



Figure S1 LASSO-Logistic regression. (A,C) LASSO coefficient profiles of the 29 variables. As the value of λ decreased, the degree of model compression increased and the function of the model to select important variables increased; (B,D) The cross-validation results. The value in the middle of the two dotted lines is the range of the positive and negative standard deviations of $\log(\lambda)$. The dotted line on the left indicated the value of the harmonic parameter $\log(\lambda)$ when the error of the model is minimized. Seven variables were selected when $\log(\lambda) = -2.8815$ in (C) and six variables were selected when $\log(\lambda) = -2.504674$ in (D). (A,B) are result for RFS, and (C,D) for OS.

Table S1 Risk factors associated with recurrence-free survival of patients with/without PNI

Variables	Univariate			Multivariable		
	HR	95% CI	P value	HR	95% CI	P value
Age	0.99	0.97–1.00	0.132			
Gender (male/female)	0.83	0.61–1.14	0.254			
Smoking	1.24	0.90–1.71	0.198			
Drinking	0.89	0.61–1.31	0.563			
Hypertension	0.95	0.65–1.38	0.783			
Diabetes	1.04	0.58–1.87	0.907			
Jaundice	0.51	0.13–2.07	0.347			
Cholangiolithiasis	1.03	0.46–2.33	0.942			
Schistosomal history	0.70	0.33–1.49	0.351			
Steatosis	0.91	0.48–1.73	0.782			
HBV	0.96	0.70–1.30	0.779			
HCV	1.08	0.57–2.05	0.809			
AFP (>400 ng/mL)	1.13	0.53–2.42	0.744			
CA199 (>40 U/mL)	1.18	0.87–1.60	0.294			
CA125 (U/mL)	1.00	1.00–1.00	0.223			
CA242 (U/mL)	1.00	1.00–1.00	0.685			
CEA (ng/mL)	1.00	1.00–1.01	0.039*	1.00	1.00–1.01	0.083
Preoperative albumin (g/L)	1.00	0.99–1.01	0.787			
Preoperative platelet ($\times 10^9/L$)	1.00	1.00–1.00	0.878			
Tumor size (cm)	1.06	1.01–1.12	0.025*	1.04	0.99–1.10	0.119
Multiple tumors	1.34	0.97–1.86	0.078			
Cirrhosis	1.11	0.77–1.62	0.578			
Poor differentiation	1.22	0.73–2.05	0.447			
AJCC-8th T stage and PNI						
T1 stage without PNI	0.66	0.46–0.94	0.021*	0.69	0.49–0.99	0.045*
T1 stage with PNI	1.19	0.74–1.91	0.462	1.29	0.80–2.07	0.303
T2 stage without PNI		Reference			Reference	
T2 stage with PNI	2.03	1.15–3.60	0.015*	1.93	1.08–3.45	0.027*

*, $P < 0.05$ was considered statistically significant.

Table S2 Risk factors associated with long-term overall survival of patients with/without PNI

Variables	Univariate			Multivariable		
	HR	95% CI	P value	HR	95% CI	P value
Age	1.00	0.99–1.02	0.702			
Gender (male/female)	0.90	0.66–1.22	0.495			
Smoking	1.32	0.96–1.80	0.086			
Drinking	1.29	0.91–1.84	0.147			
Hypertension	0.97	0.67–1.41	0.892			
Diabetes	1.16	0.66–2.04	0.613			
Jaundice	2.47	1.21–5.03	0.013*	1.93	0.94–3.98	0.074
Cholangiolithiasis	1.71	0.87–3.35	0.118			
Schistosomal history	0.93	0.46–1.89	0.841			
Steatosis	0.71	0.35–1.45	0.351			
HBV	0.75	0.55–1.01	0.062			
HCV	1.25	0.68–2.30	0.476			
AFP (>400 ng/mL)	1.04	0.49–2.23	0.912			
CA199 (>40 U/mL)	1.33	0.98–1.81	0.063			
CA125 (U/mL)	1.00	1.00–1.00	0.371			
CA242 (U/mL)	1.00	1.00–1.00	0.136			
CEA (ng/mL)	1.00	1.00–1.01	0.448			
Preoperative albumin (g/L)	1.00	0.99–1.01	0.808			
Preoperative platelet ($\times 10^9/L$)	1.00	1.00–1.00	0.453			
Tumor size (cm)	1.09	1.04–1.14	0.001*	1.07	1.02–1.13	0.004*
Multiple tumors	1.31	0.95–1.81	0.100			
Cirrhosis	1.02	0.71–1.49	0.901			
Poor differentiation	1.37	0.85–2.21	0.198			
AJCC-8th T stage and PNI						
T1 stage without PNI	0.62	0.43–0.89	0.009*	0.68	0.47–0.98	0.037*
T1 stage with PNI	1.24	0.81–1.91	0.327*	1.36	0.87–2.11	0.177
T2 stage without PNI		Reference			Reference	
T2 stage with PNI	2.28	1.34–3.88	0.002*	2.15	1.26–3.67	0.005*

*, $P < 0.05$ was considered statistically significant.