

## FLAIR-HASTE MR

1

: FLAIR (fluid-attenuated inversion recovery) -  
HASTE (half - fouver acquisition single - shot turbo spin eche) MR

.  
: 12 MR 5 mm 80  
127 60 , 27 ,  
25 , 15 . (n=11),  
(n=17), MR (n=99) . MR T2  
HASTE (TE, 134 ms; echo space, 4.4 ms) FLAIR - HASTE (TE, 64 ms; echo  
space, 4.4 ms; inversion time, 2000 ms; number of slice, 5 - 9; acquisition time, 13 - 20 s)  
, T1 FLASH (fast low - angle shot) (TR, 131 ms; TE, 4 ms)  
. FLAIR - HASTE T2 HASTE  
. FLAIR - HASTE T2 HASTE  
5 : 1) ( , 2)  
( , 3) ( , 4)  
( , 5) ( ).  
: FLAIR - HASTE 21 (84%) , 3 (12%)  
, 1 (4%)  
가 . FLAIR - HASTE  
(n=50, 83%) (n=10,  
17%) . 42 14 (33%) , 8 (19%)  
, 18 (42%) , 1 (2.5%) , 1  
(2.5%)  
: FLAIR - HASTE  
FLAIR - HASTE MRI  
MR

Fluid - attenuated inversion recovery (FLAIR) MR

(inversion recovery) MR

(inversion time) 2

T1

(8 - 10).  
(residual tumors)

FLAIR

(9, 10).

. FLAIR

FLAIR

(1 - 5),

가 , HASTE (half - fouver acquisition sin -  
gle - shot turbo spin echo)

FLAIR - HASTE

FLAIR

(6, 7).

FLAIR

FLAIR - HASTE

2000 3 2001 2 MR  
 259 FLAIR - HASTE 5 T1  
 mm 80 127 MR 3  
 30 - 76 ( ; 52.5 ) , 4  
 가 46 가 34 CT 가 가  
 45 60 , 21 27 , 9  
 25 , 9 15 MR 1.5 T (Magnetom Vision,  
 Siemens, Erlangen, Germany)  
 circular polarity - body array coil  
 11 ,  
 (gastrointestinal stromal tumor) 4  
 6.8 - 98.9 mm ( ; 30.2 mm),  
 11.3 - 143.6 mm ( ; 36.6 mm), 5.6 -  
 45.3 mm ( ; 15.7 mm), 11 - 39.2 mm  
 ( ; 25.0 mm)  
 T2  
 , T1  
 T1  
 MR

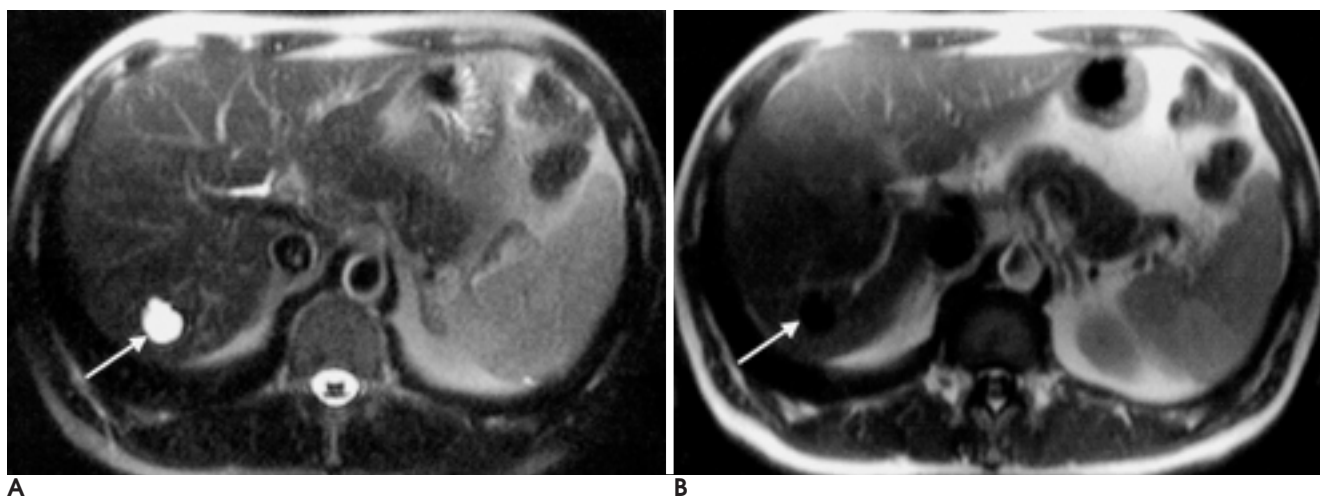
FLAIR - HASTE (TE, 64 ms; echo space, 4.4 ms; inver -  
 sion time, 2000 ms; number of slice, 5 - 9; acquisition time,  
 13 - 20 s) T2  
 HASTE (TE, 134 ms; echo space, 4.4 ms) ,  
 T1 FLASH (fast low angle shot) (TR, 131.7 ms; TE, 4.1  
 ms; Flip angle, 80 °) , True FISP (fast  
 imaging with steady state precession) (TR, 4.8 ms; TE, 2.3  
 ms; Flip angle, 70 °) 8 mm 25%

**Table 1.** Signal Intensity of Various Hepatic Tumors on FLAIR-HASTE and T2-weighted HASTE Image

SI	Cyst		Hemangioma		HCC		Metastasis	
	F-H	HASTE	F-H	HASTE	F-H	HASTE	F-H	HASTE
Very high	1(4)	25(100)	50(83)	57(95)	7(26)	4(15)	7(47)	7(47)
Moderately high			10(17)	3(5)	7(26)	7(26)	1(7)	1(6)
Slightly high					13(48)	16(59)	5(32)	7(47)
Intermediate	3(12)						1(7)	
Low	21(84)						1(7)	

SI: Signal Intensity, F-H: FLAIR-HASTE, HCC: Hepatocellular carcinoma

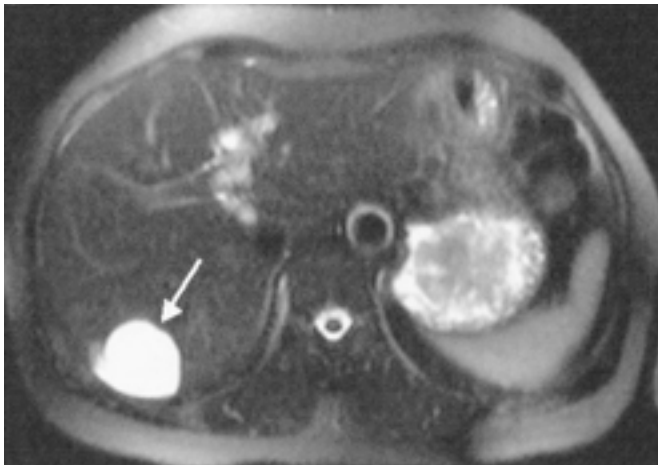
Numbers in parentheses are percentages.



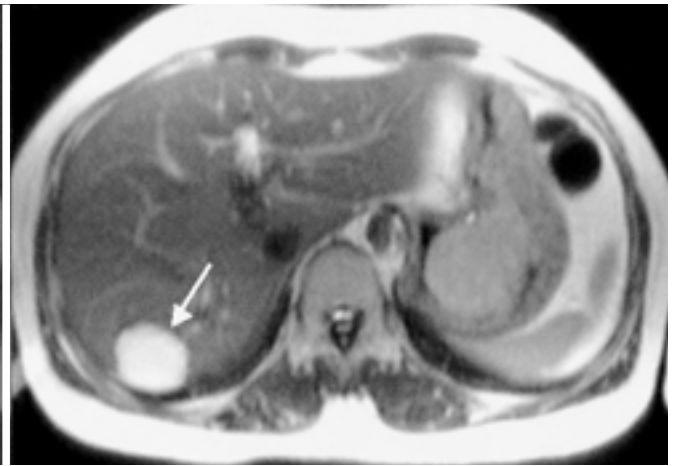
**Fig. 1.** Simple cyst of the liver in a 54-year-old male.

**A.** T2-weighted HASTE image shows a hepatic cyst (arrow) with very high signal intensity.

**B.** On FLAIR-HASTE image, this lesion (arrow) is seen as low signal intensity.



A



B



C

**Fig. 2.** Complicated cyst of the liver in a 52-year-old female.

**A.** T2-weighted HASTE image shows a hyperintense lesion (arrow) in the liver.

**B.** On FLAIR-HASTE image, the lesion (arrow) is seen as very high signal intensity.

**C.** Ultrasonogram shows multiple septa within the cyst (arrowheads).

gadolinium - DTPA (Magnevist, Schering, Germany, 1 mmol/kg)

T1 FLASH (10 , 45 , 90 , 5 )

T1 FLASH . FLAIR - HASTE

T2 HASTE

MR

. FLAIR - HASTE T2 HASTE

5

: 1) ( , 2)

( , 3) (

( , 4) ( ,

5) ( ).

(12%) (Fig. 1). FLAIR -  
HASTE T2 HASTE

(Fig. 2).

T2 HASTE FLAIR - HASTE

(T2 HASTE , 95%;

FLAIR - HASTE , 83%) (T2

HASTE , 5%; FLAIR - HASTE , 17%)

(Fig. 3).

T2 HASTE (100%) FLAIR -

HASTE (100%) (

(Fig. 4), ,

T2 HASTE

, FLAIR - HASTE 86%

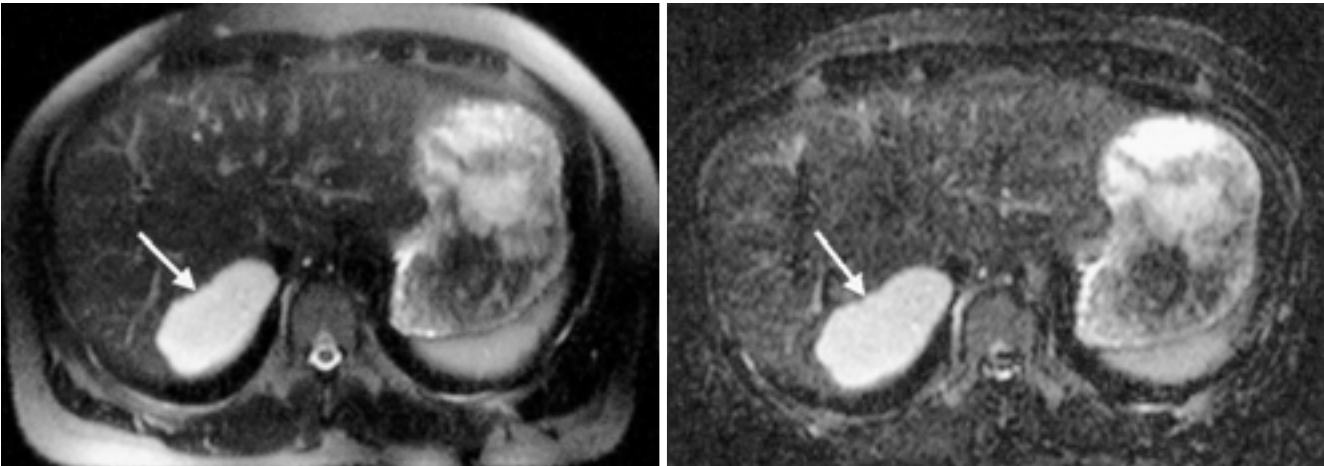
T2 HASTE FLAIR - HASTE

Table 1

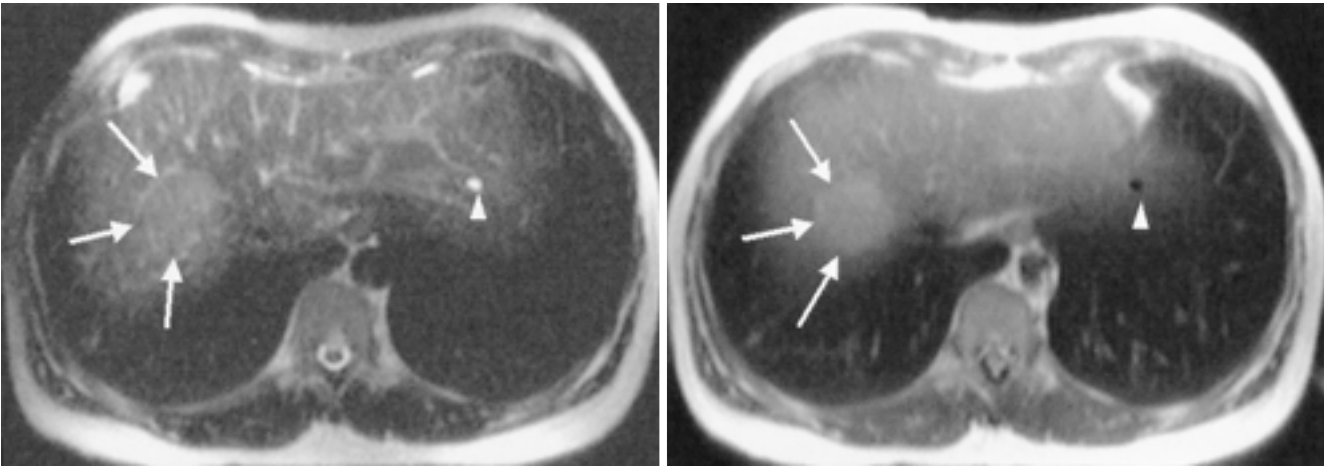
T2

HASTE (100%) ,

FLAIR - HASTE (84%)



**A**  
**Fig. 3.** Hemangioma of the liver in a 45-year-old male.  
**A.** T2-weighted HASTE image shows a hyperintense lesion (arrow) in the liver.  
**B.** On FLAIR-HASTE image, the signal intensity of the hemangioma (arrow) is higher than that of the spleen.



**A**  
**Fig. 4.** Hepatocellular carcinoma of the liver in a 46-year-old female.  
**A.** T2-weighted HASTE image shows a mass (arrows) with slightly high signal intensity in the liver. A cyst (arrowhead) with very high signal intensity is seen in the left lobe.  
**B.** On FLAIR-HASTE image, the lesion (arrows) is seen as slightly high signal intensity. The cyst (arrowhead) in the left lobe is seen as low signal intensity.

가 ,  
가 , MR  
 , FLAIR MR  
(11).  
(inversion recovery) MR  
180 (inversion pulse)  
(inversion time)  
가  
288

FLAIR MR 2 T1  
MR  
FLAIR 6000 ms, echo time 160  
ms, 2100 ms 10  
13 가  
FLAIR  
(9, 10, 12 - 15).  
HASTE FLAIR  
space 4.4 ms, , 2000 ms 20  
FLAIR-HASTE  
echo time 64 ms, echo

## 9 FLASH - HASTE

## FLAIR MR

## FLAIR - HASTE

가

Ohkawa (11)

16

10

FLAIR

9

FLAIR - HASTE

(96%)

102

2

(2%)

가 FLAIR

(5, 16, 17).

가

(18).

T2

(proton - density weighted image)

(19, 20). Aprile

(18)

(cystic intracranial lesion)

(non - free

water like cystic lesion)

(free water like cystic lesion)

T2

, FLAIR

FLAIR - HASTE

가

(Fig. 2).

2

FLAIR - HASTE

(metastasectomy)

가

FLAIR - HASTE

T2

, T1

20

9

9

FLAIR - HASTE

FLAIR - HASTE

MR

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J Korean Radiol Soc 2001;45:285 - 290

## FLAIR-HASTE Sequence in Differential Diagnosis of Focal Hepatic Lesions<sup>1</sup>

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**Purpose:** To assess the feasibility of using the FLAIR (fluid-attenuated inversion recovery)-HASTE (half-fourier acquisition single-shot turbo spin-echo) sequence for the differential diagnosis of focal hepatic lesions.

**Materials and Methods:** During a 12-month period, 80 patients with 127 focal hepatic lesions [hemangiomas (n=60), hepatocellular carcinomas (HCC) (n=27), cysts (n=25), and metastases (n=15)] underwent MR imaging using a 1.5-T scanner. Verification of the diagnosis was based on the findings of pathology (n=11), of angiography and clinical investigation (n=17), or of dynamic contrast-enhanced MR imaging (n=99). MR sequences included T2-weighted HASTE (TE, 134 ms; echo space, 4.4 ms), FLAIR-HASTE (TE, 64 ms; echo space, 4.4 ms; inversion time, 2000 ms; number of slices, 5-9; acquisition time, 13-20 s), and dynamic gadolinium-enhanced T1-weighted FLASH (TR, 131 ms; TE, 4 ms). FLAIR-HASTE imaging was of any focal lesions seen on T2-weighted HASTE images was performed in the liver area, and their signal intensity was classified in one of five ways: very high (higher than the spleen), moderately high (similar to the spleen), slightly high (higher than the liver and lower than the spleen), intermediate (similar to the liver), or low (lower than the liver).

**Results:** The signal intensity of the 25 cysts, as determined by FLAIR-HASTE, was low in 21 cases (84%), intermediate in three (12%), and very high in one (4%), which was diagnosed as a complicated cyst in which ultrasound revealed internal septa. At FLAIR-HASTE, all 60 hemangiomas showed either very high (n=50, 83%) or moderately high (n=10, 17%) signal intensity, while that of 42 hepatic malignant tumors was very high in 14 cases (33%), moderately high in 8 (19%), slightly high in 18 (43%), intermediate in one (2.5%), and low in one (2.5%).

**Conclusion:** FLAIR-HASTE showed that the signal intensity of the majority of hepatic cysts was low, while that of most hemangiomas and solid liver tumors was high. For the differential diagnosis of cystic and non-cystic liver lesions, FLAIR-HASTE is an easily applicable MR imaging sequence.

**Index words :** Liver, MR

Liver, neoplasms

Magnetic resonance(MR), pulse sequences

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