HRCT IN BRONCHIECTASIS

Abstract:

In patients with bronchiectasis, a high-resolution CT scan (HRCT) and its score play a significant role in identifying pathological alterations and pulmonary functional impairment. A total of 50 cases were studied. All the cases presenting with the features suggestive of bronchiectasis were screened clinically. 8 out of 50 patients underwent surgical resection of affected lobes. The rest was handled with caution. The primary condition, lung malignancy, claimed the life of one patient. CT can be used to quickly confirm suspected bronchiectasis due to its increased specificity. Confirmation by CT is useful in the management of patients with chronic cough and sputum production who are suspected of having bronchiectasis but for whom surgery is not an option due to age or poor lung function. Confirmation by CT is also useful in the management of patients with chronic cough and sputum production who are suspected of having bronchiectasis but for whom surgery is not an option due to age or poor lung function. In some cases, where surgery appears to be a viable option, unmistakable evidence of bilateral bronchiectasis on CT would rule out such treatment without the requirement for bronchography.

Keywords: Bronchiectasis, CT, Radiology, Scan

Introduction

Bronchiectasis is a chronic respiratory disease marked by a clinical syndrome of cough, sputum production, and bronchial infection, as well as radiologically abnormal and persistent bronchial dilatation. Preventing exacerbations, reducing symptoms, improving quality of life, and stopping disease progression are the goals of bronchiectasis treatment. The most common symptoms are cough and sputum production, as well as dyspnea, however rhinosinusitis, tiredness, haemoptysis, and thoracic pain are also prevalent [1-3]. Standard spirometry has long been known to be a poor predictor of illness progression, yet it has still become the standard by which to track progress. Some CF clinics are now requiring a chest scan with high resolution computed tomography (HRCT) every two years.

MATERIALS AND METHODS

This study on imaging in bronchiectasis was conducted in 2010-12. A total of 50 cases were studied. All the cases presenting with the features suggestive of bronchiectasis were screened clinically. Out of them 50 cases who showed evident bronchiectasis were submitted for detailed clinical study and investigations were performed. All cases were examined and investigated personally during their stay in either hospital and day to day progress was recorded. Patients were followed up regularly after their discharge from the hospitals wherever possible. The emphasis of this study is mainly on the aetiopathogenesis. Bacteriology and radiological aspects with first preference to CT scan of thorax.
The criteria adopted for selection of cases for this study were;

1. Presence of signs and symptoms of bronchiectasis

2. Those diagnosed as bronchiectasis are confirmed by CT scan after preliminary chest radiographs.

RESULT

Out of the 50 patients studied a maximum of 14 (28%) where in the 31-40 age groups. 11 patients (22%) where in the 5^{th} decade and (18%) where in the 6^{th} decade, 1^{st} and 2^{nd} decades contained the least number of patients. In this series 58% of males & 42% of females affect by the disease (Table 1).

Table – 1: SEX INCIDENCE

SEX	NO.OF CASES	%
Male	29	58
Female	21	42

TABLE 2: OCCUPATION

OCCUPATION	**NO.OF CASES**	%

Manual	11	22
Farmers	15	30
Housewives	10	20
Students	6	12
Others	8	16

A total number of farmers (30%) were affected by bronechiectasis, 11 patients (22%) were manual" labourers and 10 patients (20%) was housewives (Table 2).

TABLE 3: DURATION OF SYMPTOMS

DURATION OF SYMPTOMS IN MONTHS	**NO.OF CASES**	%
1-6	19	38
7-12	8	16
13-18	6	12
19-24	5	10
>24	12	24

19 patients (38%) presented with a short duration of symptoms ranging from 1-6 moths. 12 patients (24%)' after a duration of 2 years of onset of symptoms (Table 3).

TABLE 4: SYMPTOMS

SYMPTOMS	**NO.OF CASES**	%
Productive cough	50	100
Breathlessness	41	82

Haemoptysis	29	58
Fever	36	72
Weight loss	11	22

All the patients scanned (100%) had cough as the presenting complaint. All but for one had associated sputum production. 1 patient who had dry cough was diagnosed to be having interstitial lung disease. Breathlessness was the next common symptom with 41 patients (82%) suffering from it. 19 patients (38%) had Haemoptysis. Fever was seen in 32 (64%) patients. 11 patients had weight loss (Table 4).

TABLE 5: LOBAR DISTRIBUTION

RT	Upper	6	12%
	Mid	11	22%
	Lower	14	28%
LT	Upper	8	16%
	Lingular	7	14%
	Lower	26	52%

A maximum number of 26 cases (52%) had the disease in left lower lobe 14 patients (28%) had bronchiectasis in the right lower lobe (Table 5).

TABLE 6: SEGMENTAL DISTRIBUTION

RT	UPPER	APICAL	4	8%
		ANT	2	4%
		POST	3	6%
	MIDDLE	MED	9	18%
		LAT	5	10%

	LOWER	SUB		6%
		MEDIAL BASAL	3	6%
		POST BASAL	8	14%
		LAT BASAL	4	8%
		ANT.BASAL L	2	4%
LT	UPPER	APICO. POST.	6	12%
		ANT	4	8%
	LINGULAR	SUB	7	14%
		INF	7	14%
	LOWER	SUB	14	28%
		POST BASAL	16	32%
		LAT BASAL	4	8%
		ANT BASAL	5	10%

Post basal segment and superior segment of lower lobe were most commonly affected each accounting for 16 cases (32%) and 14 cases (28%0) followed by medial segment of (R) middle lobe, superior and inferior segment of (L) lingular lobe acconting for 9 cases (18%), 7 cases (14%>) respectively (Table 6).

TABLE 7: RADIOGRAPH V/S HRCT

	RADIOGRAPH	**HRCT**
TRUE+VE	39	48
FALSE+VE	3	0
FALSE-VE	8	2

Out of the 48 cases of bronchiectasis detected by HRCT only 39 were positive on chest radiograph. 3 cases which was diagnosed to be having

bronchiectasis on plain radiograph was normal on HRCT (Table 7).

TABLE 8: MORPHOLOGICAL FORMS OF RONCHIECTASIS

SL.NO	FORMS	NO. OF CASES	%
1.	CYSTIC	30	60%
2.	CYLINDRICAL	16	32%
3.	VARICOSE	4	8%

Cystic bronchiectasis was the commonest morphological form of bronchiectasis followed by cylindrical bronchiectasis (Table 8).

TABLE 9: SPECIFIC CAUSES BRONCHIECTASIS

SL.NO	SPECIFIC CAUSES	NO. OF CASES	%
1.	PULMONARY TUBERCULOSIS	12	24%
2.	MCLEOD'S	1	2%
3.	ASPERGILLOMA	1	2%
4.	KARTAGENER'S SYNDROME	1	2%
5.	INTERSTITIAL LUNG DISEASE	1	2%
6.	MALIGNANCY	3	6%
7.	BRONCHIOLITIS OBLITERANS ORGANISING PNEUMONIA	1	2%
8.	ENDOBRONCHIAL TUBERCULOSIS	1	2%
9.	CYSTIC FIBROSIS	2	4%

Most the cases of bronchiectasis were idiopathic in nature of the specific causes of bronchiectasis, pulmonary tuberculosis was the forerunner (Table 9).

DISCUSSION

Bronchiectasis is among the leading chronic obstructive pulmonary diseases contributing to significant morbidity and mortality. It implies a state of permanent irreversible dilatation of bronchi. This implies destruction of bronchial wall as a result of both obstruction and infection. With the advent of HRCT, and modem antibiotics, a significant range has occurred in the management of bronchiectasis because of early detection and prompt and effective treatment. HRCT has also contributed to accurate segmental localization with facilitates resection of affected segment and conserving unaffected lung [4].

In the present series, age of patients varied from as less as 7 years to as old as 70 years. The maximum number of cases (14) = 28% were found to be in 31-40 year age group. In the present series, 58% of males and 42% of females were affected with a ratio of 1.3:1. *S.Clark* (1963) studied a total of 116 patients and found out bronchietasis in 65 males and 51 females with a of 1.2:1 ratio.

This shows that there is a slight ale predilection for this disease. Where males are affected because of exposure to occupational hazards, like agricultural products, smoking habits, the females, most of whom where housewives, were affected as a result of exposure to smoke, soot due to old and primitive cooking methods. 38% of patients presented to the hospitals with a short history (1-6 on the) of symptoms indicating a better awareness of the disease & also early detection due to advent of better imaging modalities like HRCT [5].

Because of its axial sections and greater resolution compared to chest radiographs, HRCT has revolutionized the identification and localization of bronchiectasis. The bony cage obscures 70 percent of lung tissue on chest radiography. HRCT, on the other hand, does not have this issue. With the use of continuous sections, the bronchus can be tracked from its origin to its perimeter. In comparison to chest radiographs, HRCT has a higher detection rate [6]. Chest radiographs revealed bronchiectatic alterations in 39 (78%) of the 50 cases investigated. On chest radiograph, 8 instances (16%) were classified as normal but were abnormal on HRCT. On HRCT, three instances that were diagnosed as having bronchiectasis on plain radiographs were found to be normal.

Although CT findings of pulmonary tuberculosis and mycobacterium avium - intracellulare are similar, interlobular septal thickening is more common m patients with tuberculosis and bronchiectasis is more common & more extensive with MAI [7]. Micronodules, consolidation & cavitations are seen with similar frequency in pulmonary tuberculosis. In our study, 13 patients had pulmonary tuberculosis (26%) out of which 3 were FB +ve.

Bronchograms were not performed in our series because of its invasiveness & non availability of Dianosil. HRCT also is more cost effective compared to bronchogram done with iohexol & patient preparation prior to procedure is not required. A study conducted with sensitivity of 79% (false negative) and specificity of 99% (false positive) was seen [8]. Because of its high specificity, it can be used to readily confirm suspected bronchiectasis even though its insensitivity precludes its use as a 'screening' test.

HRCT is also invaluable in detecting hypertrophied bronchial arteries. A connection between bronchial and pulmonary arteries develops at the precapillary and postcapillary levels. The enlarged vessels which exist in the walls of dilated bronchi, may be injured by infection. The blood under systemic pressure may pour into respiratory tree with resultant Haemoptysis. Fiberoptic bronchoscopy is of proven efficacy in examining patients with central endobronchial disease. In addition, it is also valuable in localization of bleeding sites before surgery and removal of foreign bodies [9,10]. On the other hand, CT is of considerable value in diagnosing peripheral air way disease ~ bronchiectasis in particular. Thus CT & bronchoscopy are complementary. Bronchoscopy cannot detect peribronchial abnormalities. CT is also invaluable in providing a road map for bronchoscopists. Recognition of hypertrophied bronchial artery can be valuable information to the bronchoscopist who is planning a needle aspiration or biopsy as fatal haemorrhage can be avoided.

By its accurate localization of segment, conservative surgery can be planned. Also in patients in whom surgery might see feasible, the unequivocal demonstration of bilateral bronchiectasis by CT would rule out such treatment without need. Also it is useful in confirming or ruling out bronchiectasis as a cause for recurrent haemoptysis following surgery.

Conclusion

In conclusion, compared to cylindrical bronchiectasis, cystic bronchiectasis is linked with more severe lung function impairment and lower HRCT scores. Patients with a chronic cough and sputum production who are suspected of having bronchiectasis but for whom surgery is not an option due to age or poor lung function can benefit from CT confirmation. Where surgery looks to be a realistic option, unambiguous evidence of bilateral bronchiectasis on CT would rule out such treatment without the need for bronchography in some patients.

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