

· 病毒性肝炎 ·

DOI: 10.12449/JCH251112

前白蛋白与总胆红素比值对 HBV 相关慢加急性肝衰竭患者短期预后的预测价值

李文娟, 赵卫峰, 黄小平

苏州大学附属第一医院感染病科, 江苏 苏州 215000

通信作者: 黄小平, grehxp@163.com (ORCID: 0000-0003-0916-2885)

摘要: 目的 评估入院时前白蛋白与总胆红素比值(PA/TBil)对HBV相关慢加急性肝衰竭(HBV-ACLF)患者90天死亡或肝移植的预测价值,并分析其与MELD评分联合后对短期预后预测效能的影响。方法 回顾性分析2020年4月—2025年5月苏州大学附属第一医院感染病科收住入院的216例HBV-ACLF患者的临床资料,对患者随访3个月,根据结局将患者分为生存组($n=104$)和死亡/移植组($n=112$)。采用Kolmogorov-Smirnov检验分析计量资料是否符合正态分布,符合正态分布的计量资料两组间比较采用成组 t 检验,偏态资料两组间比较采用Mann-Whitney U 检验;计数资料两组间比较采用 χ^2 检验;采用单因素及多因素二元Logistic回归分析影响预后的因素;采用受试者操作特征曲线分析各指标对ACLF预后的预测效能,计算曲线下面积(AUC),并使用Delong检验对AUC进行比较。结果 216例患者90天生存率为48.15%(104/216),生存组PLT、淋巴细胞计数、Alb、PA/TBil水平均显著高于死亡/移植组(P 值均 <0.05);年龄、WBC、中性粒细胞计数、PT、国际标准化比值、AST、TBil、肌酐、MELD评分均显著低于死亡/移植组(P 值均 <0.05)。多因素Logistic回归分析显示,年龄($OR=1.05$, 95% CI :1.02~1.09, $P<0.001$)、PA/TBil($OR=0.16$, 95% CI :0.05~0.46, $P<0.001$)、MELD评分($OR=1.09$, 95% CI :1.01~1.17, $P=0.024$)是HBV-ACLF患者90天预后的独立影响因素。PA/TBil、MELD评分及二者联合预测HBV-ACLF患者预后的AUC分别为0.760、0.779、0.811;PA/TBil联合MELD评分预测的AUC优于单一指标AUC(Z 值分别为-2.058、2.017, P 值均 <0.05)。结论 血清PA/TBil、MELD评分均可以有效预测HBV-ACLF患者的预后,二者联合对患者的预后预测效果明显优于单独使用MELD评分,这为临床风险分层管理和及时干预提供了重要参考。

关键词: 乙型肝炎病毒;慢加急性肝功能衰竭;预后;前白蛋白;胆红素;MELD评分

基金项目:“十三五”国家科技重大专项(2017ZX10203201002-002);中国肝炎防治基金会专项(TGQB20180371)

Value of prealbumin-to-total bilirubin ratio in predicting the short-term prognosis of patients with HBV-related acute-on-chronic liver failure

LI Wenjuan, ZHAO Weifeng, HUANG Xiaoping

Department of Infectious Diseases, The First Affiliated Hospital of Soochow University, Suzhou, Jiangsu 215000, China

Corresponding author: HUANG Xiaoping, grehxp@163.com (ORCID: 0000-0003-0916-2885)

Abstract: Objective To investigate the value of prealbumin-to-total bilirubin (PA/TBil) ratio on admission in predicting 90-day mortality or liver transplantation in patients with HBV-related acute-on-chronic liver failure (HBV-ACLF), as well as the effect of its combination with Model for End-Stage Liver Disease (MELD) score on the predictive performance for short-term prognosis. **Methods** A retrospective analysis was performed for the clinical data of 216 HBV-ACLF patients who were admitted to Department of Infectious Diseases in the First Affiliated Hospital of Soochow University from April 2020 to May 2025, and the patients were followed up for 3 months. According to the outcome, the patients were divided into survival group with 104 patients and death/transplantation group with 112 patients. The Kolmogorov-Smirnov test was used to check whether the continuous data was in accordance with the normal distribution; the two-independent-samples t test was used for comparison of normally distributed

continuous data between two groups, while the Mann-Whitney U test was used for comparison of continuous data with skewed distribution between two groups. The chi-square test was used for comparison of categorical data between two groups. Univariate and multivariate binary Logistic regression analyses were used to investigate the influencing factors for prognosis, and the receiver operating characteristic (ROC) curve was used to analyze the performance of each indicator in predicting the prognosis of ACLF. The area under the ROC curve (AUC) was calculated, and the Delong test was used for comparison of AUC. **Results** A total of 216 patients were enrolled in this study, with a 90-day survival rate of 48.15% (104/216). Compared with the death/transplantation group, the survival group had significantly higher platelet count, lymphocyte count, albumin, and PA/TBil ratio (all $P < 0.05$) and significantly lower age, white blood cell count, neutrophil count, prothrombin time, international normalized ratio, aspartate aminotransferase, total bilirubin, creatinine, and MELD score (all $P < 0.05$). The multivariate Logistic regression analysis showed that age (odds ratio [OR]=1.05, 95% confidence interval [CI]: 1.02—1.09, $P < 0.001$), PA/TBil ratio (OR=0.16, 95%CI: 0.05—0.46, $P < 0.001$), and MELD score (OR=1.09, 95%CI: 1.01—1.17, $P = 0.024$) were independent influencing factors for 90-day prognosis in HBV-ACLF patients. PA/TBil ratio and MELD score used alone or in combination had an AUC of 0.760, 0.779, and 0.811, respectively, in predicting the prognosis of HBV-ACLF patients, and PA/TBil ratio combined with MELD score had a better AUC than PA/TBil ratio or MELD score used alone ($Z = -2.058$ and 2.017 , both $P < 0.05$). **Conclusion** Both serum PA/TBil ratio and MELD score can effectively predict the prognosis of patients with HBV-ACLF, and a combination of the two indicators had a better predictive performance than MELD score alone, which provides an important reference for clinical risk stratification management and timely intervention.

Key words: Hepatitis B Virus; Acute-on-Chronic Liver Failure; Prognosis; Prealbumin; Bilirubin; MELD Score

Research funding: National Key Science and Technology Special Project for the 13th Five-Year Plan (2017ZX10203201002-002); China Hepatitis Prevention and Control Foundation Special Project (TGQB20180371)

慢加急性肝衰竭(ACLF)是一种发生于慢性肝病基础上的急性肝功能失代偿,可导致多器官功能衰竭,病情进展迅速,短期内病死率高达50%~90%^[1-4]。因此,准确预测患者预后对于优化治疗策略、改善临床治疗效果具有重要意义^[5]。目前临床常用的预后评估模型主要是Child-Pugh评分^[6]、终末期肝病模型(model for end-stage liver disease, MELD)评分^[7]、白蛋白-胆红素(albumin bilirubin, ALBI)分期模型^[8],然而,上述模型预测准确性有限,因此需要更准确、更易应用的HBV相关ACLF(HBV-ACLF)预后指标和模型。前白蛋白(PA)也称为转甲状腺素运载蛋白,主要由肝脏合成^[9],是评估肝脏疾病严重程度的敏感生物标志物^[10],已被证明是预测肝衰竭的独立预后指标^[11-12]。有研究表明,总胆红素(TBil)是判断HBV-ACLF患者短期预后的独立危险因素^[13]。故本研究探讨PA/TBil联合MELD评分对HBV-ACLF患者短期预后的预测价值,以期指导临床治疗。

1 资料与方法

1.1 研究对象 回顾性分析2020年4月—2025年5月本院感染病科收住入院的HBV-ACLF患者的临床资料,所有患者均接受积极治疗。纳入标准:入选患者均符合

《肝衰竭诊治指南(2018年版)》^[14]中关于HBV-ACLF的诊断标准。排除标准:(1)妊娠或哺乳期妇女;(2)合并其他肝炎病毒感染;(3)合并免疫性、酒精性、遗传代谢性、药物性、寄生虫性肝病;(4)合并HIV感染、恶性肿瘤、血液系统疾病的患者;(5)缺失随访资料者;(6)年龄<18岁者。

1.2 研究方法 收集HBV-ACLF患者姓名、年龄、性别、病因、既往史等基本信息资料,所有对象均于入院后24 h内抽取清晨空腹静脉血。检测实验室指标包括:血常规、肝肾功能等生化指标及凝血指标,观察患者肝性脑病、腹水、消化道出血等并发症情况,记录患者肝硬化相关并发症^[15]。计算PA/TBil比值、MELD评分;MELD评分= $3.78 \times \ln[\text{TBil}(\text{mg/dL})] + 9.57 \times \ln[\text{Cr}(\text{mg/dL})] + 11.2 \times \ln[\text{国际标准化比值(INR)}] + 6.43 \times \text{病因}$,其中病因为胆汁性或酒精性时赋值为0,其他赋值为1,本研究对象均为HBV相关,故赋值均为1^[16]。通过电话随访形式获得患者出院后90天内的生存状况。

1.3 统计学方法 采用SPSS 27.0和GraphPad 10.1.2统计软件进行数据分析。采用Kolmogorov-Smirnov检验分析计量资料是否符合正态分布,符合正态分布的计量资料以 $\bar{x} \pm s$ 表示,两组间比较采用成组 t 检验;偏态资料以

$M(P_{25} \sim P_{75})$ 表示,两组间比较采用Mann-Whitney U 检验。计数资料两组间比较采用 χ^2 检验。采用单因素及多因素二元Logistic回归分析影响预后的因素;采用受试者操作特征曲线(ROC曲线)分析各指标对ACLF预后的预测效能,并计算曲线下面积(AUC),使用Delong检验对AUC进行比较,利用约登指数寻找最佳截点。 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 一般资料 共纳入HBV-ACLF患者216例,其中男174例(80.56%),女42例(19.44%),中位年龄55(49~

64)岁。根据患者生存状况分为生存组($n=104$)与死亡/移植组($n=112$)。两组间年龄、淋巴细胞计数、中性粒细胞计数、WBC、PLT、PT、INR、AST、TBil、Alb、PA/TBil、Cr、MELD评分比较,差异均有统计学意义(P 值均 < 0.05)(表1)。

2.2 HBV-ACLF患者预后影响因素的Logistic回归分析 将单因素分析有统计学意义($P < 0.05$)的临床指标纳入多因素分析,在排除指标之间共线性及校正后,进行多因素Logistic回归分析,筛选出年龄、MELD评分、PA/TBil为HBV-ACLF患者90天预后的独立影响因素(P 值均 < 0.05)(表2)。

表1 生存组和死亡/移植组HBV-ACLF患者的临床指标比较

Table 1 Comparison of clinical indicators between survival and death groups in HBV-ACLF patients

变量	合计($n=216$)	生存组($n=104$)	死亡/移植组($n=112$)	统计值	P 值
年龄(岁)	55.0(49.0~64.0)	53.0(45.5~61.0)	58.0(51.0~67.0)	$Z=-3.07$	0.002
性别(男/女,例)	174/42	83/21	91/21	$\chi^2=0.07$	0.789
WBC($\times 10^9/L$)	7.75(4.92~11.33)	7.31(4.77~9.29)	8.34(5.33~12.68)	$Z=-2.20$	0.028
淋巴细胞计数($\times 10^9/L$)	0.84(0.54~1.19)	0.93(0.75~1.29)	0.67(0.46~1.15)	$Z=-3.71$	<0.001
中性粒细胞计数($\times 10^9/L$)	5.95(3.56~9.20)	5.16(3.33~7.61)	7.09(3.79~10.84)	$Z=-3.07$	0.002
PLT($\times 10^9/L$)	76.50(48.75~131.00)	89.50(56.75~135.75)	66.50(38.75~107.75)	$Z=-2.97$	0.003
Hb(g/L)	111.24 \pm 25.10	113.98 \pm 26.73	108.69 \pm 23.32	$t=1.55$	0.122
PT(s)	19.00(16.20~24.30)	18.10(15.85~21.68)	21.55(16.78~28.40)	$Z=-3.99$	<0.001
INR	1.68(1.40~2.22)	1.59(1.36~1.89)	1.92(1.46~2.61)	$Z=-4.21$	<0.001
ALT(U/L)	115.65(42.30~222.73)	99.20(34.83~306.50)	117.55(49.90~218.73)	$Z=-0.52$	0.603
AST(U/L)	119.40(62.60~263.32)	88.50(55.08~216.90)	133.75(81.15~308.57)	$Z=-2.43$	0.015
TBil($\mu\text{mol/L}$)	194.95(86.97~365.97)	121.75(71.25~232.62)	284.65(147.75~439.70)	$Z=-6.06$	<0.001
Alb(g/L)	30.01 \pm 5.33	31.41 \pm 5.15	28.72 \pm 5.19	$t=3.83$	<0.001
Cr($\mu\text{mol/L}$)	65.05(52.70~88.00)	58.35(49.65~73.90)	76.05(56.10~99.80)	$Z=-4.29$	<0.001
PA/TBil	0.19(0.09~0.45)	0.33(0.16~0.96)	0.13(0.05~0.24)	$Z=-6.59$	<0.001
MELD评分(分)	13.17(7.80~18.61)	9.96(4.76~13.83)	16.31(12.50~22.74)	$Z=-7.09$	<0.001

表2 HBV-ACLF患者90天预后相关Logistic回归分析

Table 2 Logistic regression analysis of 90-day prognosis in HBV-ACLF patients

变量	单因素分析			多因素分析		
	β 值	OR(95%CI)	P 值	β 值	OR(95%CI)	P 值
年龄(岁)	0.04	1.04(1.01~1.06)	0.002	0.05	1.05(1.02~1.09)	<0.001
WBC($\times 10^9/L$)	0.06	1.06(1.01~1.12)	0.019	0.01	1.01(0.90~1.13)	0.877
淋巴细胞计数($\times 10^9/L$)	0.02	1.02(0.91~1.14)	0.788			
中性粒细胞计数($\times 10^9/L$)	0.09	1.09(1.03~1.16)	0.005	0.04	1.04(0.92~1.18)	0.512
PLT($\times 10^9/L$)	-0.01	0.99(0.99~0.99)	0.018	0.00	1.00(0.99~1.00)	0.755
PT(s)	0.10	1.11(1.05~1.16)	<0.001	-0.20	0.82(0.62~1.10)	0.189
INR	1.06	2.89(1.74~4.81)	<0.001	2.04	7.72(0.45~131.90)	0.158
AST(U/L)	0.00	1.00(1.00~1.00)	0.620			
TBil($\mu\text{mol/L}$)	0.01	1.01(1.01~1.01)	<0.001			
Alb(g/L)	-0.10	0.90(0.85~0.95)	<0.001	-0.02	0.98(0.92~1.05)	0.640
Cr($\mu\text{mol/L}$)	0.01	1.01(1.01~1.02)	0.001			
PA/TBil	-2.35	0.10(0.04~0.25)	<0.001	-1.84	0.16(0.05~0.46)	<0.001
MELD评分(分)	0.15	1.17(1.11~1.23)	<0.001	0.08	1.09(1.01~1.17)	0.024

2.3 MELD评分和PA/TBil对HBV-ACLF患者90天预后的预测价值 ROC曲线显示,PA/TBil、MELD评分以及二者联合对HBV-ACLF患者的短期预后均有预测价值(P 值均 <0.001),其AUC分别为0.760、0.779、0.811(图1,表3)。PA/TBil与MELD评分的AUC相比,差异无统计学意义($Z=-0.554, P>0.05$)。PA/TBil、MELD评分的AUC明显低于二者联合,差异均有统计学意义(Z 值分别为 $-2.058, 2.017, P$ 值均 <0.05),表明PA/TBil联合MELD评分可以提高预测效能。

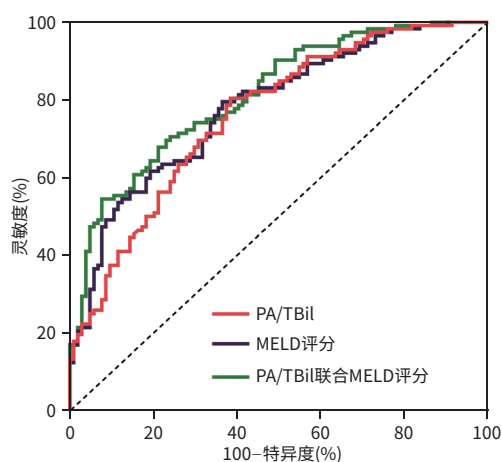


图1 PA/TBil和MELD评分以及二者联合预测HBV-ACLF患者预后的ROC曲线

Figure 1 ROC curves of PA/TBil, MELD score, and their combination in predicting prognosis of HBV-ACLF patients

3 讨论

HBV-ACLF是我国常见的肝衰竭类型,病死率较高。肝移植是提高HBV-ACLF患者生存率的主要手段^[17-18],但费用高昂,普通患者难以负担,因此早期识别并及时治疗是改善预后的关键。PA/TBil作为一种简便、经济且易于重复检测的指标,在预测肝衰竭的病情进展和短期预后方面显示出良好的潜力^[19]。根据本研究结果,PA/TBil比值、MELD评分及二者联合均能有效预测HBV-ACLF患者的短期预后(P 值均 <0.001),二者联合模型对HBV-ACLF患者预后的预测效能(AUC=0.811),显著优于单一指标,提示其预测能力更强。

目前,传统的肝功能评分系统如Child-Pugh评分、MELD评分、ALBI评分虽广泛应用于临床,但均存在一定的局限性。Child-Pugh评分常用来评估患者的肝功能和肝损伤情况,但该评分系统存在一定的主观性和滞后性,难以准确、实时地反映患者当前的肝脏储备功能和损伤程度,在快速变化的临床情境中可能会延误最佳治疗时机^[20-21]。MELD评分作为评估肝功能障碍的经典模型,最初用于预测慢性肝病(如终末期肝病)患者在器官移植等治疗前的中短期死亡风险^[22]。ACLF病程的急性特征决定了患者的预后受到多因素的复杂影响,如炎症标志物的动态变化、器官衰竭的数量和严重程度等^[23]。MELD评分虽然能够较好地反映患者的部分生理损伤,但其未能充分考量急性炎症反应、肝外器官衰竭(如心、肺、脑)以及一些其他病理机制(如PA、胆汁淤积标志物)的影响^[24]。因此,单纯依赖于MELD评分可能会低估部分患者的死亡风险。ALBI评分仅包含Alb和胆红素两项指标,但Alb水平极易受到外源性输注等人为因素的影响,评估预后可能存在偏倚^[25-26]。为弥补不足,本研究将PA/TBil与MELD评分进行联合评估。既往研究发现,PA水平与肝衰竭预后密切相关^[10-12]。血清PA由于半衰期短(约1.9天),对肝功能变化反应更为敏感,是评估肝脏合成功能及储备能力的重要指标。当PA的水平持续性下降时,往往提示预后不良,而治疗过程中PA水平的逐渐回升则提示肝脏再生修复能力良好。入院时PA水平可作为HBV-ACLF患者30天死亡的独立预测指标^[27]。肝衰竭发生时,由于肝细胞严重变性、坏死、小叶结构重建,短时间内发生胆管梗阻,从而引起胆红素急剧升高。TBil是HBV-ACLF预后评估中最早出现异常、最易获得且最稳定的实验室指标之一,其水平与ACLF患者肝衰竭的危险性和严重程度成正比^[28],是反映肝功能和判断短期预后的常用实验室指标,也是死亡的独立危险因素,但其单项指标预测能力有限^[29]。多中心证据表明,PA/TBil相较单纯PA或TBil具有更优的生存预测性能^[30],整体判别力更高。当肝脏合成功能受损时,PA水平降低;胆汁排泄受阻时,TBil水平升高。由于两项指标反映的病理过程不同且变化方

表3 PA/TBil、MELD评分、PA/TBil联合MELD评分对90天预后的预测价值

Table 3 Comparison of predictive value for 90-day prognosis among PA/TBil, MELD score, and PA/TBil combined with MELD score

模型	AUC	95%CI	灵敏度(%)	特异度(%)	Youden指数	Cut-off值	P 值
PA/TBil	0.760	0.697 ~ 0.823	61.5	80.4	0.419	0.266	<0.001
MELD评分	0.779	0.719 ~ 0.840	79.5	63.5	0.430	12.000	<0.001
PA/TBil-MELD评分	0.811	0.755 ~ 0.867	67.9	79.8	0.477	0.596	<0.001

向相反,构建PA/TBil比值能够在一定程度上增强对肝脏合成功能与胆汁淤积程度的综合反映,使其成为一个更敏感的复合指标。本研究中PA/TBil与MELD评分联合应用的模型,通过结合反映肝脏合成功能的PA与代表肝细胞损伤的TBil,更全面地评估了HBV-ACLF患者的肝功能储备和损伤状态,弥补了现有评分系统单一维度的不足。这与最新研究强调多维度评估ACLF预后的趋势相符^[31-32],值得在临床实践中推广应用。

综上所述,PA/TBil和MELD评分均可预测HBV-ACLF患者的预后,且相较于单一指标,联合使用可更准确地预测患者预后情况,有助于及早识别高风险患者。同时PA/TBil比值计算简便,基于常规血液生化检测即可快速获得,简便易行、成本较低、可重复性好,还可连续动态监测,便于及时掌握患者病情变化,具有潜在的临床应用价值,特别是在资源有限的医疗环境中,PA/TBil可能成为一种实用的替代指标。本研究也存在一定的局限性:首先,作为一项单中心回顾性研究,例数有限,无法完全排除偏倚及某些未测量混杂因素的影响,应进一步开展多中心研究验证;其次,本研究仅针对因HBV感染所致ACLF住院的患者进行分析,结论可能无法外推至其他病因人群;最后,本研究未监测肝衰竭的病程转归及其他预后相关指标的动态变化,有待进一步的前瞻性临床研究予以探讨。

伦理学声明:本研究方案由苏州大学附属第一医院伦理委员会审批,批号:(2025)伦审批第534号。

利益冲突声明:本文不存在任何利益冲突。

作者贡献声明:李文娟负责资料查找,撰写论文;黄小平负责修改论文;赵卫峰指导修改文章并最终定稿。

参考文献:

- [1] ARROYO V, MOREAU R, JALAN R. Acute-on-chronic liver failure[J]. *N Engl J Med*, 2020, 382(22): 2137-2145. DOI: 10.1056/nejmra1914900.
- [2] PERRICONE G, ARTZNER T, de MARTIN E, et al. Intensive care management of acute-on-chronic liver failure[J]. *Intensive Care Med*, 2023, 49(8): 903-921. DOI: 10.1007/s00134-023-07149-x.
- [3] ZACCHERINI G, WEISS E, MOREAU R. Acute-on-chronic liver failure: Definitions, pathophysiology and principles of treatment[J]. *JHEP Rep*, 2021, 3(1): 100176. DOI: 10.1016/j.jhepr.2020.100176.
- [4] SHI K, ZHANG Y, LI YQ, et al. High-density lipoprotein cholesterol as a prognostic marker for 90-day transplant-free mortality in hepatitis B virus-related acute-on-chronic liver failure[J]. *Front Cell Infect Microbiol*, 2024, 14: 1458818. DOI: 10.3389/fcimb.2024.1458818.
- [5] CAI Q, WANG H, ZHU MY, et al. Construction of a novel prognostic scoring model for HBV-ACLF liver failure based on dynamic data[J]. *Sci Rep*, 2024, 14(1): 15198. DOI: 10.1038/s41598-024-63900-4.
- [6] HUANG ZW, ZHANG G, LIU J, et al. LRFNet: A deep learning model for the assessment of liver reserve function based on Child-Pugh score and CT image[J]. *Comput Meth Programs Biomed*, 2022, 223: 106993. DOI: 10.1016/j.cmpb.2022.106993.
- [7] RUF A, DIRCHWOLF M, FREEMAN RB. From Child-Pugh to MELD score and beyond: Taking a walk down memory lane[J]. *Ann Hepatol*, 2022, 27(1): 100535. DOI: 10.1016/j.aohep.2021.100535.
- [8] 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]. *J Clin Oncol*, 2015, 33(6): 550-558. DOI: 10.1200/JCO.2014.57.9151.
- [9] LIAO YY, TENG CL, PENG NF, et al. Serum prealbumin is negatively associated with survival in hepatocellular carcinoma patients after hepatic resection[J]. *J Cancer*, 2019, 10(13): 3006-3011. DOI: 10.7150/jca.30903.
- [10] HUO RR, LIU HT, DENG ZJ, et al. Dose-response between serum prealbumin and all-cause mortality after hepatectomy in patients with hepatocellular carcinoma[J]. *Front Oncol*, 2020, 10: 596691. DOI: 10.3389/fonc.2020.596691.
- [11] YIN Y, CHENG JW, CHEN FY, et al. A novel preoperative predictive model of 90-day mortality after liver resection for huge hepatocellular carcinoma[J]. *Ann Transl Med*, 2021, 9(9): 774. DOI: 10.21037/atm-20-7842.
- [12] DUAN RX, LIU L, WANG Y, et al. Prognostic value of combined detection of alpha-fetoprotein, plasma prothrombin activity, and serum prealbumin in acute-on-chronic liver failure[J]. *World J Gastrointest Surg*, 2025, 17(2): 99531. DOI: 10.4240/wjgs.v17.i2.99531.
- [13] FAN WH, LIAO W, LUO YP, et al. Clinical prediction for outcomes of patients with acute-on-chronic liver failure associated with HBV infection: A new model establishment[J]. *Open Med*, 2020, 15(1): 714-722. DOI: 10.1515/med-2020-0207.
- [14] Liver Failure and Artificial Liver Group, Chinese Society of Infectious Diseases, Chinese Medical Association; Severe Liver Disease and Artificial Liver Group, Chinese Society of Hepatology, Chinese Medical Association. Guideline for diagnosis and treatment of liver failure (2018)[J]. *J Clin Hepatol*, 2019, 35(1): 38-44. DOI: 10.3969/j.issn.1001-5256.2019.01.007.
中华医学会感染病学分会肝衰竭与人工肝学组, 中华医学会肝病学分会重型肝病与人工肝学组. 肝衰竭诊治指南(2018年版)[J]. *临床肝胆病杂志*, 2019, 35(1): 38-44. DOI: 10.3969/j.issn.1001-5256.2019.01.007.
- [15] YE QX, HUANG JF, XU ZJ, et al. Short-term prognostic factors for hepatitis B virus-related acute-on-chronic liver failure[J]. *World J Clin Cases*, 2022, 10(23): 8186-8195. DOI: 10.12998/wjcc.v10.i23.8186.
- [16] KIM WR, MANNALITHARA A, HEIMBACH JK, et al. MELD 3.0: The model for end-stage liver disease updated for the modern era[J]. *Gastroenterology*, 2021, 161(6): 1887-1895. e4. DOI: 10.1053/j.gastro.2021.08.050.
- [17] ARTRU F, TROVATO F, MORRISON M, et al. Liver transplantation for acute-on-chronic liver failure[J]. *Lancet Gastroenterol Hepatol*, 2024, 9(6): 564-576. DOI: 10.1016/S2468-1253(23)00363-1.
- [18] LAI M, XU MM, WANG X, et al. Prognostic evaluation of liver transplantation for acute-on-chronic liver failure[J]. *Organ Transplant*, 2025, 16(3): 482-488. DOI: 10.12464/j.issn.1674-7445.2025002.
赖曼, 徐曼曼, 王鑫, 等. 慢加急性肝衰竭肝移植预后评估[J]. *器官移植*, 2025, 16(3): 482-488. DOI: 10.12464/j.issn.1674-7445.2025002.
- [19] ZHAO ZY, AN XQ, SHI L, et al. Prognostic value of serum prealbumin/total bilirubin ratio in patients with liver failure[J]. *China J Mod Med*, 2017, 27(21): 75-78. DOI: 10.3969/j.issn.1005-8982.2017.21.014.
赵紫烟, 安雪青, 史丽, 等. 血清前白蛋白/总胆红素比值对肝衰竭患者预后的预测价值[J]. *中国现代医学杂志*, 2017, 27(21): 75-78. DOI: 10.3969/j.issn.1005-8982.2017.21.014.
- [20] KURATA Y, MURAKI S, HIROTA T, et al. Effect of liver cirrhosis on theophylline trough concentrations: A comparative analysis of organ impairment using Child-Pugh and MELD scores[J]. *Br J Clin Pharmacol*, 2022, 88(8): 3819-3828. DOI: 10.1111/bcp.15333.

- [21] SHI JD, WANG PH, QI Z, et al. Expression of long non-coding RNA HOTAIR in acute liver injury and its intervention on cell ferroptosis and inflammation[J]. *China Med*, 2023, 18(8): 1200-1204. DOI: 10.3760/j.issn.1673-4777.2023.08.017.
史敬东, 王鹏辉, 齐中, 等. 长链非编码RNA HOTAIR在急性肝损伤中的表达及其对细胞铁死亡及炎症发生的干预作用[J]. *中国医药*, 2023, 18(8): 1200-1204. DOI: 10.3760/j.issn.1673-4777.2023.08.017.
- [22] GUO GY, YANG WT, LI J, et al. The development and appraisal of MELD 3.0 in liver diseases: Good things never come easy[J]. *J Clin Transl Hepatol*, 2025, 13(1): 62-68. DOI: 10.14218/JCTH.2024.00303.
- [23] CUI DG, XIAO LY, LIU YF, et al. The predictive value of CTP-MELD scores combined with serum M30 and M65 levels for the short-term prognosis of patients with hepatitis B-related acute-on-chronic liver failure[J]. *Chin Hepatol*, 2022, 27(1): 58-62. DOI: 10.14000/j.cnki.issn.1008-1704.2022.01.016.
崔大广, 肖玲燕, 刘永福, 等. CTP-MELD评分联合血清M30和M65预测乙型肝炎相关慢加急性肝衰竭短期预后的价值[J]. *肝脏*, 2022, 27(1): 58-62. DOI: 10.14000/j.cnki.issn.1008-1704.2022.01.016.
- [24] CHEN YQ, LI CY, TANG SH. Value of Δ total bilirubin-alpha-fetoprotein scoring model in predicting the short-term prognosis of patients with hepatitis B virus-related acute-on-chronic liver failure[J]. *J Clin Hepatol*, 2024, 40(12): 2399-2405. DOI: 10.12449/JCH241209.
陈雨琪, 李春燕, 汤善宏. Δ 总胆红素-甲胎蛋白评分模型对HBV相关慢加急性肝衰竭短期预后的预测价值[J]. *临床肝胆病杂志*, 2024, 40(12): 2399-2405. DOI: 10.12449/JCH241209.
- [25] LI WD, LIU WS, RONG YH, et al. Development and validation of a new prognostic model for predicting survival outcomes in patients with acute-on-chronic liver failure[J]. *J Clin Transl Hepatol*, 2024, 12(10): 834-844. DOI: 10.14218/jcth.2024.00316.
- [26] GAN YX, OUYANG LY, PAN YX, et al. Predictive value of ICGR15 and ALBI score for post-hepatectomy liver failure and prognosis of hepatocellular carcinoma patients after hepatic arterial infusion chemotherapy[J/OL]. *Chin J Hepat Surg (Electronic Edition)*, 2025, 14(3): 395-401. DOI: 10.3877/cma.j.issn.2095-3232.2025.03.010.
甘翌翔, 欧阳俐颖, 潘扬勋, 等. ICGR15和ALBI评分对肝动脉灌注化疗后肝癌肝切除术后肝衰竭和预后的预测价值[J/OL]. *中华肝脏外科手术学电子杂志*, 2025, 14(3): 395-401. DOI: 10.3877/cma.j.issn.2095-3232.2025.03.010.
- [27] ZHANG H, YANG K, WANG Q, et al. Prealbumin as a predictor of short-term prognosis in patients with HBV-related acute-on-chronic liver failure[J]. *Infect Drug Resist*, 2023, 16: 2611-2623. DOI: 10.2147/idr.s402585.
- [28] European Association for the Study of the Liver. EASL clinical practice guidelines on acute-on-chronic liver failure[J]. *J Hepatol*, 2023, 79(2): 461-491. DOI: 10.1016/j.jhep.2023.04.021.
- [29] CHEN XY, GAO FQ, PAN QL, et al. aCCI-HBV-ACLF: A novel predictive model for hepatitis B virus-related acute-on-chronic liver failure[J]. *Aliment Pharmacol Ther*, 2025, 61(2): 286-298. DOI: 10.1111/apt.18347.
- [30] LI C, WANG MD, SUN XD, et al. Development and validation of prealbumin-bilirubin score (preALBI score) for predicting long-term survival after hepatectomy for hepatocellular carcinoma: A multi-center analysis versus ALBI score[J]. *Am J Surg*, 2024, 232: 87-94. DOI: 10.1016/j.amjsurg.2024.01.009.
- [31] TREBICKA J, HERNAEZ R, SHAWCROSS DL, et al. Recent advances in the prevention and treatment of decompensated cirrhosis and acute-on-chronic liver failure (ACLF) and the role of biomarkers[J]. *Gut*, 2024, 73(6): 1015-1024. DOI: 10.1136/gutjnl-2023-330584.
- [32] CHEN MJ, LI X, TANG SH. Research progress on multidimensional evaluation of liver function in the prognosis of liver failure patients[J]. *Clin J Med Offic*, 2023, 51(9): 901-903, 907. DOI: 10.16680/j.1671-3826.2023.09.05.
陈美娟, 李雪, 汤善宏. 多维度评估肝功能在肝衰竭患者预后中研究进展[J]. *临床军医杂志*, 2023, 51(9): 901-903, 907. DOI: 10.16680/j.1671-3826.2023.09.05.

收稿日期: 2025-04-25; 录用日期: 2025-07-16

本文编辑: 刘晓红

引证本文: LI WJ, ZHAO WF, HUANG XP. Value of prealbumin-to-total bilirubin ratio in predicting the short-term prognosis of patients with HBV-related acute-on-chronic liver failure[J]. *J Clin Hepatol*, 2025, 41(11): 2272-2277.
李文娟, 赵卫峰, 黄小平. 前白蛋白与总胆红素比值对HBV相关慢加急性肝衰竭患者短期预后的预测价值[J]. *临床肝胆病杂志*, 2025, 41(11): 2272-2277.

• 致谢 •

本期审稿专家 Current reviewers

丁向春 孔媛媛 宁波 吕飒 朱传武 朱晓黎 刘正稳 刘亚辉 刘成 刘先治 刘江凯
刘军权 刘近春 刘银坤 孙航 苏智军 李天然 李红 李武 李勇 李婉玉 李筠
李嘉 杨长青 杨桂林 时静祥 辛永宁 汪慧 宋宇虎 宋海燕 张立婷 张成武 张振华
张雅敏 陈畅 陈钟 武振宇 范春蕾 林苏 季光 岳树强 周文策 胡中杰 胡国信
钟伏弟 施维群 姚定康 夏光涛 徐可树 翁亚丽 高英堂 涂传涛 涂相林 黄华 章宗籍
彭向欣 彭海燕 韩梅芳 程良斌 鲁玉辉 曾道炳 谢正元 管青天