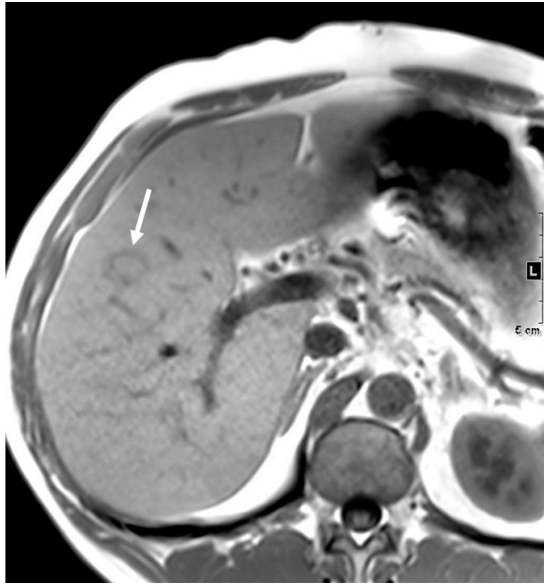
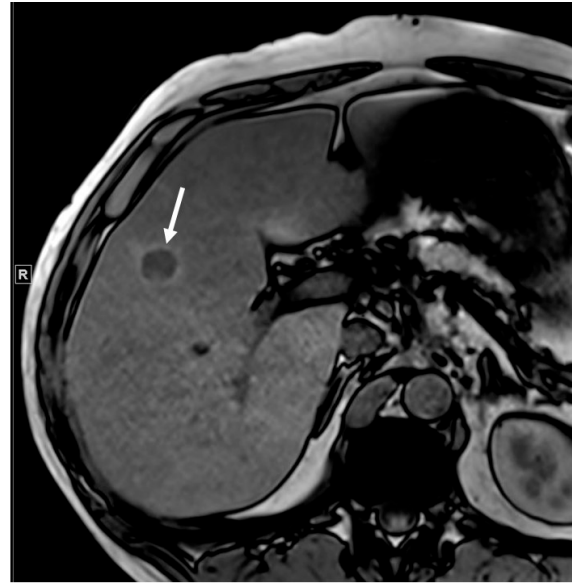


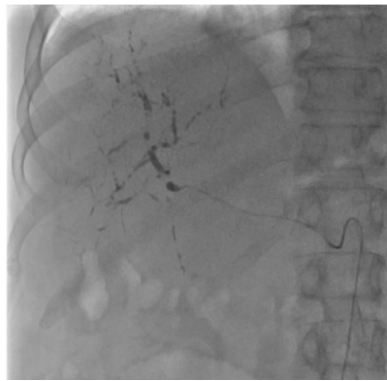


A

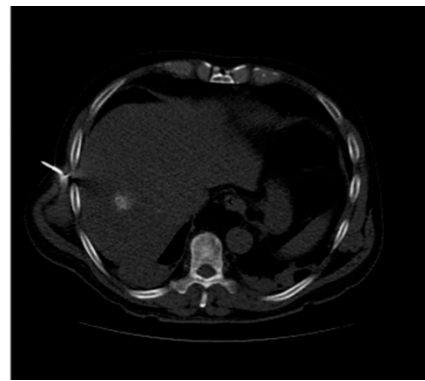


B

Figure S1 In-phase (A) and opposed-phase (B) chemical-shift imaging showing signal intensity loss on the opposed-phase image (arrow) in a typical steatotic HCC.



(A)



(B)



(C)

Figure S2 Intra-arterial injection of lipiodol to tag a HCC invisible by ultrasonography (A). Then, the HCC becomes hyperdense and a microwave ablation needle is inserted under CT-guidance (B and C).

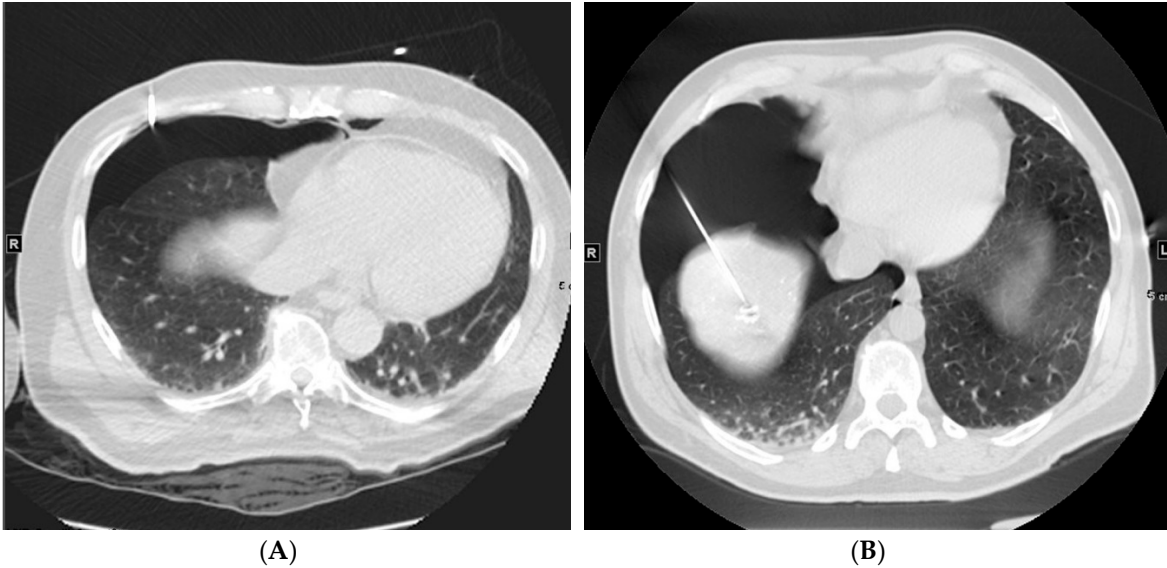


Figure S3 After intra-arterial injection of lipiodol to tag a HCC located under the liver dome (thus invisible by ultrasonography), pneumothorax was artificially induced with CO₂ using a Veress needle (A) and the radiofrequency-ablation needle was inserted through the extrapulmonary transthoracic transdiaphragmatic route (B).



Figure S4 Three radiofrequency ablation needles were inserted in a HCC nodule located close to the middle hepatic vein (A). Then, an 11mm-balloon was inflated to stop the blood flow in the middle hepatic vein in order to prevent the heat sink effect (B).

Supplemental tables

Table S1. Univariate and multivariate Cox regression models to predict recurrence-free survival (per patient analysis).

Univariate analysis	Multivariate analysis	Bootstrapping (200 replications)
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Variables	Odds ratio (95% CI)	P value	Odds ratio (95% CI)	P value	Odds ratio (95%CI)	P value
Patients						
Age	1.006 (0.987-1.024)	0.551				
Sex female vs male	0.862 (0.555-1.339)	0.51				
ASA (>2 vs. ≤2)	0.855 (0.608-1.2)	0.365				
Diabetes	0.887 (0.628 – 1.252)	0.495				
Metformin treatment	0.813 (0.468-1.41)	0.46				
Treatment-naïve patient	0.548 (0.387-10.776)	0.001	0.546 (0.362-0.823)	0.004	0.546 (0.353-0.844)	0.006
Liver diseases						
Cirrhosis	1.082 (0.506-2.313)	0.839				
Child-Pugh (B vs. A)	1.584 (0.821-3.055)	0.17				
Cause of liver disease (vs. alcohol)						
Viral hepatitis B or C	0.895 (0.590-1.358)	0.601				
Hemochromatosis	1.178 (.519-2.674)	0.696				
Others (including NASH)	0.741 (0.453-1.213)	0.233				
Steatosis	1.188 (0.83-1.7)	0.346				
AFP ≥100 vs <100 ng/mL	3.349 (1.469-7.637)	0.004	2.437 (1.211-4.906)	0.013	2.437 (1.129-5.264)	0.023
AFP (per unit)	1.001 (1 – 1.001)	0.006				
Bilirubin	1.01 (0.989-1.032)	0.344				
Albumin	0.984 (0.953-1.017)	0.338				
Prothrombin time	1 (0.987-1.013)	0.970				
Platelet count (per 1,000/mm3)	1 (0.998-1.002)	0.897				
Creatinine	1 (0.995-1.004)	0.872				
MELD (>9 vs. ≤9)	1.105 (0.78-1.567)	0.573				
ALBI score 2 vs. 1	1.16 (0.815-1.65)	0.41				
HCC						
Tumor size (per mm)	1.02 (0.99-1.051)	0.19				
Tumor size <20 mm	0.835 (0.569-1.225)	0.356				
Nb. of HCC (1 vs. >1)	2.102 (1.382-3.197)	0.001	2.144 (1.357-3.388)	0.001	2.144 (1.298-3.543)	0.003
Steatotic HCC	0.61 (0.389-0.955)	0.031	0.864 (0.540-1.383)	0.544	0.864 (0.495-1.509)	0.608
Dome tumor	1.053 (0.717-1.547)	0.791				
Subcapsular	0.964 (0.673-1.379)	0.839				
Near large vessel	1.01 (0.686-1.487)	0.959				
Near surrounding organ	0.88 (0.483-1.604)	0.677				
PTA						
PTA modality: MWA vs RF	1.196 (0.845-1.693)	0.087				
US vs CT guidance	0.938 (0.669-1.316)	0.712				
Artificial pneumothorax	1.301 (0.569-2.977)	0.533				
Tumor tagging	0.97 (0.688-1.369)	0.863				

Abbreviations: HCC, hepatocellular carcinoma; NASH, non-alcoholic steatohepatitis; MELD, model for end-stage liver disease; AFP, alpha fetoprotein; PTA, percutaneous thermal ablation; US, ultrasonography; CT, computed tomography.

Table S2. Complications observed after 412 PTA sessions.

Grade	Complication	Nb.
Minor complications (1.7%) (grade B SIR)	Hemoperitoneum without active bleeding (no embolization)	4
	Liver subcapsular hematoma without consequences	1
	Hemothorax without consequence	1
	Hepatic vein thrombosis	1
Major complications (1.9%) (grade C SIR)	Hemoperitoneum with active bleeding on post-procedure CT and embolization	2
	Pleural fistula requiring drainage	1
	Pneumothorax requiring drainage for 24h	5