

Supplementary

Table S1 MR imaging parameters

Sequence	Repetition time (ms)	Echo time (ms)	Field of view (cm ²)	Scan matrix	Slice thickness (mm)	Slice gap (mm)	Number of excitation
2D-flow-compensated GRE	1,000	65.6	42×42	80×80	8	2	1
In/out of phase T1WI	150	1.3/2.5	40×40	288×192	6	2	1
T2WI	2× RC	80	40×40	320×320	6	2	1.5
LAVA	6.0	1.4/2.7	38×30.4	300×256	4	0	1

MR, magnetic resonance; 2D, two-dimensional; GRE, gradient recalled echo; T1WI, T1-weighted imaging; T2WI, T2-weighted imaging; LAVA, liver acceleration volume acquisition; RC, respiratory cycle.

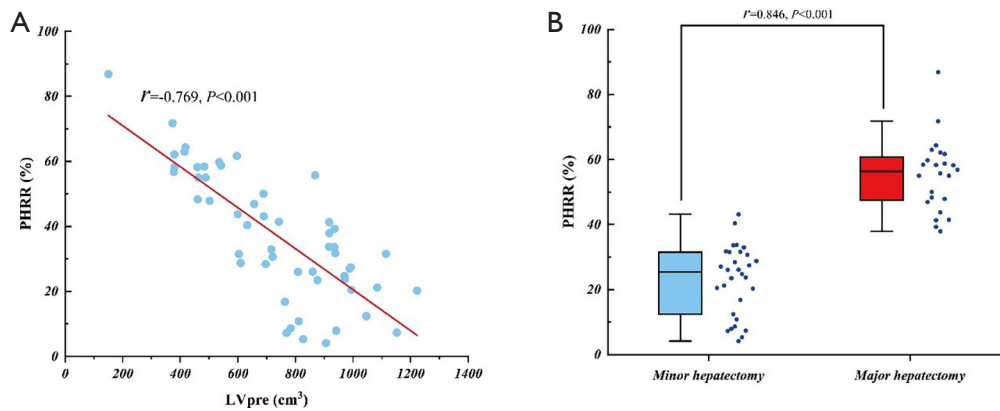


Figure S1 The relation between PHRR and LVpre (A), PHRR and the type of hepatectomy (B). PHRR, parenchymal hepatic resection rate; LVpre, volume of preoperative future liver remnant.

Table S2 Comparison of clinicopathologic characteristics of patients with low PHRR, intermediate PHRR and high PHRR

Clinicopathologic characteristics	Low PHRR (<30%, n=21)	Intermediate PHRR (30–50%, n=17)	High PHRR (>50%, n=16)	P value
RI				<0.001*
Low	21 (100.00)	10 (58.82)	2 (82.50)	
High	0 (0.00)	7 (41.18)	14 (87.50)	
RI (%)	18.65±10.48	39.78±23.75	96.66±57.96	<0.001*
Age (years)	51.52±11.91	52.76±9.82	49.88±11.40	0.499
Gender				0.406
Male	17 (80.95)	16 (94.12)	13 (81.25)	
Female	4 (19.05)	1 (5.88)	3 (18.75)	
PHRR (%)	18.01±8.70	38.59±6.16	61.00±8.43	<0.001*
LVpre (cm ³)	908.15±151.11	764.57±182.80	476.03±157.79	<0.001*
LVpost (cm ³)	1,052.42±168.00	1,028.40±169.75	962.27±207.62	0.320
BMI (kg/m ²)	22.66±3.58	24.08±3.69	23.17±2.64	0.641
Tumor size (cm)	4.22±2.07	6.23±4.27	7.54±3.87	0.017*
Multifocality	6 (28.57)	5 (29.42)	6 (37.50)	0.825
ALB (g/L)	39.92±5.38	41.74±5.91	43.53±4.80	0.139
ALT (IU/L)	77.71±152.60	113.71±310.31	102.00±250.27	0.485
AST (IU/L)	102.00±250.27	138.88±433.95	110.81±202.82	0.909
ALP (IU/L)	92.29±34.67	105.35±57.09	106.31±30.70	0.209
GGT (IU/L)	87.14±83.54	113.82±85.36	109.88±62.05	0.368
AST/ALT	1.09±0.33	1.09±0.38	1.03±0.44	0.616
TP (g/L)	67.63±9.53	68.91±6.39	69.63±9.59	0.633
TBIL (μmol/L)	16.24±7.54	12.00±3.70	14.37±6.01	0.420
DBIL (μmol/l)	5.92±4.40	4.32±2.23	5.36±2.87	0.66
HGB (g/L)	141.52±23.76	138.94±21.68	142.69±19.50	0.874
PLT (10 ⁹ /L)	138.09±71.18	156.00±88.99	172.50±66.97	0.144
PT (s)	12.71±3.93	12.63±4.39	13.15±5.31	0.773
INR	1.04±0.19	1.02±0.09	1.06±0.12	0.815
HBsAg (positive)	19 (90.48)	16 (94.12)	14 (87.50)	0.793
HBeAg (positive)	2 (9.52)	1 (5.88)	0 (0.00)	0.223
Anti-HCV (positive)	0 (0.00)	1 (5.88)	0 (0.00)	0.910
Cirrhosis	16 (76.19)	13 (76.47)	12 (75.00)	0.938
Ascites	0 (0.00)	0 (0.00)	1 (6.25)	0.184
High blood pressure	6 (28.57)	2 (11.76)	4 (25.00)	0.726
Diabetes mellitus	0 (0.00)	1 (5.88)	2 (12.50)	0.103
BCLC stage				0.116
0	1 (4.76)	1 (5.88)	0 (0.00)	

Table S2 (continued)

Table S2 (continued)

Clinicopathologic characteristics	Low PHRR (<30%, n=21)	Intermediate PHRR (30–50%, n=17)	High PHRR (>50%, n=16)	P value
A	14 (66.67)	10 (58.82)	6 (37.50)	
B	4 (19.05)	6 (35.29)	6 (37.50)	
C	2 (0.52)	0 (0.00)	4 (25.00)	
ALBI grade				0.248
I	14 (66.67)	14 (82.35)	15 (93.75)	
II	6 (28.57)	2 (11.76)	1 (6.25)	
III	1 (4.76)	1 (5.88)	0 (0.00)	
Type of hepatectomy				<0.001*
Minor (<3 Couinaud segments)	21 (100.00)	9 (52.94)	0 (0.00)	
Major (≥3 Couinaud segments)	0 (0.00)	8 (45.06)	16 (100.00)	
Inflammation grade				0.992
G1	2 (9.52)	0 (0.00)	2 (12.50)	
G2	9 (42.86)	9 (52.94)	6 (37.50)	
G3	10 (47.62)	8 (47.06)	8 (50.00)	
Fibrosis stage				0.599
F0–1	2 (9.52)	4 (23.53)	4 (25.00)	
F2–3	13 (61.91)	7 (41.18)	7 (43.75)	
F4	6 (28.57)	6 (35.29)	5 (31.25)	
LS value (kPa)	4.65±1.05	4.30±1.79	3.72±1.61	0.183

Data are represented in mean ± SD or n (%). Data were evaluated by variance analysis or Wilcoxon rank-sum test for continuous variables and the chi-square test or Fisher's exact test or Wilcoxon rank-sum test for categorical variables. *, referred to P<0.05. PHRR, parenchymal hepatic resection rate; RI, regeneration index; LVpre, volume of preoperative future liver remnant; LVpost, volume of postoperative liver remnant; BMI, body mass index; ALB, albumin; ALT, alanine aminotransferase; AST, aspartate aminotransferase; ALP, alkaline phosphatase; GGT, γ -glutamyl transferase; TP, total protein; TBIL, total bilirubin; DBIL, direct bilirubin; HGB, hemoglobin; PLT, platelet count; PT, prothrombin time; INR, international normalized ratio; HBsAg, hepatitis B surface antigen; HBeAg, hepatitis B e antigen; anti-HCV, hepatitis C virus antibody; BCLC, Barcelona Clinic Liver Cancer; ALBI, albumin-bilirubin; LS, liver stiffness.

Table S3 Results of the univariate analysis of correlations between the RI and clinical-imaging characteristic

Baseline characteristics	Low PHRR (<30%, n=21)		Intermediate PHRR (30–50%, n=17)		High PHRR (>50%, n=16)	
	Correlation coefficient	P value	Correlation coefficient	P value	Correlation coefficient	P value
Age (years)	0.109	0.639	0.106	0.686	−0.162	0.549
PHRR (%)	0.077	0.741	0.412	0.101	0.391	0.134
BMI (kg/m ²)	−0.055	0.814	−0.191	0.462	0.197	0.464
Tumor size (cm)	−0.270	0.236	−0.052	0.844	−0.469	0.067
Multifocality	0.157	0.498	0.237	0.359	0.420	0.105
ALT (IU/L)	−0.174	0.451	0.193	0.459	0.159	0.557
AST (IU/L)	−0.081	0.728	−0.012	0.963	0.122	0.652
ALP (IU/L)	0.062	0.790	0.406	0.106	−0.137	0.613
GGT (IU/L)	−0.029	0.900	0.248	0.338	−0.483	0.058
AST/ALT	0.04	0.865	−0.197	0.448	0.046	0.867
TP (g/L)	0.108	0.640	−0.069	0.793	0.288	0.279
ALB (g/L)	−0.216	0.348	0.378	0.135	0.374	0.154
TBIL (μmol/L)	−0.196	0.393	0.204	0.433	−0.078	0.774
DBIL (μmol/l)	0.096	0.678	0.037	0.892	−0.122	0.652
HGB (g/L)	0.146	0.527	0.238	0.358	−0.212	0.431
PLT (10 ⁹ /L)	−0.073	0.754	0.301	0.240	−0.05	0.854
PT (s)	−0.101	0.663	−0.080	0.761	0.046	0.866
INR	−0.073	0.752	−0.275	0.285	0.063	0.815
HBsAg (positive)	−0.107	0.644	0.408	0.104	−0.123	0.650
HBeAg (positive)	−0.402	0.071	−0.306	0.232	–	–
Anti-HCV (positive)	–	–	−0.153	0.557	–	–
Cirrhosis	−0.148	0.523	−0.170	0.515	0.501	0.205
Ascites	–	–	–	–	−0.084	0.757
High blood pressure	−0.331	0.143	−0.037	0.887	−0.063	0.818
Diabetes mellitus	–	–	0.204	0.432	0.041	0.880
BCLC stage	−0.149	0.518	−0.192	0.461	−0.354	0.179
ALBI grade	0.249	0.276	−0.282	0.273	−0.435	0.092
LS value	−0.034	0.884	−0.799	<0.001*	−0.244	0.362

*, referred to P<0.05. RI, regeneration index; PHRR, parenchymal hepatic resection rate; BMI, body mass index; ALT, alanine aminotransferase; AST, aspartate aminotransferase; ALP, alkaline phosphatase; GGT, γ -glutamyl transferase; TP, total protein; ALB, albumin; TBIL, total bilirubin; DBIL, direct bilirubin; HGB, hemoglobin; PLT, platelet count; PT, prothrombin time; INR, international normalized ratio; HBsAg, hepatitis B surface antigen; HBeAg, hepatitis B e antigen; anti-HCV, hepatitis C virus antibody; BCLC, Barcelona Clinic Liver Cancer; ALBI, albumin-bilirubin; LS, liver stiffness.

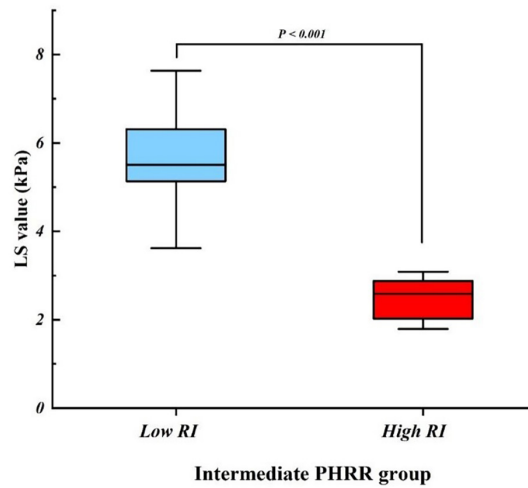


Figure S2 Comparison of LS values between the intermediate PHRR subgroup with high RI and low RI. LS, liver stiffness; RI, regeneration index; PHRR, parenchymal hepatic resection rate.

Table S4 Comparison of baseline characteristics of patients with low RI and high RI in intermediate PHRR group

Baseline characteristics	Low RI (n=10)	High RI (n=7)	P value
Age (years)	51.20±10.33	55.00±9.35	0.364
Gender			1.000
Male	9 (90.00)	7 (100.00)	
Female	1 (10.00)	0 (0.00)	
RI (%)	24.42±13.52	61.72±16.59	<0.001*
PHRR (%)	36.56±4.32	41.50±7.52	0.193
LVpre (cm ³)	871.33±145.93	612.07±105.04	0.005*
LVpost (cm ³)	1,069.50±170.55	969.69±162.38	0.230
BMI (kg/m ²)	24.91±3.87	22.89±3.32	0.315
Tumor size (cm)	6.60±5.08	5.61±3.03	0.635
Multifocality	2 (20.00)	3 (42.86)	0.309
ALT (IU/L)	158.40±406.58	49.86±26.97	0.193
AST (IU/L)	212.10±565.84	34.29±14.81	0.813
ALP (IU/L)	97.80±70.98	116.14±30.06	0.070
GGT (IU/L)	91.60±66.93	145.57±103.49	0.315
AST/ALT	1.19±0.31	0.94±0.44	0.133
TP (g/L)	68.90±7.57	68.93±4.79	0.813
ALB (g/L)	39.69±6.21	44.66±4.27	0.070
TBIL (μmol/L)	11.36±4.14	12.91±3.01	0.270
DBIL (μmol/l)	4.74±2.89	4.13±0.93	0.918
HGB (g/L)	136.90±24.84	141.86±17.62	0.536

Table S4 (continued)

Table S4 (continued)

Baseline characteristics	Low RI (n=10)	High RI (n=7)	P value
PLT (10 ⁹ /L)	132.00±67.30	190.29±109.50	0.230
PT (s)	13.52±5.63	11.36±0.84	0.475
INR	1.04±0.10	0.99±0.04	0.364
HBsAg (positive)	9 (90.00)	7 (100.00)	0.388
HBeAg (positive)	1 (10.00)	0 (0.00)	0.388
Anti-HCV (positive)	1 (10.00)	0 (0.00)	0.388
Cirrhosis	8 (80.00)	5 (71.43)	0.682
High blood pressure	1 (10.00)	1 (14.28)	1.000
Diabetes mellitus	0 (0.00)	1 (14.28)	0.412
BCLC stage			0.375
0	0 (0.00)	1 (14.29)	
A	6 (60.00)	4 (57.14)	
B	4 (40.00)	2 (28.57)	
C	0 (0.00)	0 (0.00)	
ALBI grade			0.565
I	8 (80.00)	6 (85.71)	
II	1 (10.00)	1 (14.29)	
III	1 (10.00)	0 (0.00)	
Type of hepatectomy			0.153
Minor (<3 Couinaud segments)	7 (70.00)	2 (28.57)	
Major (≥3 Couinaud segments)	3 (30.00)	5 (71.43)	
Inflammation grade			1.000
G1	0 (0.00)	0 (0.00)	
G2	5 (50.00)	4 (57.14)	
G3	5 (50.00)	3 (42.86)	
Fibrosis stage			0.001*
F0–1	0 (0.00)	4 (51.14)	
F2–3	4 (40.00)	3 (42.86)	
F4	6 (60.00)	0 (0.00)	
LS value (kPa)	5.56±1.15	2.51±0.46	<0.001*

Data are represented in mean ± SD or n (%). And Data were evaluated by independent *t*-test or Mann-Whitney U test for continuous variables and the chi-square test or Fisher's exact test for categorical variables. *, referred to P<0.05. RI, regeneration index; PHRR, parenchymal hepatic resection rate; LVpre, volume of preoperative future liver remnant; LVpost, volume of postoperative liver remnant; BMI, body mass index; ALT, alanine aminotransferase; AST, aspartate aminotransferase; ALP, alkaline phosphatase; GGT, γ -glutamyl transferase; TP, total protein; ALB, albumin; TBIL, total bilirubin; DBIL, direct bilirubin; HGB, hemoglobin; PLT, platelet count; PT, prothrombin time; INR, international normalized ratio; HBsAg, hepatitis B surface antigen; HBeAg, hepatitis B e antigen; anti-HCV, hepatitis C virus antibody; BCLC, Barcelona Clinic Liver Cancer; ALBI, albumin-bilirubin; LS, liver stiffness.

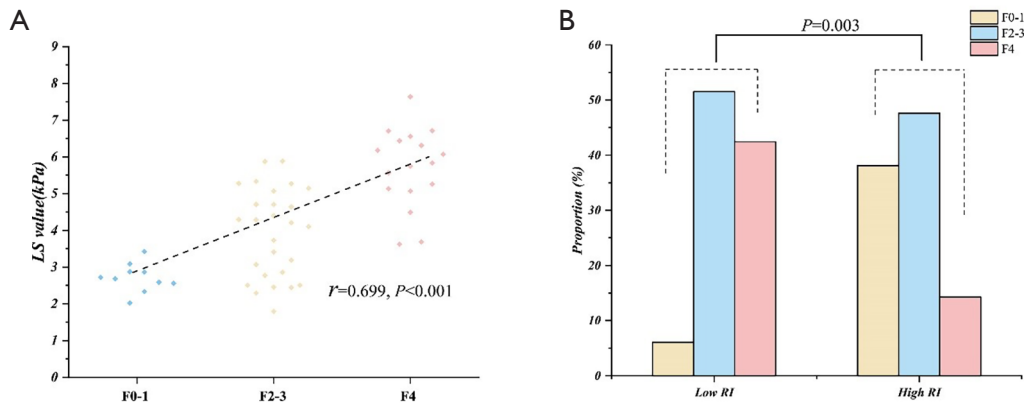


Figure S3 LS values between patients with different fibrosis stage (A), and comparison of fibrosis stage between patients with high RI and low RI (B). LS, liver stiffness; RI, regeneration index.

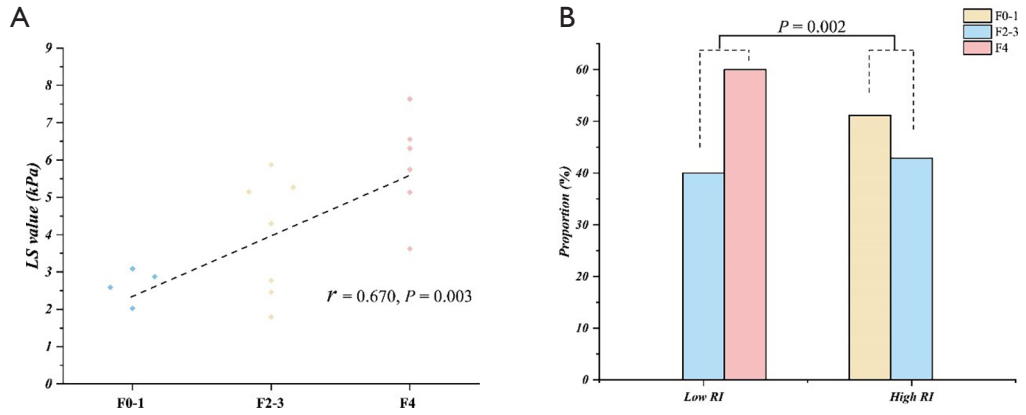


Figure S4 LS values between patients with different fibrosis stage (A) and comparison of fibrosis stage between patients with high RI and low RI (B) in intermediate PHRR subgroup. LS, liver stiffness; RI, regeneration index; PHRR, parenchymal hepatic resection rate.