

Table S1 Operative data and complications

Patient	Stage-1 operation					Stage-2 operation						Time interval between stage-1 and stage-2 operation (days)	Postoperative stay (days)	Overall hospital stay (days)
	Operative time (min)	Blood loss (mL)	RBC transfusion (U)	Complications	Clavien-Dindo grade	Type of ALPPS	Operative time (min)	Blood loss (mL)	RBC transfusion (U)	Complications	Clavien-Dindo grade			
1	270	100	0	Hepatic and renal insufficiency	I	Right trisectionectomy ALPPS	310	2,500	2	No complications	No complications	9	14	30
2	280	1,000	2	No complications	No complications	Right trisectionectomy ALPPS	110	50	0	No complications	No complications	7	10	36
3	240	200	0	No complications	No complications	Right hemihepatectomy ALPPS	240	100	0	No complications	No complications	9	8	27
4	180	200	0	Pleural effusion	I	Right hemihepatectomy ALPPS	150	3,000	3	Hepatic insufficiency	II	10	17	49
5	210	300	0	No complications	No complications	Right hemihepatectomy ALPPS	100	100	0	No complications	No complications	16	14	33
6	210	300	0	No complications	No complications	Right hemihepatectomy ALPPS	130	300	0	No complications	No complications	13	9	27
7	180	100	0	No complications	No complications	Right hemihepatectomy ALPPS	80	50	0	No complications	No complications	7	11	24
8	230	150	0	No complications	No complications	Right hemihepatectomy ALPPS	125	100	0	No complications	No complications	7	8	22
9	240	200	0	No complications	No complications	Right hemihepatectomy ALPPS	290	600	2	No complications	No complications	12	20	41
10	190	600	0	Peritoneal abscess	II	Right trisectionectomy ALPPS	150	500	0	No complications	No complications	12	29	47
11	295	800	1	No complications	No complications	Right hemihepatectomy ALPPS	205	800	3	No complications	No complications	7	15	31
12	280	2,000	4	No complications	No complications	Right hemihepatectomy ALPPS	280	1,000	0	No complications	No complications	14	10	29
13	330	600	0	No complications	No complications	Right trisectionectomy ALPPS	577	600	4	No complications	No complications	13	9	25
14	327	Missing data	0	No complications	No complications	–	–	–	–	–	–	–	–	26
15	Missing data	Missing data	0	No complications	No complications	Right trisectionectomy ALPPS	134	100	0	Hepatic insufficiency	II	11	28	58
16	360	200	0	No complications	No complications	Right hemihepatectomy ALPPS	235	Missing data	0	No complications	No complications	14	16	37
17	415	800	0	No complications	No complications	Extended right hemihepatectomy ALPPS	145	100	0	No complications	No complications	14	14	39
18	270	300	0	No complications	No complications	–	–	–	–	–	–	–	–	62
19	635	100	0	No complications	No complications	Right trisectionectomy ALPPS	210	200	0	Thoracic and abdominal effusion	III	12	10	31
20	333	Missing data	0	No complications	No complications	Right hemihepatectomy ALPPS	Missing data	1,500	3	No complications	No complications	15	34	62
21	271	50	0	No complications	No complications	Right trisectionectomy ALPPS	225	1,500	1.75	No complications	No complications	14	12	39
22	210	30	0	No complications	No complications	–	–	–	–	–	–	–	–	55
23	280	100	0	No complications	No complications	Extended right hemihepatectomy ALPPS	230	300	0	No complications	No complications	17	9	30

RBC, red blood cell; ALPPS, associating liver partition and portal vein ligation for staged hepatectomy.

Table S2 Liver volume pre- and post-stage 1 operations and FLR volume increase

Patient	Time interval (days)	SLV (mL)	Pre-stage-1 operation		Post-stage-1 operation		FLR volume increase		KGR	
			FLR volume (mL)	FLR/SLV	FLR volume (mL)	FLR/SLV	FLR volume increase (mL)	FLR volume increase (%)	Absolute KGR (mL/day)	RKGR (%/day)
1	6	1,170	330	0.28	560	0.48	230	69.70	38.33	11.62
2	7	1,060	310	0.29	480	0.45	170	54.80	24.29	7.83
3	7	1,140	400	0.35	600	0.53	200	50.00	28.57	7.14
4	7	1,142	316	0.28	520	0.46	204	64.60	29.14	9.23
5	13	1,241	400	0.32	493	0.40	93	23.30	7.15	1.79
6	9	1,240	287	0.23	463	0.37	176	61.30	19.56	6.81
7	7	1,142	254	0.22	495	0.43	241	94.90	34.43	13.56
8	7	1,312	380	0.29	706	0.54	326	85.80	46.57	12.26
9	9	1,272	329	0.26	575	0.45	246	74.80	27.33	8.31
10	8	1,238	272	0.22	383	0.31	111	40.81	13.88	5.10
11	7	1,276	358	0.28	570	0.45	212	59.20	30.29	8.46
12	8	1,324	314	0.24	555	0.42	241	76.80	30.13	9.60
13	13	1,328	424	0.32	685	0.52	261	61.56	20.08	4.74
14	16	1,201	257	0.21	302	0.25	45	17.70	2.83	1.11
15	7	1,200	350	0.29	459	0.38	109	31.10	15.57	4.44
16	7	1,335	366	0.27	544	0.41	178	48.60	25.43	6.94
17	10	1,241	290	0.23	336	0.27	46	15.90	4.60	1.59
18	25	1,323	207	0.16	305	0.23	98	47.30	3.92	1.89
19	7	1,313	510	0.39	687	0.52	177	34.80	25.29	4.97
20	10	1,272	348	0.27	483	0.38	135	38.80	13.50	3.88
21	9	1,216	418	0.34	488	0.40	70	16.75	7.78	1.86
22	19	1,270	226	0.18	383	0.30	157	69.50	8.26	3.66
23	12	1,348	379	0.28	452	0.34	73	19.26	6.08	1.61

FLR, future liver remnant; SLV, standard liver volume; KGR, kinetic growth rate; RKGR, relative KGR.

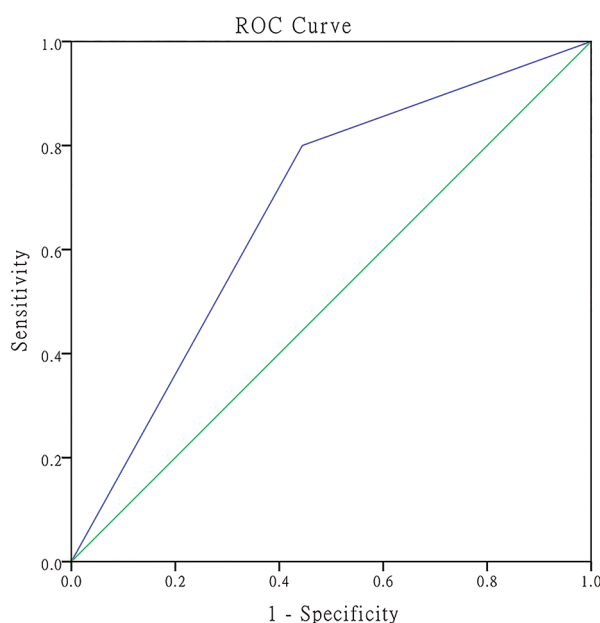


Figure S1 ROC curve analysis for determination of the cut-off value for RKGR in patients with HBV-related HCC. ROC, receiver operating characteristic; RKGR, relative kinetic growth rate; HBV, hepatitis B virus; HCC, hepatocellular carcinoma.

Table S3 Comparisons of baseline characteristics of HBV-related HCC patients receiving ALPPS and TACE before and after PSM

Characteristics	Before PSM (original cohort)			After PSM (matched cohort)		
	ALPPS (n=18)	TACE (n=76)	P value	ALPPS (n=14)	TACE (n=14)	P value
Age (y)	38.5 [32–59]	50 [19–74]	0.004	38.5 [32–59]	41 [26–71]	0.782
PVTT						
Yes	5	55	0.000	5	5	1
No	13	21		9	9	
Tumor number						
1	10	20	0.017	7	7	1
>1	8	56		7	7	
Largest tumor (cm)	9.6 (2.3–20.0)	8.4 (5.5–16.8)	0.554	8.8 (2.3–16.6)	8.15 (5.5–16.8)	0.872
Ascites						
Yes	3	14	1	3	2	1
No	15	62		11	12	
TBIL ($\mu\text{mol/L}$)	12.6 (7.0–25.7)	14.85 (4.1–42.3)	0.265	15.1 (8.0–23.6)	13.45 (4.1–42.3)	0.765
AFP ($\mu\text{g/L}$)	1,933.5 (10.8–139,031.3)	675.5 (5.0–1,277,746.0)	0.190	2,306.0 (45.2–139,031.3)	659 (5–118,900)	0.060
ALT (U/L)	37.0 (9.0–63.0)	28.5 (9.0–157.0)	0.453	38.5 (32.0–59.0)	31.5 (19.0–157.0)	0.679
AST (U/L)	33.5 (17.0–320.0)	25.0 (4.0–218.0)	0.016	37.0 (17.0–320.0)	34.5 (10.0–218.0)	0.408

HBV, hepatitis B virus; HCC, hepatocellular carcinoma; ALPPS, associating liver partition and portal vein ligation for staged hepatectomy; TACE, transarterial chemoembolization; PSM, propensity score matching; PVTT, portal vein tumor thrombus; TBIL, total bilirubin; AFP, alpha-fetoprotein; ALT, alanine aminotransferase; AST, aspartate aminotransferase.

Table S4 Comparisons of baseline characteristics of BCLC stage B and C HBV-related HCC patients receiving ALPPS and TACE before and after PSM

Characteristics	Before PSM (original cohort)			After PSM (matched cohort)		
	ALPPS (n=12)	TACE (n=74)	P value	ALPPS (n=10)	TACE (n=10)	P value
Age (y)	38 [32–55]	50 [19–74]	0.002	38.5 [32–55]	43.5 [19–60]	0.364
PVTT						
Yes	5	55	0.022	4	4	1
No	7	19		6	6	
Tumor number						
1	4	18	0.494	3	5	0.650
>1	8	56		7	5	
Largest tumor (cm)	7.25 (2.3–16.6)	8.6 (5.5–16.8)	0.440	6.05 (2.3–16.6)	8.95 (5.6–12.3)	0.406
Ascites						
Yes	3	14	0.698	2	5	0.350
No	9	60		8	5	
TBIL ($\mu\text{mol/L}$)	12.6 (8.0–23.6)	14.85 (4.1–35.0)	0.270	12.55 (9.2–23.6)	19.9 (6.5–30.9)	0.165
AFP ($\mu\text{g/L}$)	1,933.5 (10.8–139,031.3)	830.0 (2.0–1,277,746.0)	0.404	1,933.5 (10.8–17,069.0)	13,745.0 (20–999,999.0)	0.096
ALT (U/L)	38.5 (9.0–63.0)	28.5 (9.0–109.0)	0.609	38.5 (9.0–63.0)	47.5 (26.0–109.0)	0.307
AST (U/L)	37.5 (17.0–320.0)	25.0 (4.0–218.0)	0.032	37.5 (17.0–172.0)	56.0 (10.0–218.0)	0.345

BCLC, Barcelona Clinic Liver Cancer; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; ALPPS, associating liver partition and portal vein ligation for staged hepatectomy; TACE, transarterial chemoembolization; PVTT, portal vein tumor thrombus; TBIL, total bilirubin; AFP, alpha-fetoprotein; ALT, alanine aminotransferase; AST, aspartate aminotransferase.

Table S5 Preoperative patient characteristics and clinical outcomes

Patient	Age (y)	Gender	Etiology	Cancer diagnosis	Stage-2 ALPPS	Number of lesions	Largest tumor (cm)	PVTT	LNМ	MVI	Ascites	ALBI grading	BCLC staging	Recurrence site	Months to recurrence	Months to death
1	37	M	HBV	HCC	Yes	1	13.0	Yes	Yes	No	Yes	1	C	Liver, lung	1	6
2	49	F	HBV	HCC	Yes	Multiple	3.0	No	No	Yes	No	2	B	Liver	6	19
3	37	M	HBV	HCC	Yes	Multiple	5.7	No	No	No	No	1	B	Lung	6	8
4	59	M	HBV	HCC	Yes	1	15.8	No	No	Yes	No	2	A	Lung	53	54
5	55	M	HBV	HCC	Yes	1	16.6	Yes	No	No	No	1	C	Lung, right atrium	6	26
6	38	M	HBV	HCC	Yes	Multiple	8.2	No	No	No	No	1	B	Lung, enterocoelia	3	7
7	33	M	HBV	HCC	Yes	1	10.3	No	No	No	No	2	A	Liver	60	Alive
8	51	M	HBV	HCC	Yes	1	20.0	No	No	No	No	2	A	Liver, lung	2	19
9	38	M	HBV	HCC	Yes	Multiple	6.3	Yes	No	Yes	Yes	1	C	–	–	5
10	66	M	HBV	HCC	Yes	Multiple	9.3	No	Yes	No	No	2	C	Liver, Retroperitoneum	1	2
11	37	M	HBV	HCC	Yes	1	13.0	Yes	No	Yes	Yes	2	C	Liver, enterocoelia, retroperitoneum	1	4
12	32	M	HBV	HCC	Yes	Multiple	9.9	Yes	Yes	No	No	1	C	Retroperitoneum	1	8
13	40	M	HBV	HCC	Yes	Multiple	2.3	Yes	No	No	No	1	C	Lung	4	24
14	51	M	HBV	HCC	No	Multiple	13.7	No	No	No	No	2	B	–	–	3
15	32	M	HBV	HCC	Yes	1	10.9	No	No	Yes	No	1	A	Lung	12	25
16	44	M	HBV	HCC	Yes	1	14.7	No	No	No	No	1	A	–	–	2
17	39	M	HBV	HCC	Yes	Multiple	5.8	No	Yes	Yes	No	1	C	Liver, thorax	2	7
18	36	M	HBV	HCC	No	Multiple	26	No	No	No	No	2	B	–	–	Alive
19	38	M	HBV	HCC	Yes	1	13.5	No	Yes	No	No	1	C	Liver, lung	5	Alive
20	41	M	HBV	HCC	Yes	Multiple	5.5	No	No	No	No	1	B	No recurrence	Na	Alive
21	51	M	HBV	HCC	Yes	1	8.3	No	No	No	No	1	A	No recurrence	Na	Alive
22	48	M	HBV	HCC	No	1	5.1	Yes	No	No	No	2	C	No recurrence	Na	Alive
23	50	M	HBV	HCC	Yes	1	9.2	No	No	No	No	2	A	No recurrence	Na	Alive

Missing data occurred because family members of patients refused to answer. ALPPS, associating liver partition and portal vein ligation for staged hepatectomy; PVTT, portal vein tumor thrombus; MVI, microvascular invasion; LNM, lymph node metastasis; ALBI, albumin-bilirubin; BCLC, Barcelona Clinic Liver Cancer; M, male; F, female; HBV, hepatitis B virus; HCC, hepatocellular carcinoma.