

doi: 10.13241/j.cnki.pmb.2018.23.012

高血压患者动态血压与左心房增大因素回归分析*

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摘要 目的: 高血压病是心脏科常见疾病, 本文观察动态血压(ambulatory blood pressure monitoring, ABPM)不同夜间血压类型患者左心房大小并分析左心房增大的独立危险因素。**方法:** 收集 86 例高血压病患者, 所有患者行 24 小时动态血压及超声心动图检查。根据动态血压中夜间血压下降幅度分为杓形高血压组(夜间血压下降率 $\geq 10\%$, 41 例)和非杓形高血压组(夜间血压下降率 $<10\%$, 45 例)。根据心脏超声左心室长轴切面左心房前后径分两组: 左心房增大组(前后径 ≥ 3.85 cm, 45 例), 左心房正常组(前后径 <3.85 cm, 41 例), 采用 Logistic 多因素回归分析左心房增大的危险因素。**结果:** (1) 非杓形高血压组较杓形高血压组夜间平均收缩压(125.6 ± 15.0 mmHg VS 107.7 ± 14.9 mmHg $P<0.05$)及平均舒张压(70.3 ± 9.0 mmHg VS 60.3 ± 12.2 mmHg $P<0.05$)明显增高, 左心房内径明显增大(4.0 ± 0.48 cm VS 3.74 ± 0.35 cm $P=0.005$)。 (2) 左心房内径增大组夜间收缩压下降率(6.4 ± 8.1 mmHg VS 10.3 ± 6.7 mmHg $P=0.01$)及舒张压下降率(10.1 ± 9.0 mmHg VS 14.3 ± 7.9 mmHg $P=0.02$)较左心房内径正常组明显降低。 (3) Logistic 多因素回归分析示左心室质量、总胆固醇是左心房增大的独立危险因素。**结论:** 夜间血压升高更容易导致左心房内径增大。左心室质量增加、胆固醇增高与左心房内径增大有密切关系。

关键词: 高血压; 动态血压; 左心房; 危险因素

中图分类号: R544.1 文献标识码: A 文章编号: 1673-6273(2018)23-4452-04

Analysis of Dynamic Blood Pressure and Multivariate Regression of Left Atrial Enlargement in Hypertension Patients*

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ABSTRACT Objective: Hypertension is a common disease in cardiology department. The aim of this study was to observe the left atrial size in different nocturnal dynamic blood pressure types and the independent risk factors of left atrial enlargement. **Methods:** Eighty six hypertension patients were enrolled, all patients were examined 24 hours of dynamic blood pressure monitoring(ABPM)and echocardiography. Patients were divided into two groups by ABPM: dipper hypertension group (night blood pressure drop rate $\geq 10\%$, 41 cases) and non-dipper hypertension group (night blood pressure drop rate $<10\%$, 45 cases), and by left atrial size in left ventricular long axis view: left atrial enlargement group (diameter ≥ 3.85 cm, 45 cases)and left atrial diameter normal group (diameter <3.85 cm, 41 cases). Comparison of left atrial diameter was measured between dipper and non-dipper hypertension groups. The risk factors of left atrial enlargement were calculated by Logistic multiple regression analyses. **Results:** Compared with dipper hypertensive group. The night systolic blood pressure(SBP)(125.6 ± 15.0 mmHg VS 107.7 ± 14.9 mmHg $P<0.05$)and diastolic blood pressure(DBP)(70.3 ± 9.0 mmHg VS 60.3 ± 12.2 mmHg $P<0.05$)were higher in non-dipper hypertensive group, and left atrial diameter was larger(4.0 ± 0.48 cm VS 3.74 ± 0.35 cm, $P=0.005$)as well. Compared with left atrial diameter normal group, the decreased rates of night SBP (6.4 ± 8.1 mmHg VS 10.3 ± 6.7 mmHg $P=0.01$) and DBP(10.1 ± 9.0 mmHg VS 14.3 ± 7.9 mmHg $P=0.02$)were lower in left atrial diameter enlargement group. Based on the results of Logistic multiple regression analysis, the independent risk factors of left atrial enlargement included left ventricular mass and cholesterol level. **Conclusions:** Improper control of nocturnal blood pressure may easy induce the enlargement of left atrium. Increasing of left ventricular mass and total cholesterol level has a closely relation with left atrial enlargement.

Key words: Hypertension; Dynamic blood pressure; Left atrium; Risk factors

Chinese Library Classification(CLC): R544.1 **Document code:** A

Article ID: 1673-6273(2018)23-4452-04

* 基金项目: 国家自然科学基金项目(81600267)

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(收稿日期: 2018-04-29 接受日期: 2018-05-23)

前言

中国高血压人群比例高,尤其是老年人群,2012年我国≥18岁成人高血压患者患病率约为25.2%^[1]。目前血压测量方法主要包括诊所血压、家庭血压、动态血压,几种方法各有优势。诊所血压虽然测量方便,但因“白大褂效应”,其血压数值常比家庭血压和动态血压要高。为消除“白大褂效应”,同时监测白天血压、夜间血压及24小时平均血压,现采用24小时动态血压评估高血压患者白天、夜间及24小时平均血压。鉴于高血压影响左心室后负荷,导致左心室舒张功能减退,从而间接影响左心房后负荷。本文通过对不同夜间血压分类,探讨不同夜间血压类型对左心房影响,为更好控制高血压相关性左心房增大提供指导。

1 材料与方法

1.1 一般资料

回顾性分析了2016年9月至2017年6月在我院心内科住院治疗的高血压患者86例,其中男性50例,女性36例,平均年龄60.2±14.5岁。患者纳入标准:(1)符合《中国高血压防治指南》高血压诊断标准^[2],所有高血压患者均服用降血压药物治疗。(2)心脏超声排除合并器质性心脏病。排除标准:(1)轻度二尖瓣狭窄以及中度二尖瓣关闭不全以上。(2)心房颤动。(3)心脏超声提示其他明显器质性心脏病。

1.2 24小时动态血压(ABPM)

采用美国SunTech动态血压仪。设置白天时间为6:00-22:00,白天每隔30分钟自动测量一次;夜间时间为22:00-次日6:00,夜间每隔60分钟自动测量一次。ABPM观察指标:^①一般血压参数:24小时平均血压(24 Hours Average Blood Pressure, 24HABP)、白天平均收缩压(Average Daytime Systolic Blood Pressure, ADSBP)、白天平均舒张压(Average Daytime Diastolic Blood Pressure, ADDBP)、夜间平均收缩压(Average Nocturnal

Systolic Blood Pressure, ANSBP)、夜间平均舒张压(Average Nocturnal Diastolic Blood Pressure, ANDBP);^②血压形态:夜间平均收缩压下降率(Average Nocturnal Systolic Blood Pressure Decreased Rate, ANSBPDR)及舒张压下降率(Average Nocturnal Diastolic Blood Pressure Decreased Rate, ANDBPDR)较白天平均血压下降率≥10%属于杓形血压(Dipper Hypertension Group, DHG);夜间平均血压较白天平均血压下降率<10%属于非杓形血压(Non-Dipper Hypertension Group, NDHG);夜间平均血压大于白天血压属于反杓型高血压。

1.3 超声心动图

采用飞利浦IE33心脏超声机器。患者取仰卧位,平静呼吸,按照美国超声学会推荐方法分别测量室间隔舒张末期内径(Interventricular Septum, IVS)、左心室舒张末期内径(Left Ventricular Diastolic Diameter, LVDD)、左心室射血分数(Left Ventricular Ejection Fraction, LVEF)、左心房前后径内径(Left atrium, LA)、左心室质量(Left Ventricular Mass, LVM)。

1.4 统计学分析

所有数据均采用SPSS19.0统计软件进行数据分析。计量资料以($\bar{x} \pm s$)表示,组间参数比较采用t检验;计数资料以频数或率表示,采用 χ^2 检验分析。左心房危险因素采用Logistic多因素回归分析。 $P < 0.05$ 为差异具有统计学意义。

2 结果

2.1 杓形血压组和非杓形血压组比较

非杓形高血压组较杓形高血压组夜间平均收缩压(125.6 ± 15.0 mmHg VS 107.7 ± 14.9 mmHg $P < 0.05$)和舒张压(70.3 ± 9.0 mmHg VS 60.3 ± 12.2 mmHg $P < 0.05$)高,夜间收缩压及舒张压下降率低($P < 0.05$)。非杓形高血压组左心房前后径较杓形高血压组增大(4.0 ± 0.48 cm VS 3.74 ± 0.35 cm, $P = 0.005$),LVEF下降($P < 0.05$)(结果见表1)。

表1 杓形血压组和非杓形血压组比较

Table 1 Comparison of dipper and non-dipper hypertension group

	Dipper group	Non-dipper group	P
24HASBP(mmHg)	124.8± 17.0	128.1± 14.4	0.33
24HADBP(mmHg)	73.1± 13.9	74.4± 9.6	0.61
ADSBP(mmHg)	127.9± 17.5	128.9± 14.5	0.83
ADDBP(mmHg)	75.2± 14.6	74.2± 9.6	0.74
ANSBP(mmHg)	107.7± 14.1	125.6± 15.0	0.000
ANDBP(mmHg)	60.2± 12.2	70.3± 8.9	0.000
ANSBPDR(%)	15.5± 4.1	2.0± 4.0	0.000
ANDBPDR(%)	19.7± 5.5	5.1± 3.8	0.000
IVS(cm)	0.92± 0.15	0.96± 0.19	0.24
LVDD(cm)	5.01± 0.34	5.13± 0.32	0.06
LVEF(%)	60.2± 2.7	58.4± 3.8	0.013
LA(cm)	3.7± 0.35	4.0± 0.48	0.005
AGE(year)	57.5± 14.1	62.6± 14.6	0.11
LVM(g)	162.3± 44.9	179.6± 56.8	0.12

Note: $LVM = 0.8 * 1.04 * [(IVS + LVID + PWT) * 3 - LVID] + 0.6$ g.

2.2 左心房增大组与左心房正常组比较

左心房增大组较左心房正常组夜间平均收缩压 (122.1±17.7 mmHg VS 111.6±15.5 mmHg P=0.005)增高,夜间收缩压 (6.4±8.1 mmHg VS 10.3±6.7 mmHg P=0.01)及舒张压 (10.1±

9.0 mmHg VS 14.3±7.9 mmHg P=0.02)下降率减低。左心房增大组室间隔增厚(P=0.001),左心室质量增大(190.8±55 mmHg VS 150.0±38.7 mmHg P=0.000),左心室舒张末期内径增大(P=0.000),射血分数下降(P=0.01)(结果见表2)。

表2 左心房增大组(G1)与非左心房增大(G2)组比较

Table 2 Comparison of left atrial enlargement group(G1) and normal group(G2)

	G1	G2	P
24HASBP(mmHg)	129.4±15.8	123.4±15.2	0.08
24HADBPP(mmHg)	74.3±11.5	73.2±12.4	0.06
ADSBP(mmHg)	130.9±16.2	125.5±15.4	0.12
ADDBP(mmHg)	75.0±12.0	74.6±12.7	0.87
ANSBP(mmHg)	122.1±17.7	111.6±15.5	0.005
ANDBP(mmHg)	67.3±11.2	63.6±12.1	0.15
ANSBPDR(%)	6.4±8.1	10.3±6.8	0.01
ANDBPDR(%)	10.1±9.0	14.3±7.9	0.02
IVS(cm)	1.0±0.2	0.87±0.13	0.001
LVDD(cm)	5.2±0.3	4.9±0.2	0.000
LVEF(%)	58±4	60±2	0.01
LA(cm)	4.2±0.3	3.5±0.2	0.000
AGE(year)	62.6±14.6	57.6±14.1	0.11
LVM(g)	190.8±55	150.0±38.7	0.000

2.3 左心房分组与血压分组比较

非杓形高血压组左心房增大率为67%,左心房内径正常组中非杓形高血压组率为37%, $\chi^2=7.78$, P<0.05。左心房内径增大

组明显较左心房内径正常组中非杓形高血压率(67% VS 36%, P=0.005)高(结果见表3)。

表3 左心房分组(G1,G2)与动态血压分组比较

Table 3 Comparison of left atrial group(G1,G2) and dynamic blood pressure group

	Dipper group	Non-dipper group	Total
G1	15	30	45
G2	26	15	41
Total	41	45	86

2.4 左心房增大因素回归分析

Logistic 多因素回归分析发现左心房增大的危险因素包括

左心室质量增加,总胆固醇水平增高(结果见表4)。

表4 左心房增大因素回归分析

Table 4 Multivariate regression analysis of left atrial enlargement

	B	CI95%	Exp(B)	P
LVM(g)	-0.036	0.947-0.983	0.965	0.000
TC(mmol/L)	0.880	1.229-4.728	2.411	0.01

Note: TC=Total Cholesterol.

3 讨论

血压测量方法较多,诊室血压因测量影响因素较多,而动态血压可全面评估整体血压,尤其是监测夜间血压与晨峰血压^[3]。夜间血压及晨峰血压升高是心血管不良事件的预测指标^[4]。正常睡眠中,夜间血压下降呈杓形,下降幅度约10%-20%,下降幅度小于10%属于非杓形,我们的研究发现左心房增大组中非杓形高血压比例较高。Cheng^[5]等人发现夜间血压增高是慢性肾

脏病肾性和心血管事件的危险因素。Ohkub^[6]等人发现夜间血压每下降5%,心血管全因死亡率下降约20%。

考虑到血压影响因素较多,比如交感神经功能紊乱、压力感受器反射异常、睡眠呼吸暂停综合征以及盐敏感性增加^[7]。为排除精神紧张因素,夜间血压比白天血压更好的反应血压控制情况。对于病因未明的夜间高血压患者,可予晚上服用降血压药物,使24小时血压曲线呈杓形^[8]。Wijkman 等^[9]人发现单独夜间血压升高多见于年龄较大患者,多合并糖尿病和心血管病事

件病史。我们的研究发现血压组年龄虽然没有统计学差异,但构形血压组年龄偏大。

左心房增大的原因很多,如二尖瓣疾病、房颤、老年患者、高血压等。Xu 等^[10]人发现通过二维斑点追踪检查高血压患者,其左心房收缩功能有一定程度损害。Hsiang 等^[11]人在动物实验中发现极低密度脂蛋白升高导致心房肌细胞坏死,心房扩大并形成心房颤动,我们的研究发现总胆固醇升高是左心房增大的危险因素。随有左心房功能受损,左心房增大容易合并心房颤动,并导致左心房血栓形成。没有合并二尖瓣疾病的患者,左心房扩张的程度反映了左心室舒张末期压力和左心房压升高的程度^[12]。左心房增大时,在心脏超声其各个径线均增大,左心房前后径使用最广泛^[13],并重复性较好。现在左心房三维容积测量与 CT、核磁共振的测量具有很好相关性^[14],并且在预测心血管不良事件,三维超声具有更高价值^[15]。

长期严重高血压会导致左心室几何形态改变,导致左室心肌增厚,左心室心肌质量增加,心脏超声通过二维胸骨旁长轴切面径线测量可估测左心室质量,三维超声也用于估测左心室质量^[16]。左心室肥厚会导致心血管事件显著增多^[17]。长期高血压会引起左心室舒张功能减退,Nagueh^[18]等人在左心房容积指数基础上增加左心房应变指数,增加了左心室舒张功能减退的诊断比例。Morris^[19]等人通过左心室应变来评估高血压患者左心室总体收缩情况。Solomon^[20]研究发现经过降压治疗后,左心室舒张功能减退会有一定改善。因此,对于血压增高患者,动态血压监测不仅可以诊断"白大衣高血压",还可以了解昼夜血压趋势,以便及时调整药物剂量与时间。同时高血压患者需要行心脏超声检查评估心脏靶器官损伤程度等。

本研究尚存诸多不足。首先左心房大小未使用三维容积精确测量,一定程度上影响结果的准确性;其次无患者体表面积。后期尚需要通过三维心脏超声、更大样本量评估左心房。

参考文献(References)

- [1] 林晓斐.《中国居民营养与慢性病状况报告(2015 年)》发布[J]. 中医药管理杂志, 2015, (13): 79-79
Lin Xiao-fei. Report on nutrition and chronic diseases in China (2015) [J]. Journal of Traditional Chinese Medicine Management, 2015, (13): 79-79
- [2] 中国老年学和老年医学学会心脑血管病专业委员会. 老年高血压的诊断与治疗中国专家共识 (2017 版)[J]. 中华内科杂志, 2017, 56 (11)
China geriatrics and geriatrics society for cardiovascular disease professional committee. The diagnosis and treatment of elderly hypertension with Chinese expert consensus (2017) [J]. Chinese Journal of Internal Medicine, 2017, 56(11)
- [3] Atkinson G, Batterham A M, Kario K, et al. Blood pressure regulation VII. The "morning surge" in blood pressure: measurement issues and clinical significance [J]. European Journal of Applied Physiology, 2014, 114(3): 521
- [4] Pierdomenico S D, Pierdomenico A M, Cuccurullo F. Morning Blood Pressure Surge, Dipping, and Risk of Ischemic Stroke in Elderly Patients Treated for Hypertension[J]. American Journal of Hypertension, 2013, 27(4): 564-570
- [5] Cheng W, Yan L, Zhang J, et al. Prognostic Effect of Isolated Nocturnal Hypertension in Chinese Patients With Nondialysis Chronic Kidney Disease[J]. Journal of the American Heart Association Cardiovascular & Cerebrovascular Disease, 2016, 5(10): e004198
- [6] Ohkubo T, Hozawa A, Yamaguchi J, et al. Ohkubo T, Hozawa A, Yamaguchi J, et al. Prognostic significance of the nocturnal decline in blood pressure in individuals with and without high 24-h blood pressure: the Ohasama study [J]. Journal of Hypertension, 2002, 20(11): 2183-2189
- [7] Sachdeva A, Weder A B. Nocturnal Sodium Excretion, Blood Pressure Dipping, and Sodium Sensitivity[J]. Hypertension, 2006, 48(4): 527
- [8] Scarpelli P T, Gallo M, Chiari G. Chronobiology of blood pressure[J]. Journal of Nephrology, 2000, 13(13): 197-204
- [9] Wijkman M, Länne T, Engvall J, et al. Masked nocturnal hypertension—a novel marker of risk in type 2 diabetes[J]. Diabetologia, 2009, 52(7): 1258-1264
- [10] Xu T Y, Sun J P, Lee A P, et al. Left atrial function as assessed by speckle-tracking echocardiography in hypertension [J]. Medicine, 2015, 94(6): e526
- [11] Lee H C, Lin H T, Ke L Y, et al. VLDL from Metabolic Syndrome Individuals Enhanced Lipid Accumulation in Atria with Association of Susceptibility to Atrial Fibrillation[J]. International Journal of Molecular Sciences, 2016, 17(1): 134
- [12] Nagueh S F, Smiseth O A, Appleton C P, et al. Recommendations for the Evaluation of Left Ventricular Diastolic Function by Echocardiography: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging [J]. Journal of the American Society of Echocardiography, 2016, 29(4): 277-314
- [13] Rosca M, Lancellotti P, Popescu B A, et al. Left atrial function: pathophysiology, echocardiographic assessment, and clinical applications[J]. Heart, 2011, 97(23): 1982
- [14] Rohner A, Brinkert M, Kawel N, et al. Functional assessment of the left atrium by real-time three-dimensional echocardiography using a novel dedicated analysis tool: initial validation studies in comparison with computed tomography[J]. European Journal of Echocardiography, 2011, 12(7): 497-505
- [15] Caselli S, Canali E, Foschi M L, et al. Long-term prognostic significance of three-dimensional echocardiographic parameters of the left ventricle and left atrium [J]. European Journal of Echocardiography the Journal of the Working Group on Echocardiography of the European Society of Cardiology, 2010, 11(3): 250
- [16] Jung H O, Sheehan F H, Bolson E L, et al. Evaluation of Midwall Systolic Function in Left Ventricular Hypertrophy: A Comparison of 3-Dimensional Versus 2-Dimensional Echocardiographic Indices[J]. Journal of the American Society of Echocardiography, 2006, 19(6): 802-810
- [17] Schiattarella G G, Hill J A. Inhibition of hypertrophy is a good therapeutic strategy in ventricular pressure overload [J]. Circulation, 2015, 131(16): 1435
- [18] Morris D A, Belyavskiy E, Aravindkumar R, et al. Potential Usefulness and Clinical Relevance of Adding Left Atrial Strain to Left Atrial Volume Index in the Detection of Left Ventricular Diastolic Dysfunction[J]. Jacc Cardiovascular Imaging, 2017
- [19] Morris D A, Otani K, Bekfani T, et al. Multidirectional Global Left Ventricular Systolic Function in Normal Subjects and Patients with Hypertension: Multicenter Evaluation [J]. J Am Soc Echocardiogr, 2014, 27(5): 493-500
- [20] Solomon S D, Verma A, Desai A, et al. Effect of intensive versus standard blood pressure lowering on diastolic function in patients with uncontrolled hypertension and diastolic dysfunction [J]. Hypertension, 2010, 55(2): 241