



Assessment of Prognostic Accuracy of Albumin-Bilirubin and Platelet-Albumin-Bilirubin Grades in Hepatocellular Carcinoma Patients According to Different Treatment Modalities: A Prospective Study

Supplementary material

Supplementary methods

The following scores were calculated at the time of HCC diagnosis:

1. Child–Turcotte–Pugh (CTP) score: it was based on hepatic encephalopathy, ascites, and serum levels of bilirubin, albumin, and prothrombin time/INR. CTP class was defined as: class A: 5–6 points; class B: 7–9 points; class C: 10–15 points [1].
2. Model for end-stage liver disease (MELD): was calculated by the following equation, $MELD = 3.78 \times \log_e(\text{total bilirubin}) + 11.2 \times \log_e(\text{INR}) + 9.57 \times \log_e(\text{serum creatinine}) + 6.43$ [2]. MELD grade was defined as: grade 1: < 10 ; grade 2: 10 to 14; grade 3: > 14 [3].
3. ALBI grade: was calculated by the following equation, $0.66 \times \log_{10} \text{total bilirubin } (\mu\text{mol/L}) - 0.085 \times \text{albumin (g/L)}$, where bilirubin is in $\mu\text{mol/L}$ and albumin in g/L. ALBI grade was defined as: grade 1: ≤ -2.60 ; grade 2: -1.39 to -2.60 ; grade 3: > -1.39 [4].
4. PALBI grade: was calculated by the following equation, $2.02 \times \log_{10} \text{total bilirubin } (\mu\text{mol/L}) - 0.37 \times (\log_{10} \text{total bilirubin})^2 - 0.04 \times \text{albumin (g/L)} - 3.48 \times \log_{10} \text{platelets } (10^9/\text{L}) + 1.01 \times (\log_{10} \text{platelets})^2$, where bilirubin is in $\mu\text{mol/L}$ and albumin in g/L. PALBI grade was defined as: grade 1: ≤ -2.53 ; grade 2: -2.09 to -2.53 ; grade 3: > -2.09 [5].
5. Barcelona Clinic Liver Cancer (BCLC) classification system was used to stage HCC patients [6, 7]. It was based on tumour characteristics (size, number, vascular invasion, and extrahepatic spread), CTP class, and performance status of the patient based on the Eastern Co-operative Oncology Group (ECOG) performance scale [8].

Supplementary results

Sensitivity, specificity, positive- and negative-predictive values, were calculated for each parameter as follows:

- Sensitivity = true positive/ (true positive + false negative)
- Specificity = true negative/ (true negative + false positive)
- Positive-predictive value (PPV) = true positive/ (true positive + false positive)
- Negative-predictive value (NPV) = true negative/ (true negative + false negative)

Supplementary Table 1 Univariate Cox regression analysis to identify risk factors associated with OS.

	Hazard ratio (95% CI)	P-value
Age	1.006 (0.995:1.017)	0.27
Male vs Female	1.023 (0.832:1.258)	0.83
Smoking	0.822 (0.676:1)	0.05
Diabetes Mellites	0.93 (0.761:1.136)	0.477
HFL size (cm)	1.092 (1.065:1.119)	<0.0001
Number of HFL		
Single	Ref.	
Two	1.055 (0.794:1.403)	0.71
Three	1.341 (0.831:2.164)	0.229
Multiple	2.668 (2.169:3.284)	<0.0001
PVT/Extrahepatic spread	2.606 (2.154:3.153)	<0.0001
AFP	1 (1:1)	0.207
Child class		
A	Ref.	
B	2.87 (2.256:3.651)	<0.0001
C	7.419 (5.805:9.483)	<0.0001
MELD grade		
Grade 1	Ref.	
Grade 2	1.583 (1.231:2.035)	<0.0001
Grade 3	5.073 (3.969:6.484)	<0.0001
ALBI grade		
Grade 1	Ref.	
Grade 2	1.843 (1.239:2.74)	<.003
Grade 3	7.211 (4.846:10.73)	<0.0001
PALBI grade		
Grade 1	Ref.	
Grade 2	1.577 (1.018:2.444)	0.041
Grade 3	5.719 (3.857:8.48)	<0.0001
BCLC stage		
0/ A	Ref.	
B	3.631 (2.653:4.969)	<0.0001
C	6.682 (4.734:9.431)	<0.0001
D	13.159 (9.584:18.066)	<0.0001
HCC treatment		
Curative *	Ref.	
Palliative †	2.449 (1.886:3.18)	<0.0001
BSC	8.634 (6.574:11.34)	<0.0001

* Resection or ablation, † TACE or sorafenib.

CI: confidence interval; HFL: hepatic focal lesion; PVT: portal vein thrombosis; AFP: Alpha-fetoprotein; MELD: Model for End-Stage Liver Disease; ALBI: albumin-bilirubin; PALBI: platelet-albumin-bilirubin; BCLC: Barcelona Clinic Liver Cancer; HCC: hepatocellular carcinoma; BSC: best supportive care.

Supplementary references

1. Pugh RN, Murray-Lyon IM, Dawson JL, et al. Transection of the oesophagus for bleeding oesophageal varices. *Br J Surg* 1973;60:646-9.
2. Kamath PS, Wiesner RH, Malinchoc M, et al. A model to predict survival in patients with end-stage liver disease. *Hepatology* 2001;33:464-70.
3. Huo T-I, Huang Y-H, Lin H-C, et al. Proposal of a Modified Cancer of the Liver Italian Program Staging System Based on the Model for End-Stage Liver Disease for Patients with Hepatocellular Carcinoma Undergoing Loco-Regional Therapy. *Official journal of the American College of Gastroenterology | ACG* 2006;101:975-982.
4. Johnson PJ, Berhane S, Kagebayashi C, et al. Assessment of liver function in patients with hepatocellular carcinoma: a new evidence-based approach-the ALBI grade. *J Clin Oncol* 2015;33:550-8.
5. Liu PH, Hsu CY, Hsia CY, et al. ALBI and PALBI grade predict survival for HCC across treatment modalities and BCLC stages in the MELD Era. *J Gastroenterol Hepatol* 2017;32:879-886.
6. EASL Clinical Practice Guidelines: Management of hepatocellular carcinoma. *J Hepatol* 2018;69:182-236.
7. Reig M, Forner A, Rimola J, et al. BCLC strategy for prognosis prediction and treatment recommendation: The 2022 update. *J Hepatol* 2022;76:681-693.
8. Oken MM, Creech RH, Tormey DC, et al. Toxicity and response criteria of the Eastern Cooperative Oncology Group. *Am J Clin Oncol* 1982;5:649-55.