

血乳酸水平和乳酸清除率与急诊病情分层及预后的相关性分析

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【摘要】 目的 探讨血乳酸(Lac)水平和乳酸清除率(LCR)与急诊病情I、II级分层及预后评估的相关性。**方法** 回顾性分析甘肃省武威市人民医院急救中心2013年1月至2015年4月接诊的急诊病情为I、II级伴高乳酸血症的370例危重患者的临床资料,将患者分为Lac \geq 10 mmol/L组(181例)和Lac 4~10 mmol/L组(189例),比较两组患者剩余碱(BE)、急性生理学与慢性健康状况评分系统II(APACHE II)评分及住院病死率的差异;比较存活组与死亡组、急诊病情I级与II级组患者初始Lac、6 h LCR、APACHE II评分的差异。采用Pearson相关法分析初始Lac和6 h LCR与APACHE II评分的相关性。**结果** ①随着Lac水平升高,危重患者BE负向偏离和APACHE II评分逐渐增加[BE (mmol/L): -16.74 ± 8.21 比 -5.98 ± 8.43 , APACHE II评分(分): 27.6 ± 5.6 比 20.1 ± 4.8],住院病死率也随之升高[76.79% (139/181) 比 43.39% (82/189),均 $P < 0.01$]。②死亡组患者初始Lac和APACHE II评分较存活组明显升高[初始Lac (mmol/L): 8.81 ± 4.71 比 4.43 ± 2.82 , APACHE II评分(分): 23.6 ± 5.6 比 17.3 ± 3.7],6 h LCR则明显低于存活组[(12.26 \pm 6.47)% 比 (35.16 \pm 10.63)%],均 $P < 0.01$]。③急诊病情I级组初始Lac、APACHE II评分均明显高于II级组,而6 h LCR较II级组显著降低[初始Lac (mmol/L): 8.7 ± 2.6 比 6.8 ± 2.0 , APACHE II评分(分): 25.2 ± 6.3 比 16.3 ± 4.7 , 6 h LCR: (14.8 \pm 4.7)% 比 (33.5 \pm 5.8)%],均 $P < 0.01$]。④相关性分析提示,370例急诊危重患者初始Lac与APACHE II评分呈显著正相关($r=0.731, P=0.017$),而6 h LCR与APACHE II评分呈显著负相关($r=-0.694, P=0.010$)。**结论** 急诊病情I级患者的早期动脉血Lac显著高于急诊II级,而急诊病情II级患者的6 h内LCR显著高于急诊I级;急诊危重患者Lac和LCR具有与APACHE II评分相似的评估病情的作用,且较APACHE II评分简单易行。

【关键词】 动脉血乳酸; 乳酸清除率; 急诊病情分层; 预后评估

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Analysis of correlations between blood lactic acid, lactate clearance rate and emergency stratification as well as prognosis in patients

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【Abstract】 Objective To investigate the correlations between the level of blood lactic acid (Lac), lactate clearance rate (LCR) and emergency stratification I or II as well as the prognosis in patients. **Methods** A retrospective analysis was conducted. The clinical data of 370 critically ill patients with emergency stratification I or II accompanying with hyperlactacidemia admitted to emergency center of People's Hospital of Wuwei City during January 2013 to April 2015 were analyzed. The patients were allocated into two groups: Lac \geq 10 mmol/L ($n = 181$) and Lac 4–10 mmol/L ($n = 189$). Base excess (BE), acute physiology and chronic health evaluation II (APACHE II) score and hospital mortality were compared between the two groups. The differences in initial Lac, 6-hour LCR and APACHE II score were compared between survival group and death group as well as emergency stratification I and II groups. The correlation between initial Lac, 6-hour LCR and APACHE II score was analyzed by Pearson correlation method. **Results** ① With the increase in Lac level, the negative deviation extent of BE and APACHE II score in critical patients were gradually increased [BE (mmol/L): -16.74 ± 8.21 vs. -5.98 ± 8.43 , APACHE II score: 27.6 ± 5.6 vs. 20.1 ± 4.8], and hospital mortality was increased [76.79% (139/181) vs. 43.39% (82/189), all $P < 0.01$]. ② The initial Lac and APACHE II score of the death group were significantly higher than those of the survival group [initial Lac (mmol/L): 8.81 ± 4.71 vs. 4.43 ± 2.82 , APACHE II score: 23.6 ± 5.6 vs. 17.3 ± 3.7], and 6-hour LCR was significantly decreased [(12.26 \pm 6.47)% vs. (35.16 \pm 10.63)%], all $P < 0.01$]. ③ Patients in emergency stratification I group had a higher initial Lac and a higher APACHE II score but a lower 6-hour LCR level than those in emergency stratification II group [initial Lac (mmol/L):

8.7±2.6 vs. 6.8±2.0, APACHE II score: 25.2±6.3 vs. 16.3±4.7, 6-hour LCR: (14.8±4.7)% vs. (33.5±5.8)%, both $P < 0.01$]. ④ It was shown by correlation analysis that initial Lac was significantly positively correlated with APACHE II score ($r = 0.731, P = 0.017$) in 370 emergency critical ill patients, while 6-hour LCR was negatively correlated with APACHE II score ($r = -0.694, P = 0.010$). **Conclusions** The early arterial blood Lac of patients with emergency stratification I was significantly higher than emergency stratification II, and the 6-hour LCR in patients with emergency stratification II was significantly higher than emergency stratification I. Furthermore, the Lac level and LCR were simple and easy to implement as compared with APACHE II score in emergency critical ill patients.

【Key words】 Arterial blood lactate; Lactate clearance rate; Emergency stratification; Prognosis evaluation

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急诊病情分级可用于规范急诊患者就诊及处置的优先次序和医疗资源配置,确保急诊患者能够得到迅速、及时、安全、有效的救治,从而降低其病死率和致残率。急诊病情分级依据患者的生命体征分为红、橙、黄、蓝4级,但临床上生命体征异常往往较内环境失衡滞后。因此,根据急诊患者的生命体征判断病情危重程度缺乏早期、及时、准确评估病情的科学依据,容易延误导向性目标治疗时机,导致器官组织细胞进一步损害。本研究通过分析急诊患者初始血乳酸(Lac)和乳酸清除率(LCR)与急诊病情分级、病情评估及预后判断的关系,以期为临床实施目标导向性干预和医患沟通提供科学依据。

1 资料与方法

1.1 研究设计与病例选择:采用回顾性分析方法,选择本院急救中心2013年1月至2015年4月接诊的急诊病情I级或II级并伴高乳酸血症的危重患者。入选标准:动脉血Lac ≥ 4 mmol/L^[1-2];病情分级符合国家卫生和计划生育委员会制定的4级急诊病情分级标准^[3]。排除恶性肿瘤、入院前6h内使用各种酸、碱类药物及临床资料不全者。本研究符合医学伦理学标准,并经医院伦理委员会批准,所有抢救治疗和检测均获得过患者及家属的知情同意。

1.2 研究方法:所有患者入院后即刻给予对症处理,纠正内环境紊乱,同时治疗原发病;感染患者按照严重脓毒症及脓毒性休克指南^[2]要求进行早期目标导向治疗(EGDT),及早抗感染,充分液体复苏及应用血管活性药物等治疗,维持平均动脉压(MAP) > 65 mmHg(1 mmHg=0.133 kPa)。以Lac 10 mmol/L为界^[4],将患者分为Lac ≥ 10 mmol/L组和Lac 4~10 mmol/L组。记录两组患者初始Lac、剩余碱(BE)、入院8h内急性生理学与慢性健康状况评分系统II(APACHE II)评分及住院病死率;比较存活组与死亡组、急诊病情I级与II级组间初始Lac、6h LCR及APACHE II评分等临床参数。

1.3 统计学分析:用SPSS 16.0软件分析数据,满足正态分布的定量资料以均数±标准差($\bar{x} \pm s$)表示,组间比较采用完全随机设计独立样本 t 检验;计数资料采用例数和率表示,组间比较采用 χ^2 检验;采用Pearson相关法分析初始Lac、6h LCR与APACHE II评分的相关性。 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 一般资料:共纳入370例患者,男性178例,女性192例;年龄15~82岁,平均(48.00±3.25)岁;按4级急诊病情分级,I级166例,II级204例。急诊诊断:心肺复苏后综合征12例,呼吸衰竭(呼衰)49例,急性心功能衰竭(心衰)28例,中毒56例,电击伤6例,严重创伤41例,重症感染51例,休克57例,恶性心律失常17例,急性肾衰竭(ARF)4例,急性心肌梗死(AMI)并发乳头肌断裂、室间隔穿孔1例,多器官功能衰竭(MOF)45例,蜂花过敏致溶血病1例,蜂花过敏致ARF 1例,心包积液并心衰1例。
2.2 不同Lac水平患者各项临床指标比较(表1):随Lac水平升高,BE负向偏离和APACHE II评分逐渐增加,住院病死率随之升高(均 $P < 0.01$)。

表1 不同Lac水平两组危重患者BE、病情及预后比较

组别	例数	BE (mmol/L, $\bar{x} \pm s$)	APACHE II 评分(分, $\bar{x} \pm s$)	住院病死率 [% (例)]
Lac ≥ 10 mmol/L组	181	-16.74±8.21	27.6±5.6	76.79 (139)
Lac 4~10 mmol/L组	189	-5.98±8.43	20.1±4.8	43.39 (82)
t/χ^2 值		12.431	13.851	42.904
P值		0.000	0.000	0.000

注:Lac为血乳酸,BE为剩余碱,APACHE II为急性生理学与慢性健康状况评分系统II

2.3 不同预后患者各项临床指标比较(表2):存活组患者初始动脉血Lac、APACHE II评分均显著低于死亡组,而6h LCR明显高于死亡组(均 $P < 0.01$)。

表2 存活组与死亡组危重患者初始 Lac、6 h LCR 及 APACHE II 评分比较 ($\bar{x} \pm s$)

组别	例数 (例)	初始 Lac (mmol/L)	6 h LCR (%)	APACHE II 评分(分)
存活组	149	4.43 ± 2.82	35.16 ± 10.63	17.3 ± 3.7
死亡组	221	8.81 ± 4.71	12.26 ± 6.47	23.6 ± 5.6
t 值		10.185	25.735	12.164
P 值		0.000	0.000	0.000

注: Lac 为血乳酸, LCR 为乳酸清除率, APACHE II 为急性生理学及慢性健康状况评分系统 II

2.4 急诊病情 I 级与 II 级组患者各项临床指标比较(表3): 急诊病情 I 级组患者体温、脉搏、呼吸频率、收缩压(SBP)、初始 Lac 水平、APACHE II 评分均显著高于急诊病情 II 级组, 而急诊病情 I 级组患者舒张压(DBP)和 6 h LCR 显著低于急诊病情 II 级组(均 $P < 0.01$)。

2.5 初始 Lac 和 6 h LCR 与 APACHE II 评分的相关性(图1): Pearson 相关分析显示, 急诊危重患者初始 Lac 与 APACHE II 评分呈显著正相关($r = 0.731$, $P = 0.017$), 而 6 h LCR 与 APACHE II 评分呈显著负相关($r = -0.694$, $P = 0.010$)。

3 讨论

Lac 是体内无氧代谢的中间产物, 是反映组织氧供和代谢状态以及灌注量的重要指标。急危重症患者多因呼衰、低氧、休克、心衰等, 导致组织缺血缺氧、无氧代谢增加, 组织清除乳酸的能力下降, 使机体 Lac 水平明显升高。当 Lac > 10 mmol/L 时, 病死率达 83% [5]。因此, Lac 水平是反映急危重症患者组织氧供需平衡的重要指标 [6]。

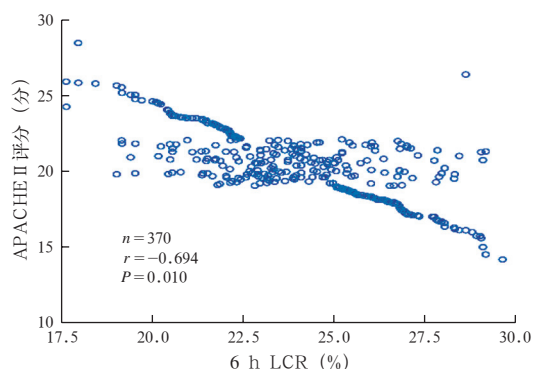
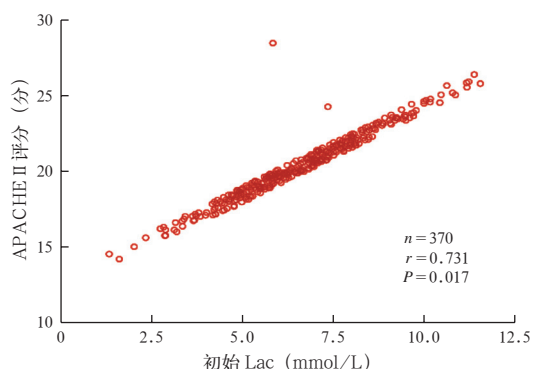
肝肾功能障碍可导致 LCR 下降, 灌注不良会影响乳酸转运, 故单纯监测某一时刻的 Lac 水平不能准确反映机体组织动态氧合状态、疾病严重程度及患者对治疗的反应。McNelis 等 [7] 认为 LCR 能反映 Lac 动态变化。LCR 与严重脓毒症和脓毒性休克患者的促炎、抗炎、凝血、凋亡等密切相关 [8-9], 进而与多器官功能障碍和预后密切相关 [10]。Nguyen 等 [11] 研究表明, 脓症患者中低 LCR 者比高 LCR 者具有更高的脓毒性休克发生率和病死率, 进一步分析显示, 6 h LCR < 10% 对于评估脓症患者住院期间病死率具有良好的敏感性和特异性。换言之, LCR 比单次 Lac 监测更为重要和准确。

2012 国际严重脓毒症及脓毒性休克诊疗指南中提出了 3 h 内监测 Lac, 并强调了尽快使 Lac 降至

表3 急诊病情 I 级与 II 级组危重患者各项参数水平比较 ($\bar{x} \pm s$)

组别	例数 (例)	体温 (°C)	脉搏 (次/min)	RR (次/min)	SBP (mmHg)	DBP (mmHg)	初始 Lac (mmol/L)	6 h LCR (%)	APACHE II 评分(分)
急诊病情 I 级组	166	37.2 ± 1.9	123.0 ± 23.5	24.00 ± 4.78	140.2 ± 21.3	60.3 ± 12.5	8.7 ± 2.6	14.8 ± 4.7	25.2 ± 6.3
急诊病情 II 级组	204	36.5 ± 2.2	94.0 ± 21.8	21.00 ± 5.97	120.7 ± 18.3	84.2 ± 15.0	6.8 ± 2.0	33.5 ± 5.8	16.3 ± 4.7
t 值		3.167	12.300	5.248	9.455	16.485	8.070	33.732	15.461
P 值		0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000

注: RR 为呼吸频率, SBP 为收缩压, DBP 为舒张压, Lac 为血乳酸, LCR 为乳酸清除率, APACHE II 为急性生理学及慢性健康状况评分系统 II; 1 mmHg = 0.133 kPa



注: Lac 为血乳酸, LCR 为乳酸清除率, APACHE II 为急性生理学及慢性健康状况评分系统 II

图1 危重患者初始 Lac(左)和 6 h LCR(右)与 APACHE II 评分的相关性

正常的EGDT(6 h内Lac<2 mmol/L)^[12-14]。Lac联合C-反应蛋白(CRP)分层对急诊可疑感染患者的预后具有重要评估价值^[15]。近年来循证医学证据表明,Lac与脓毒症患者预后关系密切^[16-17],并且较中心静脉血氧饱和度(ScvO₂)容易监测,作为复苏目标的依从性更好^[10]。目前,对休克的认识已从以血压降低为主要标志转变为以组织灌注为主要目标,并继以多器官功能障碍综合征(MODS)甚至MOF的序贯事件^[18];"生命体征稳定状态下的组织缺氧"正在对休克进行全新的诠释^[19]。临床试验也显示,低血压并不是诊断脓毒性休克的敏感性指标^[20]。

APACHE II评分系统已广泛用于临床评价疾病严重程度,作为危重患者的预后指标^[21-22],但其计算复杂,临床应用不便。因此,需要寻找更好的指标来评估急危重患者的预后^[23]。由于Lac及LCR通过常规床旁血气分析即可获得,监测手段相对简单且可靠性较高,能很好地反映脓毒症患者的组织和微循环灌注情况^[6],同时也是反映脑代谢情况的指标^[24];可代替混合静脉血氧饱和度(SvO₂)来指导脓毒性休克液体复苏的目标治疗^[23, 25-26],也可用于评估危重症患者的病情程度及推断预后^[25, 27]。因此,Lac成为临床判断患者组织灌注状态的简便而又实用的指标。

综上,早期动脉Lac及6 h LCR对急诊患者病情严重程度评估及预后判断具有敏感性高、方便易行、可操作性强等优点,可作为早期预测急诊病情I、II级患者病情转化或转归的因子,便于医师对急诊患者预后作出早期判断,及时干预,也适合于基层医院推广应用。

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• 科研新闻速递 •

促红细胞生成素与创伤性颅脑损伤: 一项随机双盲对照研究

促红细胞生成素(EPO)可能具有神经细胞保护效应。有学者进行了一项随机双盲对照试验,探讨EPO对创伤性颅脑损伤(TBI)患者神经功能恢复、病死率和静脉血栓形成事件的影响。该研究纳入了7个国家(澳大利亚、新西兰、法国、德国、芬兰、爱尔兰和沙特阿拉伯)的29家教学附属医疗中心收治的伤后24h内的TBI患者。所有患者被随机分为EPO组(皮下注射40 kU EPO)或安慰剂组(皮下注射0.9% NaCl),每周1~3次。主要研究终点指标:采用意向性治疗分析,根据6个月后调整的意向性治疗分析,记录格拉斯哥预后扩展评分(GOS-E)为1~4分(代表死亡、植物状态、重度残疾)患者的减少情况,以评估患者神经功能状态的改善情况。2010年5月3日至2014年11月1日期间,共纳入606例患者,EPO组308例,安慰剂组298例。10例患者在6个月内失访,其中EPO组6例,安慰剂组4例,因此,共收集596例患者的主要数据进行分析,EPO组302例,安慰剂组294例。结果显示,与安慰剂组相比,EPO并不能降低GOS-E评分1~4分患者的比例[44%比45%,相对危险度(RR)=0.99,95%可信区间(95%CI)=0.83~1.18,P=0.90]。在安全方面,与安慰剂组比较,EPO组并不能改善患者6个月病死率[11%(32/305)比16%(46/297),RR=0.68,95%CI=0.44~1.03,P=0.07];同时,EPO并不会增加患者下肢深静脉血栓形成(DVP)的发生率(16%比18%,RR=0.87,95%CI=0.61~1.24,P=0.44)。该研究者得出结论:EPO不能减轻中度或重度TBI患者严重的神经功能障碍,不会增加下肢DVP的发生率,对病死率的影响尚不确定。

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