

CT,

1

:

2

: MRI 가 CT
 가 MR
 : 5 CT MRI,
 3 MRI . CT . MRI
 , , ,
 MRI
 MRI
 3 MRI
 : CT 5 2 MRI 5 가
 1 가 MRI MRI
 T2 MRI MRI
 T1 T2 가 . 3
 MRI 가 2 .
 :
 T2 . , CT

CT 가

50%

6-8%

(1).

(1, 4)

, 1 cm

(2)

CT

가

CT(narrow - collimated CT)
(densitometry)

가

(1, 3)

CT

20 HU

(5)

1

2

2001 4 19

2001 8 21

ner (General Electric Medical System, Milwaukee, WI, U.S.A.)

1 cm
1.5 mm 3

mm

(Mediastinal window setting, 10 HU : 300 HU)

(density)

가
(4).

(7)
CT

-40 - -120 HU (1).

CT MR

(cleft like structure)

CT 가 CT

(tissue characterization) MRI
가 가

CT 2 가 MRI

CT MRI 1.5T (Magnetom VISION;Siemens, Erlan - gen, Germany)

T1 5 CT MRI 1 2

(ECG - gating) mul -

tisection fast low - angle shot (FLASH)

1.9 cm(1.0 - 2.8 cm)

TR 978.2 - 1122.8 msec., TE 14.0 msec. flip

1

angle 90 . T2 echo train 29 turbo spin

5

echo (TSE) TR 4.8 msec., TE 2.3 msec. flip angle

1

180 . 3 Gd - DTPA (0.1 mmol/kg body

1

wt. ; Schering, Germany)

FLASH

1

가

2

T1

MRI

1 cm

T1 T2

MR

Table 1. CT Findings (non-enhanced study) of Pulmonary Hamartoma

No.(sex/age)	Size(cm)	Contour	Margin	Fat(HU)	Calcification	Cleft-like structure
1 (M/41)	1.2	ovoid	discrete	-	-	-
2 (M/50)	2.2	round, lobulated	discrete	-	+ (popcorn type)	-
3 (M/52)	2.8	ovoid, multilobulated	discrete	+ (-89.5)	+ (popcorn type)	-
4 (M/60)	2.5	round, partly lobulated	discrete	-	-	+
5 (F/48)	1.0	ovoid, focal lobulated	discrete	-	-	-

Table 2. MR Findings of the Pulmonary Hamartoma

No.	T1		T2		Post-DTPA
	Major portion	Cleft and cystic portion	Major portion	Cleft and cystic portion	
1 specimen	intermediate	none	high	slightly high	
	intermediate	high	high	intermediate	
2 specimen	intermediate	slightly high	intermediate	high	central and pph. rim enhance
	intermediate	low	slightly high	high	pph. rim and partly cleft enhance
3 specimen	intermediate	slightly low	intermediate	high	pph. rim and cleft enhance
	intermediate	slightly low	intermediate	low cleft without cyst	
4 specimen	intermediate	high	heterogeneously high	low	
	intermediate	slightly high	slightly high	high cleft without cyst	

No.: case number, T1: T1-weighted image, T2: T2-weighted image, Post-DTPA : Gadolinium-enhanced T1-weighted mage, specimen: specimen MRI of the case

MRI가 , 1 T1 가 가 .
 MRI MRI (Fig. 1B, MRI MRI T2
 D). MRI MRI (Fig. 1C, G). MRI
 5
 4 T1 T2 가 T1 가
 가 80%, T2 100% MRI (T1
 T2 100%) .
 CT 1 MR , , T1 T2
 5 T1 T2 가 가 3
 가 1 (Fig. 2B, C, D). MRI 3 가
 2 (1) (Fig. 3B, C, D). 가 1 MRI
 가 T1 (Fig. 2). 1 가
 T2 3

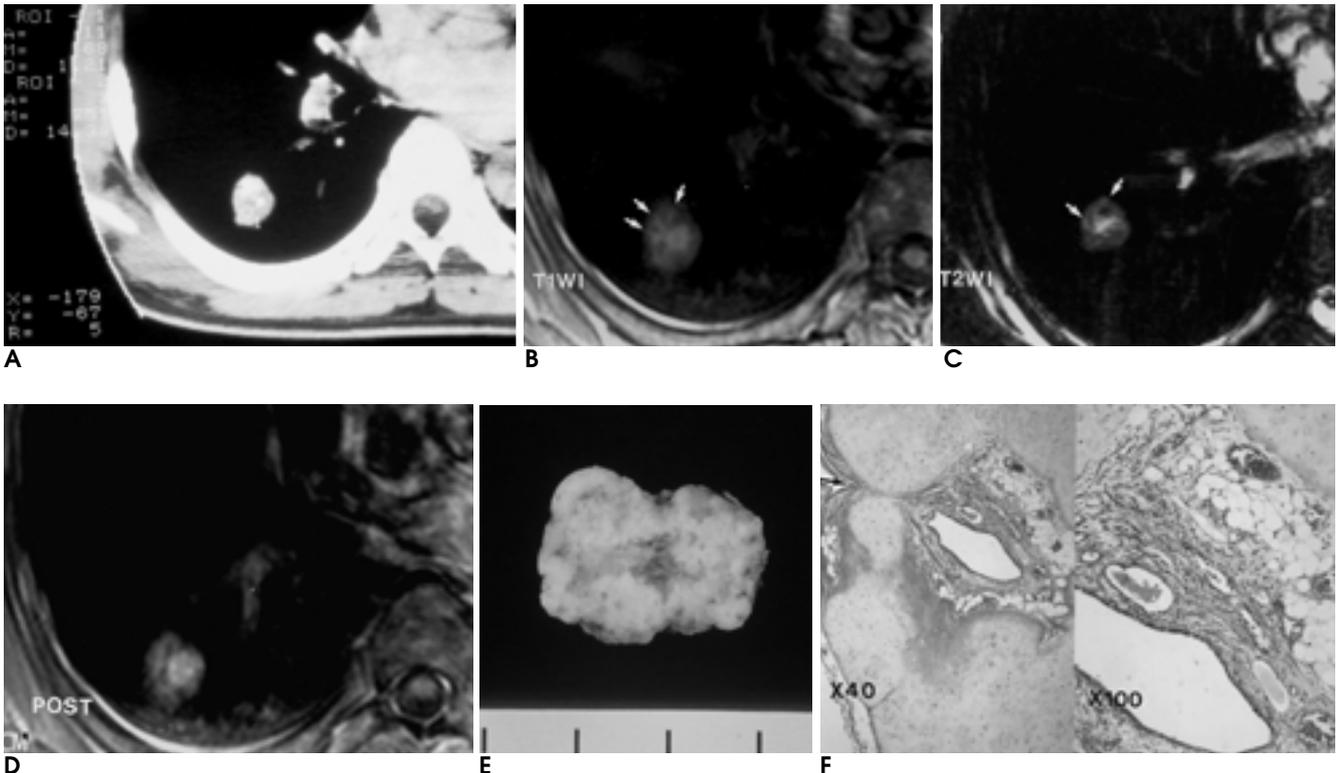


Fig. 2. 50- years old male patient of case number 2. CT scan (A) shows a nodule with small popcorn shaped calcification without fat component by densitometry. Routine T1 and T2WI (B, C) show heterogeneous nodule of intermediate SI pathologically revealed mature chondroid hamartoma (F). The centrally cystic portion and peripheral stripes (B, C, arrows) of the nodule with high SI on T1 and T2WI are pathologically correlated with multiple cleft structures (E, F, arrow) including multifocally collected fat component and other mesenchymal component. Same degree of enhancement at the central and peripheral portion of the nodule is seen after Gd-DTPA IV injection (D) is pathologically correlated with relatively even distributed blood vessels (F).

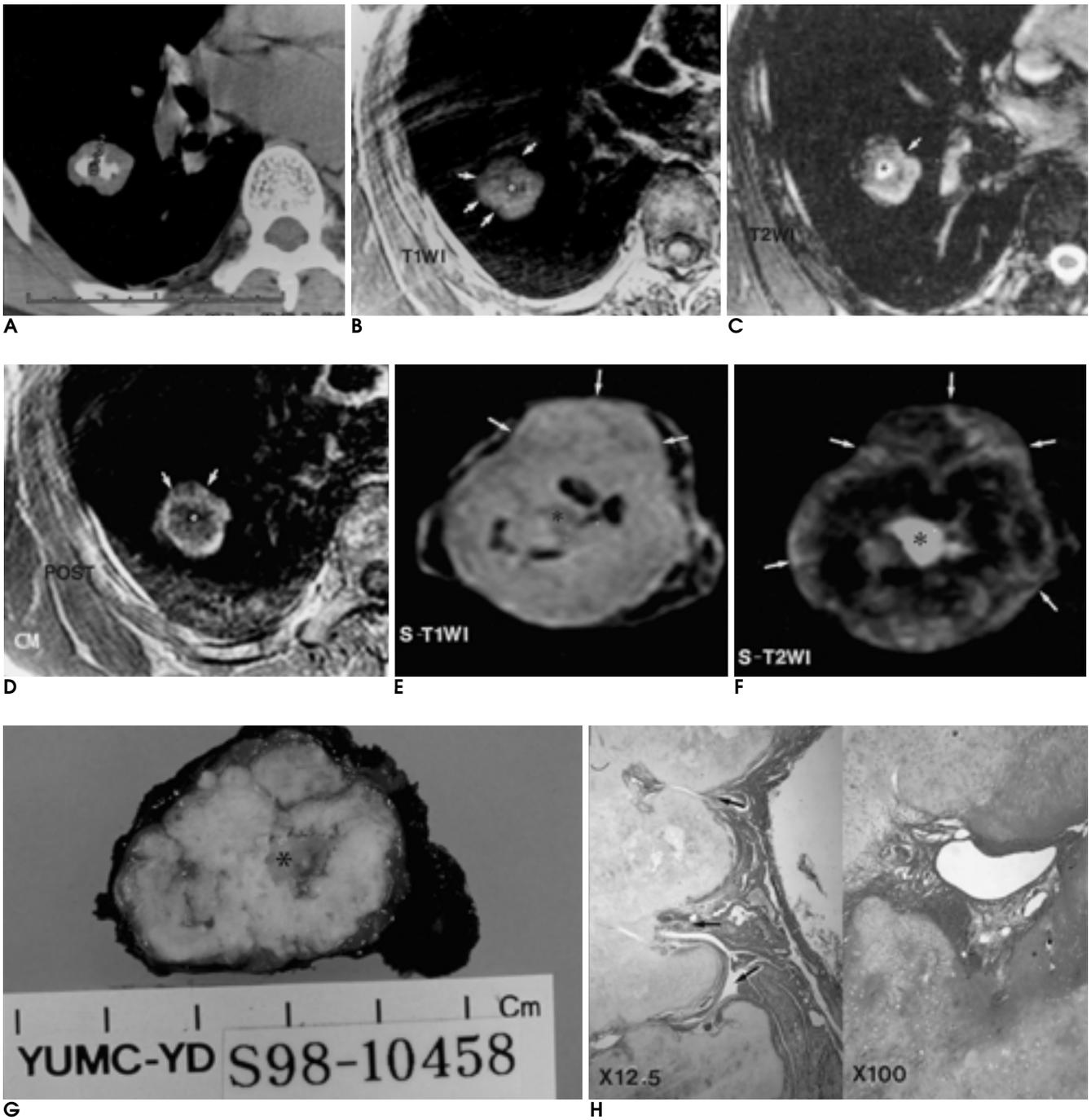


Fig. 3. 52- years old male patient of case number 3.

Narrow-collimated CT scan (**A**) shows a lobulating nodule with popcorn shaped calcification and fat component demonstrated by densitometry. Routine and specimen T1WI (**B**, **E**, arrows and asterisk) show a heterogeneous, intermediate signal nodule with low signal cleft-like structures and central cystic portion. And T2WI (**C**, **F**, arrows and asterisk) show high signal cleft-like structure and central cystic portion. But after Gd-DTPA IV injection, marginal rim and partly cleft enhancement of the nodule (**D**, arrows) are only seen without enhancement at the central portion (**D**, asterisk). Which is pathologically correlated to rich vascular structure of the margin of the nodule and lymphatics dominant mesenchymal tissues of the cleft structure (**H**, arrows).

Especially, central vacant space probably filled with fluid material (**G**, asterisk) result in non-enhanced central portion (**D**, asterisk).

(Fig. 3).

가 (5, 12, 13, 14), 3 cm (incremental dynamic CT) (11) 가 20 HU

(fibrous connective tissue) (undifferentiated multipoten - (benign mesenchymal tumor) (2). 20 HU (5) 가 (5, 12).

40 - 70 가 가 가 ,

(7). 2:1 3:1 가 가 (peripheral) (capsular) (6),

1 1.5 mm (8) Hackl (9) 가 (doubling time) 30 3 cm (5). (10) 1 mm (contrast -

14 (malignant transformation) (10) enhanced septa) 80%

가 , 가 , 가 (2, 15)

가 가 (8). (intraparenchymal hamartoma) (endobronchial hamartoma)

1 cm 가 (mesenchyme) (epithelial tissue)

가 (high predictable) (partial volume) 가 (myxomatous connective tissue) , , ,

averaging) CT (1, 3). (lobular growing)

CT가 가 (double layered sheet)

(3, 11) 가 (1). 65% CT (1) CT

CT (7). 31 % 2.2 cm 1 (transition) 가 가 가 가

, 2.8 cm 1 5 3 (60 %)

가 MRI CT

가 CT 5 1 가 MRI 5 가 MRI

가 MRI 가

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Diagnostic Usefulness of MRI for Pulmonary Hamartoma : CT, MRI and Histopathologic Correlations¹

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Purpose: To determine the diagnostic usefulness of MRI in pulmonary hamartoma, and the significant MRI features other than fat or characteristic calcification, both revealed by CT.

Materials and Methods: We prospectively studied chest MR images in five patients with pulmonary hamartoma. All underwent narrow-collimated CT scanning and conventional MRI, specimen MRI was available in three cases. Pulmonary nodular size, shape and margin and the presence of intratumoral fat density, calcification and a cleft-like structure were determined. At MRI, the presence and signal intensity (SI) of the cleft-like structure, including intratumoral cystic space and SI of the main portion of the tumor, were analyzed and compared with the findings of specimen MRI, and correlated with the histopathologic findings. In three cases, the typical enhancement pattern revealed by post-contrast MRI was also evaluated.

Results: Narrow-collimated CT scanning revealed fat density or popcorn-shape calcification in two cases and a cleft-like structure in one. The other two cases showed neither fat nor calcification. At MRI, however, all five cases showed a cleft-like structure, which was especially evident on T2WI. The detectability of this did not vary between conventional and specimen MRI. The cleft-like structure showed varying SI on T1, and T2WI correlated to variable mesenchymal component including with respiratory epithelial cells lining the cleft. Marginal rim enhancement was noted on all three post-contrast MR images, and correlated with the relatively rich vascularity of the tumor's marginal portion. An enhanced cleft-like structure was noted in two cases.

Conclusion: The presence of a cleft-like structure, especially prominent on T2WI and with variable SI, is a useful MR finding for the diagnosis of pulmonary hamartoma, and marginal rim enhancement is an ancillary diagnostic MR finding. In particular, MRI is a useful diagnostic tool in cases where a simple pulmonary nodule demonstrates neither fat nor calcification.

Index words : Lung neoplasms
Lung neoplasms, CT
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