Content of supplementary files:

**Figure S1.** A and B: Comparison of Kaplan–Meier curves in OS and RFS between the two cohorts. C: Kaplan–Meier curve of the stratified EHBH model in the training cohort D: Kaplan–Meier curve of the stratified EHBH model in the internal validation cohort.

**Figure S2.** Contour plot of one- and five-year survival probabilities.

**Figure S3.** ROC curves of nomogram score in predicting the death of training cohort.

**Figure S4.** Predicted probability of death in different models.

**Table S1.** Univariable and multivariable analyses of RFS.

**Table S2.** Comparison of the EHBH model and other clinical staging systems.
Specificity
Sensitivity

0.0 0.2 0.4 0.6 0.8 1.0

86.56 (0.726, 0.452)

Nomogram score
Predict risk probability of death

- Child-Pugh stage
- LCSGJ stage
- AJCC 8th stage
- JSHBP5 stage
- Fudan score
- Zhou score
| Variable                          | Univariable analysis | Multivariable analysis |
|----------------------------------|----------------------|------------------------|
|                                  | HR   | 95%CI          | P value | HR   | 95%CI          | P value |
| Age, year                        | 1.002 | 0.989 - 1.015 | 0.787   |      |                |         |
| Gender, Male vs. Female          | 1.253 | 0.817 - 1.921 | 0.301   |      |                |         |
| BMI                              | 0.981 | 0.946 - 1.017 | 0.297   |      |                |         |
| CSPH, Yes vs. No                 | 1.237 | 0.918 - 1.667 | 0.161   |      |                |         |
| Diabetes, Yes vs. No             | 1.275 | 0.740 - 2.196 | 0.380   |      |                |         |
| HBsAg, Yes vs. No                | 0.955 | 0.640 - 1.425 | 0.823   |      |                |         |
| Anti-HCV, Yes vs. No             | 0.301 | 0.075 - 1.215 | 0.074   |      |                |         |
| TBIL, mg/dL                      | 0.981 | 0.916 - 1.052 | 0.593   |      |                |         |
| ALB, g/L                         | 0.997 | 0.969 - 1.027 | 0.854   |      |                |         |
| ALT, IU/L                        | 1.000 | 0.999 - 1.001 | 0.338   |      |                |         |
| AST, IU/L                        | 1.000 | 0.999 - 1.001 | 0.161   |      |                |         |
| GGT, IU/L                        | 1.000 | 0.999 - 1.001 | 0.904   |      |                |         |
| PT, second                       | 1.070 | 0.943 - 1.214 | 0.293   |      |                |         |
| PLT, ×10^9/L                     | 1.000 | 0.998 - 1.002 | 0.919   |      |                |         |
| AFP, μg/L                        | 1.000 | 0.999 - 1.001 | 0.592   |      |                |         |
| CEA, μg/L                        | 1.003 | 1.001 - 1.005 | 0.001   |      |                |         |
| CA19-9, IU/mL                    | 1.001 | 0.999 - 1.002 | <0.001  | 1.001 | 1.000-1.002    | 0.001  |
| Child-Pugh grade, B vs. A        | 0.787 | 0.457 - 1.356 | 0.388   |      |                |         |
|                                    | Value 1 | Value 2   | p-value | Value 3   | Value 4   | p-value |
|------------------------------------|---------|-----------|---------|-----------|-----------|---------|
| Total tumor diameter, cm           | 1.084   | 1.044 - 1.125 | <0.001 | 1.055     | 1.013 - 1.104 | 0.010   |
| Tumor distribution, Bilateral vs. Unilateral | 1.096   | 0.743 - 1.617   | 0.643 |
| No. of tumor, per                  | 1.478   | 1.311 - 1.667 | <0.001 | 1.412     | 1.241 - 1.608 | <0.001 |
| Satellite nodules, Yes vs. No      | 1.579   | 1.134 - 2.197 | 0.006 | 1.607     | 1.151 - 2.246 | 0.005   |
| Tumor capsule, Yes vs. No          | 0.980   | 0.784 - 1.225 | 0.862 |

**Abbreviations:** CSPH, clinically significant portal hypertension; BMI, Body Mass Index; HBsAg, hepatitis B surface antigen; HCV, hepatitis C virus; TBIL, total bilirubin; ALB, albumin; ALT, alanine transaminase; AST, aspartate aminotransferase; GGT, gamma-glutamyl transpeptidase; PT, prothrombin time; PLT, platelet; AFP, alpha-fetoprotein; CEA, carcinoembryonic antigen; CA19-9, carbohydrate antigen 19-9.
|                | C-index (95%CI) | Change (95%CI)       | P change |
|----------------|----------------|----------------------|----------|
| **EHBH model** | 0.710 (0.673-0.748) |                     |          |
| **Child-Pugh stage** | 0.519 (0.481-0.558) | -0.191 (-0.244 — -0.140) | <0.0001 |
| **LCGJ stage**  | 0.579 (0.537-0.620) | -0.131 (-0.170 — -0.093) | <0.0001 |
| **AJCC 8th stage** | 0.589 (0.551-0.628) | -0.121 (-0.159 — -0.084) | <0.0001 |
| **JSHBPS stage** | 0.589 (0.548-0.630) | -0.121 (-0.158 — -0.048) | <0.0001 |
| **Fudan score** | 0.594 (0.552-0.636) | -0.116 (-0.162 — -0.074) | <0.0001 |
| **Zhou score**  | 0.598 (0.557-0.639) | -0.112 (-0.153 — -0.072) | <0.0001 |

**Abbreviation:** LCSGJ, liver cancer study group of Japan; AJCC: American Joint Committee on Cancer; JSHBPS, Japanese Society of Hepato-Biliary-Pancreatic Surgery.