

가 (1 - 4), 5 - 15% 가 (5 - 10), (11). CT 가 2 5 cm , 6 (microwave)

585

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 12 , 33
 21
 ,
 1999 5 2000 7 5 cm 가 .
 107 RITA Medical system, Inc.(Mountain
 가 24 3 , 6 View, CA, U.S.A.) 50
 26 (480 KHz)
 54 (62) (tissue impedance value),
 38 - 75 (: 54) , ,
 42:12 39 가 15 cm 25 cm 15 gauge
 CT (alpha - feto protein 가) 1 cm 4
 , 15 7 (thermosensor)가
 가
 CT

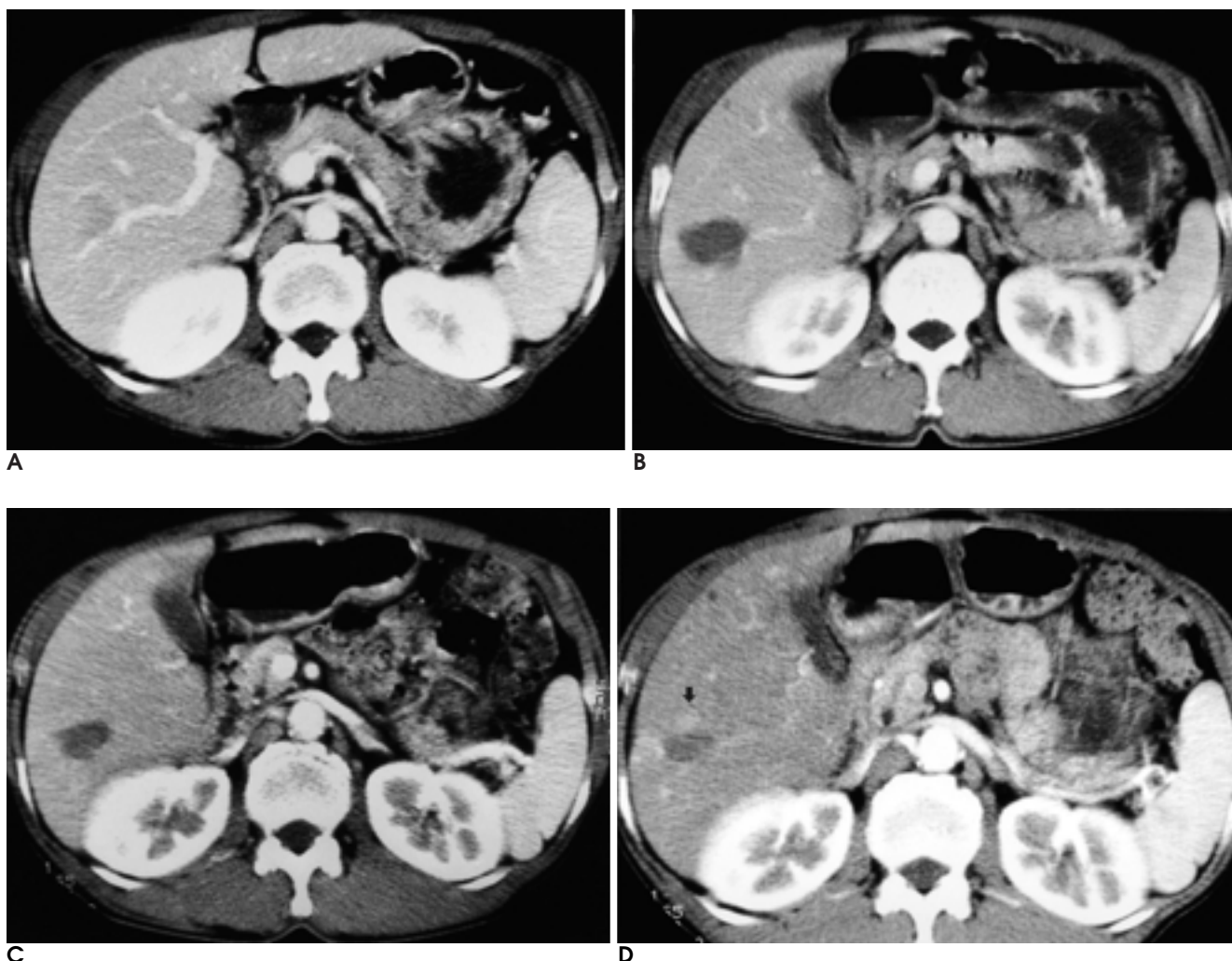


Fig. 1. Group I with marginal recurrence.

A. Before RF ablation: hypoattenuated mass is surrounded by portal vein in S6 of liver on portal phase CT.

B. Immediate CT after RF ablation.

C. 6 months follow-up CT: shrinkage rate of necrotic lesion is smaller than 50%, but no recurrence.

D. 9 months follow-up CT: focal enhancing lesion is seen in anterior margin of necrotic lesion on arterial phase (arrow).

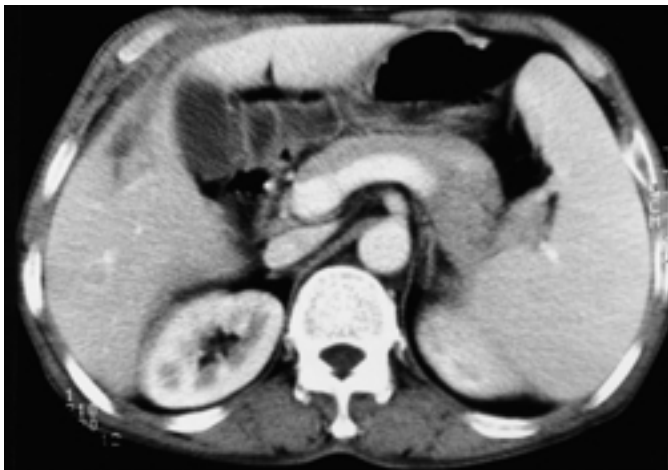
가 100 , 1 , 1 , 1, 3, 6 CT CT 6
 10 2.5 cm 3 cm , 1 ,
 가 1 CT X, Y, Z 가 /6
 가 . 6 CT 50% (Group I), 50 -
 CT 80%(Group II), 80% (Group III) 3
 CT (Child - Pugh), CT
 CT(Somatom Plus 40, Simens, Germany) 300 mg/mL
 (Ultravist 300 ; Schering AG, Berlin, Germany) 120 mL
 3 mL/sec 30 60 CT
 CT
 Fisher's Exact Test



A



B



C



D

Fig. 2. Group III without marginal recurrence.

A. Before RF ablation: 4 cm sized hypoattenuated mass is seen in S5 of liver on arterial phase CT.

B. Immediate CT after RF ablation: air bubbles are seen in necrotic lesion (arrow).

C. 6 months follow-up CT: shrinkage rate of necrotic lesion is greater than 80% in volume.

D. 20 months follow-up CT: there are not noted marginal recurrence.

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Table 1. Shrinkage Rate of RF Ablated Lesion of HCC at 6 Months Follow up CT

| | Group I* | Group II** | Group III*** | Total |
|------------------------|----------|------------|--------------|-------|
| Number | 14 | 13 | 35 | 62 |
| Mean shrinkage rate(%) | 34 | 76 | 89 | 72 |

*:below 50%, **:50 - 80%, ***:above 80%

Table 2. Influencing Factors on Shrinkage Rate of Post-RF Necrotic Lesion

| | Group I | Group II | Group III |
|---------------------------|---------|----------|-----------|
| Number | 14 | 13 | 35 |
| Child Class.(A/B) | 7/4 | 6/2 | 26/0 |
| CT density(high/low) | 9/5 | 5/8 | 19/16 |
| Tumor size(cm) | 2.8 | 2 | 3.3 |
| Treatment session | 2.8 | 3.6 | 5.5 |
| Margin (smooth/irregular) | 8/6 | 8/5 | 22/13 |
| Peritumoral vessles* | 12(86%) | 3(23%) | 11(31%) |
| Air bubble* | 2(14%) | 5(38%) | 24(69%) |

* $p < 0.05$

Table 3. Correlation between Shrinkage Rate and Marginal Recurrence

| | Group I | Group II | Group III |
|-------------------------|------------|------------|-----------|
| Marginal Recurrence (%) | 4/14 (29%) | 2/13 (15%) | 2/35 (6%) |

(16).

(19).

(20 - 22).

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(19).

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(23).

15 6

CT , 50% 1

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6 - 12 20% 가

(24), 6 CT

72%

가

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, 가

가 (23). 5 - 10 mm

(24).

가 3 cm 6

90% 3 - 5 cm 25%

71%, 5 cm 6

(25 - 27). 6

80 10 12.5%

62 8 13%

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가

가

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Figure 1 is a schematic diagram of the experimental setup for the CT scan. It shows a patient lying on a table, with a CT scanner gantry positioned above. A 1 cm scale bar is shown. The diagram is labeled with 'CT' and '72%'.

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Shrinkage Rate of Necrotic Lesion after Radiofrequency(RF) Ablation of Hepatocellular Carcinoma: Correlation with Marginal Recurrence and Influencing Factors¹

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Purpose: To compare the CT findings of hepatocellular carcinomas (HCCs) immediately after radiofrequency (RF) ablation with those obtained at six months' follow-up, to analyse the relationship between degree of shrinkage of a necrotic lesion and marginal recurrence, and to evaluate the factors influencing shrinkage.

Materials and Methods: We retrospectively evaluated 54 patients with 62 HCCs who underwent only RF ablation between May 1999 and July 2000. For six months after ablation, all had been free from marginal recurrence and new-growth tumors. The findings of six-month follow-up CT were compared with those obtained immediately after RF ablation, and the volume of each necrotic lesion was calculated and compared. In terms of degree of shrinkage, tumors were classified as belonging to either group I (below 50%), group II (50 - 80%) or group III (above 80%). Each tumor was analysed in terms of its Child-Pugh classification, vascularity at CT, size, treatment details, the post-ablation appearance of its margins, and the presence, during necrosis, of peritumoral vessels and air bubbles. For statistical evaluation, Fisher's exact test was used. Shrinkage after ablation was correlated to marginal recurrence during a period of more than one year.

Results: The Follow-up CT at six months showed that since immediately after ablation, necrotic lesions had shrunk by an average of 72%. Peritumoral vessels were seen in 12 of 14 cases in group I (86%), three of 13 in cases of group II (23%), and 11 of 35 in group III (31%) ($p=0.001$). Immediate CT revealed the presence of air bubbles in two cases in group I (14%), five in group II (38%), and 24 in group III (69%) ($p<0.05$). At follow-up CT performed during a period of more than one year, marginal recurrence was noted in four cases in group I, two in group II and two in group III ($p<0.05$).

Conclusion: When a necrotic lesion contains no peritumoral vessels but does contain air bubbles, the degree of post-RF ablation shrinkage increases. The greater the shrinkage, the less the marginal recurrence rate.

Index words : Liver, interventional procedure
Radiofrequency(RF) ablation
Liver neoplasms, therapy

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