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ORIGINAL RESEARCH

Role of Fiberoptic Bronchoscopy and Computed Tomography in the Evaluation of causes of Hemoptysis

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Abstract
Background: Hemoptysis is often an alarming & worrisome symptom for the patient and the physician as well. It has been a frequent manifestation of a variety of diseases. Therefore diagnostic approach in several cases is becoming more challenging. The purpose of this study is to evaluate the causes of hemoptysis with particular reference to diagnostic strategies in patient visiting our Hospital.
Methods: A cross sectional descriptive study was done in 50 patients with complaints of hemoptysis visiting chest OPD of Tertiary Hospital in North India. After general physical examination, hematological and biochemical tests were carried out. All patients were then subjected to Chest X-ray (PA view), ECG and Contrast Enhanced Computer Tomography (CECT) Thorax and Fiber- optic Bronchoscopy (FOB). Data analysis was done by chi square test and t test.
Result: CECT diagnosis of Lung cancer was seen in 33 (66%) cases and tuberculosis in 13 (26%) cases and normal finding in 2 (4%) cases. FOB findings are normal in 8 (16%) cases, showed growth with obstruction in 21 (42%) and growth without obstruction in 8 (16%) cases. In 13 (26%) cases, FOB was not done. The value of $P<0.05$ (significant)
Conclusion: Both CECT Thorax & FOB are found to be useful diagnostic tools in evaluating the cause of hemoptysis. FOB is useful where CT is not confirmative.
Key Words: Hemoptysis, Fiberoptic Bronchoscopy, Lung cancer, Contrast Enhanced Computer Tomography

Introduction
Hemoptysis can be defined as the expectoration of blood derived from the lungs or bronchial tubes as a result of pulmonary or bronchial hemorrhage. It can be divided into two types as non-massive or massive depending upon the volume of blood loss. Hemoptysis is generally caused by acute and chronic bronchitis, pneumonia and tuberculosis. Infection, cancer,

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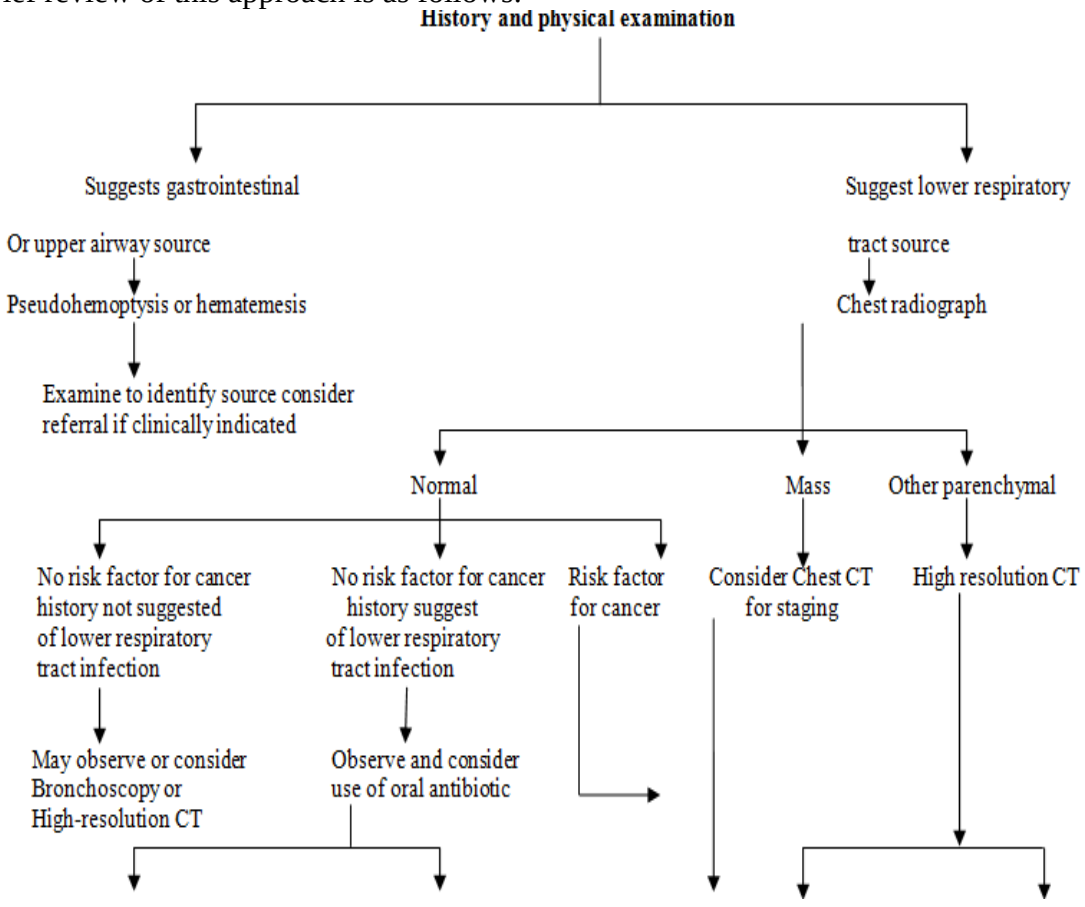
pulmonary venous hypertension are the other causes of haemoptysis. In 7 to 34 percent of patients with hemoptysis, no identifiable cause can be found even after careful evaluation (Reisz *et al*. 1997; Set at al., 1993; Herth *et al.*,2001)[1,2,3]. Prognosis for idiopathic hemoptysis usually is good, and majority of these patients have resolution of bleeding within six months of evaluation (Adelman *et al.* 1985).[4]However, results from one study found an increasing incidence of lung cancer in smokers older than 40 years with idiopathic hemoptysis, and suggested that these patients may warrant close monitoring[3].

Hemoptysis in children

The major cause of hemoptysis in children is lower respiratory tract infection. The second most common is foreign body aspiration, with most cases occurring in children younger than four years. Another important cause is bronchiectasis, which often is secondary to cystic fibrosis. Primary pulmonary tuberculosis is a rare cause estimated to occur in less than 1 percent of cases (Planosi, 1996)[5]. Although uncommon, trauma is another possible cause. Blunt-force trauma may result in hemoptysis secondary to pulmonary contusion and hemorrhage. Bleeding caused by suffocation, deliberate or accidental, also should be considered (Godfrey, 2004)[6.]

Diagnostic approach

There are enormous global, geographical variations in the causes of hemoptysis. In the West, for example, malignancy and nontuberculous causes are most common, although the social mix of the population is an important variable. Human Immunodeficiency virus (HIV) related tuberculosis (TB) is also on the increase. Within poorer Third World countries, however, tuberculosis is often the most likely cause (Broomhead, 2007)[7].The generally followed diagnostic approach includes: history taking, clinical examination followed by investigations. A brief review of this approach is as follows:



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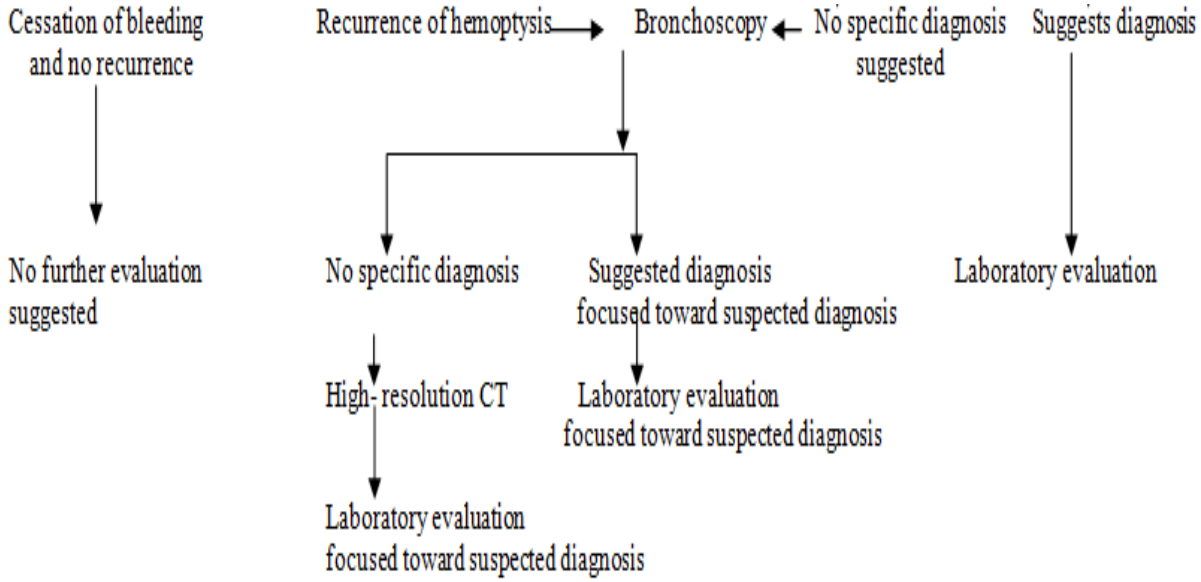

If diagnosis remains unclear, further imaging with chest computed tomography (CT) or direct visualization with bronchoscopy often is indicated. In high-risk patients with normal chest radiograph, fiberoptic bronchoscopy should be considered to rule out malignancy. Risk factors that increase the likelihood of finding lung cancer on bronchoscopy include male sex, older than 40 years, a smoking history of more than 40 pack-years, and duration of hemoptysis for more than one week (Gregory *et al.* 1996)[8].

Fiberoptic bronchoscopy is preferred if neoplasia is suspected; it is diagnostic for central endobronchial disease and allows for direct visualization of the bleeding site. It is also permits tissue biopsy, bronchial lavage, or brushings for pathologic diagnosis. Fiberoptic bronchoscopy also can provide direct therapy in cases of continued bleeding. Rigid bronchoscopy is the preferred tool for cases of massive bleeding of its greater sunctioning and airway maintenance capabilities.

High-resolution CT has become increasingly useful in the initial evaluation of hemoptysis and is preferred if parenchymal disease is suspected. Its complementary use with bronchoscopy gives a greater positive yield of pathology (McGuinness *et al.,* 1994; Taskar and Flower, 1999)[9,10] and is useful for excluding malignancy in high-risk patients (Colice, 1997)[11]. Its role in hemoptysis continue to evolve, and further studies are being done to evaluate its effect on patient management and outcome.

Material and methods

The present study was carried out in the Department of Respiratory Medicine of a tertiary care teaching hospital. Study population includes all the patients aged > 20 years with symptoms of haemoptysis. Patients having complaints of haemoptysis following trauma, patient with blood dyscrasias, thrombocytopenia. Patients who were sputum positive for acid fast bacilli or in whose sputum truenat or sputum gene expert mycobacterial tuberculosis was detected were excluded from this study.

Procedure of study

After taking history of the patient, general physical examination followed by thorough chest examination, cardiovascular, abdominal and central nervous system was done. Hematological and biochemical test were also carried out. After that all the patients were then subjected to chest X- ray (PA view), ECG was done for the confirmatory diagnosis and Contrast Enhanced Computed Tomography (CECT) chest was performed using a 16 slice multidetector CT scan unit. Sputum sample analysis was done for acid fast bacillus and

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sputum truenat or sputum gene expert was sent. All those cases in which no confirmatory diagnosis could be made out by computed tomography and sputum analysis were subjected to fibreoptic bronchoscopy (FOB).

The data collected was analysed using chi square test. Parametric evaluation is done by using Analysis of Variance and independent sample "t" test. The confidence level of the study was kept at 95% hence "p" value is less than 0.05 indicates statistically significant association.

Observation and results

Table 1: Distribution of patients according to contrast Enhanced Computed Tomographic findings

SN	Variable	No. of patients	Percentage
1	Tuberculosis	13	26.0
2	Carcinoma	33	66.0
3	Others	2	4.0
4	Normal	2	4.0

CECT revealed, cause of hemoptysis to be carcinoma in 33 (66%) patients. A total of 13 (26%) patients had tuberculosis on bronchoalveolar lavage analysis, 2 were categorized as other causes (One with peripherally located mass and another mediastinal mass) while remaining 2 (4%) cases were found to be normal on CECT and bronchoscopy.

Table 2: Distribution of patients according to Fiberoptic Bronchoscopy Findings

SN	Variable	No. of patients	Percentage
1	Apparently normal	8	16.0
2	Growth with obstruction	21	42.0
3	Growth without obstruction	8	16.0
4	Not done	13	26.0

Fiberoptic bronchoscopy was not done in 13 (26%) cases confirmed as bronchiectasis in CECT. It revealed normal finding in 8 (16%) patients. Growth with obstruction was observed in 21 (42%) patients and growth without obstruction was observed in remaining 8 (16%) patients.

Associations

Table 3 and 4shows association between CECT finding with demographic, clinical and other diagnostic findings:

Table 3: Association between CECT findings and Demographic factors

SN	Factors	CECT Findings								Statistical Significance	
		Tuberuosis (n=13)	Carcinoma (n=33)				Other (n=2)	Normal (n=2)		x	p
		No.	%	No.	%	No.	%	No.	%		
1.	Age									28.84	<0.001
	<30 Year	4	66.7	0	0.0	0	0.0	2	33.3		
	30-50 Year	7	33.3	14	66.7	0	0.0	0	0.0		
	>50 Year	2	8.7	19	82.6	2	8.7	0	0.0		
2.	Gender									2.50	0.476
	Male	9	22	28	68.3	2	4.9	2	4.9		

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			.0							
	Female	4	44.4	5	55.6	0	0.0	0	0.0	6.69 0.082
3.	Religion									
	Hindu	10	34.5	17	58.6	0	0.0	2	6.9	54.30 <0.001
	Muslim	3	14.3	16	76.2	2	9.5	0	0.0	
4	Occupation									
	Farmer	9	26.5	23	67.6	2	5.9	0	0.0	
	Housewife	4	44.4	5	55.6	0	0.0	0	0.0	
	Businessman	0	0.0	4	100.0	0	0.0	0	0.0	
	Labourer	0	0.0	1	100.0	0	0.0	0	0.0	
	Employee	0	0.0	0	0.0	0	0.0	2	100.0	

Table 4: Association between CECT Finding and Fibreoptic Bronchoscopy Finding

SN	**Fibreoptic Bronchoscopy Finding**	**CECT Finding**						**Statistical Significance**	
		Carcinoma (n=33)		**Other (n=2)**		**Normal (n=2)**		x^2	***p***
		No.	**%**	**No.**	**%**	**No.**	**%**		
1.	Normal	4	12.1	2	100.0	2	100.0		
2.	Growth with obstruction	21	63.6	0	0.0	0	0.0	**16.26**	**0.003**
3.	Growth without obstruction	8	24.2	0	0.0	0	0.0		

On the basis of present study the following conclusion have been drawn.

1. CECT diagnosed carcinoma in 33 (66%) and tuberculosis in 13 (26%) cases, and normal findings in 2 (4%) cases. In one case each peripherally located mass and mediastinal mass was observed.
2. FOB was normal in 8 (16%) cases, showed growth with obstruction in 21 (42%) and growth without obstruction in 8(16%) cases. In 13(26%) cases, bronchoscopy was not done.
3. Histopathologically, 3 (9.1%) cases had adenocarcinoma, 22 (66.7%) had squamous cell carcinoma, 5 (15.2%) had small cell carcinoma. There were 3 (9.1%) cases with other findings (one case each of poorly differentiated carcinoma, atypical cell and mediastinal lymphoma respectively). Thus confirming the positive findings of CECT in all the cases. Prevalence of carcinoma is higher in male of older ages. Lung cancer is more common in farmer, businessmen and laborers as compared to housewives and employees.

Conclusion

The present study corroborated the observation of previous workers that computed tomography is a useful diagnostic modality in cases of hemoptysis and helps in investigating

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the reason of unexplained hemoptysis. In present study, we found that CECT provides excellent information and it should be used as a first diagnostic tool in evaluating the causes of hemoptysis as it is noninvasive in nature. FOB improves the results of CECT especially in cases with intraluminal growth for making histopathological diagnosis.

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