

CT

1

: CT

: 1998 6 1999 6 (n=28)

(n=66) 94 (33 - 81 , : =73:21)

120 mL 3 mL/sec 30 (), 70 () 180

()

Child 가 가

: 65 HU , 48 HU, 81 HU, 72 HU 가

94 67 (71.3%) 가

가 67 (71.3%, I) ,

가 가 27 (28.7%, II) .

, Child (p > 0.05).

: CT 가 ,

가

CT (2, 12). , CT

, CT

(1). CT

가 , ,

, (2-4).

가

(2, 4),

가 , 1998 6 1999 6 CT

(5-7). 94

20-25% 28

75-80% , 66

CT

33-81 (: 57.6)

가 73 , 가 21

CT (HiSpeed advantage, General Electric Medical Systems, Milwaukee, WI)

120 mL (300 mgI/ml, Ultravist, Schering AG, Berlin, Germany) (OP 100, Medrad, Pittsburgh, PA) 3.0 mL/sec

(9-11). CT

CT

30 , 70 , 180
7 mm, 7

mm/sec

69

HU(34 - 116 HU), 80 HU(42 - 132 HU),
65 HU(36 - 113 HU) 가 가

가 가

(ROI) 23 (24.5%), 가 67 (71.3%),
(Fig. 1), 가 4 (4.3%)

(Fig. 2). 81 HU(56 - 108 HU), 72 HU (52 - 99 HU)
(Table 1).

가

가 10 HU 가 67 (71.3%, Group I) , 가 11
가 (11.7%, Group Ia), 가 25 (26.6%, Group Ib),
Child 가 31 (33.0%, Group Ic)

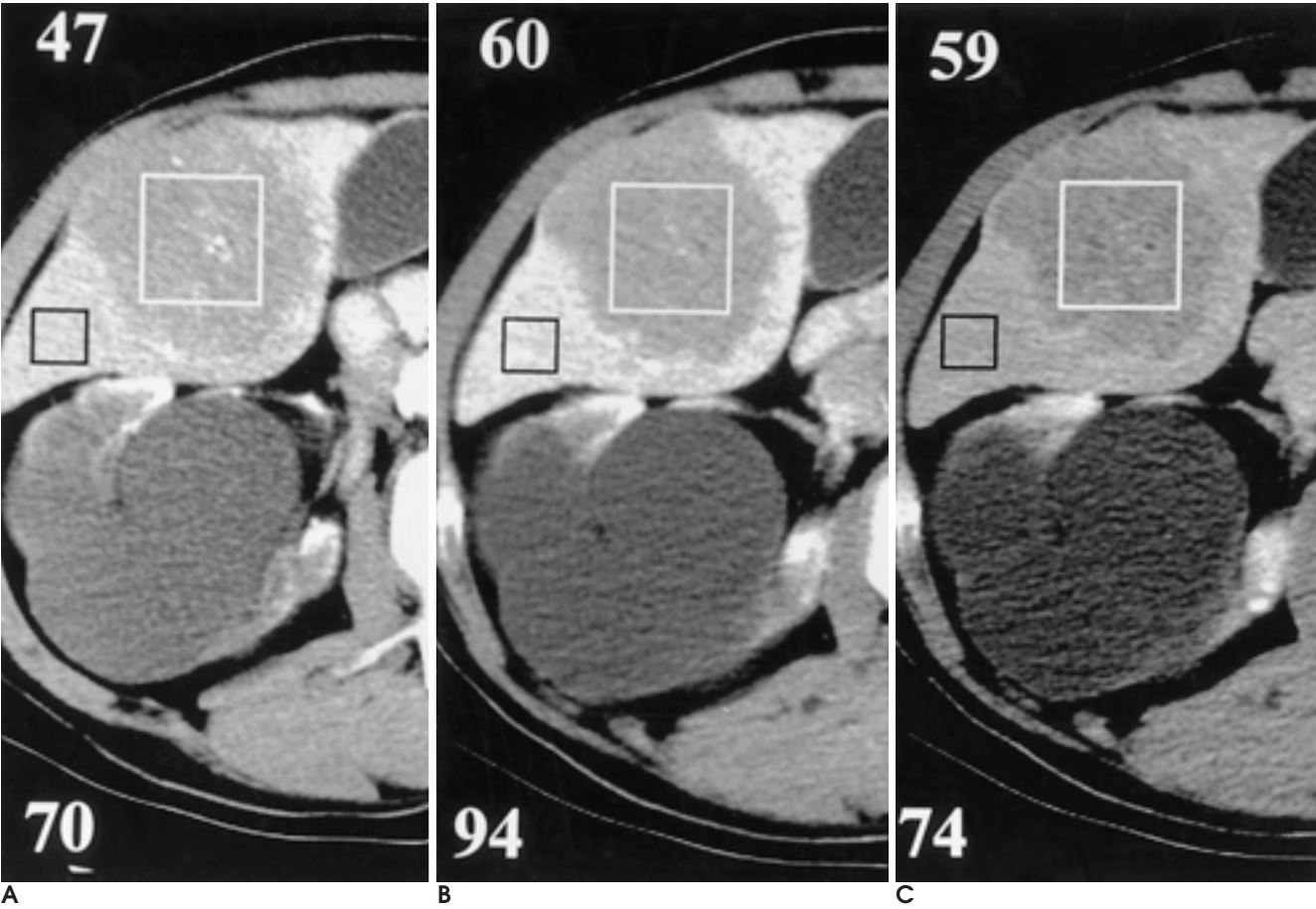


Fig. 1. Triphasic liver CT scan of HCC with homogeneous attenuation. **A.** arterial, **B.** portal, and **C.** delayed phase sections. Rectangular cursors are placed at HCC and normal adjacent liver parenchyma. Attenuation values of HCC are 47, 60 and 59 HU, respectively (Group IIa) and those of normal liver parenchyma are 70, 94 and 74 HU. Relative tumor attenuations are lower than the normal liver parenchyma on all three phases.

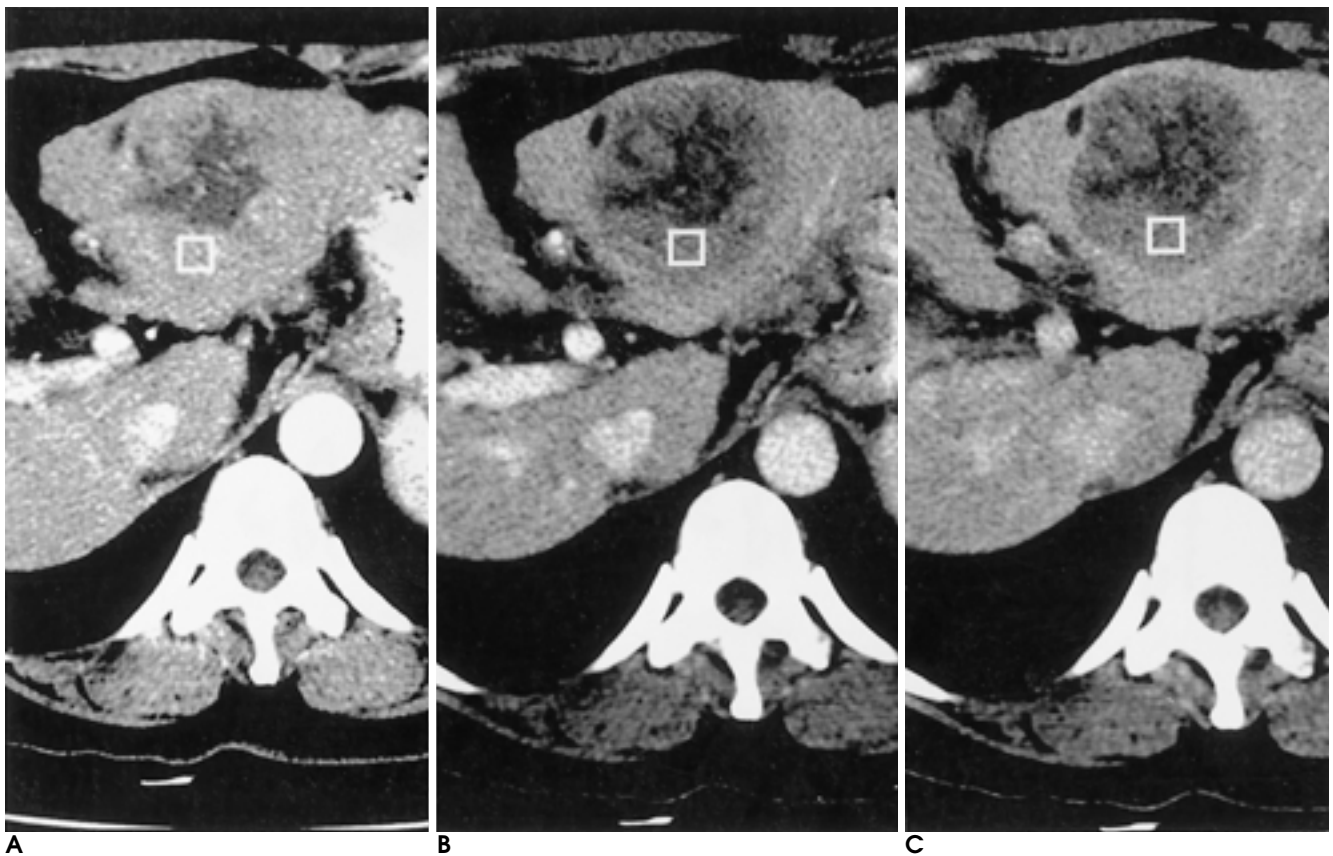


Fig. 2. Triphasic liver CT scan of HCC with heterogeneous attenuation. **A.** arterial, **B.** portal, and **C.** delayed phase sections. Rectangular cursors are placed at enhancing solid portion of HCC.

Table 1. Mean Attenuation Coefficients of the HCC and Adjacent Liver Parenchyma

Mean Attenuation Value (HU)	HCC	Liver Parenchyma
Arterial phase	69	47
Portal phase	80	81
Delayed phase	65	72

Note.-HCC = hepatocellular carcinoma

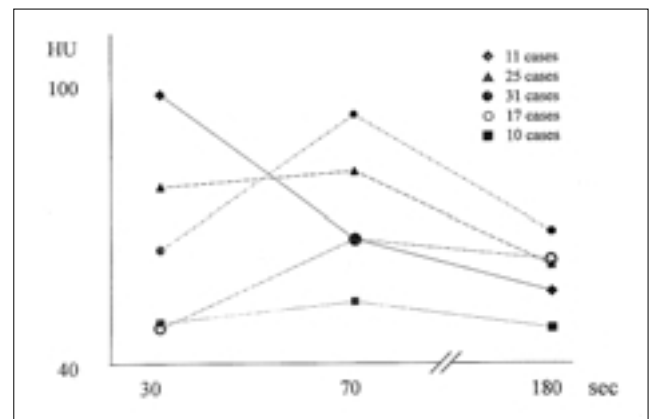


Fig. 3. The time attenuation curves for HCC.

가 27 (28.7%, Group II), 가 17 (18.1%, Group IIa), 10HU 가 10 (10.6%, Group IIb) (Fig. 3). I 5.4cm, II 8.1cm II ($p < 0.05$, Student t - test). I 32 가 14 (51.9%) 가 ($p < 0.05$, Mantel - Haenzel Chi - square test). Child I A 가 53 (79.1%), B 가 9 (13.4%), C 가 5 (8.7%), II 18 (66.7%), 7 (25.9%), 2 (7.4%) 가 ($p < 0.05$, Student t - test). 가 가

가 42 (44.7%), 가 46 (48.9%), 가 1 (1.1%), 가 2 (2.1%), 가 3 (3.2%), 10 HU 가 I 67 64 (95.5%), 가 21 (31.3%), 가 30

: CT

(59.7%), 가 16 (23.9%), (vascular lake)가
가 38 (56.7%), 가 25
(37.3%) . II 27
가 10 (37.0%), 가 16 (59.3%) ,
가 10 (37.0%), 가 17
(63.0%) , 가 11 가 (7).
(40.7%), 가 14 (51.9%) . 가

Honda (20) 45 6
CT
가 5cm ,

CT
CT (sinusoid)
가 , 가
(5-7, 11). CT 가
3cm
가
(2, 12, 13).
CT , 가
가 가

가 가 가 CT
가 5HU 98% 가 (Group I) (Group II)
CT 가 (18, 19). II 5.4cm 8.1cm II
가 가 3cm I 21
가 (40.3%), II 4 (14.8%), 5cm I
30 (44.8%), II 19 (70.4%)
가 67 (71.3%) , 10HU
가 27 (28.7%)
90 (95.8%)

가 가 가
(14-16),
CT 44 가 (17). 가 가
가
CT
(2, 12) 가
가 17 (63.0%), II 14 (51.9%)
가 가
CT (18).

가 I
가 10 HU 가 38 (56.7%)
10
가 1 5 HU

- 가
- 가
- CT
- Hwang
- (5).
- CT
- 가
- 가
- 가
- 가
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Enhancement Pattern of Hepatocellular Carcinoma on Triphasic Helical CT: Quantitative Study¹

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Purpose: To assess the enhancement pattern of hepatocellular carcinoma (HCC), as seen on triphasic helical dynamic computed tomography (CT) by measuring the attenuation value.

Materials and Methods: Triphasic helical dynamic CT scans of the liver in 94 patients (M:F=73:21; aged 33 - 81 years) with HCC were evaluated. The condition was confirmed on the basis of histologic (n=28) or clinical (n=66) findings. Scans were obtained at 30, 70, and 180 seconds after the start of contrast material injection, the attenuation values of the solid portion of the HCC and adjacent normal liver parenchyma being measured during the three phases. Enhancement patterns of the HCC nodule and adjacent liver parenchyma were analyzed, and the size of HCCs, the presence or absence of portal vein thrombosis, and the Child classification were also determined.

Results: The mean attenuation values of HCC were 69 HU during the arterial phase, 80 HU during the portal phase, and 65 HU during the delayed phase, while those of liver parenchyma were 48 HU, 81 HU and 72 HU, respectively. In 71.3% of cases (67/94), maximum enhancement occurred during the portal phase. Decreased tumor attenuation after peak enhancement was seen in 71.3% of lesions (67/94, Group I). while in 28.7% (27/94, Group II) attenuation showed no significant decrease. There were no statistically significant differences in the size of HCCs, portal vein thrombosis or Child classification between the two groups ($p>0.05$).

Conclusion: On triphasic helical dynamic CT, the mean attenuation value of HCCs was highest during the portal phase. Over time, the majority of HCCs showed a decreased attenuation value.

Index words : Computed tomography (CT), contrast enhancement
Computed tomography (CT), helical
Liver, CT
Liver neoplasms

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