Supplementary

Appendix 1

Following the acquisition of non-enhanced images, 80–100 mL of non-ionic iodine-containing contrast agent was injected at an average injection rate of 2–3 mL/second. For dynamic imaging, the injection tracking technique was employed, initiating arterial phase scanning 25–30 seconds after injection, and obtaining images in the (portal) venous phase and delayed phase at 60–70 and 90–100 seconds after injection.

Table S1 Scanning parameters

Parameter	GE revolution	Philips brilliance
Tube voltage (kVp)	120	120
Tube current (mA)	200–240	200–250
Rotation time (s)	0.5	0.5
Section thickness (mm)	5	5
Section interval (mm)	5	5
Visual field (mm × mm)	350×350	350×350
Matrix	512×512	512×512
Window width (HU)	300	300
Window level (HU)	50	50

HU, Hounsfield units.

Table S2 Definition of imaging features at enhanced CT

Phase and CT characteristics	Definition
Arterial phase	
Intratumor arteries	Abnormal vessels of maximum diameter >2 mm
Arterial phase hyperenhancement	The tumor parenchyma enhancement was greater than the surrounding liver parenchyma
Peritumoral arterial phase enhancement	Tumor surrounding irregular/wedge hyperenhancement of liver tissue
Rim arterial phase hyperenhancement	Irregularly shaped rimlike peripheral hyperenhancement
Vein or delay phase	
Non-peripheral washout	Non-peripheral visually assessed temporal reduction in enhancement in whole or in part relative to the composite liver parenchyma
Enhancing capsule	Well-defined or/unclear enhancing margins around the tumor
Substantial necrosis	Necrotic area (arterial phase decay lower than adjacent normal liver parenchyma) 20%
Irregular tumor margins	Tumors were nodular tumors with irregular margins
Tumor size	Maximum cross-sectional diameter of the major tumor at the portal vein stage

CT, computed tomography.

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Table S3 Hyperparameter values for different machine learning models

Histogram models			Clinicoradiological models			Clinicoradiological histogram models		
AdaBoost	Parameter	values	AdaBoost	Parameter	values	AdaBoost	Parameter	values
	n_estimators	16		n_estimators	73		n_estimators	16
	learning_rate	0.32528		learning_rate	0.01693		learning_rate	0.32528
	algorithm	SAMME.R		algorithm	SAMME.R		algorithm	SAMME.R
SVM	Parameter	values	SVM	Parameter	values	SVM	Parameter	SVM
	gamma_self_ defined	1		gamma_self_ defined	1		gamma_self_ defined	1
	tol	1e-04		tol	1e-04		tol	1e-04
	shrinking	True		shrinking	True		shrinking	True
	C	0.73705		C	1.74685		C	1
	coef0	0		coef0	0		coef0	0
	kernel	rbf		kernel	rbf		kernel	rbf
	class_weight	balanced		class_weight	balanced		class_weight	balanced
	degree	3		degree	3		degree	3
	gamma	auto		gamma	auto		gamma	auto
DecisionTree	Parameter	Values	DecisionTree	Parameter	Values	DecisionTree	Parameter	Values
	criterion	gini		criterion	gini		criterion	gini
	min_samples_ split	8		min_samples_ split	5		min_samples_ split	2
	max_depth	3		max_depth	3		max_depth	3
	class_weight	balanced		class_weight	None		class_weight	balanced
	min_samples_ leaf	1		min_samples_ leaf	1		min_samples_ leaf	1

SVM, support vector machine.

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Table S4 Association between preoperative CT venous phase histogram characteristics and MTM-HCCs

Histogram characteristics	MTM-HCCs (n=46)	Non–MTM-HCCs (n=76)	P value
Mean	78.4±16.6	79.3±15.4	0.76
Median	78.7±16.8	79.8±15.8	0.71
Maximum	142.0 (130.0, 156.8)	146.5 (128.0, 162.0)	0.73
Minimum	−46.0 (−82.5, 15.3)	−27.0 (−153.0, 20.5)	0.92
Percentile (10%)	59.3±18.8	59.4±19.2	0.99
Percentile (90%)	98.0±15.7	98.8±14.1	0.78
Kurtosis	4.0 (3.3, 9.3)	4.2 (3.2, 7.2)	0.87
Skewness	−0.2 (−1.0, 0.1)	−0.3 (−0.9, 0.001)	0.52
Energy	53,802,812,868.5 (14,729,575,782.3, 197,609,500,000.0)	30,093,783,326.5 (12,059,475,976.5, 93,964,876,836.5)	0.16
Range	186.0 (122.5, 246.3)	170.5 (117.0, 313.0)	0.96
Variance	246.0 (187.6, 360.6)	252.6 (150.2, 403.4)	0.82

Data are presented as mean ± standard deviation or median (interquartile range). MTM-HCC, macrotrabecular-massive hepatocellular carcinoma; CT, computed tomography.

Table S5 Arterial phase histogram features selected based on feature weights

Characteristics	Quotiety	Weight
Variance	0.2222	1
Skewness	0.2222	1
Maximum	0.2222	1
Energy	0.2222	1
Percentile (90%)	0.0556	0.25
Median	0.0556	0.25

According to ICC ≥0.75, 8 arterial period histogram features were included to establish the prediction model, and the feature weight table of the machine learning algorithm with the highest AUC value-AdaBoost algorithm was selected. AUC, area under the curve.

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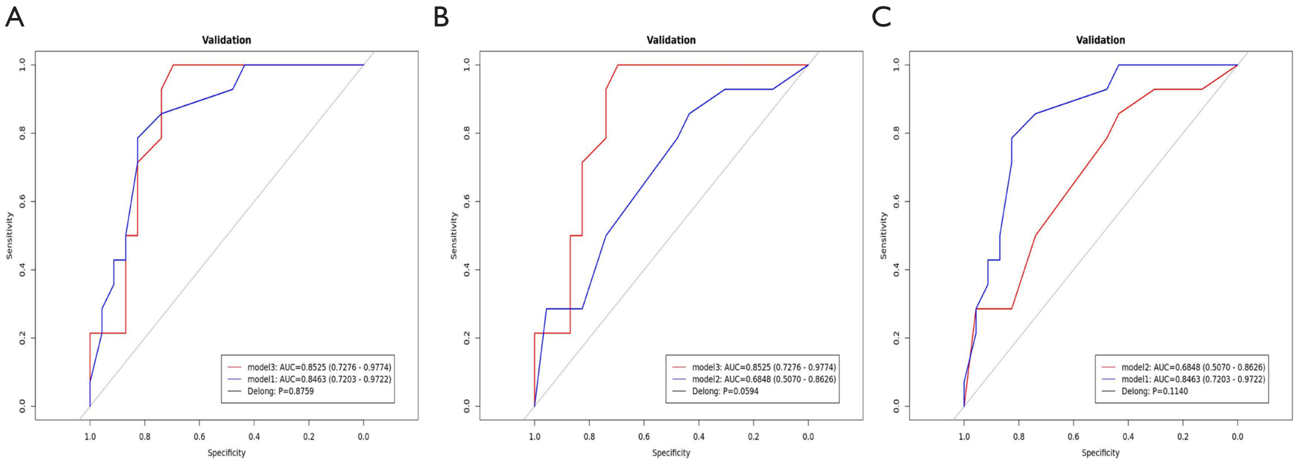

Figure S1 Delong test between AUC in the test set: (A) histogram model *vs.* clinical model, (B) clinical histogram model *vs.* clinical model, and (C) histogram model *vs.* clinical histogram model based on AdaBoost algorithm.

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