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2

: (chronic airflow obstruction; CAO)
 (high - resolution CT; HRCT) ,
 HRCT
 : CAO HRCT 80
 가 , ,
 HRCT . HRCT
 가 , HRCT CT
 HRCT , HRCT
 CT FEV1/FVC student's unpaired t - test
 Correl
 : HRCT 77.5% (62/80) .
 88.0% (24/27), 93.9% (31/33), 100% (6/6)
 , 0%(0/4) 10%(1/10)
 . HRCT CT score FEV1/FVC ($p < 0.05$, r ; -
 0.76) ($p < 0.01$, r ; -0.66) 가 , (p
 > 0.05 r ; -0.44), ($p > 0.05$ r ; -0.51) ($p > 0.05$ r ;
 -0.53) 가 .
 : HRCT
 , , , 가 가 .

(Chronic airflow obstruction; CAO) X (chest radiography)
 가 가 가 , X
 (1 - ,
 4). CAO 가 , . HRCT
 , , ,
 가 CAO ,
 (1 - 4). X , HRCT
 , , , CAO HRCT
 가 가 가 .
 가 ,
 HRCT HRCT

1 HRCT HRCT
 2

CAO (pulmonary function test; PFT) 1 (forced expiratory volume in 1 second, FEV1) 80% HRCT PFT HRCT 18 (: 2 - 46) . 59 (29 - 82) , 49 , 31 . HRCT Somatom Plus S (Siemens, Erlangen, Germany) CT scanner , 1 mm , 1 - 2 cm - 700 - - 750 HU, 1,000 - 1,500 HU 18 HRCT 62 80 77.5% HRCT (Table 1). , 27 24 (88.9%) HRCT 33 2 31 3 - 4 cm . (93.9%) HRCT 6 (100%) , 10 1 HRCT HRCT가 HRCT HRCT 4 HRCT HRCT 1 HRCT 2 (paraseptal emphysema) , (decreased attenuation HRCT area) HRCT CT . CT Goddard FEV1/FVC (p < 0.05, r: -0.76, r: -0.69) (Fig. 1). (5) Bergin (6) CT FEV1/FVC (p > 0.05, r: -0.44, r: -0.32) (Fig. 2). 0 , 1 , 2 25 - 50% , 3 50 - 75% , 4 75% . CT FEV1/FVC (p value < 0.01, r: -0.66) (Fig. 3). 가 가 75% CT FEV1/FVC

Table 1. Clinical Diagnosis vs HRCT Diagnosis in Patients with Chronic Airflow Obstruction

		Clinical Diagnosis				
		Bronchiectasis	Emphysema	Bronchiolitis Obliterans	Asthma	Chronic Bronchitis
HRCT Diagnosis	Bronchiectasis	24				
	Emphysema		31			1
	Bronchiolitis Obliterans			6		1
	Asthma				1	
	Chronic Bronchitis					
	Non-specific Diagnosis	3	2		9	2

($r = -0.51$) (Fig. 4).
 CT FEV1/FVC 가 (p value
 > 0.05 , $r = -0.53$) (Table 2).

X HRCT
 HRCT가
 가 (7 - 10). HRCT
 가
 가
 HRCT
 가 93%
 , Grenier (9)
 가 96%
 , Kang (10)
 47 41 (87%) HRCT
 . Kang (10) 47

Table 2. Correlation between Extent of Low Attenuation Areas on HRCT and FEV1/FVC

Clinical Diagnosis	Correlation rate	<i>P</i> value
Bronchiectasis	- 0.76 (ins) - 0.69 (exp)	<0.05
Emphysema	- 0.44 (ins) - 0.32 (exp)	>0.05
Bronchiolitis obliterans	- 0.66 (ins)	<0.01
Bronchial asthma	- 0.51 (ins)	>0.05
Chronic bronchitis	- 0.53 (ins)	>0.05

ins : inspiratory HRCT, exp : expiratory HRCT

6 (13%) 3
 , 3
 27 24 (88.9%)
 3 2
 가
 , HRCT
 , HRCT가
 가 1 HRCT
 Kang (10)
 , HRCT
 가 (10 - 12),
 (11, 12),
 (12).
 가 ,
 가 FEV1/FVC HRCT
 가
 (4). HRCT

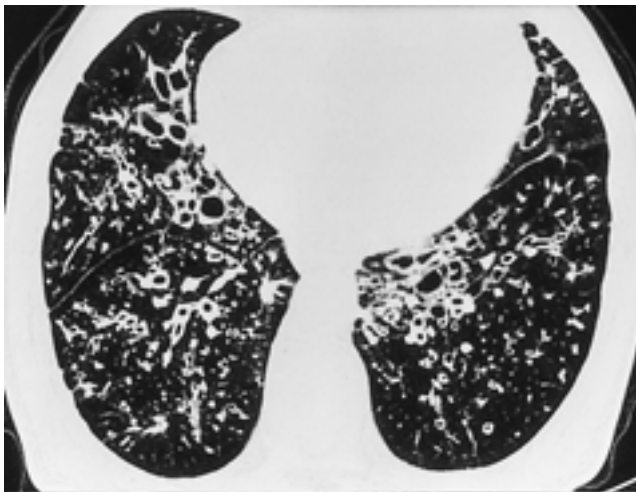


Fig. 1. Inspiratory HRCT in 60-year-old man with bronchiectasis.

Dilated bronchi with bronchial wall thickening in both lungs are suggestive of bronchiectasis on HRCT. HRCT diagnosis is good agreement with clinical diagnosis in patients with bronchiectasis. There is significant negative correlation between the CT score (20 on inspiratory HRCT, 28 on expiratory HRCT) and FEV1/FVC (65%) on pulmonary function test.



Fig. 2. Inspiratory HRCT in 56-year-old man with emphysema. centrilobular emphysema and multiple bullae are seen in both lungs on HRCT. HRCT diagnosis is good agreement with clinical diagnosis in patients with emphysema. There is no significant correlation between the CT score (29 on inspiration) on HRCT and FEV1/FVC (28.3%) on pulmonary function test.

HRCT (7),
 HRCT (13). 33
 HRCT, 93.3%
 HRCT
 가가 가, HRCT
 (6, 14 - 18). Kinsella (16)
 CT
 FEV1/FVC
 CT
 Bergin (6) CT
 (FEV1, FEV1/FVC, DLCO),
 가 Gelb (19, 20)
 CT (FEV1/FVC, FEV1)
 가
 가
 Haraguchi (21) 25
 가
 FEV1/FVC
 Gelb (19, 20)
 가

HRCT
 HRCT
 HRCT
 HRCT
 Hansell (22) Yang (23), CT
 6
 CT FEV1/FVC
 가
 가
 histamine,
 methacholine,
 가 HRCT
 (7).
 (24)
 HRCT

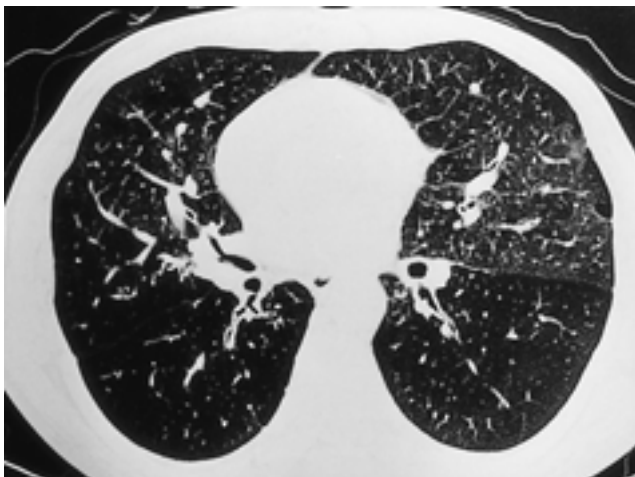


Fig. 3. Inspiratory HRCT in 43-year-old man with bronchiolitis obliterans. Multifocal low attenuated lesions in both lungs are suggestive of bronchiolitis obliterans on HRCT. HRCT diagnosis is good agreement with clinical diagnosis in patients with bronchiolitis obliterans. There is significant correlation between the CT score (58 on inspiration) and FEV1/FVC (74%) on pulmonary function test.

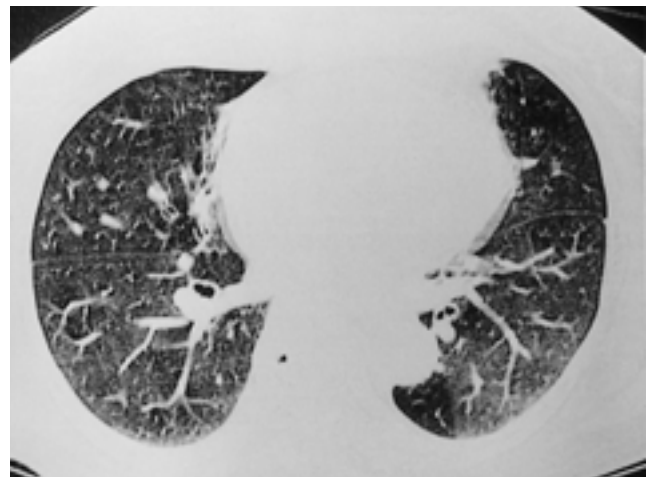


Fig. 4. Expiratory HRCT of 62-year-old women with asthma. Multifocal air-trappings are noted in both lungs and this case is only one that HRCT and clinical diagnosis are consistent in bronchial asthma. There is no significant correlation between the CT score (19 on expiration) and FEV1/FVC (113%) on pulmonary function test.

HRCT

가

CT , 14 14%

CT 39 50% 가

(27).

10 1 CT

9 CT

가 CT HRCT

가 Newman (25)

HRCT (FEV1, FRC, RV)

CT (FEV1/FVC)

CT가

3

2 (4).

가

HRCT

(centrilobular densities) (7).

HRCT X

가

4

HRCT

가

가

80 가

가

가

HRCT

- HRCT
- 가
- HRCT
- 가
- HRCT (FEV1/FVC) HRCT
- HRCT
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High-Resolution CT in Patients with Chronic Airflow Obstruction: Correlation with Clinical Diagnosis and Pulmonary Function Test¹

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Purpose: To determine the utility of HRCT in the diagnosis of chronic airflow obstruction and to correlate the morphologic abnormalities revealed by this modality with functional impairment in patients with chronic airflow obstruction.

Materials and Methods: This study involved 80 patients with chronic airflow obstruction who underwent HRCT and a pulmonary function test. Final clinical diagnosis in these patients was determined by a chest physician on the basis of clinical features, bronchoscopy, pulmonary function test, and HRCT. In order to diagnose and determine the extent of areas of decreased attenuation revealed by HRCT (the CT score), the findings of HRCT were retrospectively reviewed by two radiologists, who reached a consensus. Clinical and HRCT diagnoses were then compared, and the rate of agreement between them was calculated. The relationship between the extent of areas of decreased attenuation revealed by HRCT and by FEV1/FVC was evaluated using Correl's account and Student's unpaired t-test.

Results: The agreement rate between clinical and HRCT diagnoses was 77.5% (62/80). The rates for bronchiectasis (88.9%, 24/27), emphysema (93.9%, 31/33), and bronchiolitis obliterans (100%, 6/6) were considerably higher than those for chronic bronchitis and bronchial asthma. The correlation rate between CT score and FEV1/FVC was significant in bronchiectasis ($p < 0.05$; $r: -0.76$) and bronchiolitis obliterans ($p < 0.01$; $r: -0.66$), but not in cases involving emphysema, bronchial asthma, or chronic bronchitis ($p > 0.05$).

Conclusion: HRCT is valuable in the diagnosis and prediction of physiologic impairment in patients with bronchiectasis and bronchiolitis obliterans, but has limited value in those with emphysema, chronic bronchitis or asthma.

Index words : Bronchi, abnormalities
Lung, CT
Emphysema, pulmonary

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