

doi: 10.13241/j.cnki.pmb.2018.22.033

## 血清同型半胱氨酸、高敏 C 反应蛋白及肱踝脉搏波传导速度与冠心病患者冠脉病变程度的相关性研究\*

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**摘要 目的:**探讨血清同型半胱氨酸(Hcy)、高敏 C 反应蛋白(hs-CRP)及肱踝脉搏波传导速度(baPWV)与冠心病患者冠脉病变程度的相关性。**方法:**选取 2015 年 6 月-2017 年 10 月期间承德医学院附属医院收治的疑似冠心病的患者 324 例为研究对象,根据冠状动脉造影结果分为冠心病组 213 例与非冠心病组 111 例,根据不同冠脉病变程度将冠心病组分为单支病变组 87 例,双支病变组 74 例,多支病变组 52 例,检测并对比所有患者血清 Hcy、hs-CRP 水平及 baPWV 值,分析 Hcy、hs-CRP 水平及 baPWV 值与冠心病患者冠脉病变程度相关性。**结果:**冠心病组患者血清 Hcy、hs-CRP 水平及 baPWV 值较非冠心病组升高( $P<0.05$ )。冠心病组不同冠脉病变程度患者血清 Hcy、hs-CRP 水平及 baPWV 值整体比较差异有统计学意义( $P<0.05$ ),多支病变组与双支病变组患者血清 Hcy、hs-CRP 水平及 baPWV 值高于单支病变组,且多支病变组高于双支病变组,差异有统计学意义( $P<0.05$ )。经 Pearson 相关性分析显示,Hcy、hs-CRP 及 baPWV 均与冠心病患者冠脉病变程度呈正相关( $P<0.05$ )。**结论:**冠心病患者血清 Hcy、hs-CRP 水平及 baPWV 值高于非冠心病者,且血清 Hcy、hs-CRP 水平及 baPWV 值随着冠心病患者冠脉病变程度的加重而升高,与冠脉病变程度呈正相关。

**关键词:**同型半胱氨酸;高敏 C 反应蛋白;肱踝脉搏波传导速度;冠心病;冠脉病变程度;相关性

**中图分类号:**R541.4 **文献标识码:**A **文章编号:**1673-6273(2018)22-4346-04

## Correlation Study of Serum Homocysteine, High Sensitive C Reactive Protein and Brachial Ankle pulse Wave Velocity to Degree of Coronary Artery Disease in Patients with Coronary Heart Disease\*

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**ABSTRACT Objective:** To investigate the correlation between serum homocysteine (Hcy), high sensitivity C reactive protein (hs-CRP), brachial ankle pulse wave velocity (baPWV) and degree of coronary artery lesion in patients with coronary heart disease. **Methods:** 324 patients with suspected coronary heart disease who were treated in Affiliated Hospital of Chengde Medical College from June 2015 to October 2017 were selected as the research subjects, according to the results of coronary angiography, the patients were divided into coronary heart disease group with 213 cases and non coronary heart disease group with 111 cases. According to the different degree of coronary artery disease, coronary heart disease group was divided into single branch lesion group with 87 cases, double branch lesion group with 74 cases, multiple branch lesion group with 52 cases. The levels of serum Hcy, hs-CRP and baPWV value were measured and compared in all patients, the correlation between Hcy, hs-CRP levels, baPWV value and the degree of coronary artery disease in patients with coronary heart disease was analysed. **Results:** The levels of serum Hcy, hs-CRP and baPWV value of patients in coronary heart disease group were higher than those in non coronary heart disease group ( $P<0.05$ ). There was significant difference in overall comparison of serum Hcy, hs-CRP levels and baPWV value in patients with different degree of coronary artery disease in coronary artery disease group ( $P<0.05$ ), the levels of serum Hcy, hs-CRP and baPWV value of patients in multiple branch lesion group and double branch lesion group were higher than those in single branch lesion group, and multiple branch lesion group was higher than that of the double branch lesion group, the difference was statistically significant ( $P<0.05$ ). The Pearson correlation analysis showed that Hcy, hs-CRP and baPWV were positively correlated with the degree of coronary artery disease in patients with coronary heart disease ( $P<0.05$ ). **Conclusion:** The levels of serum Hcy, hs-CRP and baPWV value in patients with coronary heart disease are significantly higher than those of non coronary heart disease, and the levels of Hcy, hs-CRP and baPWV value are increased with the severity of degree of coronary artery disease in patients with coronary heart disease, which are positively correlated with the severity of degree of coronary artery disease.

\* 基金项目:河北省医学科学研究重点项目(20120392);承德市科学技术研究与发展计划项目(201601A050)

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(收稿日期:2018-04-17 接受日期:2018-05-11)

**Key words:** Homocysteine; High sensitive C reactive protein; Brachial ankle pulse wave velocity; Coronary heart disease; Degree of coronary lesion; Correlation

**Chinese Library Classification(CLC):** R541.4 **Document code:** A

**Article ID:** 1673-6273(2018)22-4346-04

## 前言

冠心病是临床常见的心血管疾病,具有较高的发病率及病死率<sup>[1,2]</sup>。目前临床上对于冠心病的发病机制尚不明确,机体纤溶、凝血功能失调、血脂异常及炎症反应均是引发冠心病的常见因素,患者在发病后若不进行及时有效的治疗,则会引发心肌缺氧缺血等症状,对患者的生命健康造成严重威胁<sup>[3,4]</sup>。因此,冠心病的早期诊断、及时有效的治疗对改善患者预后具有重要的临床意义。临床上冠状动脉造影作为诊断冠心病的金标准,却因为操作创伤大、检查费用昂贵、不易重复使用等缺点限制了其在临床上的应用<sup>[5,6]</sup>。有研究显示,血清同型半胱氨酸(homocysteine, Hcy)、高敏C反应蛋白(hypersensitive C-reactive protein, hs-CRP)及踝脉搏波传导速度(Brachial ankle pulse wave velocity, baPWV)是血栓栓塞性疾病和动脉粥样硬化发生发展的重要因素<sup>[7,8]</sup>。本研究通过分析Hcy、hs-CRP及baPWV与冠心病患者冠脉病变程度的相关性,旨在为临床诊断、评估冠心病患者病变严重程度提供科学依据,现作如下报道。

## 1 资料与方法

### 1.1 一般资料

选取2015年6月-2017年10月期间承德医学院附属医院收治的疑似冠心病患者324例为研究对象。纳入标准:(1)因胸闷、心悸、胸骨后疼痛等症状入院治疗的疑似冠心病患者,需进行冠状动脉造影;(2)2周内未服用抗凝和溶栓药物治疗;(3)自愿参与本次研究,签署知情同意书。排除标准:(1)肝肾功能不全者;(2)伴有恶性肿瘤、自身免疫性疾病、急慢性感染性疾病者;(3)严重贫血者;(4)精神失常者。所有患者根据冠状动脉造影结果分为冠心病组213例与非冠心病组111例。其中冠心病组患者中男142例,71例,年龄42-74岁,平均年龄(62.31±5.69)岁,合并高血压82例,合并糖尿病69例,吸烟史62例,其中单支病变87例(单支病变组),双支病变74例(双支病变组),多支病变52例(多支病变组)。非冠心病组患者中男67

例,女44例,年龄45-72岁,平均年龄(62.87±5.12)岁,其中合并高血压52例,合并糖尿病31例,吸烟史28例。两组患者一般资料对比差异无统计学意义( $P>0.05$ ),本研究通过承德医学院附属医院伦理委员会批准。

### 1.2 方法

所有患者在入院次日抽取空腹静脉血5 mL,应用离心机(美国Beckman公司)以3000 r/min的转速离心10 min,离心半径为10 cm,将血清与血浆分离,收集离心管上层的血清,并放在-70℃的冰箱中保存待检,应用I2000化学发光免疫分析仪(美国雅培公司生产)检测Hcy水平,应用罗氏E601电化学发光自动免疫分析仪(美国罗氏公司生产)检测hs-CRP水平,试剂盒均由瑞士罗氏公司提供,所有操作均按照试剂盒说明书进行;检测baPWV值前所有受试者休息5 min,采取去枕平卧位,双臂放置在身体两侧,采用日本欧姆龙动脉硬化检测仪进行检测。

### 1.3 观察指标

检测并对比冠心病组与非冠心病组患者血清Hcy、hs-CRP水平及baPWV值,对比单支病变组、双支病变组、多支病变组患者血清Hcy、hs-CRP水平及baPWV值,并分析血清Hcy、hs-CRP水平及baPWV值与冠心病冠脉病变程度的相关性。

### 1.4 统计学方法

采用SPSS19.0统计学软件,计量资料均以( $\bar{x}\pm s$ )的形式表示,组间对比经t检验分析,多组间对比经方差分析,计数资料以%的形式表示,经 $\chi^2$ 检验分析,Hcy、hs-CRP水平及baPWV值与冠心病冠脉病变程度的相关性采用Pearson相关性分析,以 $P<0.05$ 为差异有统计学意义。

## 2 结果

### 2.1 冠心病组与非冠心病组患者血清Hcy、hs-CRP水平及baPWV值比较

冠心病组患者血清Hcy、hs-CRP水平及baPWV值较非冠心病组升高( $P<0.05$ ),见表1。

表1 冠心病组与非冠心病组患者血清Hcy、hs-CRP水平及baPWV值比较( $\bar{x}\pm s$ )

Table 1 Comparison of levels of serum Hcy, hs-CRP and baPWV value between coronary heart disease group and non-coronary heart disease group( $\bar{x}\pm s$ )

Groups	n	Hcy( $\mu\text{mol/L}$ )	hs-CRP(mg/L)	baPWV(cm/s)
Coronary heart disease group	213	23.15± 5.67	6.38± 1.72	1711.63± 199.46
Non coronary heart disease group	111	11.46± 3.21	3.13± 0.26	1290.32± 114.58
t		13.782	15.372	15.697
P		0.015	0.008	0.005

### 2.2 冠心病组不同冠脉病变程度患者血清Hcy、hs-CRP水平及baPWV值比较

冠心病组不同冠脉病变程度患者血清Hcy、hs-CRP水平及baPWV值整体比较差异有统计学意义( $P<0.05$ ),多支病变

组与双支病变组患者血清Hcy、hs-CRP水平及baPWV值高于单支病变组,且多支病变组高于双支病变组,差异有统计学意义( $P<0.05$ ),见表2。

表 2 冠心病组不同冠脉病变程度患者血清 Hcy、hs-CRP 水平及 baPWV 值比较( $\bar{x}\pm s$ )

Table 2 Comparison of levels of serum Hcy, hs-CRP and baPWV value between patients with different degree of coronary artery disease in coronary heart disease group( $\bar{x}\pm s$ )

Groups	n	Hcy( $\mu\text{mol/L}$ )	hs-CRP(mg/L)	baPWV(cm/s)
Single branch lesion group	87	17.52 $\pm$ 4.31	4.53 $\pm$ 0.22	1439.12 $\pm$ 80.56
Double branch lesion group	74	22.13 $\pm$ 6.12*	6.84 $\pm$ 0.18*	1745.43 $\pm$ 131.89*
Multiple branch lesion group	52	25.49 $\pm$ 6.89*#	8.45 $\pm$ 0.27*#	1891.34 $\pm$ 174.58*#
F		102.182	72.685	152.974
P		0.003	0.009	0.000

Note: compared with the single branch lesion group, \* $P<0.05$ , compared with the double branch lesion group, # $P<0.05$ .

### 2.3 Hcy、hs-CRP 水平及 baPWV 值与冠心病患者冠脉病变程度相关性分析

经 Pearson 相关性分析显示, Hcy、hs-CRP 及 baPWV 均与冠心病患者冠脉病变程度呈正相关( $P<0.05$ ), 见表 3。

表 3 Hcy、hs-CRP 水平及 baPWV 值与冠心病患者冠脉病变程度相关性分析

Table 3 Correlation analysis of the levels of Hcy, hs-CRP and baPWV value with the degree of coronary artery disease in patients with coronary heart disease

Indexes	r	P
Hcy	0.783	0.008
hs-CRP	0.695	0.014
baPWV	0.821	0.005

## 3 讨论

Hcy 是一种含硫氨基酸, 据相关研究显示, 高 Hcy 血症与心血管疾病的发生具有密切的相关性, 高 Hcy 血症可使机体血管内细胞功能受到损伤, 对血管平滑肌造成刺激, 进而促进增生, 致使凝血 - 纤溶系统失去平衡、血小板活化等, 最终导致血栓的形成及动脉粥样硬化的发生, 而冠状动脉粥样硬化是发生粥样斑块的基础, 可使管腔狭窄, 甚至管腔闭塞, 是引发冠心病的主要病理过程<sup>[10-12]</sup>。根据免疫和感染学说, 提示炎症反应在冠状动脉粥样硬化的发生与发展过程中发挥着重要作用<sup>[13, 14]</sup>。在动脉损伤早期炎症反应起保护作用, 但当动脉损伤持续存在时则可演变为过度的炎症反应, 此时多种炎症细胞因子被释放, 与细胞表面的受体结合后可引发较为复杂的生物学效应, 促进动脉粥样斑块的生成与发展<sup>[15, 16]</sup>。hs-CRP 是反应机体炎症反应的一种较为敏感的炎症指标, 正常情况下其在血清中的水平较低, 当机体发生组织损伤、感染时, hs-CRP 在血清中的水平则会急速上升<sup>[17]</sup>。近年来, 有较多研究显示 hs-CRP 水平与冠心病的形成与发展具有密切相关性<sup>[18, 19]</sup>。baPWV 是一种能够反映动脉硬化的有效指标, baPWV 值越高, 则说明动脉的僵硬度越高、顺应性越差, 近年来, baPWV 被较多学者认为是诊断早期动脉粥样硬化的敏感指标<sup>[20-22]</sup>。

本次研究结果显示, 冠心病组患者血清 Hcy、hs-CRP 水平及 baPWV 值高于非冠心病组( $P<0.05$ ), 说明 Hcy、hs-CRP 在冠心病患者血清中具有较高的表达水平, 冠心病患者的 baPWV 较非冠心病患者快, 分析其原因可能是高水平的 Hcy 可导致机体血管内皮受到损伤, 加剧机体的炎症反应, 使 hs-CRP 水平升高, 此外 Hcy 还能促进动脉粥样硬化形成, 使 baPWV 加快, 因

此冠心病患者血清中 Hcy、hs-CRP 水平及 baPWV 高于非冠心病患者<sup>[23-25]</sup>。本研究结果还显示, 多支病变组与双支病变组患者血清 Hcy、hs-CRP 水平及 baPWV 值高于单支病变组, 且多支病变组高于双支病变组( $P<0.05$ )。说明随着冠心病患者冠脉病变程度的加重, 患者血清中的 Hcy、hs-CRP 水平随之升高, baPWV 随之加快, 分析其原因可能是高 Hcy 血症可以改变血液成分, 形成血栓, 随着 Hcy 水平的升高机体的炎症反应增强, 使 hs-CRP 水平进一步升高, 而 hs-CRP 能够使单核细胞大量释放炎症介质, 能够直接或间接的引发血栓的形成, 同时 hs-CRP 还存在细胞毒性, 进一步损害血管组织, 使动脉病变程度进一步加重, 并且动脉的僵硬度还会升高, 因此 baPWV 也随之加快<sup>[26-28]</sup>。此外, 经 Pearson 相关性分析显示, Hcy、hs-CRP 及 baPWV 均与冠心病患者冠脉病变程度呈正相关( $P<0.05$ ), 说明 Hcy、hs-CRP 水平升高及 baPWV 加快可加剧冠心病患者的冠脉病变程度, 分析其原因主要是因为 Hcy、hs-CRP 水平的升高可加重冠心病患者冠脉病变程度, 使冠脉的僵硬度升高, 因此 baPWV 也随之升高<sup>[29, 30]</sup>。然而, 本研究仍存在不足之处, 比如未对治疗前后冠心病患者血清 Hcy、hs-CRP 水平及 baPWV 值进行对比分析, 在今后的研究中可对冠心病患者治疗前后的血清 Hcy、hs-CRP 水平及 baPWV 值进行相应分析探讨, 为临床治疗冠心病提供参考依据。

综上所述, 冠心病患者血清 Hcy、hs-CRP 水平及 baPWV 值与冠脉病变程度呈正相关, 并且血清 Hcy、hs-CRP 水平及 baPWV 值较非冠心病者偏高, Hcy、hs-CRP 及 baPWV 可作为判断冠心病冠状动脉病变程度的重要指标, 为临床诊断及治疗提高参考依据。

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