·论著·

MPVPCR 与 MPVLR 在 OSAHS 合并高血压中的预测价值*

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【摘要】 目的 探讨平均血小板体积/血小板(MPVPCR)与平均血小板体积/淋巴细胞(MPVLR)在阻塞性睡眠呼吸暂停低通气综合征(OSAHS)合并高血压中的预测价值。**方法** 回顾性收集 2018 年 1 月 1 日~2021 年 1 月 1 日我院心内科 109 例 OSASH 患者,根据患者是否合并高血压,分为单纯 OSASH 组及合并高血压组,比较两组患者一般基线资料;相关性分析 OSAHS 组及合并高血压组与基线资料的相关性;受试者工作特征曲线(ROC)分析 MPVPCR 及 MPVLR 在 OSAHS 合并高血压中的预测价值。**结果** 合并高血压组与单纯 OSAHS 组相比,在呼吸暂停低通气指数(AHI)、最长呼吸暂停时间(LAT)、最低血氧饱和度($MinSaO_2$)水平、淋巴细胞计数、血小板(PLT)、MPVPCR 及 MPVLR 水平上差异有统计学意义($P<0.05$)。相关性表明:高 AHI、高 LAT、高水平 MPVPCR 及MPVLR水平与 OSAHS 发生高血压的风险呈正相关($P<0.05$),而高淋巴细胞计数及高血小板水平与与 OSAHS 发生高血压的风险呈负相关($P>0.05$)。ROC 曲线分析表明 MPVPCR、MPVLR 单独及联合预测 OSAHS 发生高血压的 AUC 分别为 0.686、0.742 和 0.819。**结论** OSAHS 合并高血压组与单纯 OSAHS 组相比 AHI、LAT 更长,MPVPCR 及 MPVLR 水平更高;MPVPCR 及 MPVLR 是 OSAHS 患者发生高血压风险的独立预测因子,两者联合预测价值更高。

【关键词】 平均血小板体积;血小板;淋巴细胞;睡眠呼吸暂停;高血压

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The predictive value of mean platelet volume-platelet ratio and mean platelet volume-lymphocyte ratio in obstructive sleep apnea hypopnea syndrome with hypertension

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【Abstract】 Objective To explore the predictive value of mean platelet volume-platelet ratio (MPVPCR) and mean platelet volume-lymphocyte ratio (MPVLR) in obstructive sleep apnea hypopnea syndrome (OSAHS) with hypertension. **Methods** This study is a retrospective study. Patients from January 1, 2018 to January 1, 2021, 109 with OSASH in the cardiology department of our hospital were collected. According to whether the patients had hypertension, they were divided into a simple OSASH group and hypertension group. We compared the general baseline data of the two groups. Besides, we analyzed the correlation between OSAHS and hypertension and baseline data using spearman's correlation analysis. Finally, we analyzed the predictive value of MPVPCR and MPVLR in OSAHS with hypertension using receiver operating characteristic curve (ROC). **Results** Compared with the simple OSAHS group, the combined hypertension group had significant differences in the apnea-hypopnea index (AHI), the longest apnea time (LAT), minimum blood oxygen saturation ($MinSaO_2$)), lymphocyte count, platelet (PLT), MPVPCR and MPVLR levels ($P<0.05$). The correlation showed that higher levels of AHI, LAT, MPVPCR and MPVLR were positively correlated with the risk of OSAHS hypertension ($P<0.05$), while higher lymphocyte count and platelet levels were negatively correlated with the risk of OSAHS hypertension. ($P>0.05$). ROC curve analysis showed that the AUCs of MPVPCR and MPVLR alone

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and in combination to predict the occurrence of hypertension in OSAHS were 0.686, 0.742 and 0.819, respectively. **Conclusion** Compared with the OSAHS group alone, the OSAHS combined with hypertension group has longer AHI and LAT, and higher levels of MPVPCR and MPVLR; MPVPCR and MPVLR are independent predictors of the risk of hypertension in patients with OSAHS, and the combination of the two is more valuable.

【**Key words**】 Mean platelet volume; Platelets; Lymphocytes; Sleep apnea; Hypertension

阻塞性睡眠呼吸暂停低通气综合征(Obstructive sleep apnea hypopnea syndrome,OSAHS)是一种常见的临床病症[1-4],主要临床表现包括持续响亮的鼾声和疲劳或白天过度嗜睡[5]。老年人比中年人发生率更高(30%~80% *vs* 2%~4%)[1]。高血压和OSAHS严重威胁健康,两者之间存在密切关系。研究表明,30%~50%的高血压患者伴有OSAHS,而50%~60%的OSAHS患者发展为高血压[6]。研究[7-8]表明,平均血小板体积(Mean platelet volume,MPV)可用作某些炎症性疾病的诊断标志物。MPV反映了血小板的活化,与不同的炎症状况有关。在患有糖尿病、心血管疾病、外周动脉疾病和脑血管疾病的患者中,MPV水平升高与低度炎症状态相关。据报道,平均血小板体积与血小板计数比(Mean platelet volume/platelet ratio,MPVPCR)可预测多种疾病的长期死亡率[9-10],包括缺血性心血管疾病、败血症和非酒精性脂肪肝[8]。平均血小板体积与淋巴细胞比率(Mean platelet volume/lymphocyte ratio,MPVLR)是预测ST段抬高型心肌梗死后早期和晚期死亡发生风险的独立指标[11]。目前尚少研究探讨MPVPCR及MPVLR中在OSAHS合并高血压中的水平,因此,本研究探讨MPVPCR及MPVLR在OSASHH合并高血压中的预测价值。

1 资料与方法

1.1 一般资料 回顾性收集2018年1月1日~2021年1月1日我院心内科109例OSASH患者,根据患者是否合并高血压,分成单纯OSAHS组(n=43)及合并高血压组(n=66)。纳入标准:①OSASH符合指南诊断标准[12]。②年龄>60岁。排除标准:①血液病或恶性肿瘤病史。②血细胞比容异常,白细胞计数异常或血小板计数异常。研究经本院伦理委员会批准(20201107152000338207),所有患者均签署知情同意书。

1.2 观察指标 ①记录每位纳入患者的临床、人口统计学如年龄、性别、是否吸烟和实验室数据如淋巴细胞计数、血小板计数(PLT)及MPV,并计算MPVLR及MPVPCR。②多导睡眠图(Polysomnography,PSG)检查:两组患者在入院后都已完善了整夜多导睡眠图(Polysomnography,PSG)检查,内容包括脑电图、眼电图、肌电图和心电图,血氧饱和度,口鼻热敏电阻检测气流及胸廓和腹部运动。通过标准手动对呼吸暂停、低通气和脑电图记录进行评分[13]。记录患者的最长呼吸暂停时间(Longest apnea time, LAT)和最低血氧饱和度(Minimum arterial oxygen saturation,MinSaO$_2$))以及呼吸暂停低通气指数(Apnea-hypopnea index,AHI)。睡眠呼吸暂停被定义为气流完全停止或减弱(下降≥90%)≥10 s。低通气被定义为气流下降≥30%,同时SaO$_2$)下降≥4%,持续时间≥10 s。AHI为PSG记录的睡眠时间内平均每小时呼吸暂停和低通气的次数之和。OSAHS定义为AHI ≥5次/h并伴有症状,分为轻度(AHI:5~14.9次/h)、中度(AHI:15~29.9次/h)和重度(AHI ≥30次/h)。

1.3 统计学分析 所有统计分析均使用SPSS 21.0版进行,通过斯米尔诺夫检验分析连续型变量是否满足正态分布。如数据满足正态分布,以均数±标准差($\bar{x}\pm s$)表示,使用t检验分析。偏态分布的连续型变量表示为中位数[$M(P_{25}\sim P_{75})$],使用非参数检验分析。多个连续型变量的比较使用单因素方差分析。χ^2检验用于比较组间率。多使用*Spearman*相关性分析OSAHS合并高血压与基线资料的相关性;受试者工作特征曲线(ROC)分析MPVPC和MPVLR预测OSAHS中合并高血压的风险,以P<0.05为差异有统计学意义。

2 结果

2.1 两组患者基线资料比较 合并高血压组中年龄(68.72±3.54)岁,女12例(18.18%),吸烟占21例(31.82%);单纯OSAHS组中年龄(51.28±13.21)岁,女10例(23.26%),吸烟占14例(32.56%),两组患者在年龄、性别及吸烟指标上差异无统计学意义(P>0.05)。两组OSAHS参数及实验室指标比较(AHI、LAT、MinSaO$_2$)、淋巴细胞计数、PLT、MPVPCR及MPVLR水平比较差异有统计学意义(P<0.05)。见表1。

2.2 OSAHS发生高血压的风险与基线资料的相关性 相关性分析表明:高AHI、高LAT、高水平MPVPCR及MPVLR水平与OSAHS发生高血压的风险呈正相关(P<0.05),而高淋巴细胞计数及高血小板水平与OSAHS发生高血压的风险呈负相关(P>0.05)。见表2。

表 1　两组患者 OSAHS 参数及实验室指标比较($\bar{x}\pm s$)

Table 1　Comparison of OSAHS parameters and laboratory parameters between the combined hypertension group and the OSAHS group

参数	合并高血压组 (n=66)	单纯 OSAHS 组 (n=43)	t/χ^2	P
AHI(次/h)	45.27±13.88	36.00 ±16.40	3.170	0.002
LAT(S)	73.12±10.22	54.23±10.67	9.269	<0.001
$MinSaO_2$)(×$^{-2}$)	71.68±15.33	90.30±17.58	−5.847	<0.001
淋巴细胞(×10^3/μL)	1.41±0.39	1.72±0.70	2.964	0.004
PLT(×10^3/μL)	202.05±52.02	253.02±45.28	5.260	<0.001
MPV(fL)	10.05±6.30	9.12±0.98	0.959	0.340
MPVPCR	0.05±0.02	0.04±0.01	3.037	0.003
MPVLR	7.20±3.51	4.77±2.27	4.021	<0.001

表 2　OSAHS 发生高血压的风险与基线资料的相关性

Table 2　Correlation between the risk of developing hypertension in OSAHS and baseline data

变量	OSAHS 合并高血压	
	r	P
AHI	0.252	0.008
LAT	0.689	<0.001
$MinSaO_2$	−0.486	<0.001
淋巴细胞	−0.283	0.003
PLT	−0.482	0.190
MPV	0.018	0.851
MPVPCR	0.322	0.001
MPVLR	0.410	<0.001

2.3　MPVPCR 及 MPVLR 在 OSAHS 合并高血压中的预测价值　MPVPCR 预测 OSAHS 发生高血压的风险截点值为>0.05，曲线下面积(AUC)为 0.686，灵敏度为 60.61%，特异性为 79.07%。MPVLR 预测 OSAHS 发生高血压的风险截点值为>6.95，AUC 为 0.742，灵敏度为 60.61%，特异度为 81.40%，联合预测较 MPVPCR、MPVLR 单独预测价值更高，差异有统计学意义($P<0.05$)。见表 3、图 1。

表 3　MPVPC 和 MPVLR 联合预测 OSAHS 中合并高血压的风险

Table 3　MPVPC and MPVLR combined predict the risk of comorbid hypertension in OSAHS

变量	截点值	AUC	灵敏度	特异度
MPVPCR	>0.05	0.686	60.61(40/66)	79.07(34/43)
MPVLR	>6.95	0.742	60.61(40/66)	81.40(35/43)
联合	−	0.819	65.15(43/66)	93.02(61/66)
χ^2/P			3.843/0.041	8.722/<0.001

3　讨论

OSAHS 是一种气道阻塞和睡眠呼吸暂停现象，存在多种致病因素，主要表现为白天嗜睡和夜间睡眠时反复发生呼吸道阻塞。OSAHS 主要发生在肥胖和老年人中。越来越多的研究[14-16]发现并证实 OSAHS 是高血压的独立危险因素，并与高血压密切相关。OSAHS的主要病理特征是间歇性缺氧。在睡眠过程中，OSAHS 患者反复出现的低氧血症和高碳酸血症会刺激已经中枢神经系统和外周化学感受器，使交感神经系统的活动增加，从而使血压升高[8]。此外，反复觉醒可进一步刺激交感神经兴奋，使血浆儿茶酚胺、肾素和血管紧张素Ⅱ水平升高，从而引起末梢血管收缩，最终引起夜间血压升高[14]。本研究探讨 MPVPCR 及 MPVLR 在 OSASHH 合并高血压中的价值，结果表明 MPVPCR、MPVLR 在 OSAHS 轻、中、重 3 组中呈上升趋势。MPVPCR 预测 OSAHS 发生高血压的风险截点值为>0.05，AUC 为 0.686，灵敏度为 60.61%，特异性为 79.07%。MPVLR 预测 OSAHS 发生高血压的风险截点值为>6.95，AUC 为 0.742，灵敏度为 60.61%，特异度为 81.40%。

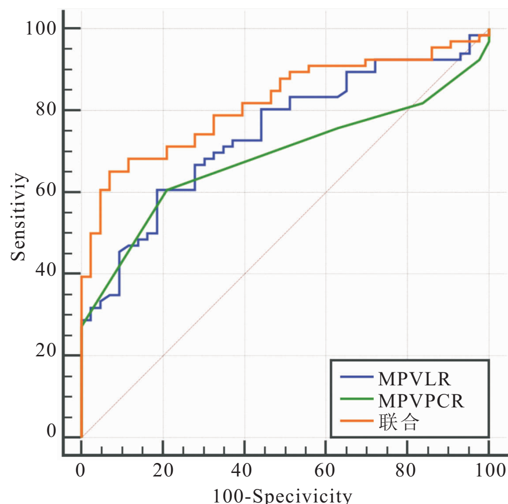

图 1　ROC 显示 MPVPCR 及 MPVLR 在 OSAHS 合并高血压中的预测价值

Figure 1　ROC shows the predictive value of MPVPCR and MPVLR in OSAHS complicated with hypertension

既往有研究报道阻塞性睡眠呼吸暂停(Obstructive sleep apnea，OSA)和 MPV 之间的关系[17]。研究[18]发现 OSA 患者的 OSA 严重程度与 MPV 水平存在正相关，即重度 OSA 患者的 MPV 水平较中度 OSA 高，而中度 OSA MPV 水平较轻度 OSA 更高。OSA 和 MPV 之间关联的确切机制尚不清楚，可能机制有由于重复性夜间低氧血症引起的交感神经系统激活、炎症和氧化应激增加等相关。在本研究中，与单纯 OSAHS 组相比，合并高血压组 MPVR 水平更高。

研究[19-22]报道 MPVPCR 在脓毒症、肝纤维化、腹膜炎和胰腺炎中水平升高，与死亡发生风险有关。之前研究表明 MPVPCR 值比 MPV 值预测由 ST 段抬高型心肌梗塞引起的并发症及预测死亡发生风险的价值更高[7]。Tekin 研究[23]表明 MPVPCR 是主动脉

夹层患者住院并发症和死亡发生风险的强有力的独立预测因子。本研究探讨了 MPVPCR 值对 OSAHS 发生高血压的预测价值,结果表明 MPVPCR 预测 OSAHS 发生高血压的风险截点值为>0.05,AUC 为 0.686,灵敏度为 60.61%,特异性为 79.07%。另外,研究[24-25]表明 MPVLR 目前已作为炎症指标,是预测 STEMI 后早期和晚期死亡率以及院内死亡率的独立指标,目前尚无 MPVLR 在 OSAHS 患者中的研究,因此本研究首次探讨 MPVLR 在 OSAHS 患者的价值,结果与前研究一致,MPVLR 为炎症指标,可预测 OSAHS 发生高血压的风险截点值为>6.95,AUC 为 0.742,灵敏度为 60.61%,特异度为 81.40%。

4 小结与展望

MPVPCR 和 MPVLR 的值可能可作为一种快速且有用的筛查工具,有助于 OSAHS 合并高血压诊断和监测炎症过程。但由于是回顾性研究,样本量相对较小,无法获得某些临床和炎症标志物(如白细胞介素 6、TNF-α 等)的实验室检查结果,因此需更大样本量的前瞻性对照研究探讨 MPVPCR 及 MPVLR 在 OSASHH 合并高血压中的价值。

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