

CT 1

: CT

: 21 가 3 cm
22 CT 30 ()
, 70 () 3 ()
, (abscess cavity) CT
(multiseptation), (granulation layer)
(collagenous wall)
: 4 (n=13) 가
3 (n=11) 2 (n=15) 가 가 . 4 13
가

(hyperperfusion zone)
가
: CT 4
, 3 , 2 ,
가

wall) ” (5-7).

(CT) 가
, CT (hyperperfu-
sion zone) (5, 6). CT
4 (5, 6). CT
가 CT (1-4). CT CT
(MRI) 2 (layer) CT
(5-7). CT CT
(three-phase)

가
ty) ” 2
layer) ” “ (abscess cavi-
“ (granulation
“ (collagenous

Spearman

Phase	No. of Layers			
	1	2	3	4
AP	1 (4)	3 (14)	5 (23)	13(59)
PP	3 (14)	4 (18)	11(50)	4 (18)
EP	5 (23)	15(68)	2 (9)	0 (0)

C. Equilibrium phase CT image shows hyperattenuating collagenous wall (arrowheads), thus obliterating hyperattenuating granulation layer.

(Fig. 1-3) 4 13 Table 2 (Fig. 3) 7 , (Fig. 2) 8 . 가
 CT 가 20 가 13 ,
 가 13 (Fig. 1, 3) .
 1.0 - 5.7 mm(, 3.3 mm), 2.0
 - 8.7 mm(, 5.3 mm) .
 1/3 , 1/3-2/3, 2/3 가 3
 (Fig. 1), 5 (Fig. 2), 14 (Fig. 3) , Table 3
 가
 r 0.674, P 0.002
 2 (Fig. 1). 4-12
 cm(, 6.8 cm) (Fig. 1) 7 ,

Table 2. Changes in Enhancement Pattern at Three-Phase Helical CT Images in 13 Hepatic Abscesses with Four Layers on AP Images

Layer	Enhancement Pattern (AP - PP - EP)	No. of Abscesses
Abscess Cavity	Low-low-low	13(100)
Granulation Tissue	High-high-high	13(100)
Collagenous Wall	Low-low-high	6 (46)
	Low-low-iso	6 (46)
	Low-low-low	1 (8)
Hyperperfusion Zone	High-iso-iso	9 (69)
	High-high-iso	4 (31)

Note. - Numbers in parentheses are percentages from a total of 13 hepatic abscesses. AP= hepatic arterial phase, PP= portal venous phase, EP= equilibrium phase.
 low, iso, and high= low, iso-, and high attenuation, respectively.

가
 CT 가

Table 3. Correlation between Number of Layers and Maturation of Collagenous Wall on AP Images of 22 Hepatic Abscesses

No. of Layers	Grade of Maturation		
	< 1/3 (n= 3)	1/3 - 2/3 (n= 5)	> 2/3 (n= 14)
1	0 (0)	0	0 (0)
2	1 (33.3)	1 (20)	1 (7)
3	1 (33.3)	3 (60)	1 (7)
4	1 (33.3)	1 (20)	12 (86)

Note. - Numbers in parentheses are percentages from the total hepatic abscesses at each grade of maturation.
 AP= hepatic arterial phase.

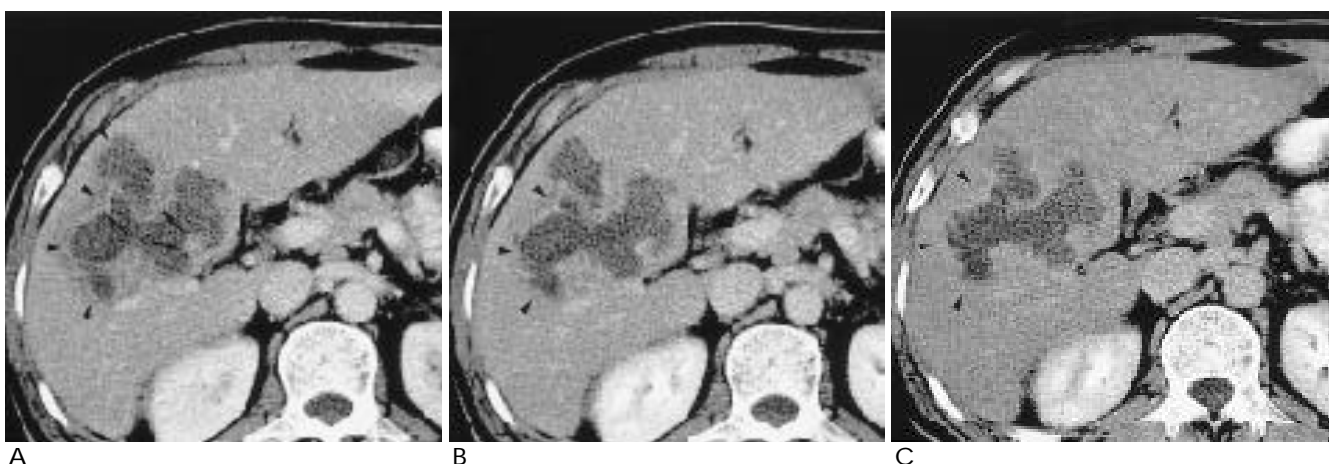


Fig. 2. 48-year-old man with pyogenic abscess.

A. Hepatic arterial phase CT image shows a lobulating lesion with a hypoattenuating abscess cavity and two hyperattenuating(granulation layer, arrows) and hypoattenuating(collagenous wall, arrowheads) concentric rings.

B. Portal venous phase CT image shows the same enhancement pattern of three layers as A, but less prominent hypoattenuating collagenous wall(arrowheads).

C. Equilibrium phase CT image shows obliterated, isoattenuating collagenous wall(arrowheads).



Fig.3. 65-year-old man with pyogenic abscess.

A. Hepatic arterial phase CT image shows a multiseptated, ovoid lesion with a low attenuating abscess cavity, a hyperattenuating ring (granulation layer, small arrows), and surrounding wedge-shaped hyperattenuating hyperperfusion zone (large arrows).

B. Portal venous phase CT images shows disappeared hyperperfusion zone, and slightly hyperattenuating granulation layer (small arrows).

C. Equilibrium phase CT image shows obliterated, isoattenuating granulation layer (small arrows).

가 20
가 MRI
가 CT
가 CT
(1, 2). CT가
가
가
, CT
(1-4). CT MRI
가
(5- 4
7).
, CT
(5-7).
(5-7). CT
, 2
(5) 68%
5-7 mm type I
(7). CT
(5, 6). Mathieu (6)
double target sign 33.3%
79% CT
CT
2 cm
(cluster sign)가
(8).
가 3 cm
cluster sign
MRI
가 (7). CT 22 4 13
MRI 가
가 가

1

2

2

2

가

CT

(rim enhance-
CT

ment)
CT double target sign

(6).

(9),

(5, 10, 11).

가

CT

가

(6, 12). Mathieu (6)

30%

(5)

62%

CT

CT

68%

CT

CT

가

CT

가

CT

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Hepatic Abscess : Three-Phase Helical CT Appearance¹

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Purpose : The purpose of this study was to evaluate the enhancement patterns and morphologic features of hepatic abscesses, as seen on three-phase helical CT images.

Materials and Methods : Three-phase helical CT images of 22 clinically and pathologically proven hepatic abscesses more than 3 cm in diameter in 21 patients were retrospectively reviewed. Three-phase helical CT scans were obtained at 30 sec (hepatic arterial phase, AP), 70 sec (portal venous phase, PP) and 3 min (equilibrium phase, EP) after the start of intravenous infusion of contrast material. We analyzed the number of abscess layers and their enhancement patterns during each phase, and evaluated the size and shape of abscess, the CT attenuation and presence of septae in the abscess cavity, and the thickness and maturation of the granulation layer and collagenous wall.

Results : AP images showed that 13 abscesses (59%) had four layers; on PP images, half the abscesses were seen to have three layers, while EP images showed that two-thirds had two layers. Among the 13 abscesses with four layers seen on AP images, all abscess cavities and granulation layers were hypo- and hyperattenuating, respectively, during all three phases. Most hypoattenuating collagenous walls seen on AP images became iso- or hyperattenuating on EP images, while hyperattenuating hyperperfusion zones seen on AP images became isoattenuating during later phases. The degree of maturation of the collagenous wall correlated with the number of abscess layers.

Conclusion : As seen on AP, PP and EP three-phase helical CT images, hepatic abscess frequently had four, three, or two layers respectively. More mature collagenous walls tended to have more abscess layers.

Index words : Liver, CT

Liver, abscess

Liver, infection

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