



: (Post - ablation syndrome)
 : 1999 4 6 (n = 29)
 (n = 13) 42 15 50
 65 , 1.1 cm 5.0 cm , 3.1 cm .
 , (38) , , ,
 , 가 , , ,
 (ablation)
 aminotransferase (ALT/AST)
 가
 : 42 29 (69.0%) ,
 20 (47.6%), 8 (19.0%),
 7 (16.7%) . 3 5.5 (20.4)
 4 (9.5%) .
 6 5 (63.0) , 1
 4 (21.0) , 6 (14.3%),
 3 (7.1%), 3 (7.1%)가 20 17
 (85.0%) 가 ,
 ALT/AST 52.6%/73.7%
 2 가
 :

가 (Transarterial Chemoem - bolization: TACE)
 , , (Percutane - ous Ethanol Injection: PEI) (6)
 , (Radio - frequency) (7 - 9),
 (1, 2). (Microwave) (10 - 11), (Laser) (12, 13)
 , 가 (Cryoprobe)
 (3 - 5). 가 (Cryosurgery) (14)
 , 가
 , 가

가 1 -
2 cm .

(38),
가

1999 4 6
67 가
(n 2 cm
= 19),
가 (n = 6) 25 가
42 .

amino - transferase (ALT/AST)
가
(bias) 25 가
6
가 가
가 4 5 cm 가 chi -
가 , square test 0.05 .
6 18 , 가 가
,
(: > 50%, 1 15 (4.15
: > 50,000/ μ l)가)
38 78 (56.0) 42
가 29 , 가 13 29 29 (69.0%)
, 13
(alpha - fetoprotein:
AFP) 20 (47.6%) 가
8 (19.0%), 7 (16.7%), 6 (14.3%)
2 (Table 1).
5.5 (20.4)

(Carcinoembryonic antigen: CEA) CA - 19 - 9
(n 4 (9.5%) 6 5
= 4), (n = 3), (n = 2), (n = 2), (63.0)
(n = 1), (n = 1) 65 1 4 (21.0
1.1 cm 5.0 cm 3.1)
cm 6 1 6 (14.3%) 3 24
가 (8.7)
RITA Medical System, Inc.
(Mountain View, CA) 50 (7.1%), 2 (4.8%) 가 3 (7.1%), 3
(460 KHz), (Ground
pad) 15 27 17 (63.0%) , 가 15
4 3 (20.0%)
10 100 가 3 cm (Table 2). (median
6)
(thermosensor)가 가 (Table 3).
가 6 4 (66.7%)

ALT/AST가 38
ALT/AST 31 (81.6%), 36 (94.7%)
가 , 가 2
가 ALT 20 (52.6%), AST 28
(73.7%) 6
ALT/AST 가 2 가
(Table 4).
8 27 ALT 24
(88.9%), AST 21 (77.8%)
18 , 7 가, 5
8 17 15
6
5
가
1

Table 1. Frequency of Post-ablation Syndrome after Radiofrequency Thermal Ablation

	No. of Patients/Total No. of Patients	%
Abdominal pain	20/42	47.6
Fever	8/42	19.0
Nausea	7/42	16.7
Right shoulder pain	6/42	14.3
Chest discomfort	3/42	7.1
Headache	3/42	7.1
Vomiting	2/42	4.8

Table 2. Correlation of Location of Mass and Abdominal Pain

	Patients with Subcapsular mass (n = 27)	Patients without Subcapsular mass (n = 15)
Pain (+)	17	3
Pain (-)	10	12

($p < 0.05$)

Table 3. Correlation of Number of Ablation and Pain

		Number of the ablation	
		< 6	6
Pain (+)		5	15
Pain (-)		16	6

($p < 0.05$)

가
(15,16), (22), (23), (25)
(15 - 24),
(absorption fever)
가
가
42 20 (47.6%)
20%
60%
(20 - 23) (Table 5).

Table 4. Correlation of ALT/AST Elevation and Number of Ablation

		Elevated ALT		Elevated AST	
		< 2*	2*	< 2*	2*
Number of Ablation	< 6	11	8	5	14
	6	7	12	5	14

*: Two fold ($p > 0.05$) ($p > 0.05$)

Table 5. Comparison between Post-ablation Syndrome and Post-embolization Syndrome in the Literature

	Choi, et al*	Ahn, et al (20)	Lee, et al (21)	Slomka, et al (22)	Yamada, et al (23)
Pain (%)	47.6	40	72	78.6	59
Fever (%)	19.0	20	92	NA	97
Nausea (%)	16.7	NA	40	64.3	NA

*: Current study

(): Reference number

NA: Not-available

:

가

가 (31 - 34).

, 가

, ,

가

, , 가

Buscarini (26)

ALT/AST

8

가

ALT/AST 2 가 가

가

ALT/AST가

가 ALT/AST

. Rossi (27)

ALT 가 82 ± 9 IU/ml,

가 21 ± 6 IU/ml ,

가 155 ± 11 IU/ml ,

가 142 ± 7 IU/ml 가 , AST

92 ± 8 IU/ml 152 ± 9 IU/ml ,

26 ± 4 IU/ml 143 ± 6 IU/ml 가

ALT/AST가 가

가

(20 - 23)

(Table 5),

3

가

, ,

가 10%

(27 - 30),

(Coagulation therapy),

(Laser photocoagulation therapy)

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Radiofrequency Thermal Ablation of Malignant Hepatic Tumors: Post-Ablation Syndrome¹

Jung-Bin Choi, M.D., Hyunchul Rhim, M.D., Yongsoo Kim, M.D.,
Byung Hee Koh, M.D., On Koo Cho, M.D., Heung Suk Seo, M.D., Seung Ro Lee, M.D.

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

Purpose: To evaluate post-ablation syndrome after radiofrequency thermal ablation of malignant hepatic tumors.

Materials and Methods: Forty-two patients with primary (n=29) or secondary (n=13) hepatic tumors underwent radiofrequency thermal ablation. A total of 65 nodules ranging in size from 1.1 to 5.0 (mean, 3.1) cm were treated percutaneously using a 50W RF generator with 15G expandable needle electrodes. We retrospectively evaluated the spectrum of post-ablation syndrome including pain, fever (≥ 38 °C), nausea, vomiting, right shoulder pain, and chest discomfort according to frequency, intensity and duration, and the findings were correlated with tumor location and number of ablations. We also evaluated changes in pre-/post-ablation serum aminotransferase(ALT/AST) and prothrombin time, and correlated these findings with the number of ablations.

Results: Post-ablation syndrome was noted in 29 of 42 patients (69.0%), and most symptoms improved with conservative treatment. The most important of these were abdominal pain (n=20, 47.6%), fever (n=8, 19.0%), and nausea (n=7, 16.7%), and four of 42 (9.5%) patients complained of severe pain. The abdominal pain lasted from 3 hours to 5.5 days (mean; 20.4 hours), the fever from 6 hours to 5 days (mean; 63.0 hours). and the nausea from 1 hour to 4 days (mean; 21.0 hours). Other symptoms were right shoulder pain (n=6, 14.3%), chest discomfort (n=3, 7.1%), and headache (n=3, 7.1%). Seventeen of 20 patients (85%) with abdominal pain had a subcapsular tumor of the liver. There was significant correlation between pain, location of the tumor, and number of ablations. After ablation, ALT/AST was elevated more than two-fold in 52.6%/73.7% of patients, respectively but there was no significant correlation with the number of ablation.

Conclusion: Post-ablation syndrome is a frequent and tolerable post-procedural process after radiofrequency thermal ablation. The spectrum of this syndrome provides a useful guideline for the post-ablation management.

Index words : Liver neoplasms, therapy
Interventional procedures, complications
Radiofrequency (RF) ablation

Address reprint requests to : Hyunchul Rhim, M.D., Department of Diagnostic Radiology, College of Medicine, Hanyang University.
17 Haengdang-Dong, Sungdong-Gu, Seoul 133-792, Korea.
Tel. 82-2-2290-9164 Fax. 82-2-2293-2111