doi: 10.13241/j.cnki.pmb.2017.27.035

血清降钙素原鉴别病毒性感染、一般性细菌感染和重症细菌性感染的临床应用价值

刘真君 董 伟 赵丽丽 李 懿 贺光明

（四川省肿瘤医院重症医学科(电子科技大学医学院重症医学科) 四川 成都 610041）

摘要 目的：研究血清中降钙素原在病毒性感染、一般性细菌感染和重症细菌性感染患者中的应用价值。**方法：**选择2014年6月～2016年12月在我院重症医学科进行诊治的感染患者60例，按照患者感染的严重程度分为病毒性感染患者（A组)15例，一般细菌感染组（B组)22例以及重症细菌性感染组（C组)23例。三组患者均采取纠正水电解质平衡、抗生素抗感染和营养支持等对症治疗，并在入院后第1、3、5、7 d检测患者的血清降钙素原水平，比较三组治疗前后血清降钙素原水平的差异，观察三组血清降钙素原≥ 0.5 μg/L的例数。**结果：**B组血清降钙素原≥ 0.5 μg/L的例数为20例，占90.91 %，C组血清降钙素原≥ 0.5 μg/L的例数为21例，占91.30 %，B组和C组之间相比无明显差异(P>0.05)，但A组血清降钙素原≥ 0.5 μg/L的例数为3例，占20.00 %，明显低于B组和C组血清降钙素原≥ 0.5 μg/L的例数，差异均具有统计学意义(P<0.05)；C组入院后第1、3、5、7 d的血清降钙素原水平均明显高于B组的血清降钙素原水平，差异均具有统计学意义(P<0.05)；重症细菌性感染患者中，血清降钙素原≥ 0.5 μg/L的患者存活率明显低于血清降钙素原 <0.5 μg/L的患者(P<0.05)。**结论：**血清中降钙素原水平对于重症感染患者的临床诊断和治疗具有较好的应用价值，对于医生判断重症感染患者的预后情况具有很好的效果，值得临床广泛应用推广。

关键词：降钙素原；病毒性感染；一般性细菌感染；重症细菌性感染；临床应用价值

中图分类号：R373；R459.7 **文献标识码：**A **文章编号：**1673-6273(2017)27-5338-03

Application Value of Serum Procalcitonin in Patients with Viral Infection, Bacterial Infection and Severe Bacterial Infection

LIU Zhen-jun, DONG Wei, ZHAO Li-li, LI Yi, HE Guang-ming

(ICU, Sichuan Cancer Hospital(School of Medicine, University of Electronic Science and Technology of China), Chengdu, Sichuan, 610041, China)

ABSTRACT Objective: To investigate the application value of serum procalcitonin in patients with viral infection, bacterial infection and severe bacterial infection. **Methods:** Selected60 cases of patients with infection who were treated in our hospital from June 2014toDecember 2016, divided into three groupsaccording to the severity of the infection, viral infection (group A) 15 cases, general bacterial infection (group B) 22 cases, and severe bacterial infection (group C) 23 cases. Three groups of patients were treated with symptomatic treatment, and after admission, the serum procalciton in levels were detected in 1, 3, 5, 7 d, and compared with the serum procalcitonin levels before and after treatment in the three groups. **Results:** The serum procalcitonin ≥ 0.5 μg/L number of B group and C group had no significant difference (P>0.05), the serum procalcitonin ≥ 0.5 μg/L number of A group was significantly lower than that of B group and C group (P<0.05); the survival rate of severe bacterial infection patients whose serum procalcitonin was higher than than 0.5 μg/L was significantly higher than those who with serum procalcitonin lower than 0.5 μg/L (P<0.05). **Conclusion:** Serumprocalcitonin level had a good application value in the clinical diagnosis prognostic prediction of patients with severe infection.

Key words: Serum procalcitonin; Viral infection; Bacterial infection; Severe bacterial infection; Application value

Chinese Library Classification(CLC): R373; R459.7 Document code: A

Article ID: 1673-6273(2017)27-5338-03

前言

重症感染是一种常见的以多器官功能受损为临床特征的复杂性临床综合征，是引起危重症患者死亡的主要原因之一。由于目前医疗条件的限制，感染性疾病的早期诊断指标尚不完全明确，难以做到早发现和早治疗[1,2]。如何有效、准确地对重症感染进行诊断并判断其治疗效果和患者的预后情况是目前医学研究的热点问题。既往临床实验室常使用的检测感染的指标存在耗时长、敏感性以及特异性较低等缺点[3-5]。降钙素原作为感染性疾病的一种血清学标志物，具有高特异性以及高灵敏性的优点。本研究通过比较病毒性感染、一般性细菌感染和重症细菌性感染患者血清中降钙素原水平，旨在评价其在重症医学科感染患者诊治中的临床应用价值。

1 资料与方法

1.1 一般资料

选择2014年6月～2016年12月在我院重症医学科进行

作者简介：刘真君（1978-），男，硕士，主治医师，研究方向：重症医学，E-mail：liuzhenjun_1978@medicinepap.cn

（收稿日期：2017-05-05 接受日期：2017-05-30）

诊治的感染患者 60 例，按照患者感染的严重程度分为病毒性感染患者(A 组)15 例，主要为皮肤带状疱疹、呼吸道感染和胃肠道轮状病毒感染；一般细菌感染组(B 组)22 例，患者为局部、肺炎感染；重症细菌性感染组(C 组)23 例，患者的心率 > 90 次/min，体温 <36℃或 >38.3 ℃，呼吸频率 >30 次 /min，淋巴细胞计数降低，白细胞计数大于 12× 10^9/L。A 组男 9 例，女 6 例；年龄 26~78 岁，平均(57.12± 12.45)岁。B 组男 12 例，女 10 例；年龄 24~79 岁，平均(53.27± 13.15)岁。C 组男 15 例，女 8 例；年龄 25~76 岁，平均(56.28± 13.29)岁。三组患者的性别、年龄比较差异无统计学意义(P>0.05)，具有可比性。本研究获得我院伦理委员会的批准，所有患者均签署知情同意书。

1.2 方法

三组患者均采取对症治疗，主要包括纠正水电解质平衡、抗生素抗感染和营养支持等。并在入院后第 1、3、5、7 d 采集 3 mL 空腹肘正中静脉血，采用双抗体夹心免疫荧光法检测患者的血清降钙素原水平，试剂盒购自南京森贝伽生物科技有限公司。

1.3 统计学分析

采用 SPSS15.00 软件，计量资料以 $\bar{x}\pm s$ 表示，多组间对比采用单因素方差分析，两组间比较采用 t 检验，组间率的比较用 χ^2 检验，以 P<0.05 表明差异有统计学意义。

2 结果

2.1 三组血清降钙素原≥ 0.5 μg/L 比例比较

B 组和 C 组血清降钙素原≥ 0.5 μg/L 的比例相比差异无统计学意义 (P>0.05)，A 组血清降钙素原≥ 0.5 μg/L 的比例明显低于 B 组和 C 组(P<0.05)，见表 1。

表 1 三组血清降钙素原≥ 0.5μg/L 的比例对比[例(%)]

Table 1 Comparison of the percentage of serum procalcitonin ≥ 0.5μg/L between there groups[n(%)]

Groups	n	<0.5 μg/L	≥ 0.5 μg/L
Group A	15	12(80.00)	3(20.00)
Group B	22	2(9.09)*	20(90.91)*
Group C	23	2(8.70)*	21(91.30)*

Note: Compared with group A, *P<0.05.

2.2 三组入院后不同时间血清降钙素原水平对比

C 组入院后第 1、3、5、7 d 的血清降钙素原水平均明显高于 B 组(P<0.05)，见表 2。

表 2 三组入院后不同时间血清降钙素原水平对比($\bar{x}\pm s$,μg/L)

Table 2 Comparison of the serum procalcitonin levels between B group and C group at different time points after admission($\bar{x}\pm s$,μg/L)

Groups	n	The first day	The third day	The fifth day	The seventh day
Group A	15	1.03± 0.37#	0.95± 0.24#	0.83± 0.24#	0.72± 0.79#
Group B	22	2.7± 1.0	2.4± 0.9	1.6± 0.8	1.0± 0.5
Group C	23	18.5± 5.3#	15.9± 0.7#	8.6± 2.3#	6.2± 2.4#

Note: Compared with group B, #P<0.05.

2.3 预后情况

23 例重症细菌性感染患者中，血清降钙素原≥ 0.5 μg/L 的例数为 21 例，随访 1 年后发现，其中 16 例患者死亡，5 例存活；血清降钙素原 <0.5 μg/L 的 2 例患者均存活，其存活率明显高于血清降钙素原≥ 0.5 μg/L 者(P<0.05)。

3 讨论

重症感染是临床上较为常见的急危重症，是指以全身性感染引起器官功能损害为主要特征的较为复杂的临床综合征，具有症状重、起病急、病死率高、预后差的特点[6-10]。引起重症感染的因素主要包括阴性球菌、病毒和阳性球菌，这些毒素和病菌均能参与一系列的病理生理过程，因此重症感染是器官损伤的最主要原因[11-15]。目前，临床上主要采用抗生素治疗重症感染，但患者的死亡率仍较高。重症感染所引起的多器官功能障碍综合征的死亡率高达 35%~70%[16-19]。对及早诊断重症感染患者，并根据感染的具体情况给予及时有效的抗感染治疗，不仅可以有效降低耐药性的产生，还可以明显改善患者的预后。

传统的细菌学检测极易受环境、时间、实验检测水平以及抗生素的应用等条件的影响，且检测周期较长，常常会延误病情，甚至出现误诊和错诊的病例。降钙素原作为降钙素的前体物质，主要集中在肝脏，在人体正常的机体循环内血液中降钙素水平较低，仅 <0.1 μg/L，但当发生脓毒症和严重细菌感染时能升高到 1000 μg/L[20-26]。降钙素原在鉴别炎性反应和细菌感染方面较体温、白细胞和 C 反应蛋白具有更好的临床应用价值。血清降钙素原水平不仅可以反映患者全身炎症反应的活跃程度，还可以反映被感染器官的类型、大小、患者炎症的严重程度、感染细菌的种类以及患者自身免疫反应情况等[27-30]。降钙素原水平为 0.5 μg/L 被认为是判断感染性疾病的分界值。本研究结果显示：一般细菌感染和重症细菌感染患者血清降钙素原≥ 0.5 μg/L 的比例相比无明显差异，但病毒性感染患者血清降钙素原≥ 0.5 μg/L 的比例明显低于一般细菌感染和重症细菌感染患者，表明血清降钙素原对于鉴别诊断病毒感染或细菌感染具有较高的价值。重症细菌感染患者入院后第 1、3、5、7 d 的血清降钙素原水平均明显高于一般细菌感染患者，表明随着感染程度的加重，体内血清降钙素原水平会随之升高，降钙素原水平与感染性疾病的严重程度紧密相关，其对一般感染与重症感

染具有较好的鉴别诊断作用。此外，一般细菌感染和重症细菌感染患者入院后第 1、3、5、7d 的血清降钙素原水平均逐渐明显降低，表明血清降钙素原可以作为评价细菌感染患者的治疗效果和判断患者预后情况的参考指标，从而有助于医生有效选择以及调整治疗方案，对于提高治疗效果、改善患者预后、降低死亡率均具有重要的意义。

综上所述，血清降钙素原水平对于重症感染患者的临床诊断和治疗具有较好的应用价值，对于医生判断患者的预后预测具有很好的效果。

参 考 文 献(References)

[1] Hibberd P L, Hansen N I, Wang M E, et al. Trends in the incidence of possible severe bacterial infection and case fatality rates in rural communities in Sub-Saharan Africa, South Asia and Latin America, 2010-2013: a multicenter prospective cohort study [J]. Reproductive Health, 2016, 13(1): 1-13

[2] Musiime G M, Seale A C, Moxon S G, et al. Risk of gentamicin toxicity in neonates treated for possible severe bacterial infection in low and middle income countries: Systematic Review[J]. Tropical Medicine & International Health, 2015, 20(12): 1593-1606

[3] Wacharasint P, Boyd J H, Russell J A, et al. One size does not fit all in severe infection: obesity alters outcome, susceptibility, treatment, and inflammatory response[J]. Critical Care, 2013, 17(3): R122

[4] Dong X J, Zhang Z M, Zhao X W, et al. ABCA1 expression in macrophages of allogeneic hematopoietic stem cell transplantation patients with severe infection undergoing continuous blood purification[J]. International Journal of Artificial Organs, 2015, 38(2): 83-88

[5] Gilliaux Q, Stoenoiu M, Bellefon L M D, et al. SAT0163 Risk of Malignancy and Severe Infection in a Population of Rheumatoid Arthritis Patients Treated with Biologics or DMARDS [J]. Annals of the Rheumatic Diseases, 2015, 74(Suppl 2): 711.2-712

[6] Gille-Johnson P, Hansson K E, Gårdlund B. Severe sepsis and systemic inflammatory response syndrome in emergency department patients with suspected severe infection [J]. Infectious Diseases, 2013, 45(3): 186-193

[7] M. SantosGómez, J. Loricera, C. GonzálezVela, et al. THU0289 Histopathological Differences Between Cutaneous Vasculitis Associated with Severe Bacterial Infection and Other Non-Infectious Cutaneous Vasculitis: Study of 52 Patients [J]. Annals of the Rheumatic Diseases, 2015, 74(Suppl 2): 300.2-301

[8] Hernández-Rocha C, Tejos S R, Plaza-Garrido Á, et al. Performance of prognostic index in severe Clostridium difficile-associated infection: Retrospective analysis in a university hospital [J]. Revista Chilena De Infectologia Organo Oficial De La Sociedad Chilena De Infectologia, 2014, 31(6): 659-665

[9] Hyun S Y, Han S H, Kim S J, et al. Pretreatment Lymphopenia, Poor Performance Status, and Early Courses of Therapy Are Risk Factors for Severe Bacterial Infection in Patients with Multiple Myeloma during Treatment with Bortezomib-based Regimens[J]. Journal of Korean Medical Science, 2016, 31(4): 510

[10] Jammes Y, Steinberg J G, Guieu R, et al. Chronic fatigue syndrome with history of severe infection combined altered blood oxidant status, and reduced potassium efflux and muscle excitability at exercise [J]. Open Journal of Internal Medicine, 2013, 03(3): 98-105

[11] Carbone J, Fernandez-Yañez J, Gomez-Sanchez M, et al. A Pre-Transplant Humoral Immunity Score to Identify Risk of Severe Infection in Heart Recipients. A Multicenter Study [J]. Journal of Heart & Lung Transplantation, 2016, 35(4): S105-S106

[12] MavedzengeNapierala S, Baggalery R, Corbett E L. Reply to Ng and Tan, a/k/a Candidemia Subsequent to Severe Infection Due to Clostridium difficile: Is There a Link? Reply [J]. Clinical Infectious Diseases An Official Publication of the Infectious Diseases Society of America, 2013, 57(5): 772-774

[13] Kazuma Y, Ono Y, Yonetani N, et al. Successful treatment of an overwhelming infection with granulocyte transfusion in severe aplastic anemia patient undergoing allogeneic peripheral blood stem cell transplantation[J]. The Japanese journal of clinical hematology, 2016, 57(4): 440

[14] Rafat C, Klouche K, Ricard J D, et al. Severe Measles Infection: The Spectrum of Disease in 36 Critically Ill Adult Patients [J]. Medicine, 2013, 92(5): 257-272

[15] Linder A, Arnold R, Boyd J H, et al. Heparin-Binding Protein Measurement Improves the Prediction of Severe Infection With Organ Dysfunction in the Emergency Department[J]. Critical Care Medicine, 2015, 43(11): 1

[16] Tan W S D, Hong Y P, Liao W, et al. Cigarette Smoke-Induced Lung Disease Predisposes to More Severe Infection with Nontypeable-Haemophilusinfluenzae:Protective Effects of Andrographolide [J]. Journal of Natural Products, 2016, 79(5): 1308

[17] Lertchaisataporn K, Kasitanon N, Wangkaew S, et al. An evaluation of the association of leukopenia and severe infection in patients with systemic lupus erythematosus [J]. Journal of Clinical Rheumatology Practical Reports on Rheumatic & Musculoskeletal Diseases, 2013, 19(3): 115

[18] Shaughnessy M K, Williams D N, Segal B. Severe infection with encapsulated bacteria as the initial presentation of systemic lupus erythematosus: two case reports and a review of the literature [J]. JMM Case Reports, 2014, 1(2): e001362-e001362

[19] Guo H M, Gao J M, Luo Y L, et al. Infection by Toxoplasma gondii, a severe parasite in neonates and AIDS patients, causes impaired anion secretion in airway epithelia[J]. Proceedings of the National Academy of Sciences, 2015, 112(14): 4435

[20] Rashad N M, Elshal A S, Abdelaziz A M. Association between inflammatory biomarker serum procalcitonin and obesity in women with polycystic ovary syndrome [J]. Journal of Reproductive Immunology, 2013, 97(2): 232-239

[21] Bode-Jänisch S, Schütz S, Schmidt A, et al. Serum procalcitonin levels in the postmortem diagnosis of sepsis[J]. Forensic Science International, 2013, 226(1-3): 266

[22] Shaikh M M, Hermans L E, van Laar J M. Is serum procalcitonin measurement a useful addition to a rheumatologist's repertoire? A review of its diagnostic role in systemic inflammatory diseases and joint infections[J]. Rheumatology, 2015, 54(2): 231

[23] Branche A R, Walsh E E, Vargas R, et al. Serum Procalcitonin and Viral Testing to Guide Antibiotic Use for Respiratory Infections in Hospitalized Adults: A Randomized Control Trial [J]. Journal of Infectious Diseases, 2015, 212(10): 1692-700

(下转第 5384 页)

regulation of Huangqin Decoction [J]. Journal of Southern Medical University, 2011, 31(2): 252-255

[26] 迟宏罡, 邹颖, 戴世学, 等. 黄芩汤对 TNBS 诱导的结肠炎大鼠 IL-23 / IL-17 通路的影响 [J]. 中国实验方剂学杂志, 2012, 19(1): 211-215
Chi Hong-gang, Zou Yin, Dai Shi-xue, et al. The effect of Huangqin decoction on the pathway of IL-23/IL-17 in Ulcerative Colitis Rat induced by TNBS[J]. Chinese Journal of experimental traditional medical formulae, 2012, 19(1): 211-215

[27] 刘婧娜, 李红玉, 苏海震, 等. 药源性腹泻 132 例临床分析[J]. 实用药物与临床, 2012, 15(11): 754-755
Liu Qian-na, Li Hong-yu, Su Hai-zhen, et al. Clinical analysis of 132 drug-induced diarrhea cases [J]. Practical Pharmacy and Clinical Remedies, 2012, 15(11): 754-755

[28] 孙华君, 王翠松. 伊立替康肠毒性预防研究进展[J]. 世界临床药物, 2005, 26(5): 286-291
Sun Hua-jun, Wang Cui-song. Advances of research on prevention of intestinal toxicity caused by irinotecan [J]. World Clinical Drugs, 2005, 26(5): 286-291

[29] Chen S, Yueh MF, Bigo C, et al. Intestinal glucuronidation protects against chemotherapy-induced toxicity by irinotecan (CPT-11) [J]. Proceedings of the National Academy of Sciences, 2013, 110 (47): 19143-19148

[30] Kummar S, Copur M S, Rose M, et al. A Phase I Study of the Chinese Herbal Medicine PHY906 as a Modulator of Irinotecan-based Chemotherapy in Patients with Advanced Colorectal Cancer [J]. Clin Colorectal Canc, 2011, 10(2): 85-96

[31] Liu S H, Cheng Y C. Old formula, new Rx: The journey of PHY906 as cancer adjuvant therapy [J]. J Ethnopharmacology, 2012, 140(3): 614-623

[32] Farrell M P, Kummar S. Phase I/IIA Randomized Study of PHY906, a Novel Herbal Agent, as a Modulator of Chemotherapy in Patients with Advanced Colorectal Cancer [J]. Clini Colorectal Canc, 2003, 2 (4): 253-256

[33] Yen Y, So S, Rose M, et al. Phase I/II Study of PHY906/ Capecitabine in Advanced Hepatocellular Carcinoma [J]. Anticancer Res, 2009, 29(10): 4083-4092

[34] Saif M W, Lansigan F, Ruta S, et al. Phase I study of the botanical formulation PHY906 with capecitabine in advanced pancreatic and other gastrointestinal malignancies [J]. Phytomedicine, 2010, 17(3): 161-169

[35] Lam W, Bussom S, Guan F, et al. The Four-Herb Chinese Medicine PHY906 Reduces Chemotherapy-Induced Gastrointestinal Toxicity [J]. Sci Transl Med, 2010, 2 (45): 45-59

[36] Liu CF, Wang N, Liu SM, et al. Study of Huanglian Jiedu decoction on fever syndrome by metabolomics [J]. J Shandong Univ Trad Chin Med, 2011, 35(1): 60-63

[37] 向丽. 麝香保心丸及组分配伍代谢组学研究 [D]. 第二军医大学, 2012
Xiang Li. Metabolomic studies of Shexiang Baoxin Pill and its multi-component combination [D]. Second Military Medical University, 2012

[38] 王喜军, 孙文军, 孙晖, 等. CCL4 诱导大鼠肝损伤模型的代谢组学及茵陈蒿汤的干预作用研究 [J]. 世界科学技术 - 中医药现代化, 2007, 8(6): 101-106
Wang Xi-jun, Sun Wen-jun, Sun Hui, et al. Metabolomics reveals the liver injury induced by CCl4 and the protective action by Yin Chen Hao Tang [J]. World Sci Technol Mod Tradit Chin Med, 2007, 8(6): 101-106

(上接第 5340 页)

[24] Angeletti S, Spoto S, Fogolari M, et al. Diagnostic and prognostic role of procalcitonin (PCT) and MR-pro-Adrenomedullin (MR-proADM) in bacterial infections[J]. Apmis, 2015, 123(9): 740-748

[25] Festic E, Siegel J, Stritt M, et al. The utility of serum procalcitonin in distinguishing systemic inflammatory response syndrome from infection after aneurysmal subarachnoid hemorrhage [J]. Neurocritical Care, 2014, 20(3): 375-381

[26] Agnello L, Bellia C, Gangi M D, et al. Utility of serum procalcitonin and C-reactive protein in severity assessment of community-acquired pneumonia in children[J].Clinical Biochemistry, 2016, 49(1-2): 47-50

[27] Huang M Y, Chen C Y, Chien J H, et al. Serum Procalcitonin and Procalcitonin Clearance as a Prognostic Biomarker in Patients with Severe Sepsis and Septic Shock [J]. Biomed Research International, 2016, 2016(2): 1758501

[28] Musher D M, Bebko S P, Roig I L. Serum procalcitonin level, viral polymerase chain reaction analysis, and lower respiratory tract infection[J]. Journal of Infectious Diseases, 2014, 209(4): 631

[29] Rahimzadeh N, Otukesh H, Hoseini R, et al. Serum procalcitonin level for prediction of high-grade vesicoureteral reflux in urinary tract infection[J]. Iranian Journal of Kidney Diseases, 2014, 8(2): 105-108

[30] Plebani M, Fabbri L M. Procalcitonin-guided antibiotic therapy: a potentially effective and efficient strategy[J]. Clinical Chemistry & Laboratory Medicine, 2015, 53(4): 519-520