Original

Trans-thoracic microwave coagulo-necrotic therapy for hepatic tumors without chest tube insertion

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Abstract

Background—The objective of this study was evaluate the efficiency of chest tube insertion after trans-thoracic microwave coagulo-necrotic therapy for hepatic tumors.

Methods—Twenty trans-thoracic microwave coagulo-necrotic therapy was performed in patients with hepatic tumors. The cases was divided into two groups : Group I consisted of 10 patients with chest tube insertion. Group II consisted of 10 patients without chest tube insertion.

Results—A comparison of pre-, intra- or post-operative data revealed that there was no significant differences in each group. A complication occurred in 1 (5%) patient out of 20 cases. When a comparison was made with Group I and Group II, there was no significant difference in complication. The mean durations of hospitalization after treatment were 14.3 days in Group I and 21.1 days in Group II ($p=0.0871$).

Conclusions—Trans-thoracic microwave coagulo-necrotic therapy for hepatic tumors without chest tube insertion was performed safely.

Key words : microwave coagulo-necrotic therapy, chest tube

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Introduction

Surgery for hepatic tumors have recently become much safer^{1) 2)}. This progress is due in part to the development of intraoperative devices^{1) 3)}, such as the ultrasonic dissector, as well as to improvements in postoperative patient management^{1) 2) 4)}. However, surgical resection is not a viable option for all patients, due to poor liver function induced by chronic liver disease.

To overcome the disadvantages of surgical resection, a microwave coagulo-necrotic therapy (MCN) was developed⁵⁾⁻⁷⁾. However, MCN of the superior or posterior part of the liver is well known as being difficult to perform. Moreover, performing MCN for recurrent hepatic tumors remains very difficult, since there are usually severe adhesions around the liver caused by the previous operation. Therefore, the method of a trans-thoracic or trans-thoracoabdominal MCN was developed⁸⁾.

We herein report to evaluate the efficiency of chest tube insertion after a trans-thoracic MCN for hepatic

tumors.

Patients and methods

Between January 1998, and August 1998, 20 patients with hepatic tumor underwent a trans-thoracic MCN in the department of Surgery, National Kyushu Medical Center. They ranged in age from 47 to 80 years (mean $\pm$ SD, 62.1 ± 9.3 years), and 19 (95.0%) were males. The preoperative, intraoperative, and postoperative variables in the patients who underwent MCN with HCC were compared (**Tables 1**).

After a trans-thoracic MCN, a careful hemostasis was performed, and abdominal drains were placed in the Winslow's foramen and subphrenic space. Patients with postoperative ascites were treated with water and sodium restriction and the administration of diuretics and compensation of albumin and fresh-frozen plasma.

The complications associated with increased morbidity were defined as liver failure, intractable ascites (which either had a poor response to ordinary diuretic

Table 1 Perioperative variables in patients who underwent MCN with and without chest tube

Variables	Group I (n=10)	Group II (n=10)	p
Age (years)	58.7 $\pm$ 6.0	65.4 $\pm$ 10.7	0.1010
Sex (male : female)	10 : 0	9 : 1	0.3049
Preoperative laboratory data			
Platelet count ($10^4/\mu\ell$)	11.3 $\pm$ 3.7	10.9 $\pm$ 4.3	0.8201
Total bilirubin (mg/dl)	0.95 $\pm$ 0.36	0.99 $\pm$ 0.61	0.8599
Albumin (g/dl)	3.72 $\pm$ 0.59	4.10 $\pm$ 0.34	0.0947
AST (IU/ ℓ)	64.7 $\pm$ 48.4	41.9 $\pm$ 10.9	0.2400
ALT (IU/ ℓ)	70.1 $\pm$ 50.0	35.5 $\pm$ 31.2	0.0786
Hepaplastin test (%)	99.9 $\pm$ 31.2	96.8 $\pm$ 33.1	0.8349
Prothrombin time (%)	78.4 $\pm$ 24.6	74.4 $\pm$ 10.6	0.6416
Ccr (ml/min)	85.0 $\pm$ 19.6	63.8 $\pm$ 28.3	0.0902
ICG (%)	27.7 $\pm$ 19.2	19.6 $\pm$ 9.2	0.2634
Child's classification ⁹			0.3247
A	7 (70%)	9 (90%)	
B	1 (10%)	1 (10%)	
C	2 (20%)	0 (0%)	
Cirrhosis	6 (20%)	3 (30%)	0.2350
Operation time (min)	110 $\pm$ 35	140 $\pm$ 52	0.1469
Blood loss (ml)	40.2 $\pm$ 28.9	37.8 $\pm$ 32.0	0.8623
Tumor diameter (cm)	2.7 $\pm$ 0.6	2.7 $\pm$ 1.3	0.9824
Complication	0 (0%)	1 (10%)	0.3049

AST : glutamic oxaloacetic transaminase ALT : glutamic pyruvic transaminase Ccr : Creatinine Clearance ICG : indocyanine green retention rate at 15min

therapy or required drainage because of tense ascites), intractable pleural effusion that required 2 or more thoracenteses or continuous drainage, intraperitoneal infection, a hemorrhage requiring reoperation, a major bile leakage, and gastrointestinal bleeding.

The patients who underwent a trans-thoracic MCN were assigned to two groups. Group I consisted of the patients that had undergone MCN without chest tube insertion (n=10). Group II consisted of the patients with chest tube insertion (n=10). A 20Fr. drainage tube was inserted into the right pleural cavity through the 7th or 8th intercostal space after MCN. The evaluation of chest radiography was performed first, second, 4th, 7th day after the treatment. The chest tube was removed when the drained serous fluid from chest tube was less than 100ml.

Statistical analyses were performed using the χ^2 test and Student's test. A p value of <0.05 was considered to be significant.

Results

A trans-thoracic MCN was performed nine patients of

hepatocellular carcinoma and a patient of metastatic liver tumor in Group I, and 9 with hepatocellular carcinoma and one with metastatic liver tumor in Group II.

A comparison of pre-, intra- or post-operative data (Table 1, 2) revealed that there was no significant difference in each group. There were two patients of Child C⁹ in the Group I. However, they had no complication after the treatment occurred in 1 (5%) patient with chest tube out of 20 cases. When a comparison was made with Group I and Group II, there was no significant difference in complication. The mean interval for the chest tube insertion was 5.9 days (range 4 to 12 days). The mean durations of hospitalization after the treatment were 14.3 days in Group I and 21.1 days in Group II (p=0.0871).

Discussion

Despite recent developments in intensive perioperative management, patients under going hepatic surgery are vulnerable to complications⁽¹⁰⁻¹²⁾. In this study, no intra-thoracic complications as the formation of the

Table 2 Postoperative variables in patients who underwent MCN with and without chest tube

Variables	Group I (n=10)	Group II (n=10)	p
7 th postoperative laboratory date			
Platelet count ($10^4/\mu\ell$)	15.8 $\pm$ 6.3	13.4 $\pm$ 6.5	0.4289
Total bilirubin (mg/dl)	0.87 $\pm$ 0.37	1.35 $\pm$ 1.20	0.2400
Albumin (g/dl)	3.61 $\pm$ 0.51	3.52 $\pm$ 0.42	0.6732
AST (IU/l)	63.9 $\pm$ 34.7	77.7 $\pm$ 57.2	0.5390
ALT (IU/l)	83.1 $\pm$ 34.2	116.2 $\pm$ 93.4	0.3305
Hepaplastin test (%)	94.0 $\pm$ 25.7	100.9 $\pm$ 31.2	0.6168
Prothrombin time (%)	67.8 $\pm$ 8.4	70.7 $\pm$ 10.6	0.5302
14th postoperative laboratory date			
Platelet count ($10^4/\mu\ell$)	16.7 $\pm$ 6.2	16.5 $\pm$ 6.3	0.9256
Total bilirubin (mg/dl)	0.86 $\pm$ 0.30	1.09 $\pm$ 1.00	0.4963
Albumin (g/dl)	3.70 $\pm$ 0.58	3.71 $\pm$ 0.55	0.9665
AST (IU/l)	57.3 $\pm$ 28.9	62.1 $\pm$ 39.5	0.7637
ALT (IU/l)	56.5 $\pm$ 26.8	65.6 $\pm$ 31.9	0.5105
Hepaplastin test (%)	103.3 $\pm$ 31.7	103.5 $\pm$ 30.0	0.9913
Prothrombin time (%)	67.3 $\pm$ 10.8	69.7 $\pm$ 7.7	0.6376
Chest tube insertion	—	5.9 $\pm$ 3.0	
Duration of hospitalization	14.3 $\pm$ 3.8	21.1 $\pm$ 11.3	0.0871

AST : glutamic oxaloacetic transaminase

ALT : glutamic pyruvic transaminase

trans-thoracic abscess, atelectasis, air leakage or pleural effusion was occurred without chest tube insertion. The mean durations of hospitalization after the treatment were shorter in patients without chest tube insertion.

For an infection, intraoperative careful treatments and an appropriate abdominal drainage after a trans-thoracic MCN for hepatic tumors could prevent from the intra-thoracic abscess. We checked the intraoperative lung injury and lung collapse with a routine intraoperative chest X ray and tracheoscopy. Intra- or post-operative atelectasis or air leakage was not recognized in this series. Cirrhosis is one of the most prominent risk factors of intractable ascites and pleural effusion after liver surgery⁹⁾. Hartz et al¹³⁾ stated that there is a direct communication between the chest and the abdomen via a tiny hole in the diaphragm; any increased intra-abdominal pressure may stretch the diaphragm and a small hole will develop. Lee et al¹⁴⁾ assumed that right pleural effusion after hepatectomy was caused by diffusion from subphrenic space through the dissected diaphragmatic triangular area. In cases undergoing major lobectomy, and also in patients undergoing partial hepatectomy of the right lobe, the right triangular and the coronary ligaments must be dissected to mobilized the right hepatic lobe. The diaphragmatic triangular area, where there is no parietal peritoneum, extrudes into the peritoneal cavity. However, a wide dissection of the right triangular and coronary ligaments was not needed in trans-thoracic MCN for hepatic tumors. A minimal invasive treatment prevented from pleural effusion after the hepatic surgery.

In conclusion, based on the above findings, a trans-thoracic microwave coagulo-necrotic therapy without chest tube insertion was performed safely. The indication for a chest tube insertion after trans-thoracic microwave coagulo-necrotic therapy was that intraoperative lung injury or intractable ascites was

recognized.

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