

HRCT ¹

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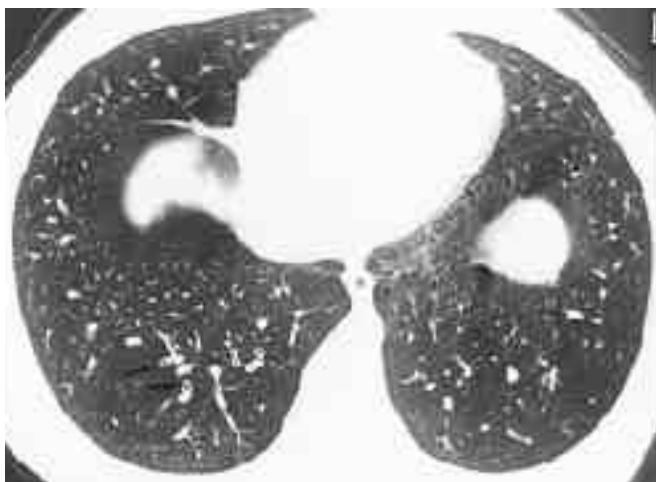
: HRCT , 가
 가
 : 3.5 13.8 (7.7) 21
 (14, 7) HRCT . 16
 5 . 13
 , 8 7 , 가 14 .
 4 6 (3.2) . HRCT 19
 , , , 2
 . HRCT CT-W2000(Hitachi medical Co, Tokyo, Japan)
 , 10 . HRCT
 , , , , ,
 ,
 : 21 7 (33.3%) HRCT , 14 (66.7%)
 . HRCT 14 11 (52.3%) , 3
 , , 가
 (p < .05).
 : 가 HRCT

가 (6).
 , 가 HRCT 가 가
 가 , (5-12), Paganin (11)
 . HRCT
 , (acinar pattern), 가 ,
 (1, 2). 가 ,
 (sequellar line shadow), 가
 가 가
 HRCT
 가 (1-5). (9).

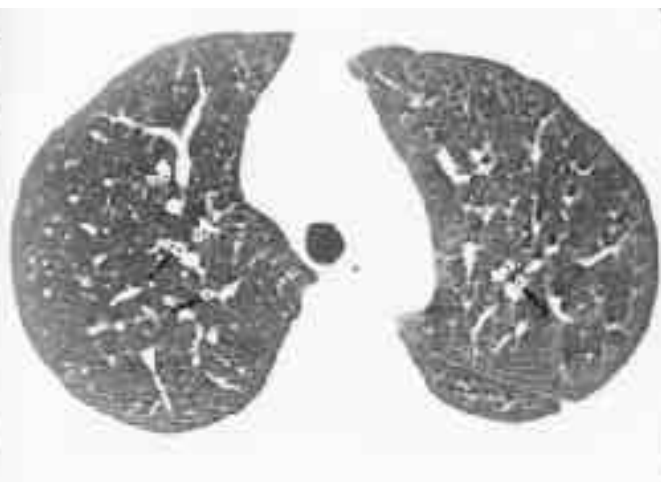
¹
² HRCT

21 (:14 , :7)
 3.5 13.8 (7.7) . HRCT 16
 , 5
 . 13
 (Radioallergosorbent test, Ala STAT[®], DPC[®], CA, U.S.A.)
 8
 ,
 ,
 Sly (13)
 14 . 4 6 11 (3.2) 가
 . HRCT 19
 ,
 , 2
 . HRCT CT W-2000(Hidachi medial Co, Tokyo,
 Japan)

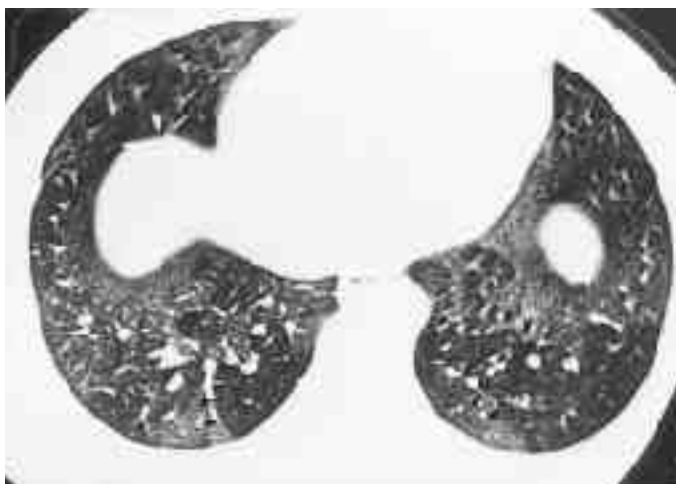
: HRCT
 (high spatial frequency reconstruction algorithm)
 , 10 . 120 kVp,
 300mA, FOV 30cm, 1mm, window level -750HU,
 window width 1000-1300HU . (3 3
 10 1 : 6.9 , 8 , 2)
 , , ,
 1cm
 (14, 15). HRCT 가
 , , ,
 ,
 1/6
 가 , , ,
 , , ,
 density mask (20)
 ,
 Mann-Whitney test , ,
 chi-square test .



A



B



C

Fig. 1. A, B, C. HRCT scan through right lower lobe in a 13 years 10 months-old male in inspiratory phase. The bronchial walls are moderately thickened in right lower lobe (A, arrows) and both upper lobe (B, arrows), mainly subsegmental bronchi. Nonsegmental air trapping is seen in the both lower lobe (C, arrows).

21 14 (66.7%) (Fig.1A, B), 7
(33.3 %)
11 (52.3 %) (Fig. 1C, Fig. 2 A, B)
, 3 (Table 1).

Table 1. HRCT and Clinical Findings of 21 Patients with Asthma

Sex/Age	HRCT findings		Duration	Grade	Type	Medicationat
	BW thickening	Air trapping	of disease	of disease		HRCT scan
1. M/6y6m	+	-	3y2m	S	A	B
2. M/13y10m	+	+	6y1m	S	A	iB+ iST
3. M/12y	-	-	4y	S	A	B
4. M/10y7m	+	+	6y	Mo	NA	B
5. F/8y11m	-	-	2y8m	Mo	A	B
6. F/3y6m	+	+	8m	Mo	A	B+ iST
7. M/6y	+	+	1y5m	Mo	A	B
8. F/9y10m	+	-	7y	S	A	B
9. F/8y6m	-	-	1y4m	Mo	A	B
10. F/8y6m	+	+	4m	S	A	B+ ST
11. M/5y3m	+	+	1y7m	Mo	A	B
12. F/8y6m	-	-	6y11m	Mo	A	B
13. M/3y6m	+	+	2y	Mo	NA	B
14. F/8y6m	+	-	2y7m	S	NA	B+ iST
15. M/9y1m	+	+	3y5m	S	A	iB
16. M/10y1m	+	+	3y	Mo	NA	B
17. M/8y8m	-	-	1y4m	Mo	A	B
18. M/6y7m	-	-	1y7m	Mo	NA	B
19. M/7y3m	-	-	6y1m	Mo	NA	B
20. M/3y	+	+	2y8m	Mo	NA	B
21. M/3y3m	+	+	2y8m	Mo	NA	iB+ ST

BW : bronchial wall
S: severe, Mo: moderate
A: allergic, NA: non-allergic
i : inhalatory

+ : finding present at CT
- : finding absent at CT
B : bronchodilator
ST : steroid

6.7-9.5%
(p = .359),
(p = .881),
(p = .659),
(p = .361) p > .05
(p = 1.0),
가
chi-square test
가 (p < 0.05) (Table 2).

가
가 가

(1-5).

22-42 %

Table 2. Comparison between the Bronchial Wall Thickening and Air Trapping

	Air Trapping		Total
	+	-	
BW Thickening +	11	3	14
-		7	7
Total	11	10	21

P= 0.001 by chi-square test
+ : presence, - : absence

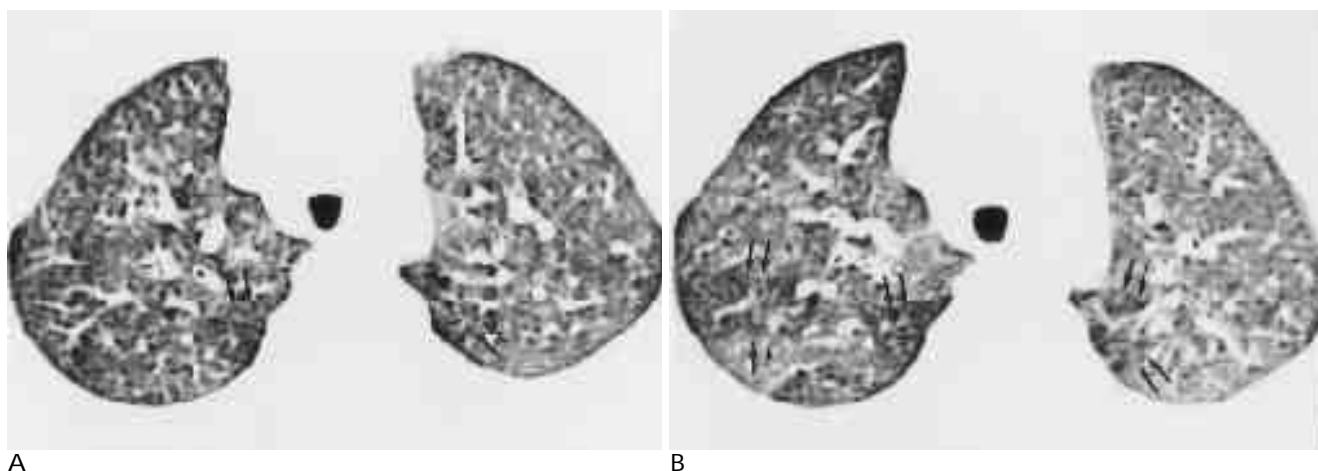


Fig. 2. HRCT scan through the right upper lobe in a 3 year - old male. Focal area of hyperlucency, most likely representing air trapping are seen in the both upper lobe (A, arrows), which is more prominent in expiratory scan (B, arrows).

(6). CT Allergic bronchopulmonary aspergillosis (ABPA), (5, 6, 9). Lynch (10) Neeld (17) ABPA가 15-77 % (cylindrical bronchiectasis), Paganin (11) 56 % (bronchial dilatation) 가 가 가 (remodelling) 가 (17). 가 가 (permanent abnormality) 가 가 (17). 가 가 가 Paganin 6 23 가 가 (18, 19). Paganin (11) 16 %, HRCT 46 % Lynch (10) 71 % 92 % 가 (20) 1 44% (forced expiratory volume in 1 second, FEV1) 60 % 가 가 7 11 (10-12). (23). (20) 가 14 % 50 % 가 (residual volume, RV) 가 , Lynch (22) CT FEV1, (functional residual capacity, FRC), (forced vital capacity, FVC) CT

가 (total lung volume) density mask (20) 10 6.7-9.5 % 4 가 가 가 (9, 10, 22). 가 가 HRCT 가

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HRCT Findings of Asthmatic Children under Maintenance Therapy¹

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Purpose: The purpose of this study was to evaluate the HRCT findings of bronchial asthma during maintenance bronchodilator therapy and to determine whether there were irreversible bronchial changes occurred in pediatric patients with this condition.

Materials and Methods: HRCT findings of the lung in 21 asthmatic children [14 boys and 7 girls aged between 3.5 and 13.8 (mean : 7.7) years] who were receiving maintenance bronchodilator therapy were retrospectively studied. At the time of CT examination, 16 were receiving nonsteroid bronchodilator therapy only, and five were receiving both bronchodilator and steroid therapy. Thirteen patients were defined as allergic and eight were nonallergic. The clinical severity of chronic asthma was graded as severe in seven cases, and moderate in 14. The duration of the disease ranged from 4 months to 6 years (mean 3.2 years). HRCT was performed in 19 cases for evaluation of the atelectasis, hyperinflation, and prominent bronchovascular bundles seen on plain radiographs, and in two cases for evaluation following acute exacerbation. A CT W-2000 scanner (Hitachi Medical Co. Tokyo, Japan) was used during the end inspiratory phase, and in addition, ten patients were scanned during the expiratory phase. Scans were reviewed for evidence of bronchial thickening, bronchiectasis, emphysema, abnormal density, mucus plugs, and other morphological abnormalities. The presence of bronchial wall thickening or air trapping was evaluated according to the duration, severity and type of asthma.

Results: Among the 21 patients, 7(33.3%) had normal HRCT findings, while in 14 (66.7%), bronchial wall thickening was demonstrated. Eleven of the 14 patients with bronchial wall thickening (78.6%) also had air trapping. No patient was suffering from bronchiectasis or emphysema. There were no statistically significant correlations between the presence of bronchial wall thickening or air trapping and the duration of the disease, its severity, or type of asthma. There was, however, a statistically significant correlation between bronchial wall thickening and air trapping ($p < .05$).

Conclusion: In asthmatic children who were under maintenance therapy, the most frequent HRCT findings were bronchial wall thickening and air trapping, with significant correlation between the presence of these two phenomena. No destructive lesion such as bronchiectasis or emphysema was found in these asthmatic children, however, and this is probably due to the short duration of the disease, and different disease processes.

Index words : Children, respiratory system

Asthma

Lung, CT

Computed tomography (CT), high-resolution

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