

doi: 10.13241/j.cnki.pmb.2020.19.022

血清 Gal-3、NT-pro-BNP 及 hs-CRP 水平与慢性心力衰竭超声心动图指标的相关性研究*

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摘要 目的:探讨血清半乳糖凝集素-3(Gal-3)、氨基末端脑钠肽前体(NT-pro-BNP)、超敏C反应蛋白(hs-CRP)水平与慢性心力衰竭超声心动图指标的相关性。**方法:**选择2018年2月~2019年10月我院收治的慢性心力衰竭患者112例作为研究组,按美国心脏病协会(NYHA)分级分为Ⅱ级组43例、Ⅲ级组39例、Ⅳ级组30例,另选择同期我院体检的健康人员60例作为对照组,比较研究组和对照组及不同心功能分级的慢性心力衰竭患者血清Gal-3、NT-pro-BNP、hs-CRP水平和超声心动图指标,分析慢性心力衰竭患者上述指标之间的相关性。**结果:**研究组血清Gal-3、NT-pro-BNP、hs-CRP水平显著高于对照组,E峰与A峰比值(E/A)及左心室射血分数(LVEF)显著低于对照组($P<0.05$)。随NYHA分级增加,慢性心力衰竭患者血清Gal-3、NT-pro-BNP、hs-CRP水平逐渐升高,E/A和LVEF逐渐降低($P<0.05$)。经Pearson相关性分析显示,慢性心力衰竭患者血清Gal-3、NT-pro-BNP、hs-CRP分别与E/A、LVEF水平呈负相关关系($P<0.05$)。**结论:**慢性心力衰竭患者血清Gal-3、NT-pro-BNP、hs-CRP水平异常升高,与超声心动图指标相关,检测Gal-3、NT-pro-BNP、hs-CRP有助于慢性心力衰竭的诊断和病情评估。

关键词:慢性心力衰竭;半乳糖凝集素-3;氨基末端脑钠肽前体;超敏C反应蛋白;超声心动图

中图分类号:R541.61 文献标识码:A 文章编号:1673-6273(2020)19-3707-04

Correlation Study between the Levels of Serum Gal-3, NT-pro-BNP, hs-CRP and the Echocardiographic Indexes of Chronic Heart Failure*

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ABSTRACT Objective: To investigate the correlation between the levels of serum galactose-3 (Gal-3), N-terminalpro-brain natriuretic peptide (NT-pro-BNP), hypersensitive C-reactive protein (hs-CRP) and echocardiographic indexes of chronic heart failure. **Methods:** 112 patients with chronic heart failure who were admitted to our hospital from February 2018 to October 2019 were selected as study group, they were divided into Grade II 43 cases, grade III 39 cases and grade IV 30 cases of the American Heart Association (NYHA), and 60 healthy people in our hospital at the same time were selected as the control group. The levels of serum Gal-3, NT-pro-BNP, hs-CRP and echocardiographic indexes of chronic heart failure patients with different heart function grades were compared between the study group and the control group, and the correlation between the above indexes in chronic heart failure patients were analyzed. **Results:** The levels of serum Gal-3, NT-Pro-BNP and hs-CRP in the study group were significantly higher than those in the control group, and the ratio of peak E to peak A (E/A) and left ventricular ejection fraction (LVEF) were significantly lower than those in the control group ($P<0.05$). With the increase of NYHA grade, the levels of serum Gal-3, NT-Pro-BNP and hs-CRP in patients with chronic heart failure gradually increased, the E/A and LVEF decreased gradually ($P<0.05$). The Pearson correlation analysis showed that the serum levels of Gal-3, NT-pro-BNP and hs-CRP were negatively correlated with the E/A and LVEF levels respectively ($P<0.05$). **Conclusion:** The levels of serum Gal-3, NT-pro-BNP and hs-CRP in patients with chronic heart failure are abnormally high, which were related to echocardiographic indexes, the detection of Gal-3, NT-Pro-BNP and hs-CRP is helpful for the diagnosis and evaluation of chronic heart failure.

Key words: Chronic heart failure; Galactose-3; N-terminalpro-brain natriuretic peptide; Hypersensitive C-reactive protein; Echocardiography

Chinese Library Classification(CLC): R541.61 **Document code:** A

Article ID: 1673-6273(2020)19-3707-04

前言

慢性心力衰竭是由各种原因所导致的心脏收缩和(或)舒张功能降低,心脏排血量不能满足机体组织代谢需要所引起的

* 基金项目:重庆市科卫联合医学科研项目(2017QNXM449)

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(收稿日期:2020-01-27 接受日期:2020-02-23)

综合征,是各种心脏疾病的终末阶段^[1]。近年来,随着人口老龄化和人们生活方式的改变,我国慢性心力衰竭的发病率呈上升趋势,如何对慢性心力衰竭进行评估和诊断是临床医生面临的重要问题。超声心动图是目前临床上诊断慢性心力衰竭的重要检测手段^[2],但超声诊断受气体影响较大,且对医生的临床技能水平要求较高,诊断存在一定的主观性^[3]。半乳糖凝集素-3 (Galactose-3, Gal-3)是半乳凝集素家族的重要成员之一,在介导心肌病变中能够起到重要的作用^[4]。氨基末端脑钠肽前体(N-terminal pro-brain natriuretic peptide, NT-pro-BNP)是一种无活性的血管调节肽,主要由心肌细胞合成并分泌,其水平可以反映心功能情况^[5]。超敏C反应蛋白(Hypersensitive C-reactive protein, hs-CRP)是反映机体炎症反应的敏感指标,当发生慢性心力衰竭时,机体处于应激状态,血清hs-CRP升高^[6,7]。本研究分析了慢性心力衰竭患者血清Gal-3、NT-pro-BNP、hs-CRP与超声心动图指标的关系,旨在为慢性心力衰竭的诊断和病情评估提供参考,现报道如下。

1 资料与方法

1.1 一般资料

选择2018年2月~2019年10月我院收治的慢性心力衰竭患者112例作为研究组,纳入标准:(1)所有患者符合《中国心力衰竭诊断和治疗指南》中慢性心力衰竭的诊断标准^[8];(2)患者入院后3天内均进行了超声心动图检查和血清学检查,病例资料完整;(3)无器质性心脏疾病;(4)对本研究知情同意。排除标准:(1)生命垂危或患有精神疾患,无法完成研究者;(2)合并心源性休克、先天性心肌病、心肌炎、肝脏疾病、恶性肿瘤者;(3)近3个月发生感染性疾病或服用影响检测指标药物者。其中男性69例、女性43例,年龄45~82岁,平均年龄(63.56±7.37)岁,体质指数(Body mass index, BMI)18~28 kg/m²,平均

(22.65±2.78)kg/m²,美国心脏病协会(New York Heart Association, NYHA)分级:II级组43例、III级组39例、IV级组30例。另选择同期我院体检的健康人员60例作为对照组,男性41例,女性19例,年龄45~80岁,平均年龄(62.02±8.43)岁, BMI 18~28 kg/m²,平均(21.82±2.56)kg/m²;两组年龄、性别、BMI比较差异无统计学意义($P>0.05$),具有可比性。本研究已获医院伦理委员会批准。

1.2 研究方法

1.2.1 血清学指标的检测 慢性心力衰竭患者于入院次日抽取外周静脉血5 mL,对照组于体检当日抽取外周静脉血5 mL,静置后3500 r/min离心5 min,分离血清,离心半径12 cm,应用酶联免疫吸附法测定血清Gal-3、NT-pro-BNP、hs-CRP水平,试剂盒购自上海基免生物技术有限公司,严格按照试剂盒操作进行。

1.2.2 超声心动图检测 采用PHILIPS彩色多普勒超声仪对两组受试者进行超声心动图检测,记录受试者E峰与A峰比值(E/A)及左心室射血分数(Left ventricular ejection fraction, LVEF)。

1.3 统计学方法

统计学分析应用SPSS23.0软件完成,以[n(%)]进行计数资料的表示,实施 χ^2 检验。以($\bar{x} \pm s$)进行计量资料的表示,多组比较采用单因素方差分析,两组数据比较采用t检验,并应用Pearson相关性分析数据的相关性,以 $P<0.05$ 说明差异具有统计学意义。

2 结果

2.1 两组血清Gal-3、NT-pro-BNP、hs-CRP、E/A及LVEF比较

研究组血清Gal-3、NT-pro-BNP、hs-CRP显著高于对照组,E/A及LVEF显著低于对照组($P<0.05$),见表1。

表1 研究组与对照组血清Gal-3、NT-pro-BNP、hs-CRP、E/A及LVEF水平比较($\bar{x} \pm s$)

Table 1 Comparison of serum Gal-3, NT Pro BNP, hs CRP, E/A and LVEF levels between the study group and the control group($\bar{x} \pm s$)

Groups	n	Gal-3 (ng/mL)	NT-pro-BNP (pg/mL)	hs-CRP (mg/L)	E/A	LVEF (%)
Study Group	112	15.60±2.87	1137.51±228.28	11.42±3.93	0.90±0.21	47.27±5.28
Control group	60	2.32±0.18	52.83±12.84	1.34±0.56	1.08±0.09	61.73±6.07
t		16.826	67.026	8.732	3.762	5.926
P		0.000	0.000	0.000	0.000	0.000

2.2 不同心功能分级慢性心力衰竭患者血清Gal-3、NT-pro-BNP、hs-CRP、E/A及LVEF比较

随NYHA分级升高,慢性心力衰竭患者血清Gal-3、NT-pro-BNP、hs-CRP水平逐渐升高,E/A和LVEF水平逐渐降低,不同NYHA分级患者血清Gal-3、NT-pro-BNP、hs-CRP、E/A及LVEF水平比较有统计学差异($P<0.05$),见表2。

2.3 慢性心力衰竭患者血清Gal-3、NT-pro-BNP、hs-CRP水平与E/A、LVEF的相关性分析

经Pearson相关性分析显示,慢性心力衰竭患者血清Gal-3、NT-pro-BNP、hs-CRP分别与E/A、LVEF呈负相关关系($P<0.05$),见表3。

3 讨论

慢性心力衰竭是各种心脏疾病的终末阶段,具有较高的死亡率,严重威胁人类健康。近年来研究发现,心肌重构在慢性心力衰竭的发生、发展中起到重要作用,是造成慢性心力衰竭发生的主要机制^[9-11]。研究发现,心肌重构的发生是多种因素引起的心肌细胞和心肌细胞外基质变化,其中炎症反应和神经内分泌通路的激活在心肌重构中发挥重要的作用^[12]。Gal-3是近年来新发现的炎症介质,它主要由巨噬细胞合成并分泌,与多种细胞外基质有较强的结合能力^[13]。研究发现,Gal-3参与细胞凋亡、组织纤维化等过程^[14]。Ghorbani A等报道,Gal-3可以诱导

巨噬细胞浸润心肌,并激活纤维母细胞,从而促进心肌重构^[15]。在心肌重构中起到促进作用。NT-pro-BNP 是在 B 型脑钠肽合成中生成的无活性氨基末端片段,其水平主要受心室的机械刺激和神经调节作用^[16]。相比传统的 B 型脑钠肽,NT-pro-BNP 半

衰期更长,血浆浓度更高,且无生物学活性,其分泌和释放量与心室压力和张力有关^[17-19]。C 反应蛋白是一种急性时相反应蛋白,主要由肝细胞合成并分泌,是临床上反映炎症反应的重要指标^[20-22]。

表 2 不同心功能分级慢性心力衰竭患者血清 Gal-3、NT-pro-BNP、hs-CRP、E/A 及 LVEF 水平比较($\bar{x} \pm s$)

Table 2 Comparison of serum Gal-3, NT-Pro-BNP, hs CRP, E/A and LVEF levels in patients with chronic heart failure with different levels of concentric function($\bar{x} \pm s$)

Groups	n	Gal-3(ng/ml)	NT-pro-BNP(pg/ml)	hs-CRP(mg/L)	E/A	LVEF(%)
NYHA II group	43	10.73 $\pm$ 1.33	583.23 $\pm$ 93.44	8.34 $\pm$ 2.02	0.94 $\pm$ 0.11	54.18 $\pm$ 5.34
NYHA III group	39	15.80 $\pm$ 1.47*	1182.38 $\pm$ 293.33*	11.03 $\pm$ 3.24*	0.90 $\pm$ 0.05*	46.92 $\pm$ 5.17*
NYHA IV group	30	22.32 $\pm$ 1.50**	1873.65 $\pm$ 403.43**	16.33 $\pm$ 4.33**	0.85 $\pm$ 0.08**	37.81 $\pm$ 4.37**
F		9.382	105.837	22.932	5.722	10.028
P		0.000	0.000	0.000	0.041	0.000

Note: Compared with NYHA III group, * $P < 0.05$; compared with NYHA II group, ** $P < 0.05$.

表 3 慢性心力衰竭患者血清 Gal-3、NT-pro-BNP、hs-CRP 水平与 E/A、LVEF 的相关性分析

Table 3 Correlation Analysis of serum Gal-3, NT Pro BNP and hs CRP levels with E / A and LVEF in patients with chronic heart failure

Indicators	E/A		LVEF	
	r	P	r	P
Gal-3	-0.423	0.018	-0.673	0.000
NT-pro-BNP	-0.503	0.010	-0.688	0.000
hs-CRP	-0.413	0.014	-0.584	0.000

超声心动图是目前临床上诊断慢性心力衰竭的重要检测手段,具有操作简便、无创、重复性强等特点^[23,24]。其中 LVEF 是反映收缩能力和射血功能的可靠指标,其正常值为 50%~70%,当发生心力衰竭时,心脏射血能力降低,LVEF 也随之降低^[25]。E/A 也是反映心功能的重要指标,当进行超声心动图检查时,二尖瓣口血流速度的频谱分为 E 峰和 A 峰,正常 E/A>1,当心脏舒张功能降低时,E/A 降低^[26,27]。本研究结果中,研究组血清 Gal-3、NT-pro-BNP、hs-CRP 显著高于对照组,E/A 及 LVEF 显著低于对照组,结果表明,相对于健康人慢性心力衰竭患者心脏收缩、舒张功能降低,表现为超声心动图 E/A 及 LVEF 降低,同时慢性心力衰竭患者血清 Gal-3、NT-pro-BNP、hs-CRP 水平升高,可能是慢性心力衰竭患者存在炎症反应和心肌重构导致 Gal-3、hs-CRP 水平升高,而 NT-pro-BNP 水平升高主要与患者心脏负荷增加,刺激 B 型脑钠肽合成分泌有关^[28,29]。进一步分析显示,随 NYHA 分级升高,慢性心力衰竭患者血清 Gal-3、NT-pro-BNP、hs-CRP 水平逐渐升高,E/A 和 LVEF 逐渐降低,这表明血清 Gal-3、NT-pro-BNP、hs-CRP 水平升高和 E/A 和 LVEF 水平降低的慢性心力衰竭患者病情加剧,也提示临床工作中可以通过对上述指标的检测达到诊断以及判断患者病情的目的。

经 Pearson 相关性分析显示,慢性心力衰竭患者血清 Gal-3、NT-pro-BNP、hs-CRP 分别与 E/A、LVEF 水平呈负相关关系,慢性心力衰竭病变是一个持续发展的过程,涉及到多种神经内分泌通路的调节和机体的代偿,患者心功能越低时,心

脏收缩和舒张功能也越低,引起心脏负荷增加,NT-pro-BNP 合成分泌增多,心肌重构加重引起 Gal-3 和 hs-CRP 合成增加,而此时患者超声心动图也表现出 LVEF 和 E/A 的降低^[30]。

综上所述,慢性心力衰竭患者血清 Gal-3、NT-pro-BNP、hs-CRP 水平异常升高,LVEF 和 E/A 明显降低,且随心功能分级的增加,患者血清 Gal-3、NT-pro-BNP、hs-CRP 水平升高及 LVEF 和 E/A 降低越明显,血清 Gal-3、NT-pro-BNP、hs-CRP 与 LVEF 和 E/A 呈负相关,检测 Gal-3、NT-pro-BNP、hs-CRP 有助于慢性心力衰竭的诊断和病情评估。

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