

:
 : 가 5 6 cm 11
 A , 21 10 B
 ()
 50 15
 . B , 1 6
 . 24
 가 . 가
 , 3 6
 (: 4 - 17)
 , : 10.2).
 : 3 6 A 43.8%(7/16) 31.2% (5/16)
 , B 3 6 75.0%(15/20) . 3
 (p<0.05), 6
 27.3% (3/11) , B 80.0%(8/10) A
 (p<0.05).

가 가 (2, 3, 11 - 14) , 가
 , 가 , 가
 (1 - 6). 가
 , 20 - 30% 가 (Radiofrequency thermal ablation)
 (6, 7).
 (15).
 (8), (9), (10)

¹
² 가

가

1 Methotrexate (Emthexate, Myung Ji Pharm. Co., Seoul, Korea) 300 mg/m² Oxaliplatin (Eloxatin, Sanofi-Synthelabo Korea Co., Seoul, Korea) 130mg/m²

, 2 5 5-Fluorouracil (5-FU, Choongwae Pharm. Co., Seoul, Korea) 500 mg/m² 1, Leucovorin calcium (Ferberon, Samjin Pharm. Co., Seoul, Korea) 15mg 3

1999 5 2000 5 83

35 가 37 78 (61.2)

6 (palliative) , 6 cm (n=4), 가 5 , 가 6 (n=3), (n=2), (n=1), (n=1) 16

가 14 21 , 1.5 cm 5.5 cm 3.30

, 7 2 5 14 cm . B , 29 68 (51.8) , 가 3 , 가 7 (n=5), (n=2), (n=1),

가 21 가 (n=1), (n=1)

3 , 18 5 20 , 1.5 cm 6.0 cm 2.95

56 (: 21.4) (CT) Fisher's exact test ,

가 CT 가 Mann-Whitney test , P-value 0.1 (Table 1).

가 RITA Medical system Inc. (Mountain View, CA) 50 (460 kHz) 15 (ground pad)

11 A , 10 B (impedance) . 15 4 7

6 , B 1 3 cm 가

1 5

Table 1. Patients with Liver Metastases Treated with RFTA or RFTA and Combined Chemotherapy

Patient No.	Sex	Age (years)	Primary cancer	No. of nodules	Largest size of tumors (cm)	Group
1	F	64	Rectum	1	5.0	A
2	M	57	Stomach	1	4.5	A
3	M	55	Colon	3	3.2	A
4	M	71	Colon	1	4.8	A
5	F	78	Colon	1	1.5	A
6	F	42	Breast	2	3.5	A
7	M	74	Rectum	1	2.5	A
8	F	60	Breast	2	3.2	A
9	M	58	CBD	1	5.0	A
10	F	75	Colon	1	5.5	A
11	F	39	Breast	2	4.0	A
12	F	47	Colon	4	6.0	B
13	F	58	Stomach	1	1.5	B
14	F	29	Pancreas	1	1.5	B
15	M	52	Colon	1	3.2	B
16	F	58	Colon	4	4.2	B
17	F	64	Colon	5	5.0	B
18	F	41	Breast	1	2.0	B
19	M	68	Stomach	1	6.0	B
20	M	52	Duodenum	1	4.0	B
21	F	49	Colon	1	1.7	B

30 Pethidine HCl (Pethidine ,
Daewon Pharm. Co., Pusan, Korea) 50 mg
, Lidocaine
HCl (Lidocaine , Jaeil Pharm. Co., Daegu, Korea) 200 mg

100 °C 10

가

가

CT Iopromide (Ultravist 300, Scher -
ing Korea Ltd., Seoul, Korea) 120 ml 2.5 - 3 ml

30 , 60 , 220
3 CT
24 CT
가
(complete ablation)
3 6 CT

가

3 6

6

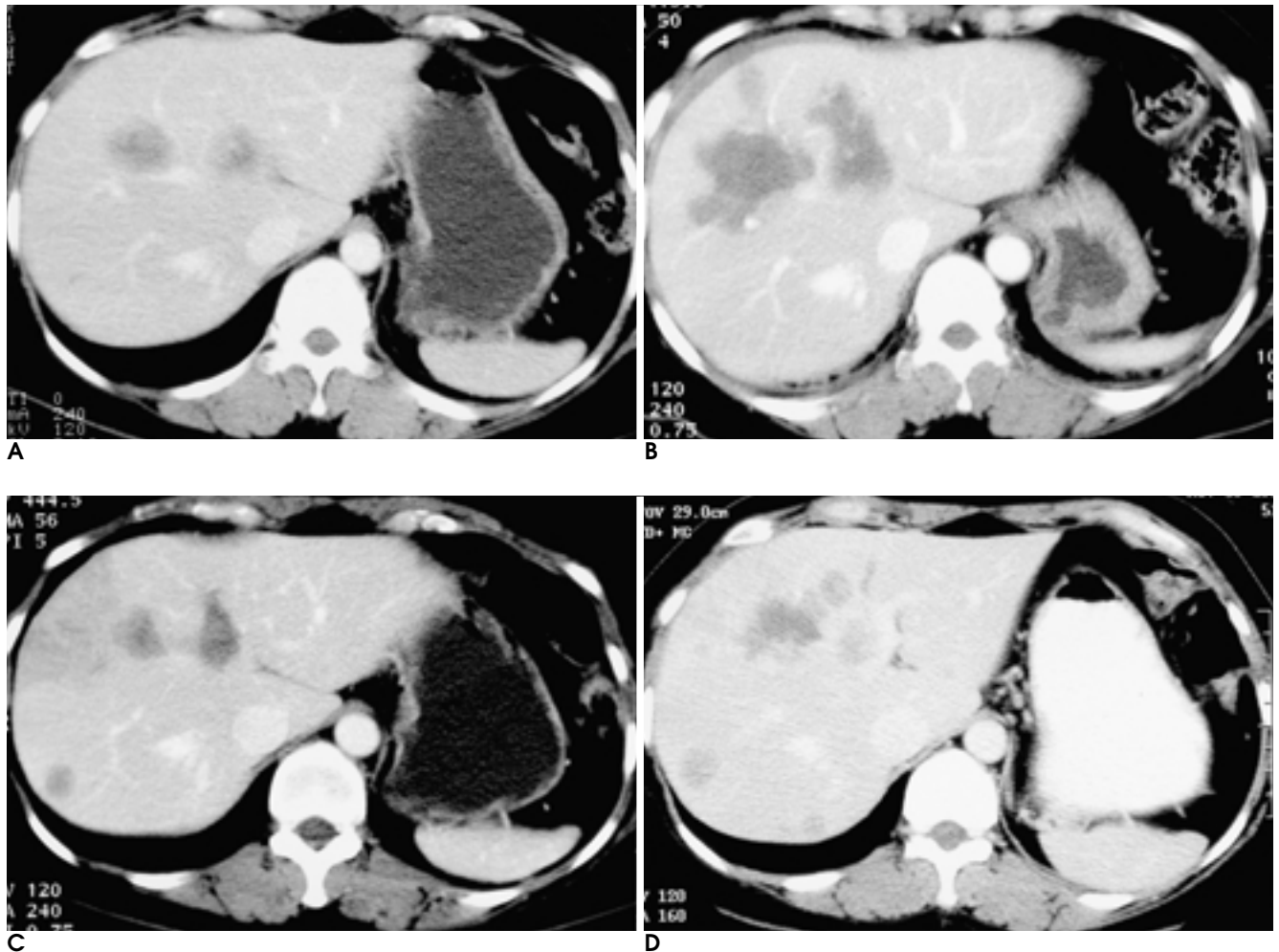


Fig. 1. 42-year-old woman with two metastases from breast cancer classified as Group A.
A. CT scan show two well-localized metastatic nodules in left lobe of liver.
B. CT scan immediately after RF ablation show complete ablation without evidence of residual tumors.
C. Follow-up CT scan at 2 months after RF ablation show suspicious marginal recurrence and another metastatic nodule in right lobe of liver.
D. Follow-up CT scan at 4 months after RF ablation show definite marginal recurrence at previous RF ablation sites and multiple metastatic nodules at both lobes of liver.

/ 가 /) (($p=0.038$).
 , Fisher's exact test . 6 가 A 11
 , 8 (Fig. 1D), B 10
 2
 27.3%(3/11) 80.0%(8/10) B ,
 ($p=0.030$).
 36 210 , A 가 가 7
 , 2 , , , 가
 36 CT CT 가 1 가 . B 2
 (Fig. 1A, B, 2A, 가
 B).
 4 17
 10.2 .
 Table 2, 3 . 3 CT , A
 16 9 , B 20 , , ,
 5 가 , , ,
 , 3 40(75% (3, 5, 6).
 43.8%(7/16) 75.0%(15/20) B ,
 ($p=0.198$). 6 A 3 9.6 (5, 16).
 16 11
 (Fig. 1C), B 20 가 1 , 3 , 5
 3 5 90%, 40%, 30% (4, 17 - 21),
 (Fig. 2C), 6 25% 5% (18).
 31.2%(5/16) 75.0%(15/20) B , , ,

Table 2. Outcomes of Tumor Treatments at 3, 6 Months Follow up Studies

Patient No.	Total times of ablation	Local recurrence		Distant metastasis	
		At 3 months	At 6 months	At 6 months	Site
1	14	Y(1/1)	-	Y	Liver, Peritoneum, Lung
2	10	Y(1/1)	-	Y	Liver
3	15	N	Y(2/3)	Y	Liver, Rib, Vertebra
4	10	Y(1/1)	-	Y	Liver
5	13	Y(1/1)	-	Y	Liver
6	8	Y(2/2)	-	Y	Liver
7	3	N	N	N	-
8	5	Y(1/2)	-	Y	Liver
9	10	Y(1/1)	-	Y	Vertebra, Pelvic bone
10	10	N	N	N	-
11	6	Y(1/2)	-	N	-
12	25	Y(1/4)	-	Y	Liver
13	2	N	N	N	-
14	2	N	N	N	-
15	5	N	N	N	-
16	14	N	N	N	-
17	30	Y(4/5)	-	Y	Liver
18	4	N	N	N	-
19	14	N	N	N	-
20	6	N	N	N	-
21	4	N	N	N	-

Abbreviation : Y = Recurrence, N = No recurrence

3 - 5% (3, 5, 6). 가 가
 가 (9), (10), (8),
 15 - 23%(6, 7), (22), (2, 3, 11 - 14) 가
 50% 가
 (6). 가

Table 3. Correlation of Local Tumor Control and Remote Tumor Control at 3 Months and 6 Months Follow up

	Local tumor control rate		Remote tumor control rate
	3 months	6 months	6 months
Group A	43.8%(7/16)	31.2%(5/16)	27.3%(3/11)
Group B	75.0%(15/20)	75.0%(15/20)	80.0%(8/10)
p-value	0.198	0.038	0.030

Table 4. Comparison Our Results to Other Researchers Results

Researchers	No. of Patients	Mean follow-up (months)	Tumor-free (%)
Group A	11	9.3	18
Group B	10	11.2	80
Rossi et al.(12)	11	11	11
Solbiati et al.(3)	16	18.1	50
Solbiati et al.(13)	29	10.3	50
Rossi et al.(11)	14	12	18
Lencioni et al.(15)	29	6.5	52

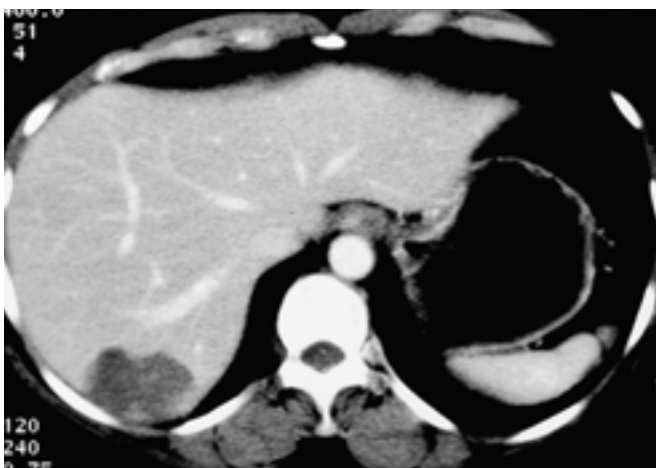
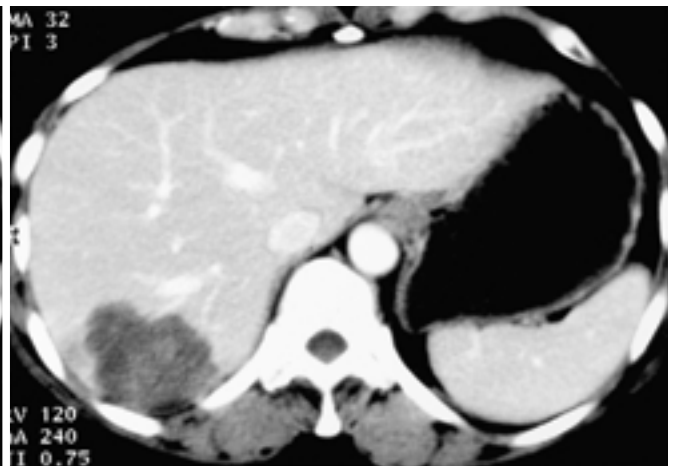
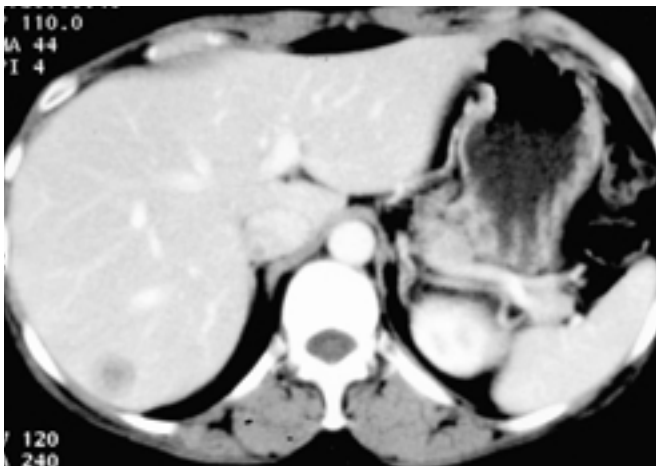


Fig. 2. 41-year-old woman with one metastasis from breast cancer classified as Group B.
A. CT scan show one well-localized metastatic nodule in right lobe of liver.
B. CT scan immediately after RF ablation show complete ablation without evidence of residual tumor.
C. Follow-up CT scan at 3 months after RF ablation show no evidence of marginal recurrence or new metastasis.

:

(coagulation necrosis)

가 가 3 cm (13, 23),

A

, B

가 (12).

가 heat sink effect (24, 25).

CT MR 가 3 mm

(11, 28).

, 3

가가 가

, 45°C

5 mm

가 가

100°C

(28),

가

가

가

가

1 cm

(safety margin)

가 Goldberg

(14, 29)

(30)

(balloon heat

heat

(Goldberg SN et al, RSNA 2000 Scientific Program, unpublished data).

catheter) sink effect (24),

Preketes

(5), Kainuma

1

66.7%

가

가

가

bias

가

(26). , Patt

가

(27), 가

가

(Table

4),

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Radiofrequency Thermal Ablation of Metastatic Liver Tumors: Usefulness of Combined Chemotherapy¹

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Purpose: To assess the usefulness of radiofrequency (RF) thermal ablation with combined chemotherapy for the treatment of metastatic liver tumors.

Materials and Methods: A non-randomized, comparative study was performed in 21 patients with metastatic liver tumors. Inclusion criteria were that these should be less than five in number and less than 6 cm in diameter. Two groups were designed for comparison of the local and remote (new intrahepatic or extrahepatic) tumor control rate (Group A: RF alone, n = 11; Group B: RF + combined chemotherapy, n = 10). There was no significant difference in age, sex, and mass size between the two groups ($p > 0.05$). All ablations were performed percutaneously with a 50W RF generator and 15G-needle electrode (RITA Medical System Inc.) under US guidance. In group B, six cycles of systemic chemotherapy were performed every month immediately after RF ablation. Follow-up CT scans were obtained within 24 hours of ablation and were compared with the findings of pre-ablation CT scanning. If an ablated lesion covered the mass without any residual enhancing foci, this was defined as complete ablation. Three and six months after ablation, local and remote tumor control rates were compared between the two groups (follow up: range 4 - 17 (mean, 10.2) months).

Results: In group A, the local tumor control rate was 43.8% (7/16) and 31.2% (5/16) at 3 and 6 months follow-up, respectively, while in group B, the corresponding rates were both 75% (15/20). At three months, the difference in this rate between the two groups was not significantly different ($p > 0.05$), but at 6 months there was significant difference ($p < 0.05$). At 6 months follow-up, the remote tumor control rate for Group A and Group B was 27.3% (3/11) and 80.0% (8/10), respectively, reflecting a significant difference between the two groups ($p < 0.05$).

Conclusion: In patients with metastatic liver tumor, radiofrequency thermal ablation with combined chemotherapy may be superior to RF thermal ablation alone for both local and remote tumor control.

Index words : Liver neoplasm, therapy
Interventional procedures

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