

Table S1 Clinical characteristics of patients without MVI who underwent adjuvant TACE or not before PSM

Clinical characteristics	MVI absent			P	
	Total (n = 815)	Adjuvant TACE			
		No (n = 431)	Yes (n = 384)		
Age (years)	57.00 (49.00, 65.00)	58.00 (48.00, 66.00)	56.00 (49.00, 64.00)	0.102	
AFP (ng/mL)	17.47 (4.30, 186.25)	16.20 (4.25, 143.00)	19.19 (4.40, 264.10)	0.101	
ALT (U/L)	30.00 (21.10, 44.67)	29.00 (20.73, 42.32)	31.39 (21.68, 47.00)	0.111	
AST (U/L)	32.57 (25.71, 44.81)	31.22 (25.00, 44.00)	33.05 (26.00, 45.95)	0.079	
GGT (U/L)	44.45 (27.00, 81.95)	46.00 (25.42, 81.39)	42.51 (27.36, 83.12)	0.995	
ALP (U/L)	91.00 (72.81, 115.44)	89.00 (70.28, 112.00)	94.95 (75.00, 118.66)	0.030	
ALB (g/L)	41.56 (38.41, 44.25)	41.20 (38.20, 44.00)	41.92 (38.70, 44.50)	0.109	
TB (mol/L)	14.48 (10.73, 19.80)	13.60 (10.40, 19.80)	15.20 (11.10, 19.82)	0.058	
WBC (10 ⁹ /L)	5.24 (4.16, 6.47)	5.24 (4.11, 6.48)	5.26 (4.22, 6.44)	0.628	
CR (μmol/L)	73.00 (62.20, 83.62)	73.30 (62.92, 82.86)	72.38 (61.80, 83.84)	0.581	
PT (s)	11.80 (11.20, 12.60)	11.80 (11.30, 12.50)	11.80 (11.20, 12.60)	0.984	
NLR	2.10 (1.52, 3.01)	1.95 (1.43, 2.81)	2.20 (1.64, 3.30)	<0.001	
LMR	3.79 (2.80, 5.10)	3.90 (2.90, 5.18)	3.62 (2.72, 5.00)	0.132	
PLR	101.50 (78.13, 140.36)	96.69 (73.49, 136.10)	108.47 (83.88, 143.39)	<0.001	
Operation time (mins)	202.00 (150.00, 260.00)	200.00 (150.00, 260.00)	210.00 (165.00, 271.25)	0.066	
Tumor diameter (mm)	33.00 (22.00, 53.00)	33.00 (22.00, 51.00)	34.00 (22.00, 55.00)	0.197	
Gender [n(%)]	male	674 (82.70)	362 (83.99)	0.347	
	female	141 (17.30)	69 (16.01)		72 (18.75)
HBV [n(%)]	Negative	113 (13.87)	62 (14.39)	0.724	
	Positive	702 (86.13)	369 (85.61)		333 (86.72)
Child-Pugh classification [n(%)]	A	782 (95.95)	414 (96.06)	1.000	
	B	33 (4.05)	17 (3.94)		16 (4.17)
Liver cirrhosis [n(%)]	No	219 (26.87)	119 (27.61)	0.671	
	Yes	596 (73.13)	312 (72.39)		284 (73.96)
Tumor number [n(%)]	single	760 (93.25)	407 (94.43)	0.200	
	multiple	55 (6.75)	24 (5.57)		31 (8.07)
Tumor location [n(%)]	left	249 (30.55)	137 (31.79)	0.702	
	right	534 (65.52)	278 (64.50)		256 (66.67)
	double	32 (3.93)	16 (3.71)		16 (4.17)
Tumor margin [n(%)]	Non-smooth	128 (15.71)	68 (15.78)	1.000	
	Smooth	687 (84.29)	363 (84.22)		324 (84.38)
Anatomical liver resection [n(%)]	No	290 (35.58)	165 (38.28)	0.103	
	Yes	525 (64.42)	266 (61.72)		259 (67.45)
Laparoscopic surgery [n(%)]	No	425 (52.15)	223 (51.74)	0.860	
	Yes	390 (47.85)	208 (48.26)		182 (47.40)
Satellite nodules [n(%)]	Negative	759 (93.13)	406 (94.20)	0.254	
	Positive	56 (6.87)	25 (5.80)		31 (8.07)
Differentiation [n(%)]	High-medium	735 (90.18)	391 (90.72)	0.670	
	Low	80 (9.82)	40 (9.28)		40 (10.42)

PSM, Propensity score matching; **MVI**, Microvascular invasion; **TACE**, Transarterial chemoembolization; **AFP**, Alpha-fetoprotein; **ALT**, Alanine aminotransferase; **AST**, Aspartate aminotransferase; **GGT**, Gamma-glutamyltransferase; **ALP**, Alkaline phosphatase; **ALB**, Albumin; **TB**, Total bilirubin; **WBC**, White blood cell; **CR**, Creatinine; **PT**, Prothrombin time; **NLR**, Neutrophil-to-lymphocyte ratio; **LMR**, Lymphocyte-to-monocyte ratio; **PLR**, Platelet-to-lymphocyte ratio; **HBV**, Hepatitis B virus

Table S2 Clinical characteristics of MVI patients who underwent adjuvant TACE or not before PSM

Clinical characteristics		MVI present			P
		Total (n = 557)	Adjuvant TACE		
			No (n = 229)	Yes (n = 328)	
Age (years)		55.00 (46.00, 64.00)	55.00 (46.00, 65.00)	55.00 (46.00, 63.25)	0.919
AFP (ng/mL)		224.50 (16.40, 1000.00)	227.00 (18.32, 1000.00)	214.30 (16.05, 1000.00)	0.867
ALT (U/L)		31.00 (22.12, 47.00)	28.51 (21.00, 45.00)	33.86 (23.00, 48.79)	0.044
AST (U/L)		38.89 (28.07, 56.37)	35.00 (27.00, 53.62)	41.70 (29.20, 59.73)	0.010
GGT (U/L)		63.71 (35.23, 118.00)	61.11 (37.00, 118.24)	67.72 (35.11, 117.25)	0.946
ALP (U/L)		100.00 (78.02, 129.12)	99.00 (76.70, 132.50)	100.00 (80.00, 127.25)	0.777
ALB (g/L)		40.80 (37.80, 43.40)	39.90 (37.30, 42.86)	41.12 (38.00, 43.60)	0.006
TB (mol/L)		14.80 (10.94, 19.70)	15.09 (10.50, 19.95)	14.60 (11.18, 19.31)	0.933
WBC (10⁹/L)		5.33 (4.38, 6.51)	5.53 (4.42, 6.80)	5.29 (4.33, 6.46)	0.226
CR (μmol/L)		73.10 (62.35, 82.23)	72.00 (61.80, 80.00)	73.89 (63.45, 83.43)	0.055
PT (s)		12.00 (11.40, 12.60)	12.00 (11.40, 12.60)	11.90 (11.40, 12.60)	0.699
NLR		2.32 (1.69, 3.360)	2.40 (1.74, 3.58)	2.27 (1.61, 3.27)	0.271
LMR		3.240 (2.440, 4.560)	3.24 (2.50, 4.60)	3.25 (2.43, 4.48)	0.773
PLR		115.79 (88.50, 165.04)	111.65 (88.10, 156.30)	118.03 (90.21, 170.09)	0.118
Operation time (mins)		230.00 (180.00, 288.00)	225.00 (180.00, 295.00)	235.00 (180.00, 285.00)	0.717
Tumor diameter (mm)		57.00 (38.00, 82.00)	50.00 (34.00, 73.00)	63.50 (41.00, 88.00)	0.001
Gender [n(%)]	male	479 (86.00)	194 (84.72)	285 (86.89)	0.546
	female	78 (14.00)	35 (15.28)	43 (13.11)	
HBV [n(%)]	Negative	68 (12.21)	34 (14.85)	34 (10.37)	0.145
	Positive	489 (87.79)	195 (85.15)	294 (89.63)	
Child–Pugh classification [n(%)]	A	529 (94.97)	211 (92.14)	318 (96.95)	0.018
	B	28 (5.03)	18 (7.86)	10 (3.05)	
Liver cirrhosis [n(%)]	No	129 (23.16)	50 (21.83)	79 (24.09)	0.605
	Yes	428 (76.84)	179 (78.17)	249 (75.91)	
Tumor number [n(%)]	single	463 (83.12)	185 (80.79)	278 (84.76)	0.264
	multiple	94 (16.88)	44 (19.21)	50 (15.24)	
Tumor location [n(%)]	left	178 (31.96)	73 (31.88)	105 (32.01)	0.449
	right	346 (62.12)	139 (60.70)	207 (63.11)	
	double	33 (5.92)	17 (7.42)	16 (4.88)	
Tumor margin [n(%)]	Non-smooth	201 (36.09)	88 (38.43)	113 (34.45)	0.383
	Smooth	356 (63.91)	141 (61.57)	215 (65.55)	
Anatomical liver resection [n(%)]	No	143 (25.67)	65 (28.38)	78 (23.78)	0.261
	Yes	414 (74.33)	164 (71.62)	250 (76.22)	
Laparoscopic surgery [n(%)]	No	374 (67.15)	157 (68.56)	217 (66.16)	0.616
	Yes	183 (32.85)	72 (31.44)	111 (33.84)	
Satellite nodules [n(%)]	Negative	439 (78.82)	165 (72.05)	274 (83.54)	0.002
	Positive	118 (21.18)	64 (27.95)	54 (16.46)	
Differentiation [n(%)]	High-medium	420 (75.40)	173 (75.55)	247 (75.30)	1.000
	Low	137 (24.60)	56 (24.45)	81 (24.70)	

PSM, Propensity score matching; **MVI**, Microvascular invasion; **TACE**, Transarterial chemoembolization; **AFP**, Alpha-fetoprotein; **ALT**, Alanine aminotransferase; **AST**, Aspartate aminotransferase; **GGT**, Gamma-glutamyltransferase; **ALP**, Alkaline phosphatase; **ALB**, Albumin; **TB**, Total bilirubin; **WBC**, White blood cell; **CR**, Creatinine; **PT**, Prothrombin time; **NLR**, Neutrophil-to-lymphocyte ratio; **LMR**, Lymphocyte-to-monocyte ratio; **PLR**, Platelet-to-lymphocyte ratio; **HBV**, Hepatitis B virus

Table S3 DFS and OS at 1, 2, and 3 years for different subgroups of population who received adjuvant TACE before PSM

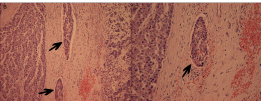
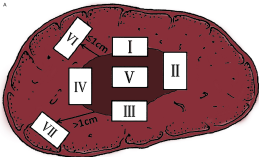
Characteristics [Number (%), Event, Median time (months)]		1 year		2 year		3 year		P	
		Adjuvant TACE							
		No	Yes	No	Yes	No	Yes		
DFS	All patients (1372, 462, NA/NA)		74% (70%-77%)	81% (78%-84%)	62% (58%-66%)	69% (66%-73%)	55% (51%-60%)	63% (58%-67%)	0.001
	MVI	Absent [815 (59.40), 173, NA/NA]	88% (85%-91%)	92% (89%-95%)	78% (74%-83%)	82% (78%-86%)	70% (65%-76%)	76% (71%-82%)	0.065
		Present [557 (40.60), 289, 12/28]	46% (40%-54%)	68% (63%-73%)	29% (23%-38%)	54% (48%-60%)	23% (16%-34%)	45% (38%-52%)	<0.001
	CNLC stage I (1253, 401, NA/NA)		76% (72%-79%)	82% (79%-85%)	64% (60%-69%)	71% (67%-75%)	57% (52%-62%)	64% (60%-69%)	0.002
	MVI	Absent [778 (62.09), 162, NA/NA]	88% (85%-91%)	92% (90%-95%)	78% (74%-83%)	82% (78%-87%)	70% (64%-76%)	77% (72%-83%)	0.041
		Present [475 (37.91), 239, 12/29]	48% (42%-56%)	69% (64%-75%)	31% (24%-40%)	55% (49%-62%)	25% (17%-36%)	47% (40%-56%)	<0.001
	CNLC stage II (119, 61, 12/29)		47% (34%-64%)	67% (56%-79%)	35% (23%-54%)	56% (45%-70%)	35% (23%-54%)	47% (36%-62%)	0.015
	MVI	Absent[37 (31.09), 11, NA/NA]	82% (62%-100%)	84% (70%-100%)	72% (49%-100%)	75% (60%-95%)	72% (49%-100%)	70% (54%-92%)	0.806
		Present[82 (68.91), 50, 7/22]	35% (22%-56%)	56% (43%-74%)	21% (9.5%-47%)	44% (30%-63%)	NA	31% (18%-53%)	0.006
	OS	All patients (1372, 211, NA/NA)		91% (89%-93%)	97% (96%-98%)	81% (77%-84%)	89% (87%-92%)	71% (66%-76%)	84% (81%-88%)
MVI		Absent [815 (59.40), 73, NA/NA]	96% (94%-98%)	98% (96%-99%)	91% (87%-94%)	95% (93%-97%)	84% (80%-89%)	90% (86%-94%)	0.057
		Present [557 (40.60), 138, 30/NA]	81% (76%-86%)	96% (94%-98%)	61% (54%-69%)	82% (77%-87%)	39% (30%-51%)	77% (72%-83%)	<0.001
CNLC stage I (n = 1253, 180, NA/NA)		92% (90%-95%)	98% (96%-99%)	83% (80%-87%)	89% (87%-92%)	73% (69%-78%)	84% (80%-88%)	<0.001	
MVI		Absent [778 (62.09), 68, NA/NA]	97% (95%-99%)	98% (96%-99%)	91% (88%-94%)	95% (92%-98%)	85% (80%-90%)	89% (85%-94%)	0.148
		Present [475 (37.91), 112, 32/NA]	83% (77%-88%)	97% (95%-99%)	65% (54%-74%)	82% (76%-87%)	42% (32%-55%)	77% (71%-84%)	<0.001
CNLC stage II (n = 119, 31, 24/NA)		72% (60%-86%)	94% (88%-100%)	47% (33%-67%)	88% (80%-97%)	39% (25%-61%)	85% (76%-96%)	<0.001	
MVI		Absent[37 (31.09), 5, NA/NA]	74% (53%-100%)	100% (100%-100%)	63% (40%-100%)	96% (88%-100%)	63% (40%-100%)	96% (88%-100%)	0.010
		Present[82 (68.91), 26, 20/NA]	72% (58%-88%)	90% (81%-100%)	40% (24%-67%)	82% (70%-97%)	27% (12%-57%)	77% (62%-95%)	<0.001

PSM, Propensity score matching; DFS, Disease-free survival; OS, Overall survival; MVI, Microvascular invasion; TACE, Transarterial chemoembolization; CNLC, China liver cancer

Fig.51

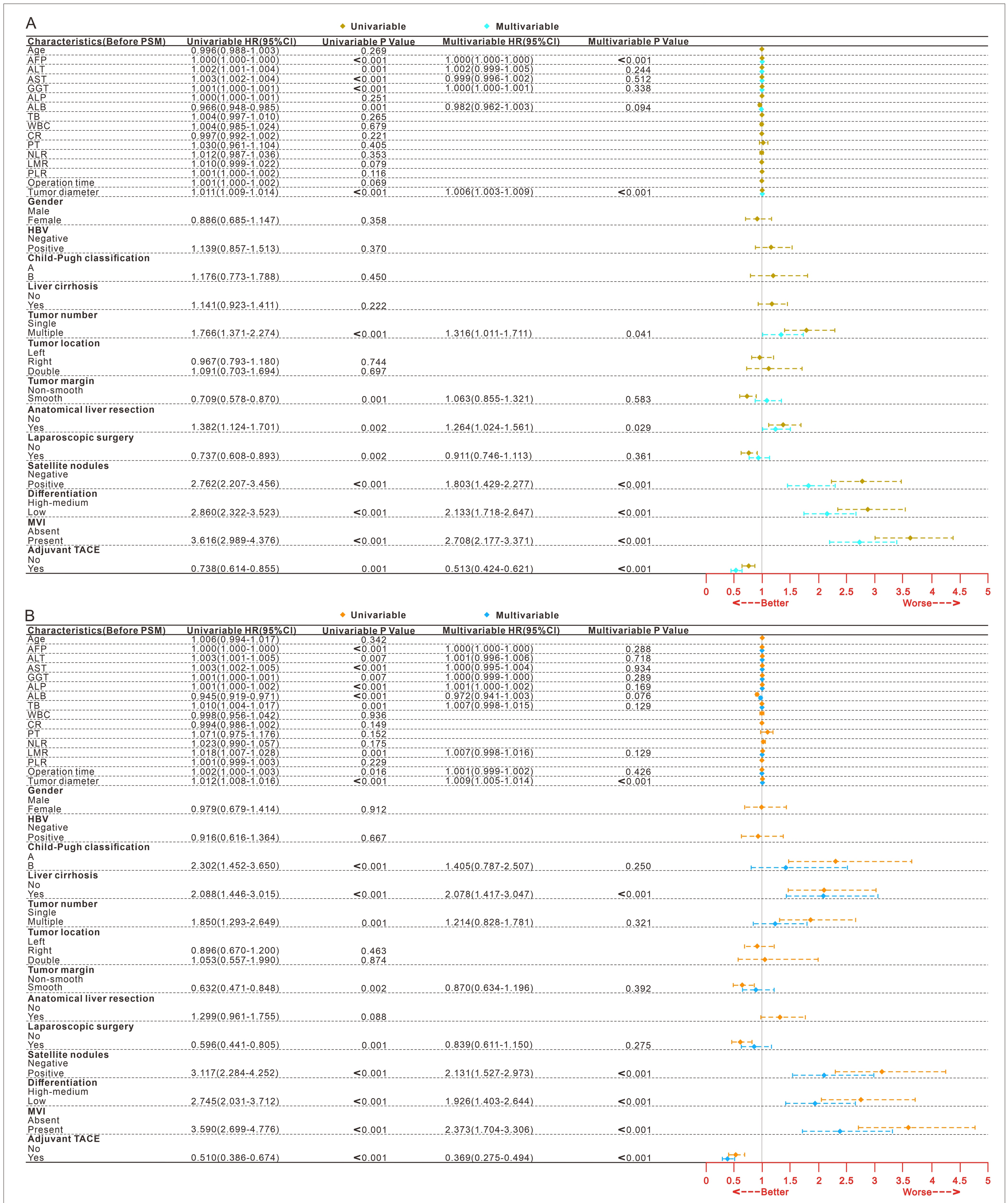
Schematic diagram of baseline sampling site of a liver tumor specimen (A). I, II, III, IV: Junction of carcinoma and para carcinoma tissues corresponding to clockwise 12, 3, 6 and 9; V: Tumor region; VI: Adjacent para carcinoma liver tissue region; VII: Distant para carcinoma liver tissue region. MVI (black arrow) can be seen in adjacent liver tissue adjacent to cancer [hematoxylin and eosin stain, $\times 100$ (B), $\times 200$ (C)].

A



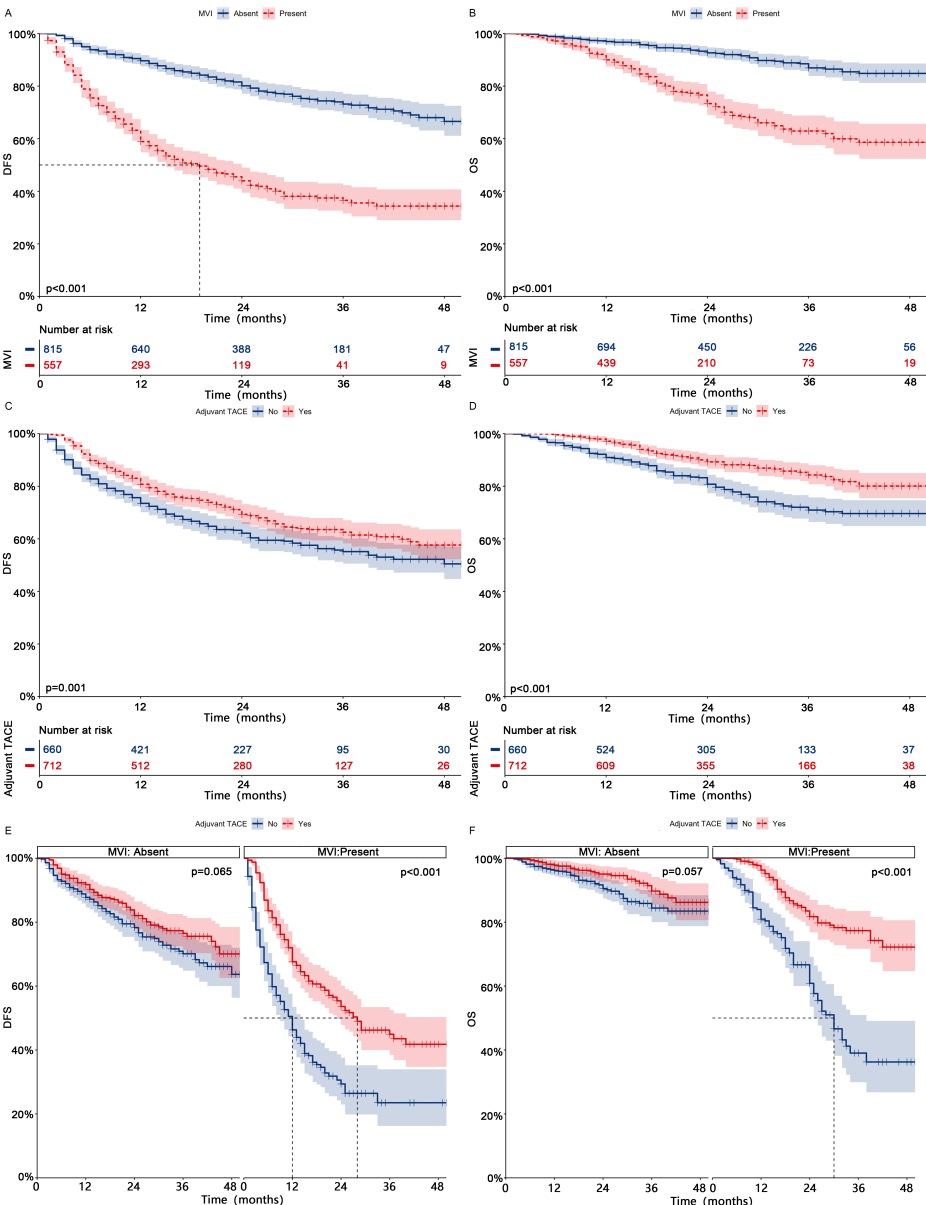
MVI, Microvascular invasion

Fig.S2 Forest plot of univariate and multivariate Cox regression analysis of DFS (A) and OS (B) after hepatectomy in HCC patients before PSM.



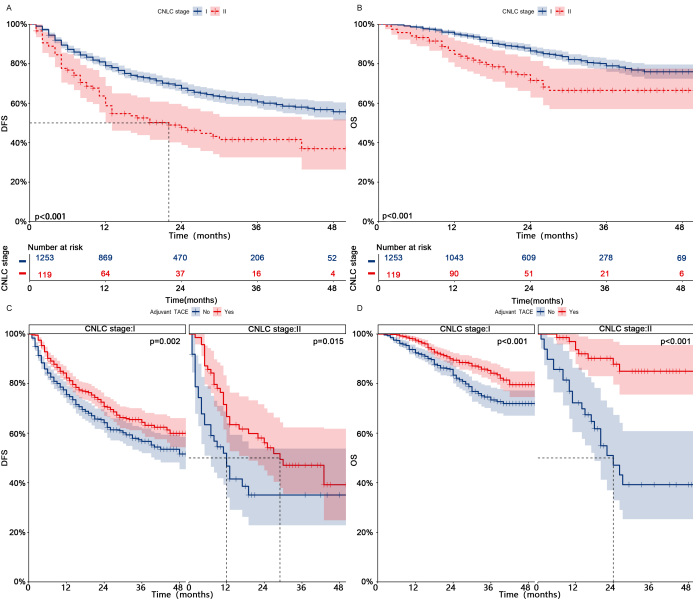
HCC, Hepatocellular carcinoma; PSM, Propensity score matching; DFS, Disease-free survival; OS, Overall survival; MVI, Microvascular invasion; TACE, Transarterial chemoembolization; HR, Hazard ratio; CI, Confidence interval; AFP, Alpha-fetoprotein; ALT, Alanine aminotransferase; AST, Aspartate aminotransferase; GGT, Gamma-glutamyltransferase; ALP, Alkaline phosphatase; Alb, Albumin; TB, Total bilirubin; WBC, White blood cell; CR, Creatinine; PT, Prothrombin time; NLR, Neutrophil-to-lymphocyte ratio; LMR, Lymphocyte-to-monocyte ratio; PLR, Platelet-to-lymphocyte ratio; HBV, Hepatitis B virus

Fig.S3 Kaplan-meier analysis of DFS (A) and OS (B) in HCC patients with or without MVI before PSM; Kaplan-meier analysis of DFS (C) and OS (D) in HCC patients receiving adjuvant TACE or not before PSM; Subgroup Kaplan-meier analysis of DFS (E) and OS (F) in patients with and without MVI receiving adjuvant TACE before PSM.



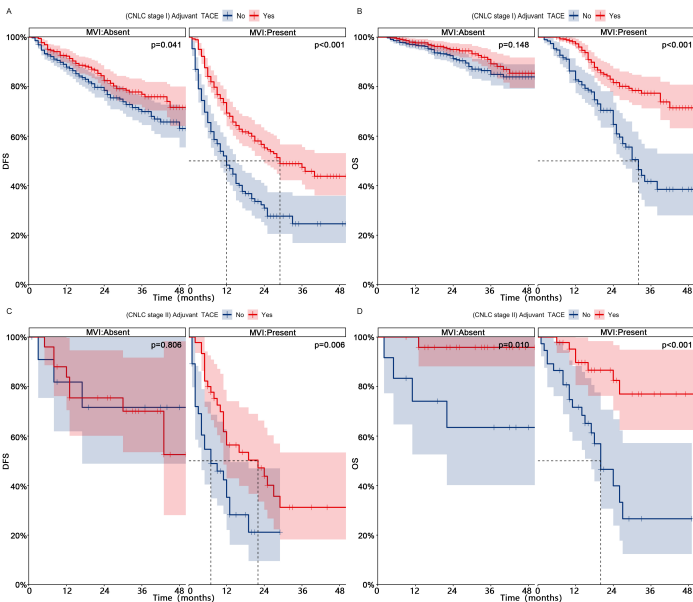
HCC, Hepatocellular carcinoma; PSM, Propensity score matching; DFS, Disease-free survival; OS, Overall survival; MVI, Microvascular invasion; TACE, Transarterial chemoembolization

Fig.S4 Kaplan-meier analysis of DFS (A) and OS (B) for patients with different CNLC stages before PSM; Subgroup Kaplan-meier analysis of DFS (C) and OS (D) for patients with different CNLC stages receiving adjuvant TACE before PSM.



PSM, Propensity score matching; DFS, Disease-free survival; OS, Overall survival; TACE, Transarterial chemoembolization; CNLC, China liver cancer

Fig.S5 Subgroup Kaplan-meier analysis of DFS (AC) and OS (BD) for MVI patients in different CNLC stages who received adjuvant TACE before PSM.



PSM, Propensity score matching; DFS, Disease-free survival; OS, Overall survival; MVI, Microvascular invasion; TACE, Transarterial chemoembolization; CNLC, China liver cancer