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脓毒症患者血清氧化应激因子、炎症因子水平与 APACHE II 评分及预后的关系研究 *

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摘要 目的:探讨脓毒症患者血清氧化应激因子、炎症因子水平与急性生理学及慢性健康状况 II(APACHE II)评分及预后的关系。**方法:**选择 2016 年 1 月-2019 年 10 月我院收治的脓毒症患者 76 例作为研究组,同期收治的相同基础疾病非脓毒症患者 60 例作为对照组,比较两组血清氧化应激因子[丙二醛(MDA)、超氧化物歧化酶(SOD)、一氧化氮(NO)]、炎症因子[降钙素原(PCT)、C 反应蛋白(CRP)、白细胞介素 27(IL-27)]水平及 APACHE II 评分,根据脓毒症患者预后将其分为死亡组 25 例、存活组 51 例,比较两组上述指标,并分析脓毒症患者预后的影响因素及血清氧化应激因子、炎症因子水平与 APACHE II 评分的相关性。**结果:**研究组血清 MDA、PCT、CRP、IL-27 及 APACHE II 评分显著高于对照组,血清 SOD、NO 显著低于对照组 ($P<0.05$)。死亡组血清 MDA、PCT、CRP、IL-27 及 APACHE II 评分显著高于存活组,血清 SOD、NO 显著低于存活组 ($P<0.05$)。多因素 logistic 回归分析显示 MDA 升高、SOD 降低、NO 降低、PCT 升高、CRP 升高、APACHE II 评分升高均是脓毒症患者死亡的危险因素($OR=2.293, 1.872, 1.527, 2.472, 1.667, 1.926, P<0.05$)。Pearson 相关性分析显示,脓毒症患者血清 MDA、PCT、CRP、IL-27 水平与 APACHE II 评分呈正相关($r=0.563, 0.582, 0.441, 0.302, P<0.05$),血清 NO、SOD 水平与 APACHE II 评分呈负相关($r=-0.301, -0.386, P<0.05$)。**结论:**脓毒症患者血清 MDA、PCT、CRP、IL-27 与 APACHE II 评分异常升高,血清 NO、SOD 异常降低,可能通过对上述指标进行检测从而判断患者病情及评估其预后。

关键词:脓毒症;氧化应激因子;炎症因子;APACHE II 评分;预后;相关性

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Study on the Relationship between Serum Levels of Oxidative Stress Factor and Inflammatory Factor, APACHE II Score and Prognosis in Patients with Sepsis*

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ABSTRACT Objective: To explore the relationship between the prognosis and the levels of serum oxidative stress factor, inflammatory factor, acute physiology and chronic health II (APACHE II) in patients with sepsis. **Methods:** 76 patients with sepsis who were admitted to our hospital from January 2016 to October 2019 were selected as study group, 60 patients with non sepsis of the same basic disease as control group. The serum oxidative stress factors [Malondialdehyde (MDA), superoxide dismutase (SOD), nitric oxide (NO)], inflammatory factors [procalcitonin (PCT), C-reactive protein (CRP), interleukin 27 (IL-27)] and APACHE II score were compared between the two groups. According to the prognosis of sepsis patients, the patients were divided into two groups: the dead group (25 cases) and the living group (51 cases). The above indexes were compared between the two groups. The influencing factors of the prognosis of sepsis patients and the correlation between the levels of serum oxidative stress factor and inflammatory factor and Apache II were analyzed. **Results:** The levels of MDA, PCT, CRP, IL-27 and Apache II score in the study group were significantly higher than those in the control group, and the levels of SOD and NO in the study group were significantly lower than those in the control group ($P<0.05$). The scores of MDA, PCT, CRP, IL-27 and Apache II score in the dead group were significantly higher than those in the alive group, and the levels of SOD and NO in the dead group were significantly lower than those in the alive group ($P<0.05$). Multivariate logistic regression analysis showed that MDA increased, SOD decreased, NO decreased, PCT increased, CRP increased, APACHE II increased were the risk factors of sepsis death ($OR=2.293, 1.872, 1.527, 2.472, 1.667, 1.926, P<0.05$). Pearson correlation analysis showed that MDA,

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2.2 不同预后脓毒症患者观察指标比较

著高于存活组,血清 SOD、NO 显著低于存活组 ($P<0.05$),见表2。

死亡组血清 MDA、PCT、CRP、IL-27 及 APACHE II 评分显

表 2 不同预后脓毒症患者观察指标比较($\bar{x} \pm s$)Table 2 Comparison of observation indexes of sepsis patients with different prognosis($\bar{x} \pm s$)

Groups	n	MDA(ng/L)	SOD(IU/L)	NO(ng/L)	PCT(mg/L)	CRP(mg/L)	IL-27(μ g/L)	APACHE II score(score)
Death group	25	702.61 $\pm$ 43.02	47.21 $\pm$ 6.29	1.63 $\pm$ 0.42	9.12 $\pm$ 0.98	92.47 $\pm$ 16.28	5.13 $\pm$ 0.29	23.27 $\pm$ 2.12
Survival group	51	374.78 $\pm$ 35.83	54.77 $\pm$ 8.99	4.42 $\pm$ 0.72	5.69 $\pm$ 0.87	77.25 $\pm$ 14.22	2.75 $\pm$ 0.28	11.31 $\pm$ 1.08
t		35.050	3.771	9.736	15.487	4.178	34.412	32.689
P		0.000	0.000	0.000	0.000	0.000	0.000	0.000

2.3 脓毒症患者预后的多因素 Logistic 回归分析

于均值作为降低,纳入多因素 Logistic 回归分析模型,见表3。自

以脓毒症患者为样本,以患者预后为因变量,以 MDA、SOD、NO、PCT、CRP、IL-27、APACHE II 评分为自变量,以表2中脓毒症患者 MDA、SOD、NO、PCT、CRP、IL-27、APACHE II 评分的均值为基准,将均值作为正常,高于均值的作为升高,低

变量剔除 α 退出 =0.05, 多因素 Logistic 回归分析结果显示,MDA 升高、SOD 降低、NO 降低、PCT 升高、CRP 升高、APACHE II 评分升高是脓毒症患者死亡的危险因素 ($P<0.05$),见表4。

表 3 多因素非条件 Logistic 回归分析变量赋值情况

Table 3 Variable assignment of multivariate unconditional logistic regression analysis

Factors	Variable	Assignment situation
Prognosis	Y	Death=1, Survival=0
MDA	X1	Increased=1, Normal=0
SOD	X2	Decreased=1, Normal=0
NO	X3	Decreased=1, Normal=0
PCT	X4	Increased=1, Normal=0
CRP	X5	Increased=1, Normal=0
IL-27	X6	Increased=1, Normal=0
APACHE II score	X7	Increased=1, Normal=0

表 4 脓毒症患者预后的多因素 Logistic 回归分析

Table 4 Multivariate logistic regression analysis of prognosis in patients with sepsis

Variable	β	SE	Wald χ^2	P	OR(95%CI)
MDA increased	0.526	0.102	12.942	0.000	2.293(1.926~2.467)
SOD decreased	0.436	0.087	5.028	0.000	1.872(1.625~2.027)
NO decreased	0.187	0.056	3.028	0.018	1.527(1.388~1.732)
PCT increased	0.728	0.123	13.922	0.000	2.472(2.253~2.708)
CRP increased	0.473	0.098	3.192	0.012	1.667(1.442~1.836)
IL-27 increased	0.142	0.067	1.382	0.114	1.167(0.836~1.302)
APACHE II score increased	0.672	0.109	7.921	0.000	1.926(1.778~2.143)

2.4 脓毒症患者血清氧化应激因子、炎症因子水平与 APACHE II 评分的相关性

Pearson 相关分析显示,脓毒症患者血清 MDA、PCT、CRP、IL-27 水平与 APACHE II 评分呈正相关,血清 NO、SOD 水平与 APACHE II 评分呈负相关 ($P<0.05$),见表5。

3 讨论

脓毒症的早期、快速、准确评估是其诊疗的重要内容,通过早期对脓毒症的诊断可以有效提高患者生存率,降低医疗经济负担。但目前对于脓毒症的发病机制仍未完全阐明,脓毒症的始发因素是感染,但机体感染后如何进展为脓毒症仍未完全明确,给脓毒症的诊断、病情评估和治疗带来了一定困难^[12]。近年来研究发现,氧化应激损伤、失控的炎症反应是脓毒症发生和

进展的重要环节^[13,14]。炎症反应是脓毒症发生的重要基础,脓毒症的发生主要是感染后引起内毒素移位,继而引发炎症级联反应和机体组织灌注不足,导致器官功能严重损伤^[15,16]。当机体发生脓毒症时会产生大量的氧自由基,与此同时组织灌注不足,

缺血缺氧导致机体清除氧自由基的能力下降,进而加重炎症反应和组织损伤^[17,18]。因此对脓毒症患者血清氧化应激因子及炎症因子进行检测可能对脓毒症的诊断和预后评估提供依据。

表 5 脓毒症患者血清氧化应激因子、炎症因子水平与 APACHE II 评分的相关性

Table 5 Correlation between serum levels of oxidative stress factor and inflammatory factor and Apache II score in patients with sepsis

Factors	APACHE II score	
	r	P
MDA	0.563	0.000
SOD	-0.386	0.000
NO	-0.301	0.025
PCT	0.582	0.000
CRP	0.441	0.000
IL-27	0.302	0.042

本研究发现,研究组血清 MDA、PCT、CRP、IL-27 及 APACHE II 评分显著高于对照组,血清 SOD、NO 显著低于对照组。MDA 是反映机体脂质过氧化速度和强度的重要指标^[19]。SOD 是一种抗氧化酶,是反映机体抗氧化能力的重要指标^[20]。当机体发生氧化应激时,血管内皮细胞受损,引起 NO 释放降低,血管舒张、收缩能力紊乱,因此 NO 水平可以反映机体抗氧化能力^[21,22]。PCT 是一种无激素活性的糖蛋白,生理情况下机体血液中仅有极微量的 PCT,当发生严重的细菌感染的细菌性脓毒症时,机体可快速合成并分泌 PCT,引起血液中 PCT 水平升高^[23]。目前临床上已将 PCT 作为评价细菌性脓毒症病情严重程度的重要指标之一^[24]。CRP、IL-27 是机体重要的炎症因子,当机体发生炎症反应时其水平会升高^[25,26]。APACHE II 评分是目前临床上评价患者生理、病理状态和病情严重程度的重要评分^[27]。明颖等^[28]报道,脓毒症患者血清 CRP、IL-27 水平升高。褚永果等^[29]报道,脓毒症患者血清 MDA 水平升高,SOD 水平降低。以上报道均证实了本研究结果的准确性。本研究结果表明,脓毒症患者体内氧化应激反应程度高于非脓毒症患者,抗氧化应激能力明显低于非脓毒症患者,脓毒症患者炎症反应程度也高于非脓毒症患者。本研究还对不同预后脓毒症患者观察指标进行了比较,结果死亡组血清 MDA、PCT、CRP、IL-27 显著高于存活组,血清 SOD、NO 显著低于存活组。脓毒症是临床上死亡率较高的疾病^[30]。本研究结果表明脓毒症死亡患者氧化应激程度较高,机体抗氧化应激能力降低,炎症反应更为强烈,同时患者 APACHE II 评分较高机体状况较差。另外,经多因素 Logistic 回归分析显示 MDA 升高、SOD 降低、NO 降低、PCT 升高、CRP 升高、APACHE II 评分升高是脓毒症患者死亡的危险因素,提示临床上对于存在以上危险因素的脓毒症患者应给予抗氧化应激、适当剂量糖皮质激素抗炎等干预,可能降低患者死亡率。而 IL-27 升高并非脓毒症患者死亡的危险因素,可能与该指标敏感度不高有关。本研究显示,脓毒症患者血清 MDA、PCT、CRP、IL-27 水平与 APACHE II 评分呈正相关,血清 NO、SOD 水平与 APACHE II 评分呈负相关,也提示通过血清 MDA、PCT、CRP、IL-27、NO、SOD 与 APACHE II 评分联合检验可能

为脓毒症的诊断及预后评估提供依据。

综上所述,脓毒症患者血清 MDA、PCT、CRP、IL-27 与 APACHE II 评分异常升高,血清 NO、SOD 异常降低,可能通过对上述指标进行检测从而判断患者病情及评估其预后;MDA 升高、SOD 降低、NO 降低、PCT 升高、CRP 升高、APACHE II 评分升高是脓毒症患者死亡的危险因素,临床上对脓毒症患者应适当给予抗氧化应激、适当剂量糖皮质激素抗炎等干预,以降低其死亡率。

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