

CT

:

1

: CT

: 1997 7 1999 6 CT
 26 (: =23:3) . CT (30), (70),
 (220) 가
 () 가 () , ,
 , CT (CT), (),
 : CT 7 (27%), 13 (50%) , 1
 가 (12 , 13 , 25), 96%
 가 : : = 2:2:2 (11)
 , 3:3:3 1 12 (46.2%) 14
 (53.8%) 가 3 4
 CT , 1
 가 (86%,14%) 2
 (25%,75%) (43%,57%).
 : CT 3 4 가
 가 1 2
 CT

가 (5).
 CT
 , , ,
 50 - 60% 0 - 2% (1 - 3).
 가 가
 (conventional computed tomography, CT),
 CT, (magnetic resonance imaging, MRI)가
 CT 가 CT
 , 6% CT 가 ,
 (4), CT
 CT 33% CT
 3 , ,
 (radiologic - pathologic
 correlation)가
 1
 2000 8 21 2000 11 10
 CT

CT

3 1:256

metronidazole CT

5 cm, 5-10 cm, 10 cm

가 ()

가 () , SPSS 7.5

(Chi-Square test).

CT

7, 13

1

가 (12, 13, 25),

96% (Fig. 1).

가 : : = 2:2:2

(11) (Fig. 2), 3:3:3 1

12 (46.2%) 14 (53.8%)

가 3 4

(Table 1)

(Fig. 3, 4).

CT 가 1-7, 8-14, 15 7,

12, 7, CT 1-11 cm(6.5 cm)

CT

가 , 50%

가

, CT (-CT),

, CT

(9, 34.6%), (3,

11.5%), (1, 3.8%), (13, 50%)

, 10 (38.5%).

, , , ,

가 , CT

(CT) 4-56 (15.4)

, 1-7, 8-14, 15

가 14, (, 7 ;

, 3 ; , 2), 2 (+

, +) 9

CT

3 1:256

metronidazole CT

5 cm, 5-10 cm, 10 cm

가 ()

가 () , SPSS 7.5

(Chi-Square test).

CT

7, 13

1

가 (12, 13, 25),

96% (Fig. 1).

가 : : = 2:2:2

(11) (Fig. 2), 3:3:3 1

12 (46.2%) 14 (53.8%)

가 3 4

(Table 1)

(Fig. 3, 4).

CT 가 1-7, 8-14, 15 7,

12, 7, CT 1-11 cm(6.5 cm)

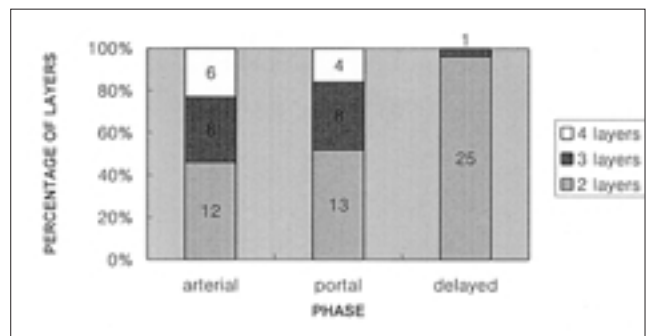


Fig. 1. Distribution of alternating layers of liver abscess in each three phase

Table 1. Multiple Layering Pattern of Liver Abscess in Three Phases

Changing Group		Unchanging Group	
A:P:D	No. of subjects	A:P:D	No. of subjects
4:4:2	2		
4:3:2	3		
3:4:2	2		
3:3:2	4	3:3:3	1
3:2:2	2		
2:3:2	1	2:2:2	11
Total (%)	14 (53.8)		12 (46.2)

A:P:D = arterial:portal:delayed

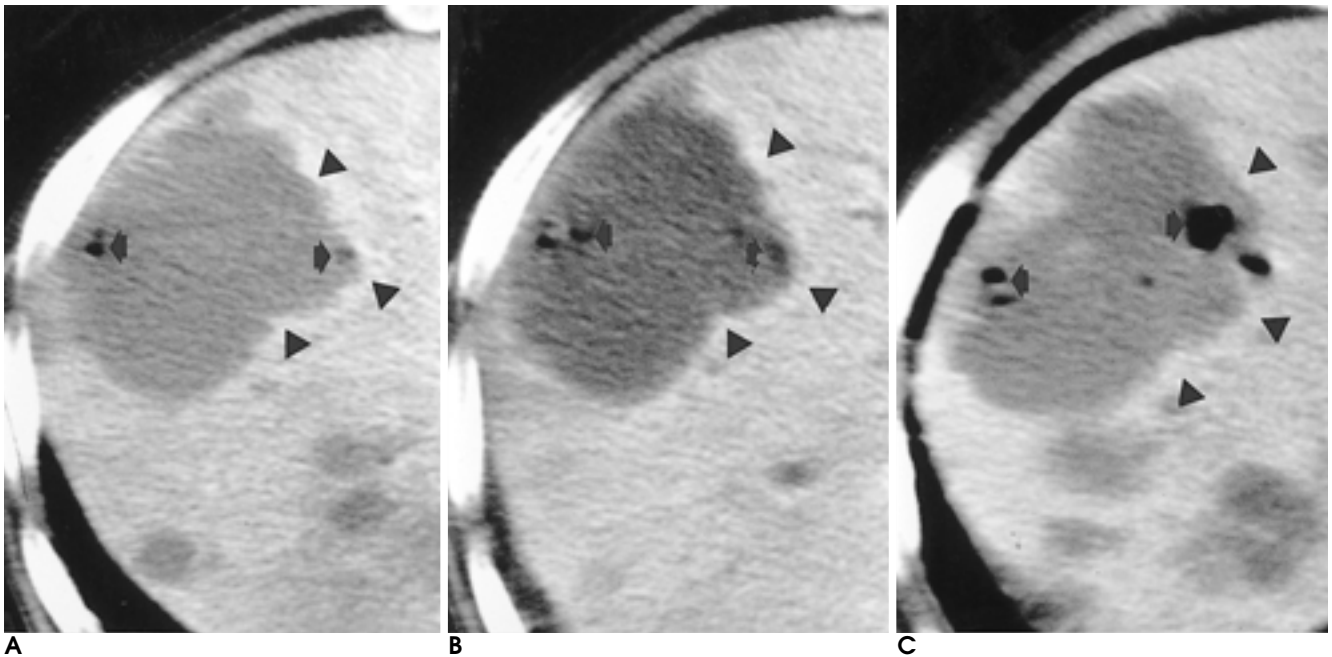


Fig. 2. Multiple pyogenic liver abscesses in a 64-year-old man who received Whipple's operation due to pancreatic cancer: 2:2:2 enhancement pattern.

The CT interval is 3 days in this patient, who has been treated for diabetes mellitus. Three consecutive CT scans during arterial, portal, and delayed phase (**A, B, C**) show multiple hypodense lesions in the liver. The largest one have persistent marginal enhancement (arrowheads) and intralesional air bubbles (arrows). This central hypodense and marginally enhanced layering is the most common of all enhancement pattern in three phases.

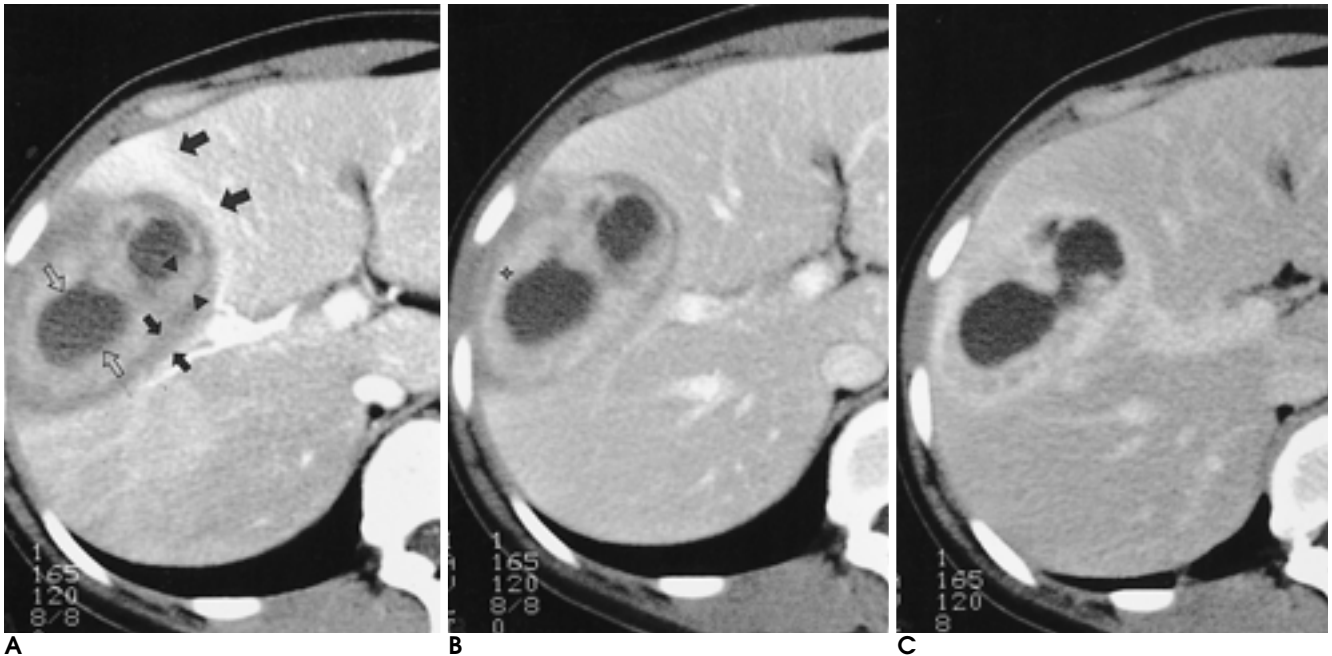


Fig. 3. A pyogenic liver abscess in a 30-year-old female: 4:3:2 enhancement pattern.

The CT interval is 20 days. No predisposing factors to the liver abscess was identified. A CT scan in arterial phase (**A**) shows the liver abscess as four alternating enhanced layers that are composed of central hypodense area (open arrows), inner slightly-enhanced ring (arrowheads), outer hypodense ring (black arrows), and peripheral wedge-shaped layer (large arrows). The fourth layer is isodense and disappeared in portal phase (**B**), and 3th layer is imperceptible and only two layers are remained in delayed phase (**C**).

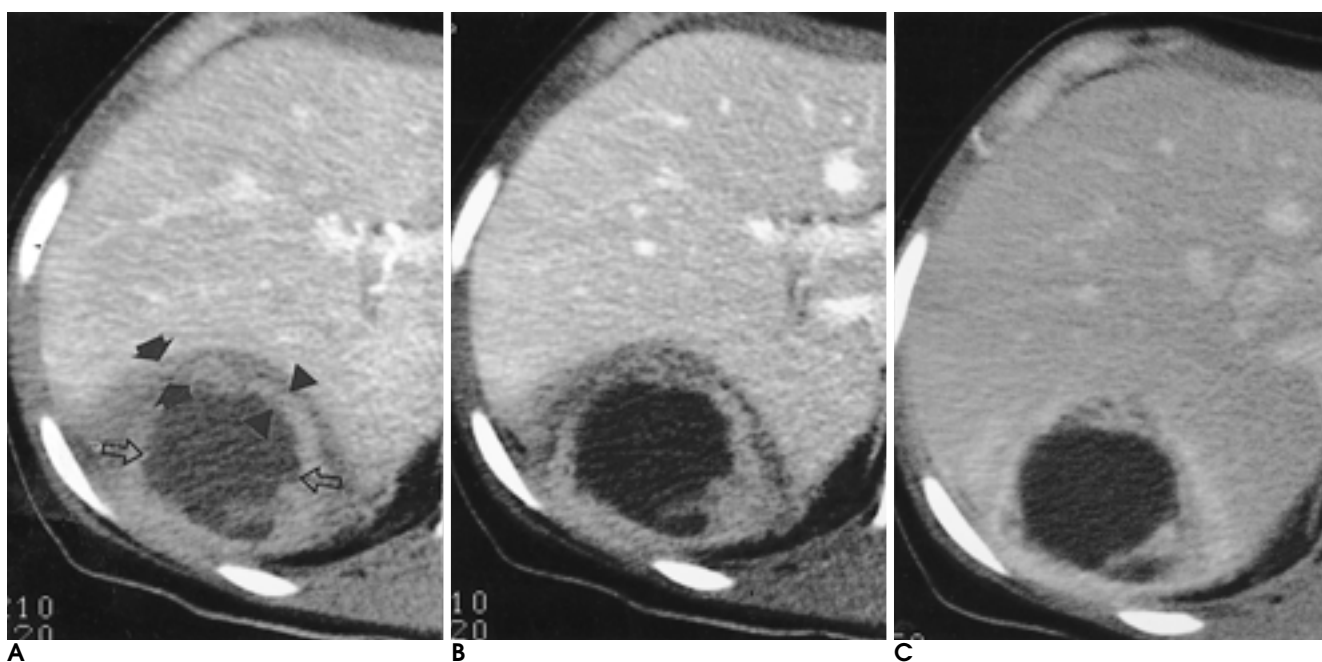


Fig. 4. A pyogenic liver abscess in a 39 year-old female: 3:3:2 enhancement pattern.

The CT interval is 13 days. No predisposing factors to liver abscess was identified. CT scans in arterial and portal phase (**A, B**) show central hypodense (open arrows), inner slightly-enhanced ring (arrowheads), and outer hypodense ring (black arrows). The outer ring is imperceptible and only two layers are remained in delayed phase (**C**).

5 cm , 5 - 10 cm, 10 cm
6 , 18 , 2 가 .

CT (p=.037),
1 가 (14%) 2
가 (75%)
(57%). 10
16 3 , 11
(p=.054).
(Table 2).

, CT 가
(4, 6).

(7 - 9). CT
“(cluster sign)가
Jeffrey (10) 2 cm
(14%),

Table 2. Relationship of Changing-layer Pattern with Various Factors

Factors	Changing-layer Pattern		P value
	Yes	No	
Underlying disease			
Biliary disease	2 (25)	6 (75)	.123
GB perforation	1 (33)	2 (67)	
Pylephlebitis	1 (100)	-	
Unknown	10 (71)	4 (29)	
DM			
Yes	3 (30)	7 (70)	.054
No	11 (69)	5 (31)	
CT interval (days)			
1 - 7	1 (14)	6 (86)	.037
8 - 14	9 (75)	3 (25)	
15	4 (57)	3 (43)	
Microbial agent			
Pyogenic	11 (48)	12 (52)	.088
Amebic	3 (100)	-	
Abscess size (cm)			
1 - 5	1 (17)	5 (83)	.091
5 - 10	11 (69)	5 (31)	
10 <	2 (50)	2 (50)	

Note. - Data are the number of cases.

The numbers in parentheses are percentages.

가 . CT
(dou -
ble - target sign)가 (5).
3 , CT

(33%) (6 - 20%) Balci (14) MRI T1 T2
가 (37.7%), 45
가 (- 10), 가 (10 - 15 가
, (> 15 (34%). , 4
) (11). 4 가
, 7 가 가
(27%) 가 5 (19%) 4
Mathieu CT
(5, 7). , Elizondo CT(CTAP) CT가
gran - 가 4:4:4
ulation tissue, MRI 3 CT 4
(sinusoid) (12). 가 7 3 2
가 , 가 CT 2 3:4:2
Mathieu 3 (33%) 4 가 4
CT (7) 10 CT CT
(62%),
CT 가 ,
(organization) ,
가 15 (58%) 가 ,
1 2 가
CT 3 CT
CT CT
Mathieu (5) CT CT - MR
(30%). , , ,
가 (13) 3 16). 가 (15,
CT(CT during arterial portography) 12 (46%)
가 가 가 13 (50%) 가
Elizondo (12) 가 (17). CT
가 가 CT 3
MRI

가 3 4 가 1
가 2 CT .
CT
가 가
가 (12),
가 ,
가 (30%),
(69%) 가
가 가
Ralls (18)
가
, CT MRI
(7)
CT 4 2 가
가 3
3 2
CT
가 CT
, CT 가
CT 3
가
CT

1. McDonald AP, Howard RJ. Pyogenic liver abscess. *World J Surg* 1980;4:369-380
2. Giorgio A, Tarantino L, Mariniello N, et al. Pyogenic liver abscesses: 13 years of experience in percutaneous needle aspiration with US guidance. *Radiology* 1995;195:122-124
3. Stain SC, Yellin AE, Donovan AJ, Brien HW. Pyogenic liver abscess. Modern treatment. *Surgery* 1991;126:991-996
4. Halvorsen RA, Korobkin M, Foster WL Jr, et al. The variable CT appearance of hepatic abscesses. *AJR Am J Roentgenol* 1984;142:941-946
5. Mathieu D, Vasile N, Fagniez PL et al. Dynamic CT features of hepatic abscesses. *Radiology* 1985;154:749-752
6. Newlin N, Silver TM, Stuck KJ, Sandler MA. Ultrasonic features of pyogenic liver abscesses. *Radiology* 1981;139:155-159
7. : 4
1994;31(2):321-326
8. : 1993;
12:9-13
9. Philips RL. Computed tomography and ultrasound in the diagnosis and treatment of liver abscess. *Australas Radiol* 1994;38:165-169
10. Jeffrey RB Jr, Tolentino CS, Chang FC, Federle MP. CT of pyogenic hepatic microabscesses. The cluster sign. *AJR Am J Roentgenol* 1988;151:487-489
11. Barreda R, Ros PR. Diagnostic imaging of liver abscess. *Crit Rev Diagn Imaging* 1992;33:29-58
12. Elizondo G, Weissleder R, Stark D, et al. Amebic liver abscess: Diagnosis and treatment, evaluation with MR imaging. *Radiology* 1987;165:795-800
13. : CT
1993;29(4):765-774
14. Balci NC, Smelka RC, Noone TC, et al. Pyogenic hepatic abscesses: MRI findings on T1- and T2-weighted and serial gadolinium-enhanced gradient-echo images. *J Magn Reson Imaging* 1999;9:285-290
15. Branum GD, Tyson GS, Branum MA, Meyers WC. Hepatic abscess. *Ann Surg* 1990;212:655-662
16. Land MA, Moinuden M, Bianco AL. Pyogenic liver abscess. Changing epidemiology and prognosis. *South Med J* 78:1426-1430, 1985
17. Peer A, Witz E, Manor H, Strauss S. Intrahepatic abscess due to gallbladder perforation. *Abdom Imaging* 1995;20:452-455
18. Ralls PW, Barnes PF, Radin DR, Colletti P, Halls J. Sonographic features of amebic and pyogenic liver abscess: A blinded comparison. *AJR Am J Roentgenol* 1987;149:499-501

Three-phase Dynamic CT Findings of Liver Abscess: Related Factors with Multiple Layering Enhancement Pattern¹

Bae Ju Kwon, M.D., Yong-Soo Kim, M.D., Hyun-Chul Rhim, M.D., Byung Hee Koh, M.D.,
On Koo Cho, M.D., Bong Soo Kim, M.D., Dong Woo Park, M.D., Choong Ki Park, M.D.

¹Department of Diagnostic Radiology, College of Medicine, Hanyang University

Purpose: To determine the number of multiple alternating layers of liver abscess, and changes in this number, as revealed by spiral CT, and to ascertain which factors are related to changes occurring during the three phases of this modality.

Materials and Methods: Using three-phase spiral CT imaging we studied 26 cases of liver abscess (pyogenic: amebic = 23:3). The number of layers comprising the abscess, as seen on postcontrast CT scans, was determined during the arterial (30sec), portal (70sec), and delayed (220sec) phase, and all cases were assigned to one of two groups according to changes in the number of layers observed during the three phases. With regard to underlying disease, the two groups were compared in terms of the presence of abscess and of diabetes mellitus, CT interval (time from onset of symptoms to CT scanning), microbial agent (pyogenic vs. amebic), and the largest diameter of abscess as revealed by CT.

Results: Except in one case, three or four alternating layers [in 13(50%) and 7(27%) cases, respectively] were seen only during the arterial and portal phase. During each of the three phases-and especially the delayed phase, where it was present in 25 of cases (96%)-two alternating layers (2:2:2) was the most common pattern, with a 3:3:3 pattern occurring in one case. All 12 cases (46%) in the unchanging-layer group showed one of these two patterns. All changing-layer group cases (14;54%) demonstrated three or four layers during the arterial and portal phase but only two during the delayed phase. The CT interval was the only significantly different factor between the two groups. During the first week, the number of cases in the unchanging-layer group was much higher than in the changing-layer group (86%,14%), but during the second week this situation reversed (25%, 75%).

Conclusion: Our study reveals that on three-phase dynamic CT images, a characteristic enhancement feature of liver abscesses is three or four layers during the arterial and portal phases, with reduction to two layers during the delayed phase. This change, as revealed by spiral CT, is rare during the week following the onset of symptoms, but common during the second week.

Index words : Liver, abscess
Liver, CT

Address reprint requests to : Yong-Soo Kim, M.D., Department of Diagnostic Radiology, College of Medicine, Hanyang University
249-1 Kyomoon-dong, Kuri Kyunggi-do 471-701, Korea.
Tel. 82-31-560-2544 Fax. 82-31-560-2551 E-mail: ysookim@email.hanyang.ac.kr

2,000 3 2001

가. :
 . : 2,000
 . : 1
 . : (A, B) 1 .
 . : 1
 . : 가
 . : 2001 1 31 ()
 . : (E - mail : office@radiology.or.kr)
 . (121 - 8 , () 137 - 130 : (02)578 - 8003)
 . 「 」
 .(http://www.radiology.or.kr)