

创伤性脑损伤患者血清 PCT, sTREM-1 水平检测 联合 GCS 评分对临床预后评估的价值

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摘要: 目的 探讨创伤性脑损伤 (traumatic brain injury, TBI) 患者血清降钙素原 (procalcitonin, PCT)、可溶性髓样细胞触发受体-1 (soluble triggering receptor-1, sTREM-1) 水平检测联合格拉斯哥昏迷评分 (Glasgow coma scale, GCS) 对临床预后评估的价值。方法 选取2018年1月~2020年5月涿州市医院收治的TBI患者142例, 根据28天预后情况分成存活组 ($n=110$) 和死亡组 ($n=32$)。采用格拉斯哥昏迷评分 (GCS) 分为轻度组 ($n=10$, 13~15分)、中度组 ($n=79$, 9~12分) 和重度组 ($n=53$, 3~8分)。比较各组血清 PCT 及 sTREM-1 水平, 绘制受试者工作特征 (ROC) 曲线分析 PCT, sTREM-1 及 GCS 评分预测 TBI 患者死亡的价值。结果 死亡组血清 PCT ($1.91 \pm 1.06 \text{ ng/ml}$ vs $0.48 \pm 0.30 \text{ ng/ml}$) 及 sTREM-1 ($60.28 \pm 9.74 \text{ pg/ml}$ vs $36.50 \pm 6.83 \text{ pg/ml}$) 水平均明显高于存活组, 差异均有统计学意义 ($t=8.284, 8.117$, 均 $P<0.01$)。重度组血清 PCT ($1.74 \pm 0.95 \text{ ng/ml}$ vs $0.63 \pm 0.38 \text{ ng/ml}$) 及 sTREM-1 ($53.90 \pm 8.32 \text{ pg/ml}$ vs $42.70 \pm 7.26 \text{ pg/ml}$) 水平均明显高于轻中度组, 差异具有统计学意义 ($t=7.506, 6.974$, 均 $P<0.01$)。ROC 曲线分析显示, PCT, sTREM-1 及 GCS 评分三项联合预测 TBI 患者死亡的曲线下面积 (0.928, 95%CI: 0.870 ~ 0.991) 最大, 其敏感度和特异度分别为 94.8% 和 87.0%。结论 血清 PCT 及 sTREM-1 水平升高与 TBI 患者的病情严重程度相关, 联合 GCS 评分对 TBI 患者预后评估有较好的价值。

关键词: 创伤性脑损伤; 降钙素原; 可溶性髓样细胞触发受体-1; 格拉斯哥昏迷评分; 预后评估

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Value of Serum PCT, sTREM-1 Levels Combined with GCS Score in Clinical Prognosis Evaluation of Patients with Traumatic Brain Injury

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Abstract: Objective To investigate the value of serum procalcitonin (PCT), soluble triggering receptor-1 (sTREM-1) levels combined with Glasgow Coma Scale (GCS) in the evaluation of clinical prognosis in patients with traumatic brain injury (TBI). **Methods** The 142 TBI patients in Zhuozhou City Hospital from January 2018 to May 2020 were selected, and they were divided into survival group ($n=110$) and death group ($n=32$) according to the 28 days prognosis. Glasgow Coma Scale (GCS) were used to divide the patients into mild group ($n=10$, 13~15 score), moderate group ($n=79$, 9~12 score), severe group ($n=53$, 3~8 score). The levels of serum PCT and sTREM-1 were compared. Drawn to analyze the value of PCT, sTREM-1 and GCS scores in predicting death in TBI patients. **Results** The levels of serum PCT ($1.91 \pm 1.06 \text{ ng/ml}$ vs $0.48 \pm 0.30 \text{ ng/ml}$) and sTREM-1 ($60.28 \pm 9.74 \text{ ng/ml}$ vs $36.50 \pm 6.83 \text{ pg/ml}$) in the death group were significantly higher than those in the survival group, the differences were statistically significant ($t=8.284, 8.117$, all $P<0.01$). The levels of serum PCT ($1.74 \pm 0.95 \text{ ng/ml}$ vs $0.63 \pm 0.38 \text{ ng/ml}$) and sTREM-1 ($53.90 \pm 8.32 \text{ ng/ml}$ vs $42.70 \pm 7.26 \text{ pg/ml}$) in severe group were significantly higher than those in mild and moderate group, the differences were statistically significant ($t=7.506, 6.974$, all $P<0.01$). ROC curve analysis showed that the area under the curve (0.928, 95%CI: 0.870-0.991) of PCT, sTREM-1 and GCS scores the three combined predictors of TBI patients' death was the largest, and its sensitivity and specificity were 94.8% and 87.0%. **Conclusion** The increase of serum PCT and sTREM-1 levels is related to the severity of TBI, and combined with GCS score has a good value in evaluating the prognosis of patients with TBI.

Keywords: traumatic brain injury; procalcitonin; soluble triggering receptor expressed on myeloid cells-1; Glasgow coma scale; prognosis evaluation

创伤性脑损伤 (traumatic brain injury, TBI) 是临床上常见的重症神经外科疾病, 有效评估 TBI 患者的严重程度及预后情况, 对 TBI 患者救治具有重大帮助^[1]。研究发现, 可溶性髓系细胞触发受体-1

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(soluble triggering receptor expressed on myeloid cells-1, sTREM-1) 能触发并放大炎症反应, 参与炎症级联反应, 在创伤患者中发挥作用^[2]。降钙素原 (procalcitonin, PCT) 参与外伤的病情发展, 对评价炎症反应程度及预后指导具有较好的帮助^[3-4]。格拉斯哥昏迷评分 (Glasgow coma score, GCS) 是一种评估患者昏迷程度的可靠指标, 可用于判断 TBI 患者病情^[5]。本研究分析血清 PCT 及 sTREM-1 水平在 TBI 患者中的变化, 探讨 PCT 及 sTREM-1 联合 GCS 评分预测 TBI 患者预后的价值。

1 材料与方法

1.1 研究对象 选取涿州市医院 2018 年 1 月~2020 年 5 月收治的 142 例 TBI 患者, 其中男性 94 例, 女性 48 例, 年龄 25~77 (46.80 ± 10.16) 岁。病因: 交通伤 81 例, 坠落伤 37 例, 打击伤 19 例, 跌到伤 5 例。入选标准: ①脑损伤经头颅 CT 扫描及 MRI 检查证实; ②需入住重症监护病房监护治疗。排除既往有神经系统疾病和脑外伤史者。本研究与患者或其家属签署知情同意书。

1.2 仪器与试剂 全自动化学发光仪 (贝克曼), 配套试剂 (深圳生物医学工程有限公司); sTREM-1 试剂盒由美国 R&D 公司提供。

1.3 方法 观察 142 例患者 28 天的预后情况, 分为 110 例存活组和 32 例死亡组。死亡组与存活组的性别、年龄及体质指数等比较, 差异均无统计学意义 (均 $P > 0.05$)。TBI 患者入院时昏迷程度应用 GCS 评分进行评估, 其中轻度组 10 例 (GCS 分值为 13~15 分), 中度组 79 例 (GCS 分值为 9~12 分), 重度组 53 例 (GCS 分值为 3~8 分)。PCT 及 sTREM-1 检测分别采用化学发光法、酶联免疫吸附法。

1.4 统计学分析 采用 SPSS20.0 统计, 计量资料以均数 ± 标准差 ($\bar{x} \pm s$) 表示, 组间比较采用 t 检验。PCT, sTREM-1 及 GCS 评分预测 TBI 患者死亡的价值应用受试者工作特征 (ROC) 曲线进行分

析。 $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 存活组和死亡组血清 PCT 及 sTREM-1 水平比较 见表 1。与存活组比较, 死亡组血清 PCT 及 sTREM-1 水平明显升高, 差异均有统计学意义 ($P < 0.01$)。死亡组 GCS 评分明显低于存活组, 差异有统计学意义 ($P < 0.05$)。

表 1 存活组和死亡组血清 PCT 及 sTREM-1 水平比较 ($\bar{x} \pm s$)

项 目	存活组 ($n=110$)	死亡组 ($n=32$)	t	P
PCT (ng/ml)	0.48 ± 0.30	1.91 ± 1.06	8.284	<0.001
sTREM-1 (pg/ml)	36.50 ± 6.83	60.28 ± 9.74	8.117	<0.001
GCS 评分 (分)	11.60 ± 2.10	5.50 ± 0.70	7.913	<0.001

2.2 重度组和轻中度组 PCT 及 sTREM-1 水平比较 见表 2。与轻中度组比较, 重度组血清 PCT 及 sTREM-1 水平明显升高, 差异均有统计学意义 (均 $P < 0.01$)。

表 2 重度组和轻中度组 PCT 及 sTREM-1 水平比较 ($\bar{x} \pm s$)

项 目	轻中度组 ($n=89$)	重度组 ($n=53$)	t	P
PCT (ng/ml)	0.63 ± 0.38	1.74 ± 0.95	7.506	<0.001
sTREM-1 (pg/ml)	42.70 ± 7.26	53.90 ± 8.32	6.974	<0.001

2.3 血清 PCT 及 sTREM-1 水平联合 GCS 评分预测 TBI 患者死亡的价值 见表 3 和图 1。血清 PCT, sTREM-1 水平及 GCS 评分三项联合预测 TBI 患者死亡的曲线下面积 (0.928, 95%CI: 0.870~0.991) 明显高于单项 PCT (0.845, 95%CI: 0.786~0.903), sTREM-1 (0.810, 95%CI: 0.753~0.868) 及 GCS 评分 (0.784, 95%CI: 0.727~0.833), 差异均有统计学意义 ($Z=4.953, 5.618, 6.407$, 均 $P < 0.05$), 其敏感度和特异度分别为 94.8% 和 87.0%。

表 3 血清 PCT 及 sTREM-1 水平联合 GCS 评分预测 TBI 患者死亡的价值

项目	最佳截值	AUC (95%CI)	敏感度 (%)	特异度 (%)	阳性预测值 (%)	阴性预测值 (%)
PCT	1.27 ng/ml	0.845 (0.786 ~ 0.903)	85.6	79.0	77.4	84.2
sTREM-1	50.14 pg/ml	0.810 (0.753 ~ 0.868)	80.2	75.7	78.0	79.0
GCS 评分	8.20 分	0.784 (0.727 ~ 0.833)	77.5	71.8	75.0	74.2
三项联合	-	0.928 (0.870 ~ 0.991)	94.8	87.0	90.3	91.4

3 讨论

TBI 是由暴力作用于头部所造成的一种严重创伤, 其病死率高达 50% 左右, 已成为神经外科当前救治的难题^[6-7]。目前主要使用临床症状、格拉斯哥昏迷评分和影像学检查等评价指标指导 TBI 的病情判断, 但不能准确反映脑损伤的程度和病情进展。因此, 寻找一种有效评估 TBI 患者病情严重程度及

预后的可靠指标显得尤为重要。PCT 是一种炎症反应指标, 在感染性疾病中可显著升高, 可作为评估脑损伤患者严重程度、预后情况及指导临床治疗有很好的效果^[8-9]。sTREM-1 可在中性粒细胞的细胞膜表面受体上表达, 参与炎症的级联放大反应^[10-11]。GCS 评分是用来判断 TBI 患者病情严重程度的常用临床指标, GCS 评分越低, 患者预后越差^[12-13]。

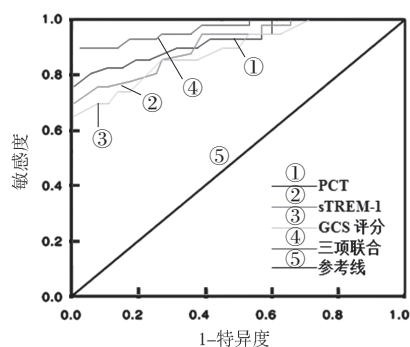


图1 血清PCT及sTREM-1水平联合GCS评分预测TBI患者死亡的ROC曲线

本研究血清PCT及sTREM-1水平在死亡组较存活组明显升高,死亡组GCS评分明显低于存活组,血清PCT及sTREM-1水平在重度组较轻度组明显升高。说明PCT, sTREM-1及GCS评分与TBI患者病情严重程度有关。有研究发现, sTREM-1水平与创伤后的严重程度有关,是判断患者预后、进展及死亡风险的较好、较快指标^[14]。薛静等^[15]研究认为, TBI患者血清PCT水平明显升高,能很好地预测TBI患者的病情严重程度及预后,是一种简单有效的评估方法。另有研究表明,创伤患者血清PCT水平升高越显著,患者的病情越重, PCT的高水平与患者预后不良有关,临床上应重视,并采取可靠的措施^[16]。ROC曲线显示, PCT及sTREM-1联合GCS评分在预测TBI患者死亡中有较大的效能,说明单独检测一个指标对预测TBI患者预后存在一定的不足,三项联合可弥补单一指标的不足,更有助于预测TBI患者的预后情况。陈明科等^[17]研究显示, sTREM-1与感染严重程度密切相关,对创伤患者的病情及预后判断均具有较好的应用价值。赵元元等^[18]研究发现,血清PCT水平持续升高与病情严重和预后不良有关, PCT在判断脑损伤严重程度及预后转归中具有较好的价值。

综上所述, TBI患者的病情严重程度及预后与血清PCT及sTREM-1水平升高有关,联合GCS评分对TBI患者预后评估有较好的价值,也为临床治疗提供帮助。

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