



: HRCT ,
 : 1995 1 1998 7
 7 (2 , 2 , 2 ,
 1) HRCT . HRCT
 : 7 , 6
 (5) , (3) ,
 (2) , (1) 5 ,
 2 ,
 HRCT
 forced vital capacity(FVC), forced expiratory volume(FEV1)
 HRCT
 maximal midexpiratory flow rate 25 - 75 (MMEF25 -
 75)가 .
 : forced expi -
 ratory volume(FEV1), forced vital capacity(FVC)
 가

(1, 2).
 3 precipitin
 T -
 (1). (4)
 precipitin (1).
 3가 precipitin
 (1).
 4 (8
 1(2
 (3 - 5).
 가
 (4, 5),

(5 - 7).

(5, 8),

가

HRCT

1991 1 1998 7

7

가 4 , 가 3 , 31 가 (9).

73 47.4 , , 3

(7), (3)

toluene diisocyanate(TDI)

(3) 가 . 3 2

, 4 1

. 2 , 2 , 1

2 가

T8 가

가 76%

2

7 HRCT 10

FVC, FEV1, FEV1/
FVC, DLCO, MMEF25 - 75%

(%) . 7

, 1

. 5 3 - 10

CT Somatom plus - S (Erlangen, Germany) Imatron
C - 150 (San Francisco, CA)

130, 120 kVp, 630,
610 mA , 1 mm

Window level - 600 - 700 HU, window width
1000 HU

HRCT , , ,

50 HU

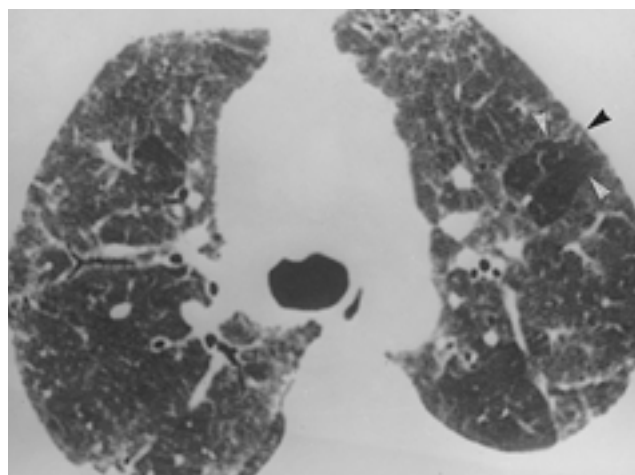


Fig. 1. Forty two-year-old male patient with subacute hypersensitivity pneumonitis. HRCT scan shows ground glass attenuation involving both lungs. Sparsed areas of lobular low attenuation (arrow heads) in the area of ground glass opacity.

Table 1. Relationship of Grade Score of Radiologic Findings to Pulmonary Function Test

Case	HRCT				PFT				
	GGA	CLN	LLA	RET	FVC(%)	FEV1(%)	FEV1/FVC(%)	DLCO(%)	MMEF 25 - 75% (%)
1	4	4	3	5	47	57	111	70	99
2	4	5	1	3	72	77	109	50	86
3	4	6	1	0	76	92.2	121.4	59.2	86
4	1	7	1	0	80.5	79	105.7	70	80
5	1	7	3	5	48	57	86	67.5	101
6	3	0	1	7	51	60	119	47	76
7	1	3	3	5	62	63	101.6	49	55

GGA : ground glass attenuation CLN : centrilobular nodule LLA : lobular low attenuation RET : reticular
FVC : forced vital capacity FEV1 : forced expiratory volume during 1 second
DLCO : diffusing capacity MMEF25-75% : maximal midexpiratory flow rate
PFT results are % of predictive value for individuals.

(10) (Grade) 0% 0 (G0),
0 - 25% 1 (G1), 25 - 50% 2 (G2), 50% 3
(G3) (9)

/ / /

(Pearson correlation)

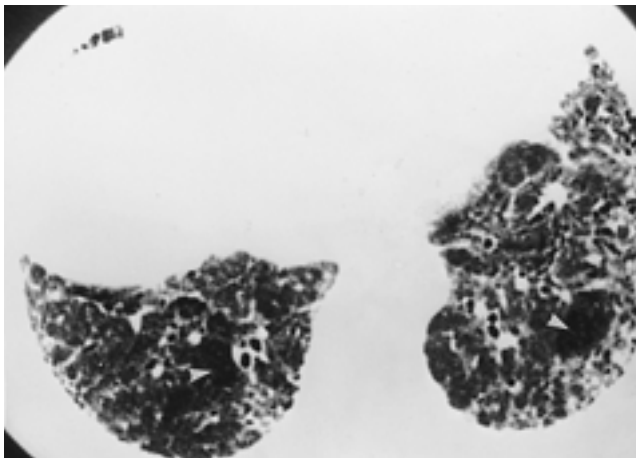
function test 가 power 가

4가
(regression analysis)

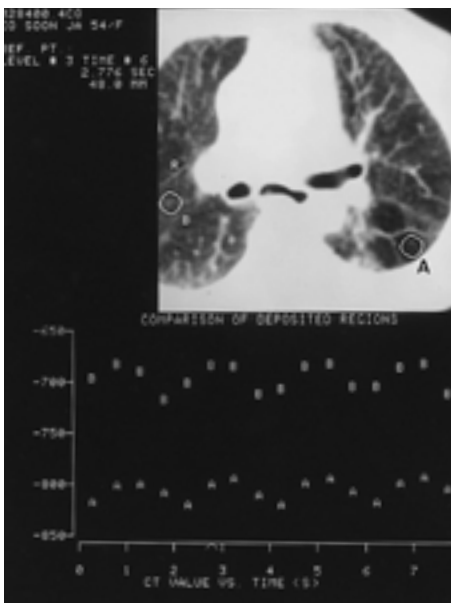
1 (tidal respiration) (forced
expiration) 8 (elec -
tron beam tomography)

7 (Fig. 1)
(Fig. 1, 2)
(Fig. 3) 6 . 2
usual interstitial pneumonia (UIP)
(Table 1,
case 6, 7) (Fig. 2). 1
5

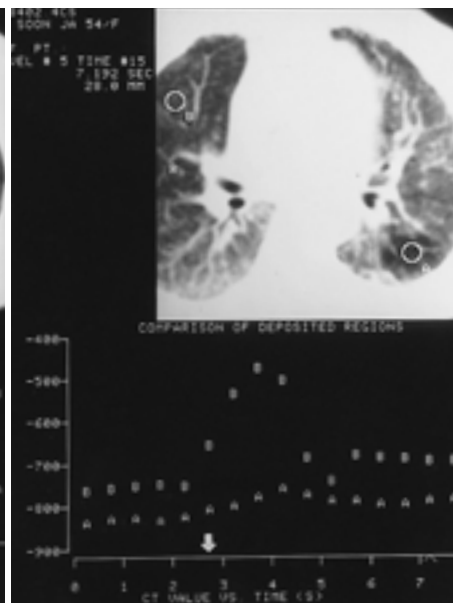
2
1
7
1 , 6
1 , 5
7 3
4
HRCT , 2
2 3 2
5 ,



A



B



C

Fig. 2. Fifty four-year-old female patient with chronic hypersensitivity pneumonitis.

A. HRCT scan shows reticular pattern, honeycombing and interlobular septal thickening, but does not show centrilobular nodules. Therefore HRCT pattern simulates usual interstitial pneumonia. Presence of lobular decreased low attenuation (arrow heads) was quite helpful for the diagnosis of chronic hypersensitivity pneumonia.

B. Dynamic image during tidal respiration. The curve with letter A shows time-density curve during tidal respiration on the region of lobular overinflation and the curve with letter B shows it on normal lung parenchyma.

C. Dynamic image during forced expiration. The white arrow means the start point of forced expiration. The

curve with letter A shows the time-density on the region of lobular overinflation and the letter B shows it on normal lung parenchyma. The increase of lung density during forced expiration is very flat in the area of lobular low attenuation (A) compared to the normal (B).

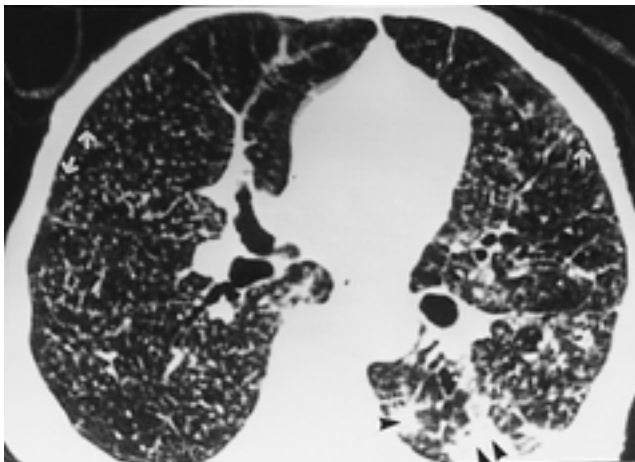


Table 2. Correlation between Extent of Disease on HRCT(Grade Score) and PFT (Pearson correlation)

		Pulmonary Function Test				
		FVC	FEV1	FEV1/ FVC	DLCO	MMEF 25 - 75%
GGA	r	0.173	0.515	0.560	-0.136	0.299
	p	0.711	0.237	0.212	0.771	0.514
CLN	r	0.286	0.341	-0.219	0.558	0.517
	p	0.583	0.508	0.677	0.250	0.294
LLA	r	-0.669	-0.710	-0.643	0.291	0.104
	p	0.100	0.074	0.119	0.527	0.825
Reticular	r	-0.876	-0.867	-0.115	-0.345	-0.106
	p	*0.010	*0.012	0.805	0.448	0.822

GGA : ground glass attenuation

CLN : centrilobular nodule

LLA : lobular low attenuation

FVC : forced vital capacity

FEV1 : forced expiratory volume during 1 second

DLCO : diffusing capacity

MMEF25-75% : maximal midexpiratory flow rate

* significant correlation between extent of disease and PFT

Table 3. Correlation between Extent of Disease on HRCT(Grade Score) and PFT (regression analysis)

		Pulmonary Function Test				
		FVC	FEV1	FEV1/ FVC	DLCO	MMEF 25 - 75%
GGA	β	-0.319	0.152	0.464	0.111	0.735
	p	0.099	0.552	0.186	0.855	0.154
CLN	β	-0.599	-0.225	-0.847	1.027	1.780
	p	0.095	0.625	0.188	0.405	0.098
LLA	β	-0.205	-0.258	-0.179	0.118	-0.351
	p	0.262	0.179	0.594	0.874	0.473
Reticular	β	-1.334	-0.889	-0.565	0.424	1.611
	p	*0.026	0.179	0.358	0.735	0.138

GGA : ground glass attenuation

CLN : centrilobular nodule

LLA : lobular low attenuation

FVC : forced vital capacity

FEV1 : forced expiratory volume during 1 second

DLCO : diffusing capacity

MMEF25-75% : maximal midexpiratory flow rate

* significant correlation between extent of disease and PFT

(15, 18).

7

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(1, 8).

(paradoxical decrease) ” 가 ,

HRCT

가

가 가 가

(16).

(areas of decreased attenuation)

(5, 6, 11), CT
(air trapping)

(8),

(50HU) 가
(Fig. 2 B, C).

HRCT

HRCT

(11, 19),

(residual volume) 가

가

(11).

6

가

FVC가

가 (3, 6, 12, 13)

. Lynch

FVC

(5)

,

8

HRCT

FEV1

,

13

10

. 7

UIP

FEV1/FVC

2

,
MMEF 25 - 75%

FEV1/FVC,

가

1 - 3

가

가

(11).

, 가

가

(17). 4가

(3).

FEV1/FVC, MMEF 25 - 75%

,
80%

,
3가

(14). Hansell (11)

FEV1/FVC

, MMEF 25 - 75%

가

2

MMEF 25 - 75%가 80%

HRCT

가

(15 - 17).

가 ,

HRCT

가

(branching linear structure)

가

(air trapping) (18).

FEV1, FVC

FEV1

, Swyer - James

가

HRCT

HRCT

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HRCT Findings of Hypersensitivity Pneumonitis: Correlation with Pulmonary Function Test¹

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Purpose: To evaluate the HRCT findings of hypersensitive pneumonitis and to correlate the findings with the results of the pulmonary function test (PFT).

Materials and Methods: Seven patients in whom hypersensitive pneumonitis was histologically confirmed (by transbronchial lung biopsy in two, thoroscopic lung biopsy in one, open lung biopsy in two, and typical clinical and laboratory findings in two) were involved in this study. Their radiological patterns were assessed by HRCT and the extent of each finding was evaluated semi-quantitatively and correlated with the results of the pulmonary function test.

Results: The HRCT findings were as follows: lobular overinflation (n = 7), ground glass attenuation (n = 7), centrilobular nodule (n = 6), reticular opacity (n = 5), interlobular septal thickening (n = 3), consolidation (n = 2), and irregular subpleural line (n = 1). Five patients showed lower lung predominance and two, middle lung predominance. In all, a restrictive pattern and diminished diffusion capacity was noted. The grade score of reticular opacity showed significant correlation with forced vital capacity and forced expiratory volume. There was, however, no significant correlation between other HRCT findings and PFT results. Two patients in whom lobular overinflation associated with parenchymal fibrosis was noted showed a decreased maximal midexpiratory flow rate of 25 - 75.

Conclusion: Lobular overinflation, ground-glass attenuation and centrilobular nodules are commonly observed in hypersensitive pneumonitis. The only significant correlation between each HRCT finding and the pulmonary function test was that between reticular opacity and both forced expiratory volume and forced vital capacity. In cases of chronic hypersensitive pneumonitis presenting as pulmonary fibrosis, associated lobular overinflation could be helpful for differential diagnosis.

Index words : Pneumonitis, hypersensitivity
Computed tomography(CT), high-resolution
Lung, CT
Lung, radiography

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