Supplementary Table 1 Baseline characteristics comparison between training and validation cohorts

	Overall (n = 576)	Training cohort (n = 403)	Validation cohort (n = 173)	P value
Age, years	57 (51-62)	56 (48-62)	57 (52-62)	0.184
Sex, %male	328 (56.9)	228 (56.6)	100 (57.8)	0.785
Follow-up time, years	2.83 (1.42-4.25)	2.83 (1.42-4.25)	2.75 (1.67-4.17)	0.896
LREs, %	313 (54.3)	221 (54.8)	92 (53.2)	0.714
AST, U/L	35.1 (26.6-52.0)	35.4 (26.7-50.9)	34.6 (26.4-52.4)	0.966
ALT, U/L	30.5 (19.9-45.5)	31.0 (21.1-45.0)	29.5 (18.6-48.3)	0.750
TB, $\mu mol \times L^{-1}$	21.05 (15.3-31.4)	21.2 (15.6-31.25)	20.9 (13.3-32)	0.440
DB, $\mu mol \times L^{-1}$	8.65 (5.95-13.3)	8.9 (6.1-13.3)	8.5 (5.2-13.1)	0.608
ALB, $g \times L^{-1}$	38.9 (29.9-44.8)	38.4 (29.4-44.0)	40.3 (32.0-45.7)	0.111
A/G	1.2 (0.8-1.5)	1.2 (0.8-1.5)	1.3 (0.9-1.5)	0.224
GGT, U/L	39.9 (21.7-78.2)	39.5 (21.7-74.0)	40.3 (21.8-89.5)	0.441
ALP, U/L	87.9 (65.4-116.9)	89.4 (67.0-121)	86.4 (64.2-105.8)	0.125
Bile acid, $\mu mol \times L^{-1}$	19.6 (6.9-41.9)	19.6 (7.2-43.0)	19.4 (6.1-40.5)	0.270
Creatinine, $\mu mol \times L^{-1}$	62.5 (52.5-72.4)	62.4 (50.6-72.8)	62.8 (56.1-71.7)	0.211
PT, s	13.2 (12.4-14.4)	13.2 (12.4-14.7)	13.0 (12.4-13.9)	0.157
INR	1.22 (1.14-1.37)	1.23 (1.15-1.38)	1.20 (1.13-1.37)	0.319
WBC, $10^9 \times L^{-1}$	3.60 (2.66-4.84)	3.71 (2.67-5.09)	3.47 (2.59-4.60)	0.362
Neutrophil count, $10^9 \times L^{-1}$	1.94 (1.47-2.76)	1.97 (1.48-2.77)	1.87 (1.44-2.62)	0.594
Lymphocyte count, $10^9 \times L^{-1}$	1.10 (0.7-1.59)	1.12 (0.73-1.60)	1.0 (0.64-1.44)	0.068
HB, $g \times L^{-1}$	134 (117-150)	134 (116-151)	135 (117-149)	0.600
PLT, $10^9 \times L^{-1}$	74 (52.8-99.6)	74 (51.7-99.7)	76 (58-99.4)	0.480
Child Pugh score, points	3 (3-5)	4 (3-5)	3 (3-5)	0.159
LSM, kPa	25.4 (20.3-38)	26.0 (21.3-36.7)	24.2 (19.2-38.0)	0.461
LPR	0.37 (0.24-0.58)	0.37 (0.25-0.59)	0.37 (0.24-0.55)	0.290
LAR	0.71 (0.50-1.11)	0.71 (0.51, 1.11)	0.68 (0.48, 1.11)	0.193
LSPS	5.49 (3.19-9.03)	5.47 (3.20-8.94)	5.62 (3.18-9.35)	0.786

Portal vein width, mm	12 (11-13)	12 (11-13)	12 (12-13)	0.438
Spleen thickness, mm	44 (37-54)	47 (38-54)	43 (37-53)	0.322
Spleen diameter, cm	14.8 (12.4-17.1)	14.5 (12.2-17.1)	15.2 (12.7-17.6)	0.177

Data are presented as median (interquartile range) for continuous variables and *n* (%) for categorical variables. Mann-Whitney U test was used for comparisons of continuous variables between groups; Chi-square test was used for categorical variables. LREs: Liver related events; AST: Aspartate aminotransferase; ALT: Alanine aminotransferase; TB: Total bilirubin; DB: Direct bilirubin; ALB: Albumin; A/G: Albumin-to-globulin ratio; GGT: Gamma glutamyltransferase; ALP: Alkaline phosphatase; PT: Prothrombin time; INR: International normalized ratio; WBC: White blood cell; HB: Hemoglobin; PLT: Platelets; LSM: Liver stiffness measurement; LPR: LSM-to-platelet ratio; LAR: LSM-to- albumin ratio; LSPS: LSM-spleen diameter to platelet ratio score.

Supplementary Table 2 Performance comparison of Cox regression and random survival forest models for liver related events prediction

	Training cohort	Validation cohort
COX		
C-index	0.784	0.765
12-month AUC	0.745	0.628
24-month AUC	0.823	0.811
36-month AUC	0.791	0.779
48-month AUC	0.794	0.783
RSF		
C-index	0.827	0.791
12-month AUC	0.747	0.642
24-month AUC	0.878	0.881
36-month AUC	0.886	0.872
48-month AUC	0.883	0.874

RSF: Random survival forest; AUC: Area under the curve.