



## Analysis of the causes diagnosed by computed tomography in patients with haemoptysis and normal chest radiograph

## KEYWORDS

Hemoptysis, chest radiograph, CT, Tuberculosis, Bronchiectasis, Malignancy

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**ABSTRACT** Back ground: Hemoptysis is one of the common symptom with which patients attend chest department. If chest radiograph is normal further investigations are necessary to detect the cause of haemoptysis so that appropriate treatment can be given. The study is taken to retrospectively analyse the causes diagnosed by computed tomography (CT) in patients with hemoptysis with normal chest radiograph .

Type of study : a retrospective analysis of pulmonary causes diagnosed by CT scan chest in patients with hemoptysis and normal chest radiograph admitted and managed in pulmonary medicine department , Kurnool medical college ,Kurnool, AP.

Method :41 cases admitted in pulmonary medicine ward with hemoptysis and normal chest radiograph and investigated with HRCT/CECT are taken into the study . patients age, sex, symptoms, reports of CT scan, FOB, sputum for AFB, Grams staining, culture sensitivity for pyogenic organisms and malignant cells were collected from records .

Results: The diagnoses made by CT were Tuberculosis In 17, bronchiectasis in 9, malignancy in 2 copd with pneumonia in 2, vascular 1. CT was normal in 10 patients.

Conclusion : tuberculosis and bronchiectasis (26 cases 63.41%) were found to be the commonest causes of hemoptysis. In patients with hemoptysis and normal chest radiograph CT helps in early diagnosis . CT being non invasive and detects Tuberculosis, Bronchiectasis , diffuse parenchymal diseases, peripheral masses Mediastinal and vascular lesions better than FOB preferred prior to bronchoscopy.

**Introduction:**

Hemoptysis is one of the common symptom with which patients attend to the chest op. Haemoptysis of any degree requires thorough evaluation to recognize the cause and treat the patient appropriately. Despite thorough evaluation in 30% of cases no definite cause can be found<sup>1</sup>. Haemoptysis occur in many conditions<sup>2,3</sup> chest radiograph is the first investigation done in patients with haemoptysis. Chest x ray may be normal in 20-30% of patients with haemoptysis<sup>1</sup>. Computed Tomography (CT) chest plays important role in investigation of chest diseases when chest x ray is normal.<sup>1,3,4,5,6</sup> It helps in diagnosing the condition early in treatable stage and useful noninvasive test for choosing invasive test like Fiber Optic Bronchoscopy( FOB) and trans thoracic Fine Needle Aspiration Cytology (FNAC) <sup>7</sup>. A retrospective study done to evaluate the role of CT in detecting the cause of hemoptysis in patients with normal chest radiograph.

**Material & methods:** a retrospective analysis of patients with hemoptysis and normal chest radiograph admitted in pulmonary medicine department between April 2013 and March 2015 was conducted. 41patients with haemoptysis and normal chest x - ray investigated with ( High Resolution Computed Tomography) HRCT/ CECT (Contrast Enhanced Computed Tomography,) chest were selected for the study.Patients diagnosed having cardio vascular disease , bleeding disorders, bleeding from upper respiratory tract were excluded from the study. The following variables were collected from the records. Age, sex, symptoms, history of smoking, drug intake ,past tuberculosis , clinical findings, amount and duration of hemoptysis. Results of investigations done like haemogram, coagulation profile, sputum Acid Fast Bacilli (AFB), sputum Grams staining, culture sensitivity for pyogenic organisms,

fungus, and malignant cells, CT chest , and FOB were taken into consideration in arriving final diagnosis.

Hemoptysis is graded as mild hemoptysis <30ml/day moderate 30 to 200ml/day severe>200ml/day<sup>7,8</sup> High Resolution CT (HRCT) sections was performed employing 0.625 mm sections. CT chest plain and contrast (CECT) volume scans were performed starting from apices of lung down to the level of domes of diaphragm liver and adrenals employing 0.625 mm sections. Intravenous contrast infusion was done using 55 cc of optiray 350 mg/ml iodine.

**Results :** total 41 patients fulfilled the criteria and taken into the study .

**Table 1 Sex wise distribution of cases**

	No.cases	Percentage
Males	23	56.09
Females	18	43.9
Total	41	

Among 41 cases 56.09 % are males and 43.9 % are females

**Table 2 Age wise distribution of cases**

Age	No of cases	Abnormal	Normal
18- 40	19 (46.3%)	11 (57.9%)	8 (42.1%)
41-70	22 (53.7%)	20 (90.9%)	2 (9.1%)
Total	41	31 (75.6%)	10(24.4%)

22 (53.7%) patients were above 40 years Out of 22 patients 20(90.9%) showed abnormality and 2 (9.1%) were normal. Out of 19 patients below 40 years 11 (57.9%) showed abnormality and 8(42.1%) were normal.

Out of 41cases 14 (34.14%) were smokers and all were males

**Table 3 Degree of Haemoptysis and CT findings**

Degree of Haemoptysis	No of cases	normal	abnormal
Mild	18 (43.9%)	8 (44.4%)	10 (55.6%)
Moderate	20 (48.8%)	2 (10%)	18 (90%)
Massive	3 (7.3%)	----	3 (100%)
Total	41	10	31

Hemoptysis was mild in 18(43.90%) , moderate in 20(48.78%) and massive in 3 (7.31%) cases

**Table 4 CT chest findings**

Diagnosis	No. of cases	Percentage
Tuberculosis	17	41.46
Bronchiectasis	9	21.95
Pneumonitis	2	4.87
Malignancies	2	4.87
Vascular anomalies	1	2.43
Normal	10	24.39

**In 24.4% CT scan chest was normal and in 75.60 % cases abnormality detected.**

tuberculosis In 41.46%, bronchiectasis in 21.95%, pneumonitis in 4.87% , malignancies in 4.87% and right common carotid artery aneurysm with thrombus in one (2.43%) were detected

#### Discussion :

Chest radiograph is the primary investigation of hemoptysis. When chest x ray is normal other investigations are done to rule out haematological ,cardiovascular, connective tissue disorders . Chest CT is more sensitive than chest x ray in detecting abnormalities<sup>9</sup>. CT chest being non invasive and ability to detect conditions like bronchiectasis, Tuberculosis, Peripheral tumors , mediastinal masses, vascular abnormalities etc was preferred prior to FOB.<sup>10</sup>

Among 41 cases 23 were males 18 were females (Table 1)

Out of 22 (53.65%) patients above 40 years 20(90.9%) showed abnormality and 2 (9.1%) were normal. Out of 19 (46.34% ) patients below 40 years 11 (57.9%) showed abnormality and 8(42.1%) were normal. (Table :2)more abnormalities seen in patients above 40 years

Compared to abnormality detected in mild hemoptysis cases 10 in 18(55.6%) abnormality detected in moderate

to severe hemoptysis 21 in 23 (91.3%)were more (Table:3). Associated symptoms seen were cough in 31 (75.6 % ) , fever 17 (41.5%), dyspnea 8 (19.5% ), Chest pain 6 (14.6% ). Out of 14 smokers abnormality detected in 11(78.6% ) and normal in 3 (21.4%). More abnormalities were detected in patients aged above 40 years, smokers with moderate to severe hemoptysis or persistent mild hemoptysis so further investigation with CT should be considered<sup>6</sup> in them.

In our study abnormalities detected in CT in 31 (75.6%) patients<sup>10,11,12,13</sup>. out of 31 abnormalities detected 20(64.5%) were in patients above 40 years . 11 (35.5% ) were below 40 years. The following diagnosis were made. Tuberculosis in 17( active in 11 , inactive in 6), bronchiectasis in 9, malignancy in 2, Chronic Obstructive Pulmonary Disease (COPD) with pneumonitis in 2, right common carotid artery aneurysm with thrombus in one (Table :4)

CT was normal in 10 (24.39%) patients. Other investigations like sputum for AFB, malignant cells, FOB were also normal in them<sup>14,15</sup>. Age of 8 patients was below 40 years and 2 patients was above 40 years. In a female aged 47 years and a male smoker aged 46 years FOB done and reported normal study. All 10 patients having single episode of mild haemoptysis were treated conservatively and there was no recurrence of hemoptysis .They were discharged with a advise for follow up.<sup>6</sup>

In 17 (41.46%) patients tuberculosis was diagnosed <sup>12</sup>. Inactive as sequele in 4 and active in 13. Hemoptysis was severe in one, moderate in 12 and mild in 4. 11 patients gave the history of low grade fever , cough, evening rise of temperature. The active lesions seen in CT are centri lobular nodules , small cavities, in upper lobes, middle lobe. Hatipoglu et al reported that centrilobular densities in and around small airways and tree in bud appearance were the most characteristic CT features of TB disease activity<sup>16</sup>. In inactive cases fibrotic changes, calcified mediastinal lymph nodes, pleural thickening bronchiectatic changes in upper lobes noted. History of treatment with Anti tubercular drugs present in 4 inactive tuberculosis cases. sputum AFB was negative in all patients . Anti tuberculosis treatment started in patients with active tuberculosis lesions .

Bronchiectasis was the next common cause seen in 9 (21.95%) patients. Site involved was lower lobes, lingular segment left side and middle lobe right side .Tree in bud appearance, signet ring shadows , cystic changes were observed<sup>17,18</sup>. HRCT found to has a sensitivity of 98% and specificity of 99% for the diagnosis of bronchiectasis when compared to bronchography<sup>19</sup>. Hemoptysis was moderate in 6 cases severe in 1 case. In 2 cases hemoptysis of mild degree for more than a week present. All the cases diagnosed as bronchiectasis were treated with antibiotics and symptomatics and haemoptysis was controlled.

As tuberculosis and bronchiectasis are important causes of haemoptysis in India it is suggested that CT scan should precede bronchoscopy in patients with haemoptysis and normal chest radiograph<sup>7</sup>.

Malignancies were detected in 2 (4.87%) cases. The diagnosis of malignancy is low in our study consistant with some of the studies<sup>3,12,21,22,23,24</sup>. Though overall diagnostic yield is low , there could be 3 to 10% incidence of malignancy in cases of hemoptysis with normal chest radio-

graph<sup>23</sup>. In one female aged 52 years right para tracheal mass with mediastinal lymph nodes detected. In a 65 year male smoker left upper lobe peripheral mass with mediastinal lymphadenopathy detected. CT guided Trans thoracic FNAC of the lesion in both cases revealed malignancy. Patients referred to cancer ward. CT scan helps in localizing the lesion and site to take further interventions. CT also gives a clue to extent of disease, presence of metastatic lesions in other parts of lung, pleura, mediastinum, liver, adrenals etc. the main drawback with CT was we can not do histopathological examination<sup>7</sup>. Follow up CT may be done after several months after the episode of hemoptysis to see the evolution of underlying abnormality which may have missed at initial CT.<sup>6</sup>

In 2 (4.87%) cases report came as COPD with pneumonitis. History of fever for 3-4 days, cough, breathlessness mild hemoptysis for two days present. No evidence of intra bronchial growth in FOB. Bronchial washings were negative for malignant cells, AFB, and fungus. sputum culture sensitivity reported as positive for pneumococci in one case and negative in another case. Both treated with antibiotics. symptoms subsided within a week and patients discharged with a advise to follow up.

Right common carotid artery aneurysm with thrombus detected in a young boy of 19 years. He presented with single bout of severe haemoptysis with no history of cough, dyspnea or fever. He was referred to cardiothoracic vascular surgery where carotid artery bypass with synthetic graft surgery done and patient was healthy after surgery.

Conclusion: Chest CT is more sensitive than chest x ray in detecting abnormalities. In patients aged 40 years and above, smokers, moderate to severe hemoptysis or persistent mild hemoptysis further investigation with CT should be considered. CT detects bronchiectasis, tuberculosis (active and inactive), mediastinal lesions, peripheral masses, vascular lesions, diffuse parenchymal diseases more accurately. CT scan being non invasive may be preferred as first choice of investigation in patients with Hemoptysis and normal chest radiograph. Histopathological specimen can not be collected but CT helps in choosing the site for bronchoscopic interventions and FNAC.

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