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血浆 D-二聚体、CRP 及血乳酸在急诊创伤性休克患者中的表达及临床意义

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摘要 目的:探讨血浆 D-二聚体、C 反应蛋白(CRP)及血乳酸在急诊创伤性休克患者中的表达及临床意义。**方法:**选取 2015 年 2 月到 2017 年 9 月期间在我院接受治疗的创伤性休克患者 186 例,根据患者的最终结局分为存活组和死亡组,其中在病情平稳后转出重症监护室的作为存活组(106 例),死亡的患者作为死亡组(80 例)。比较两组患者的急性生理学及慢性健康状况评分 II (APACHE II)评分,并比较两组患者在入院时、入院后 12h、入院后 24h 的血浆 D-二聚体、C 反应蛋白(CRP)及血乳酸水平,分析血浆 D-二聚体、CRP 及血乳酸水平与 APACHE II 评分的相关性。**结果:**死亡组的 APACHE II 评分显著高于存活组,差异具有统计学意义($P<0.05$);两组的 D-二聚体、CRP 水平均随着时间的推移逐渐升高,血乳酸水平逐渐降低,差异具有统计学意义($P<0.05$);存活组患者的 D-二聚体、CRP、血乳酸水平在各个时间点均低于死亡组,差异具有统计学意义($P<0.05$)。急诊创伤性休克患者血浆 D-二聚体、CRP 及血乳酸水平与 APACHE II 评分均呈正相关($r=0.564, 0.676, 0.506, P<0.05$)。**结论:**血浆 D-二聚体、CRP 及血乳酸水平与急诊创伤性休克患者的 APACHE II 评分存在相关性,临床上可对其进行检测来评估患者的病情和预后情况。

关键词:创伤性休克;D-二聚体;C 反应蛋白;血乳酸;临床意义

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Expression and Clinical Significance of Plasma D-Two Dimer, CRP and Blood Lactate in Patients with Acute Traumatic Shock

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ABSTRACT Objective: To investigate the expression and clinical significance of plasma D-two dimer, C reactive protein (CRP) and blood lactate in patients with acute traumatic shock. **Methods:** 186 patients with traumatic shock who were treated in our hospital from February 2015 to September 2017, and they were divided into survival group and death group according to the final outcome of patients. The patients were transferred out of intensive care unit after the stable condition as the survival group (106 cases), and the patients were dead as the death group (80 cases). The scores of acute physiology and chronic health score II (APACHE II) were compared between the two groups, the levels of plasma D-two dimer, C reactive protein (CRP) and blood lactate were compared between the two groups at admission, 12h after admission and 24h after admission, and the correlation between the levels of plasma D-two dimer, CRP and blood lactate and APACHE II score was analyzed. **Results:** The APACHE II score of death group was significantly higher than that of survival group, the difference was statistically significant ($P<0.05$). The levels of D-two dimer and CRP in the two groups were gradually increased with time, and the level of blood lactate was gradually decreased, the difference was statistically significant ($P<0.05$), and the levels of D-two dimer, CRP and blood lactate in the survival group were lower than those in the death group at each time point, and the difference was statistically significant ($P<0.05$). The levels of plasma D-two dimer, CRP and blood lactate in the two groups were positively correlated with APACHE II score ($r=0.564, 0.676, 0.506, P<0.05$). **Conclusion:** The levels of plasma D-two dimer, CRP and blood lactate are correlated with APACHE II score in patients with acute traumatic shock, which can be assessed clinically to assess the patient's condition and prognosis.

Key words: Traumatic shock; D-two dimer; C reactive protein; Blood lactate; Clinical significance

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前言

创伤性休克是急诊科急危重症中的常见类型,主要表现为

机体遭受到撞击、击打、坠落等外界暴力作用后,患者体内重要脏器受到严重损伤并伴随着严重出血、剧烈疼痛、恐惧,从而导致机体代偿失调^[1-3]。在发生创伤性休克后,机体会发生一系列

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的反应,并可引起全身炎症反应综合征、抗炎反应综合征等症,进而可导致患者器官出现功能障碍甚至衰竭,最终死亡^[4-6]。由此可见,创伤性休克症状多、病情进展迅速,如何在早期准确的对患者的病情及预后进行评估分析,并以此为依据采取针对性的治疗具有重要的临床价值。D-二聚体是一种与机体高凝及纤溶状态密切相关的指标,其水平变化将受血栓形成及纤维溶解活动的影响^[7-9]。C反应蛋白(C-reactive protein, CRP)是一种急性蛋白,当机体受到严重损伤或发生炎症反应时,其水平会急剧上升^[10-12]。血乳酸是体内无氧酵解的正常产物,当机体发生缺血缺氧时,血乳酸的水平会明显上升,因此通过检测血乳酸水平能够反映体内缺氧的严重程度^[13-15]。本研究旨在探讨血浆D-二聚体、CRP及血乳酸在急诊创伤性休克患者中的表达及临床意义,以为临床评估创伤性休克患者的病情提供参考。

1 资料与方法

1.1 一般资料

选取2015年2月到2017年9月期间在我院接受治疗的创伤性休克患者186例,纳入标准:①所有患者均符合创伤性休克的相关诊断标准^[13];②均有明确的致伤原因;③均在受到损伤后6h内发病;④患者家属对本研究知情同意。排除标准:①合并有恶性肿瘤者;②合并有严重心脑血管疾病、自身免疫系统疾病、肝肾功能不全、神经系统疾病者;③在急诊6h内死亡者;④创伤前合并严重感染者;⑤临床资料不全者。根据患者的最终结局分为存活组和死亡组,其中在病情平稳后转出重症监护室的作为存活组(106例),死亡的患者作为死亡组(80例)。存活组男60例,女46例;年龄21-72岁,平均(38.63±11.31)岁;致伤原因:车辆撞伤64例,重物打击20例,高处坠落16例,摔伤6例;创伤部位:四肢伤37例、胸部创伤24例、颅脑损伤18例、腹部创伤14例、脊柱或骨盆伤13例;受伤至入院时间差为0.4-5.8h,平均(4.26±0.71)h。死亡组男43例,女37例;年龄23-74岁,平均(40.12±11.03)岁;致伤原因:车辆撞伤50例,重物打击16例,高处坠落10例,摔伤4例;创伤部位:四肢伤20例、胸部创伤22例、颅脑损伤14例、腹部创伤12例、脊柱或骨盆伤12例;受伤至入院时间差为0.5-6h,平均(4.41±0.76)h。两组上述一般资料比较差异无统计学意义($P>0.05$),具有临床可比性。本研究符合我院伦理委员会的相关标准,并已获得批准通过。

1.2 检测方法

抽取所有患者在入院时、入院后12h、入院后24h的晨起空腹静脉血3mL,采用肝素作为抗凝剂,以3000 r/min的离心速度进行10 min的离心运动,取上清液,-20℃环境下保存待测。采用免疫散射比浊法检测血浆中D-二聚体水平,试剂盒购于Abbott Laboratories公司,操作严格参照试剂盒说明书中的指南进行。采用双抗夹心酶联免疫吸附法检测血浆中的CRP水平,操作严格参照试剂盒(购于上海蓝基生物科技有限公司)说明书中的指南进行。采用多功能血气分析仪(美国NOVA BIOMEDICAL)检测血乳酸的水平。所有患者在入院后24h内采用急性生理学与慢性健康状况评分II(Acute physiology and chronic health II, APACHE II)对患者的病情程度进行评估,APACHE II评分总分为71分,其最终得分为急性生理学评分、年龄评分、慢性健康状况评分的总和,患者的病情越严重则分数越高。

1.3 观察指标

比较两组患者的APACHE II评分,并比较两组患者在入院时、入院后12h、入院后24h的血浆D-二聚体、CRP及血乳酸水平,分析血浆D-二聚体、CRP及血乳酸水平与APACHE II评分的相关性。

1.4 统计学方法

所有数据均用SPSS19.0进行统计分析,计数资料以率(%)的形式表示,采用卡方检验,计量资料以均值±标准差($\bar{x} \pm s$)的形式表示,采用t检验,采用Spearman相关性分析对血浆D-二聚体、CRP及血乳酸与APACHE II评分的相关性进行分析。检验标准设置为 $\alpha=0.05$ 。

2 结果

2.1 两组的APACHE II评分比较

死亡组的APACHE II评分为(26.78±4.26)分,存活组的APACHE II评分为(18.54±4.11)分,两组的APACHE II评分比较差异具有统计学意义($t=13.326, P=0.000$)。

2.2 两组在不同时间点的血浆D-二聚体、CRP及血乳酸水平比较

两组的D-二聚体、CRP水平均随着时间的推移逐渐升高,血乳酸水平逐渐降低,差异具有统计学意义($P<0.05$);存活组患者的D-二聚体、CRP、血乳酸水平在各个时间点均低于死亡组,差异具有统计学意义($P<0.05$)。具体见表1。

表1 两组在不同时间点的血浆D-二聚体、CRP及血乳酸水平比较($\bar{x} \pm s$)

Table 1 Comparison of levels of plasma D-two dimer, CRP and blood lactate between the two groups at different time points ($\bar{x} \pm s$)

Groups	n	Time	D-two dimer($\mu\text{g/L}$)	CRP(mg/L)	Blood lactate(mmole/L)
Death group	80	On admission	394.23±83.64	64.36±14.69	6.72±1.33
		12h after admission	471.46±102.34 ^b	87.58±15.34 ^b	4.23±0.62 ^b
		24h after admission	553.71±123.52 ^{bc}	154.92±18.44 ^{bc}	4.01±0.63 ^{bc}
Survival group	106	On admission	387.21±80.56 ^a	62.67±13.64 ^a	2.68±0.61 ^a
		12h after admission	435.36±93.65 ^{ab}	74.17±14.89 ^{ab}	2.23±0.54 ^{ab}
		24h after admission	492.68±108.65 ^{abc}	103.57±16.36 ^{abc}	2.04±0.52 ^{abc}

Note: compared with the death group, ^a $P<0.05$; compared with admission, ^b $P<0.05$; compared with 12h after admission, ^c $P<0.05$.

2.3 急诊创伤性休克患者的血浆 D-二聚体、CRP 及血乳酸水平与 APACHE II 评分的相关性

根据 Spearman 相关性分析结果显示,急诊创伤性休克患者的血浆 D-二聚体、CRP 及血乳酸水平与 APACHE II 评分均呈正相关($r=0.564, 0.676, 0.506, P=0.027, 0.012, 0.033$)。

3 讨论

创伤性休克是一种机体代谢失调综合征,主要是由于患者受到严重创伤导致,随着近年来交通事故、安全性事故及突发性灾难性事件的增多,创伤性休克的发生率也逐年升高。创伤性休克可导致患者的心、肺、肝等多种器官受到严重损伤,严重时还可引发多脏器功能障碍综合征(MODS),具有极高的死亡率^[14-16]。在发生创伤性休克后,若患者能在短时间内送至医院并进行及时有效的救治,可显著提高患者的生存率,但是休克救治时间窗较短,一旦超出救治时间窗,患者死亡的可能性极大,因此必须在短时间内对患者的病情进行合理有效的评估,以尽快确定治疗方案,降低患者的死亡率。相关研究显示^[17-19],在发生创伤性休克后,血浆中多种指标的水平会出现异常波动,如 D-二聚体、CRP 及血乳酸、降钙素原(Procalcitonin, PCT)等,提示或可通过检测部分血浆指标的水平来对患者的病情程度以及预后进行评估。

在本次研究中,死亡组的 APACHE II 评分明显高于存活组,差异有统计学意义($P<0.05$),这说明 APACHE II 评分可侧面反映创伤性休克患者的临床转归,具有一定的指导意义。本研究结果还显示,两组的 D-二聚体、CRP 水平均随着时间的推移逐渐升高,血乳酸水平逐渐降低,差异具有统计学意义($P<0.05$);存活组患者的 D-二聚体、CRP、血乳酸水平在各个时间点均低于死亡组,差异具有统计学意义($P<0.05$)。这说明创伤性休克患者血浆中 D-二聚体、CRP 及血乳酸水平在短时间内会随着时间的改变而改变,且病情更为严重的患者血浆中的 D-二聚体、CRP、血乳酸均处于较高水平。D-二聚体是一种常用于鉴别诊断静脉血栓、弥散性血管内凝血等疾病的指标,近年来有研究显示^[20-22],在严重创伤的患者血浆中 D-二聚体呈高表达,且发生了创伤性深静脉血栓的患者其血浆中的 D-二聚体水平明显高于未发生创伤性深静脉血栓的患者,提示 D-二聚体对创伤严重程度和患者预后具有一定的指导作用。创伤性休克患者由于受到严重创伤,导致机体处于严重的应激及炎症状态,从而对患者的血管内皮细胞造成严重损伤,激活凝血系统和纤溶系统,进而导致 D-二聚体水平上升。CRP 是一种急性蛋白,主要由肝脏合成,常用于评估体内的炎症反应程度和感染程度,在创伤性感染休克患者体内有较为严重的炎症反应,可导致 CRP 的水平迅速上升。蒋正财等人^[23-25]对 70 例创伤性休克伴感染患者进行了研究,结果显示治疗有效组的 CRP 水平明显低于治疗无效组,提示 CRP 水平与创伤性休克伴感染患者的预后密切相关。血乳酸是衡量细胞血氧供应障碍的指标,创伤性休克患者的组织细胞血氧供应不足,将影响正常的糖代谢,诱导血糖发生无氧反应,进而产生大量的乳酸^[26,27]。高铁梅等人的研究结果显示^[28],在入院后 6h、12h、24h 三个时间点,病情恶化的创伤失血性休克患者的血乳酸水平明显高于病情好转者,与本研结果类似。本研究结果还显示,急诊创伤性休

克患者的血浆 D-二聚体、CRP 及血乳酸水平与 APACHE II 评分均呈正相关($P<0.05$),这说明血浆 D-二聚体、CRP 及血乳酸水平与创伤性休克患者的预后情况密切相关。D-二聚体水平升高会导致患者出现高凝状态,进而加重组织细胞的血氧供应障碍,增加 MODS 发生的几率,不利于患者预后。而 CRP 过高表达可进一步加重机体的炎症反应,并且还能直接对血管内皮细胞造成损伤,进而加重患者的病情。血乳酸水平过高则代表患者组织细胞的血氧供应障碍未得到改善,将提高出现 MODS 的风险,导致病情恶化^[29,30]。

综上所述,最终结局是死亡的创伤性休克患者血浆中的 D-二聚体、CRP 及血乳酸水平高于存活的创伤性休克患者,且急诊创伤性休克患者血浆中的 D-二聚体、CRP 及血乳酸水平与 APACHE II 评分均呈正相关,临床上可通过检测创伤性休克患者血浆中的 D-二聚体、CRP 及血乳酸水平来评估患者病情和预后。

参考文献(References)

- [1] Chaudoye G, Strauss-Kahn M, Zebdi R. Memory: Between traumatic shock and psychic historicization [J]. *Int J Psychoanal*, 2017, 98(4): 985-997
- [2] Langness S, Costantini TW, Morishita K, et al. Modulating the Biologic Activity of Mesenteric Lymph after Traumatic Shock Decreases Systemic Inflammation and End Organ Injury [J]. *PLoS One*, 2016, 11(12): e0168322
- [3] Chen S, Shi JS, Yibulayin X, et al. Cystatin C is a moderate predictor of acute kidney injury in the early stage of traumatic hemorrhagic shock [J]. *Exp Ther Med*, 2015, 10(1): 237-240
- [4] Rochwerg B, Hylands M, Møller M, et al. Comparing biomarkers of traumatic shock: the utility of anion gap, base excess, and serum lactate in the ED [J]. *Am J Emerg Med*, 2015, 33(9): 1134-1139
- [5] Asfar P, Cohen D, Khadaroo RG, et al. CCCS-SSAI WikiRecs Clinical Practice Guideline: vasopressors in early traumatic shock [J]. *Can J Anaesth*, 2017, 64(7): 766-768
- [6] Rochwerg B, Hylands M, Møller MH, et al. CCCS-SSAI WikiRecs clinical practice guideline: vasopressor blood pressure targets in critically ill adults with hypotension and vasopressor use in early traumatic shock [J]. *Intensive Care Med*, 2017, 43(7): 1062-1064
- [7] Zhang J, Guo Z, Yang W, et al. D-Dimer levels are correlated with disease activity in Crohn's patients [J]. *Oncotarget*, 2017, 8(38): 63971-63977
- [8] Greenberg CS. The role of D-dimer testing in clinical hematology and oncology [J]. *Clin Adv Hematol Oncol*, 2017, 15(8): 580-583
- [9] Akutsu K. What are diagnostic implications and limitations of assessing D-dimer and fibrin degradation products levels in the management of patients with acute aortic dissection? [J]. *J Thorac Dis*, 2017, 9(8): 2214-2216
- [10] Zhang L, Liu N, Zhang J, et al. Clinical research of homocysteine, high-sensitive C-reactive protein and D-Dimer in patients with vascular dementia [J]. *Pak J Pharm Sci*, 2017, 30 (4 (Suppl)): 1445-1447
- [11] Wei XB, Liu YH, He PC, et al. Combined efficacy of C-reactive protein and red blood cell distribution width in prognosis of patients with culture-negative infective endocarditis [J]. *Oncotarget*, 2017, 8

- (41): 71173-71180
- [12] Gilotra TS, Geraci SA. C-Reactive Protein as an Independent Cardiovascular Risk Predictor in HIV+ Patients: A Focused Review of Published Studies[J]. J Clin Med Res, 2017, 9(11): 891-899
- [13] Baumert J, Lukaschek K, Kruse J, et al. No evidence for an association of posttraumatic stress disorder with circulating levels of CRP and IL-18 in a population-based study[J]. Cytokine, 2013, 63(2): 201-208
- [14] Hamshary AAEE, Sherbini SAE, Elgebaly HF, et al. Prevalence of multiple organ dysfunction in the pediatric intensive care unit: Pediatric Risk of Mortality III versus Pediatric Logistic Organ Dysfunction scores for mortality prediction [J]. Rev Bras Ter Intensiva, 2017, 29(2): 206-212
- [15] 李小丽,刘鲁沂,田行瀚,等.连续性血浆滤过吸附对严重感染合并MODS患者炎症因子水平的影响[J].现代生物医学进展, 2017, 17(19): 3700-3702, 3753
- Li Xiao-li, Liu Lu-yi, Tian Hang-han, et al. Effect of Continuous Plasma Filtration Adsorption on the Levels of Inflammatory Factors in Patients with Severe Infection and MODS [J]. Progress in Modern Biomedicine, 2017, 17(19): 3700-3702, 3753
- [16] Cui YL, Qiu LH, Zhou SY, et al. Necroptosis as a potential therapeutic target in multiple organ dysfunction syndrome [J]. Oncotarget, 2017, 8(34): 56980-56990
- [17] Michopoulos V, Rothbaum A O, Jovanovic T, et al. Association of CRP Genetic Variation and CRP Level With Elevated PTSD Symptoms and Physiological Responses in a Civilian Population With High Levels of Trauma[J]. Am J Psychiatry, 2015, 172(4): 353-362
- [18] Hwabejire JO, Nembhard CE, Oyetunji TA, et al. Abdominal compartment syndrome in traumatic hemorrhagic shock: is there a fluid resuscitation inflection point associated with increased risk?[J]. Am J Surg, 2016, 211(4): 733-738
- [19] Jia Y, Wang Y, Yu X. Relationship between blood lactic acid, blood? procalcitonin, C-reactive protein and neonatal sepsis and corresponding prognostic significance in sick children [J]. Exp Ther Med, 2017, 14(3): 2189-2193
- [20] Xu L, He F, Wang H, et al. A high plasma D-dimer level predicts poor prognosis in gynecological tumors in East Asia area: a systematic review and meta-analysis[J]. Oncotarget, 2017, 8(31): 51551-51558
- [21] Shahi A, Kheir MM, Tarabichi M, et al. Serum D-Dimer Test Is Promising for the Diagnosis of Periprosthetic Joint Infection and Timing of Reimplantation [J]. J Bone Joint Surg Am, 2017, 99(17): 1419-1427
- [22] Ryu JA, Bang OY, Lee GH. D-dimer levels and cerebral infarction in critically ill cancer patients[J]. BMC Cancer, 2017, 17(1): 591
- [23] 蒋正财,叶兵,周磊,等.炎症指标和前白蛋白在创伤性休克伴感染患者的病情评估应用 [J]. 中华医院感染学杂志, 2014, 24(23): 5807-5808, 5811
- Jiang Zheng-cai, Ye Bing, Zhou Lei, et al. The role of inflammation indexes and prealbumin in patients with traumatic shock complicated with infection [J]. Chinese Journal of Nosocomiology, 2014, 24(23): 5807-5808, 5811
- [24] Nelson DW, Black GE, Thomas RL, et al. Sugar or salt? The relative roles of the glucocorticoid and mineralocorticoid axes in traumatic shock[J]. J Trauma Acute Care Surg, 2015, 79(6): 1023-1029
- [25] Li B, Sun H. Research progress of acute coagulopathy of trauma-shock[J]. Chin J Traumatol, 2015, 18(2): 95-97
- [26] Dell'Anna AM, Sandroni C, Lamanna I, et al. Prognostic implications of blood lactate concentrations after cardiac arrest:a retrospective study[J]. Ann Intensive Care, 2017, 7(1): 101
- [27] Lucertini F, Gervasi M, D'Amen G, et al. Effect of water-based recovery on blood lactate removal after high-intensity exercise [J]. PLoS One, 2017, 12(9): e0184240
- [28] 高铁梅,吴冰清,茆顺翠,等.血乳酸监测对创伤失血性休克患者预后的评估[J].山西医药杂志, 2017, 46(13): 1596-1598
- Gao Tie-mei, Wu Bing-qing, Mao Shun-cui, et al. Prognostic value of blood lactate monitoring in patients with traumatic hemorrhagic shock[J]. Shanxi Medical Journal, 2017, 46(13): 1596-1598
- [29] Oliveira GG, Oliveira SAH, Botelho PHH, et al. Tadalafil: Protective Action against the Development of Multiple Organ Failure Syndrome [J]. Braz J Cardiovasc Surg, 2017, 32(4): 312-317
- [30] Mitchell TA, Herzig MC, Fedyk CG, et al. Traumatic Hemothorax Blood Contains Elevated Levels of Microparticles that are Prothrombotic but Inhibit Platelet Aggregation[J]. Shock, 2017, 47(6): 680-687

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- Man Hong. Influence of intraoperative warming nursing measures on core body temperature[J]. Guide of China Medicine, 2017, 15(1): 213
- [28] Görges M, West NC, Cheung W, et al. Preoperative warming and undesired surgical and anesthesia outcomes in pediatric spinal surgery-a retrospective cohort study[J]. Paediatr Anaesth, 2016, 26(9): 866-875
- [29] 杜成华,包金锁,孙志刚,等.不同亚低温治疗时间对缺氧缺血性脑病新生儿疗效的影响 [J]. 现代生物医学进展, 2016, 16(25): 4879-4882
- Du Cheng-hua, Bao Jin-suo, Sun Zhi-gang, et al. Effect of Different Treatment Time of Mild Hypothermia on Neonatal Hypoxic-ischemic Encephalopathy [J]. Progress in Modern Biomedicine, 2016, 16(25): 4879-4882
- [30] Hong JH, Kim SJ, Hwang MS. Comparison of effect of electroacupuncture and nefopam for prevention of postanesthetic shivering in patients undergoing urologic operation under spinal anesthesia[J]. Korean J Anesthesiol, 2016, 69(6): 579-586