT features were present in 28 cases. Bronchiectasis diagnosed solely by the HRCT.

Mass lesions were seen in 25 cases in which 10 cases were with central mass lesion and 15 cases were peripheral mass lesion.

In our study CT scan was also helpful in localizing the lesion in bronchiectasis. CT scan abnormality was discovered to be bilateral in (64%), involving 43% in RUL and 36% involvement of RLL and also LLL respectively.

In our study Bronchogenic Carcinoma cases were diagnosed by CT guided procedure in 15 cases, in which 5 cases were by CT guided FNAC and 10 cases were by CT guided biopsy and BAL and Brush procedures.

ROLE OF FOB IN DIAGNOSING ETIOLOGY:

FOB procedure was done in 88 cases excluding peripherally situated lung mass which were diagnosed by CT guided FNAC and biopsy. In Bronchogenic Carcinoma 10 cases were diagnosed by FOB in which 2 cases BAL fluid M cells were positive and by brush cytology 5 cases and by biopsy 8 cases were diagnosed.

In 13 cases Mycobacterium Tuberculosis were diagnosed by BAL fluid CBNAAT, and 2 cases were PERL's stain positive and diagnosed as diffuse alveolar haemorrhage.

In 53 cases site of bleeding was detected in FOB.
In our study etiology of haemoptysis were diagnosed by CT in 66(64%) cases and by FOB in 25(24%) cases and when we combined CT and FOB then total 77(74.7%) cases were diagnosed. This study result is similar to study done by Michele Mondoni et al in which CT and FOB combined had diagnostic yields83.9%[11]. Whereas B Khezrollah etal found in his study that definite diagnosis was made by CT in 19 cases (38%), by FOB in another 19 (38%), and by the other tools in 4 (8%), combined CT and bronchoscopy in 3 cases (6%), 5(10%)were undiagnosed. The diagnosis was made by CT and FOB in 41 cases (82%).

In bronchogenic carcinoma, 10 cases were diagnosed by FOB guided BAL fluid ,brush cytology and FOB guided biopsy. 13 cases of sputum negative Tuberculosis were diagnosed by FOB and CT. Total 5 cases pulmonary vasculitis diagnosis were helped by CT in 5 cases and helped by FOB in 2 cases by performing PERLS STAIN in BAL fluid. Finally Pulmonary vasculitis 5 cases were diagnosed by vasculitis marker and corroborating CT and FOB finding. In 18 cases diagnosis were not possible by CT and FOB.

In our study we found that the etiology of haemoptysis is bronchiectasis 27.2%, chronic bronchitis 20.4%, lung carcinoma 21.3%, sputum smear negative tuberculosis 8.7%,vasculitis 4.9%, cryptogenic 17.5%. In Indian population study by Tinku Joseph et al found that bronchiectasis to be the etiology of haemoptysis 25.49%. Chronic bronchitis as cause of haemoptysis was 12% in study done by B Khezorollah et al which is less than our study[10], in Maria et al chronic bronchitis was found to be 23% similar to our study. Lung carcinoma was found to contribute 26% in study done by M Thirumaran et al,(17%) in Fartoukh et al[12,13], in Michele Mondoni etal in her study found lung ca to be most contributing cause of haemoptysis (19.1%)[11],the findings of these studies being almost similar to our study. Two European studies showed that cryptogenic or idiopathic to be the most common cause of haemoptysis. In our study idiopathic cause also contributed to about 17.5 % of cases[14].

In our study lung cancer was diagnosed by CT in 59% and in combined CT and FOB 40 %, none was diagnosed by FOB alone. A retrospective analysis by M Thirumaran etal. showed Fibreoptic bronchoscopy was diagnostic of cancer in 54% cases. CT thorax was suggestive of cancer in 96% patients with malignancy. In Hirshberg etal[8] Study CT scan was 67% diagnostic when employed alone. When combining a CT study together with a bronchoscopy, it was increased to 93%. In our study CT and FOB together diagnosed 79 % cases.

Limitations of the Study:

A) Not including patients below 18 years.
B) Not doing repeat CT to exclude ground glass opacity.
C) Not doing Endobronchial ultra sonography and guided biopsy

CONCLUSION:

CT and FOB play definite role in diagnosing etiology of haemoptysis. By recognition of CT abnormality it can help in localizing the area of disease and also help in FOB to take samples from pathologic area.
So CT and FOB are complementary each other in diagnosis of haemoptysis.

In the etiology we found brochiectasis, chronic bronchitis and lung carcinoma in majority cases. Vasculitis also is a etiology of haemoptysis presenting in a tertiary care hospital. Early diagnosis in such cases can prevent major organ damage and decrease mortality and morbidity.

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