

1997 9 1998 7 , 11
 CT 63 108
 45:18, 33-76 53
 76 , 32 . 42 1
 가 , 11 2 가
 10 3 가
 1.7 . 5mm 110mm
 23mm . 1)
 CT ,
 (n=28), CT(n=10) 6
 가 , 2)
 MRI(n=17), (n=5) 108 24 (22.2%)
 , 3)
 (n=3)
 6 34 18
 CT Somatom Plus-S, Somatom Plus-4(Siemens
 Medical Systems, Erlangen, Germany) Hi-Speed Advantage
 System(GE Medical System, Milwaukee, Wis, U.S.A.)
 26 , 8 29 . CT
 (Ultravist 370; Schering AG, Berlin, Germany) 120mL
 3mL/ sec
 30 () 65 () , 7mm/sec,
 CT 7mm 7mm
 . MRI 1.0T(Magnetom expert,
 Siemens, Erlangen, Germany) 1.5T(Signa, GE Medical
 Systems) body array coil
 , T2 (TR/TE=3000-
 5000/90-117msec, echo train length=6-15)
 T1 FLASH (fast low angle shot) (TR/TE = 130-
 153/5-6msec, flip angle=70()
 FLASH
 1Kg 0.1mmol Gd-DTPA(Magnevist,
 Schering, Germany) , 1 , 3 , 5
 Integris V-3000(Phillips Medical system, Netherland)
 Angiostar(Siemens Medical Systems, Erlangen, Germany)
 6.5F RH
 catheter(Cook, Bloomington, U.S.A.)
 6cc 7 (Ultravist 370; Schering AG,
 Berlin, Germany) 2 . 2 가
 가
 CT
 A , B

20mm ,
 21-40mm, 41mm ,
 3
 가 4 (Grade I,
 <25%; Grade II, 25-50%; Grade III, 51-99%; Grade IV,
 100%)
 가
 가 Mantel-Haenszel chi-square test
 가 .
 가 .
 . A
 5mm 53mm 22 ± 13mm
 , 20mm , 21-40mm, 41mm 가 14 ,
 8 , 2 . B 5mm 110 mm
 24 ± 21mm , 20mm , 21-40mm, 41mm
 가 53 , 21 , 10 20mm
 가 가 (58.3%, 63.1%),
 Mantel-Haenszel chi-square test
 (p=0.653).
 A Grade III 91.7%
 가 , B Grade II 90.4%
 100% , B 가 , Mantel-
 82.1% (Table 1) , Mantel-
 Haenszel chi-square test
 ,
 50% 가
 (p<0.01).
 A
 (Fig. 1)가 45.8%(11/24),
 (Fig. 2)가 54.2%(13/24) .
 가 (Fig. 2) 8.3%(2/24) .
 4 5 6 3
 CT
 (Fig. 3).

Freeny (1) CT 가 (14) 가 96% 가 (14, 15), 가 CT 가 20 mm 가 13.4%, 가 9.8%, 가 2.4% (" bright dot " sign) (16), 가 (2, 16, 17). CT (scar tissue) 가 (cystic cavity) (18-21). (conventional) CT CT가 가

Quinn (11) (foci of globular enhancement) 94% Leslie (12) 67%, 100% (13) CT (35) 가 58%, (180)

Table 1. The Grade of Intratumoral Enhancement in Hepatic Hemangioma

	Group A(n= 24)		Group B(n= 84)	
	HAP	PVP	HAP	PVP
Grade I	0	0	68(80.9%)	56(66.7%)
Grade II	2 (8.3%)	0	8 (9.5%)	13(15.5%)
Grade III	8(33.3%)	9(37.5%)	3 (3.6%)	6 (7.1%)
Grade IV	14(58.3%)	15(62.5%)	5 (6.0%)	9(10.7%)

*Abbreviations: HAP, hepatic arterial phase; PVP, portal venous phase

*Intratumoral enhancement : Grade I, < 25%; Grade II, 25-50%; Grade III, 51-99%; Grade IV, 100%



Fig. 1. A Hemangioma with wedge-shaped parenchymal enhancement in the periphery to the tumor in a 48-year-old man. CT scan during the hepatic arterial phase(A) show a small hyperattenuated nodule(arrow) and wedge-shaped homogeneous hyperattenuated area(open arrows) peripheral to the nodule. CT scan during the portal venous phase(B) shows hyperattenuated nodule(arrow in C) without peripheral wedge-shaped hyperattenuated area.

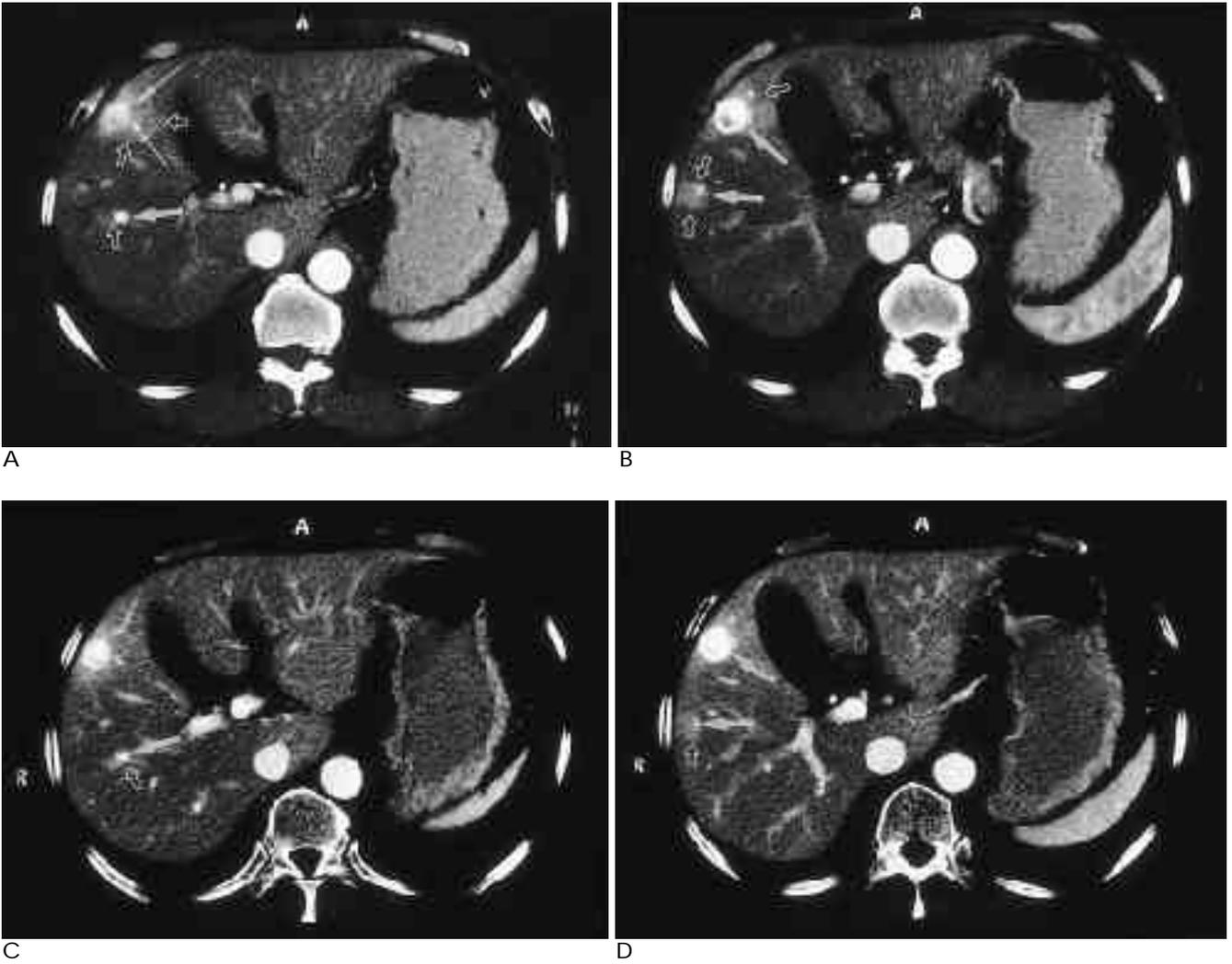


Fig. 2. Three hemangiomas with wedge-shaped parenchymal enhancements in the periphery to the tumors in a 70-year-old man. Two consecutive CT scans during the hepatic arterial phase(A, B) show three small hyperattenuated nodules(arrows) and wedge-shaped homogeneous hyperattenuated areas(open arrows) peripheral to the nodules. Branches of the portal vein(thin arrows in A) are early opacified, suggesting the presence of an arterioportal shunt. CT scan during portal venous phase(C, D) show still hyperattenuated nodules(arrows) and peripheral wedge-shaped hyperattenuated areas(open arrows).

Itai
 emia), (congestion) 가, (hyper- (22), 가 (2-6),
 가 CT (3). (4) 가 CT 가 CT 가,
 CT 가 가 가,
 , Hanafusa (2) CT 3 4 가,
 CT (transsinusoidal type)
 (transvasal type)
 Bookstein (8) 가 가 (portal

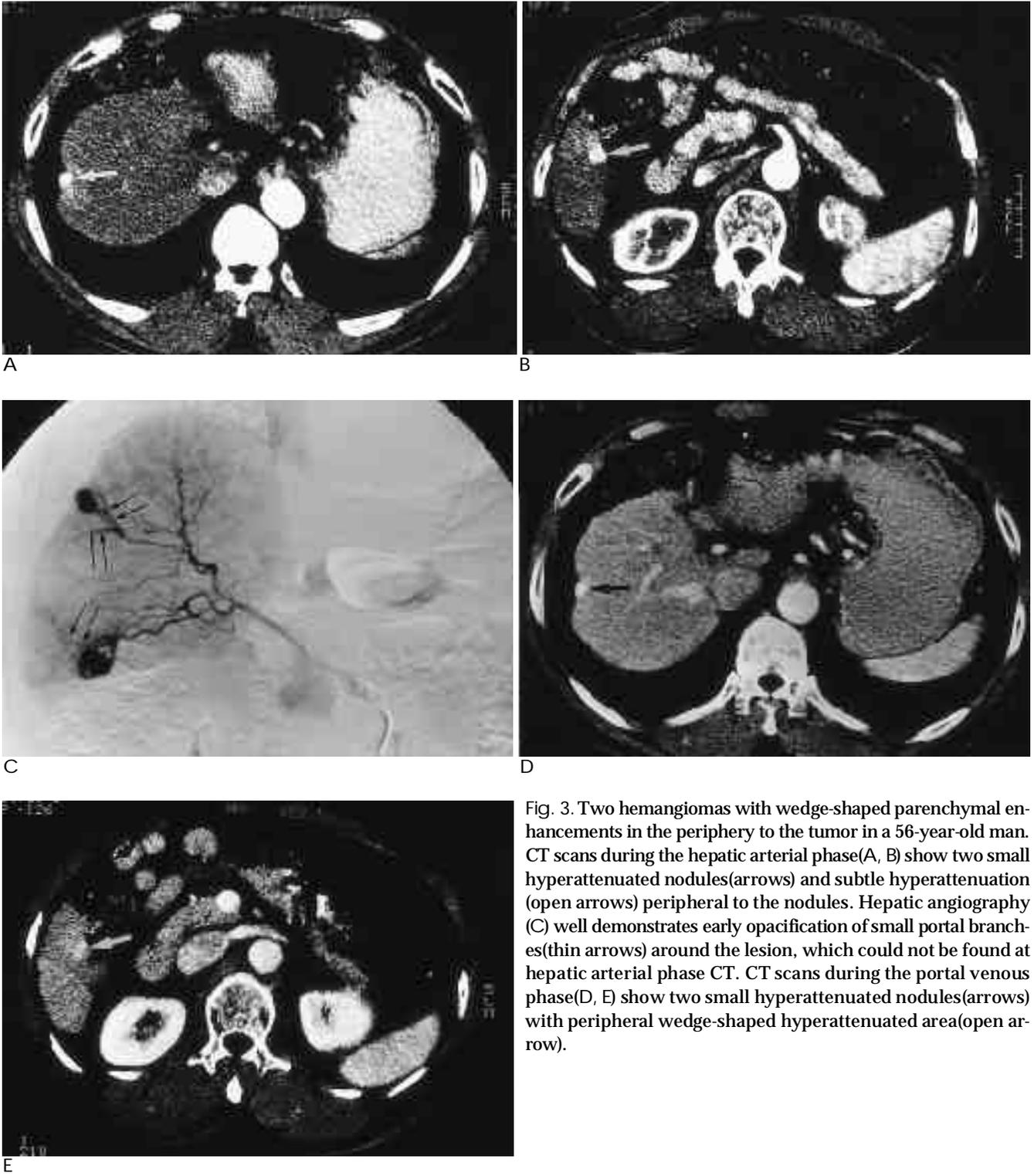


Fig. 3. Two hemangiomas with wedge-shaped parenchymal enhancements in the periphery to the tumor in a 56-year-old man. CT scans during the hepatic arterial phase(A, B) show two small hyperattenuated nodules(arrows) and subtle hyperattenuation (open arrows) peripheral to the nodules. Hepatic angiography (C) well demonstrates early opacification of small portal branches(thin arrows) around the lesion, which could not be found at hepatic arterial phase CT. CT scans during the portal venous phase(D, E) show two small hyperattenuated nodules(arrows) with peripheral wedge-shaped hyperattenuated area(open arrow).

triad) (hepatic sinusoid) (hepatic 30% (23).
 venule) (portal vein) .
 (vas vasorum) (7-10), Bookstein (8)
 (hepatocellular carcinoma) 가 (transtumoral type)
 가
 (7), 20- CT
 277

가 (2), , 22.2% CT 6 가 , CT 가 , 4cm 가 CT 50%

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Wedge-shaped Parenchymal Enhancement Peripheral to the Hepatic Hemangioma : Two-phase Spiral CT Findings¹

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Purpose : To determine the incidence of hepatic hemangiomas associated with wedge-shaped parenchymal enhancements adjacent to the tumors as seen on two-phase spiral CT images obtained during the hepatic arterial phase and to characterize the two-phase spiral CT findings of those hemangiomas.

Materials and Methods : One hundred and eight consecutive hepatic hemangiomas in 63 patients who underwent two-phase spiral CT scanning during an 11-month period were included in this study. Two-phase spiral CT scans were obtained during the hepatic arterial phase(30-second delay) and portal venous phase(65-second delay) after injection of 120 mL of contrast material at a rate of 3 mL/sec. We evaluated the frequency with which wedge-shaped parenchymal enhancement was adjacent to the hemangiomas during the hepatic arterial phase and divided hemangiomas into two groups according to whether or not wedge-shaped parenchymal enhancement was noted (Group A and Group B). The presence of such enhancement in hemangiomas was correlated with tumor size and the grade of intratumoral enhancement.

Results : In 24 of 108 hemangiomas, wedge-shaped parenchymal enhancement adjacent to hepatic tumors was seen on two-phase CT images obtained during the hepatic arterial phase. Mean hemangioma size was 22mm in Group A and 24mm in Group B. There was no statistically significant relationship between lesion size and the presence of wedge-shaped parenchymal enhancement adjacent to a hemangioma. In 91.7% and 100% of tumors in Group A, and in 9.6% and 17.8% in Group B, hemangiomas showed more than 50% intratumoral enhancement during the arterial and portal venous phase, respectively. Wedge-shaped parenchymal enhancements peripheral to hepatic hemangiomas was more frequently found in tumors showing more than 50% intratumoral enhancement during these two phases($p < 0.01$).

Conclusion : Wedge-shaped parenchymal enhancements is not uncommonly seen adjacent to hepatic hemangiomas on two-phase spiral CT images obtained during the hepatic arterial phase. A hemangioma showing wedge-shaped parenchymal enhancement tends to show more than 50% intratumoral enhancements during the arterial and portal venous phase.

Index words : Angioma, gastrointestinal tract
Liver neoplasms, CT
Liver neoplasms, diagnosis
Shunts, arteriovenous
Computed tomography (CT), helical

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