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心电向量图对慢性肺源性心脏病右心室肥厚与扩张的诊断研究*

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摘要 目的:探讨心电向量图(VCG)对慢性肺源性心脏病早期右心室肥厚与扩张的诊断价值。**方法:**选择我院 2015 年 1 月-2016 年 1 月门诊及住院慢性肺源性心脏病患者 100 例,所有患者进行心电向量图和常规心电图(ECG)检查,比较两种方法对慢性肺心病右心室肥厚与扩张的检出率,以及和超声心动图诊断的符合率,另外对比两种检测方法的检测差异,并进行统计分析。**结果:**与超声结果对比,ECG 的检出率为 43.00%(73/100)明显低于 VCG 的 91.00%(91/100),且差异具有统计学意义($X^2=36.326, P=0.000$);VCG 在诊断慢性肺源性心脏病右心室肥厚与扩张方面的敏感性明显高于 ECG($P<0.05$),而两种检测方法的特异度、假阳性预测值及假阴性预测值之间的差异无统计学意义($P>0.05$)。**结论:**以超声心动图为标准,VCG 对于慢性肺源性心脏病早期右心室肥厚与扩张的检出率较高,且具有较高的敏感性,值得在临床上广泛应用。

关键词:心电向量图;慢性肺源性心脏病;心电图;右心室肥厚与扩张

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Diagnostic Study of Vectorcardiogram on Right Ventricle Hypertrophy and Dilatation of Chronic Pulmonary Heart Disease*

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ABSTRACT Objective: To investigate diagnostic value of vectorcardiogram (VCG) on chronic pulmonary heart disease of right ventricular hypertrophy and expansion. **Methods:** 100 cases of patients with chronic pulmonary heart disease were selected from January 2015 to January 2016 in outpatient and hospitalization. All patients were treated with vectorcardiogram and conventional electrocardiogram (ECG) examination. The detection rate and echocardiographic diagnosis coincidence rate of two methods for right ventricular hypertrophy and expansion was compared, in addition, the differences of two kinds of detection methods were compared, which was analyzed statistically. **Results:** Compared with the ultrasound results, the detection rate of ECG was 43.00% (43/100), which was notably lower than 91.00% (91/100) of VCG, and the difference was statistically significant ($X^2=36.326, P=0.000$); The sensitivity of VCG in diagnosis of right ventricular hypertrophy and expansion of chronic pulmonary heart disease was obviously higher than that of ECG ($P<0.05$), and the difference of specific degree, the projections false positive and false negative predictive value of two methods had no statistical significance ($P>0.05$). **Conclusion:** On the basis of echocardiography, the early detection rate of VCG in the right ventricle hypertrophy and expansion of chronic pulmonary heart disease was high, and has high sensitivity, which is worth to be widely applied in clinic.

Key words: Vectorcardiogram; Chronic pulmonary heart disease; Electrocardiogram; The right ventricle hypertrophy and expansion

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前言

慢性肺源性心脏病是心脏病的类型之一,其发病原因主要包括慢性支气管炎/肺气肿等肺部疾病^[1]。患者的主要临床表现为右心室增大等,并且均出现于右心功能代偿之前,因此尽早检查并进行科学有效的治疗具有重要意义^[2]。心电图(Electrocardiogram, ECG)和心电向量图(Vectorcardiogram, VCG)是临床上常用的检查心功能形式,虽然其检测机制基本相同,但是 ECG 只能反映两个电极的电位差,只包括二维波幅的变化,

对于三维空间的变化并不能有效表征,而 VCG 可以记录心脏瞬间变化的三维空间变化,能够更明确心脏结构的三维变化^[3,4]。临床上主要通过 QRS 波群电压的变化及心电轴位移的偏差对右心室肥大进行诊断,但是其受到多方面因素影响,而对检测结果造成偏差。临床上患者不愿意做心脏超声检查,给慢性肺源性心脏病的诊断带来一定的难度^[5]。本研究对比心电向量图和常规心电图,探讨心电向量图对慢性肺心病右心室肥大患者进行初步的筛查和诊断的意义,为临床医生提供诊断依据。

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1 资料与方法

1.1 临床资料

选择我院 2015 年 1 月 -2016 年 1 月门诊及住院就诊的慢性肺源性心脏病患者 100 例, 其中男 52 名, 女 48 名; 年龄 45~80 岁, 平均 (65.17 ± 6.24) 岁; 病程 1~4 年, 平均 (2.17 ± 0.34) 年, 所有患者均符合全国慢性肺源性心脏病诊断标准^[6], 均经超声心动图确诊为右心室肥大。入组标准: ① 具有肺疾病家族病史, 如右心室肥大、心功能不全等。② 经过影像学技术, 如超声心动图、X 线检查等符合慢性肺源性心脏病诊断标准的患者; 入组患者签署知情同意书; 入组无年龄限制。排除标准: 对有先天性心脏病、原发性心肌病及慢性缩窄性心包炎、风湿性心脏病及其风湿性心脏瓣膜病的患者予以排除。所有研究过程均符合我院医学伦理委员会制订的相关规定, 征得患者及其家属同意, 并签署知情同意书。

1.2 方法

所有患者先进行心电图向量图检测, 并在 48 h 内进行心电图检测。VCG 采用心电工作站 SE-1515(深圳理邦公司产品), 具体操作过程: 电极安放, 按 Frank 导联体系定好背部与前胸第五肋间对应正中线上 M 点, 将 V5 的电极放到该处, 再在同一横面水平分别把 V1 放在右腋中线(I 点), V2 放在前正中(E 点), V4 放在左腋中线上(A 点), V3 放在 V2 与 V4 中点(C 点), V6 放到右侧颈项部离中线约 1 厘米处(H 点), 最后放四肢电极(左下肢为 F 点)。系统自动采图。

ECG 采用 SE-1201 心电图机(深圳理邦公司产品), 常规记录十二导联 ECG, 具体操作过程: 电极的安放, 肢体导联右上肢放红色, 左上肢黄色, 下肢右侧黑色, 左侧绿色。胸导联 V1

放置在胸骨右缘第 4 肋间; V2 胸骨左缘第 4 肋间; V3 在 V2 和 V4 连接中点; V4 左锁骨中线与第 5 肋间交点; V5 左腋前线同 V4 水平处; V6 左腋中线同 V4 水平处。确定增益, 描记心电图。

1.3 观察指标

对患者进行心电图向量图和常规心电图检查, 并与其心脏彩超结果比较, 计算心电图向量图、常规心电图的符合率。

1.4 诊断指标

ECG 测量指标^[7]: (1) QRS 电轴右偏 $\geq +110^\circ$; (2) QRS 电压改变: ① $R_{avR} > 0.5 \text{ mV}$; ② $R_{II}、III、aVF} > 2.0 \text{ mV}$, $R_{III} \geq R_{aVF} > R_{II}$; ③ $R_{V1} > 1.0 \text{ mV}$; ④ V5、V6 导联 $R/S < 1.0 \text{ mV}$; (3) V1 的 $AVT \geq 30 \text{ mS}$; (4) V1、V2 导联 ST 下降, T 波倒置。

VCG 诊断右心室肥厚诊断标准^[8,9]: ① 横面 ORS 环向前 + 向右面积 > 总面积 70%; ② 横面 QRS 环向右后面积 > 总面积 20%; ③ 横面 QRS 环最大向量方位 $> 20^\circ$ 或 $< -90^\circ$; ④ 额面 QRS 环在右下或右上面积 > 总面积 20%; ⑤ QRS 环右向力 $> 1.0 \text{ mV}$, 右向力 / 左向力 > 1 。

1.5 统计学方法

所有资料采用 SPSS14.0 系统软件进行统计学分析。计数资料的比较用 χ^2 检验, $P < 0.05$ 为差异有统计学意义。

2 结果

2.1 ECG、VCG 与超声结果的符合率

与超声结果对比, ECG 的检出率为 43.00%(43/100), 而 VCG 的检出率为 91.00%(91/100), ECG 的检出率明显低于 VCG, 且差异具有统计学意义($\chi^2=36.326, P=0.000$), 如表 1 所示。

表 1 ECG、VCG 与超声结果的符合率

Table 1 The ultrasound results coincidence rate of ECG and VCG

Ultrasound results	ECG		VCG	
	Positive	Negative	Positive	Negative
Positive	35	52	79	8
Negative	8	5	12	1
Total	43	57	91	9

2.2 ECG 与 VCG 诊断结果对比分析

VCG 在诊断慢性肺源性心脏病右心室肥厚与扩张方面的敏感性明显高于 ECG, 且差异具有统计学意义($P < 0.05$), 而两

种检测方法的特异度、假阳性预测值及假阴性预测值之间的差异无统计学意义($P > 0.05$), 如表 2 所示。

表 2 ECG 与 VCG 诊断结果对比分析 [n(%)]

Table 2 Analysis of the results of ECG and VCG diagnosis [n(%)]

Project	ECG	VCG	χ^2	P
Sensitivity(%)	35(40.23)	79(90.81)	49.249	0.000
Specificity(%)	5(38.46)	1(7.69)	3.467	0.063
False positives(%)	8(61.54)	12(92.31)	3.467	0.063
False negatives(%)	52(59.77)	8(67.19)	2.152	0.078

3 讨论

ECG 和 VCG 均可以有效诊断右心室肥大和扩张, 同时具有无创、便捷的特点, ECG 是一种应用心电图机检查每一个心

动周期的电活动变化的检查技术,应用范围广,操作简单,但随着人类疾病显著的发展以及人们对医疗技术要求的提高,心电图检查的效果需要进一步提高^[10,11]。VCG 能够记录心脏瞬间产生的电信号在立体结构中的方向和大小,并详细记录^[12],心电图向量图除了心律失常外的各种心脏疾病,比如心肌梗死、心脏增大等都有很好的诊断价值,能够真实描述心脏活动立体的图像,并用于心脏疾病的预防和诊断,在提高临床诊断方面有很好的应用前景,可以弥补心电图对心室肥大诊断的不足和能否在肺心病早期做出预测,起到和心脏超声互相补充的早期诊断作用^[13,14]。在实际工作中,VCG 对慢性肺心病右心室肥大有一定的敏感性和特异性,特别对临床症状不典型患者有早期筛查作用,对今后的诊断治疗起指导方向的作用^[15,16]。我们还发现 VCG 和 ECG 检查在同一个右心室肥大患者的应用中检查结果并不完全一致,VCG 的诊断率要明显高于 ECG,除了心律失常外,VCG 对其他心脏疾病尤其是心脏肥大方面有其独特优势^[17]。

研究结果中,与超声结果对比,ECG 的检出率为 43.00% (43/100),而 VCG 的检出率为 91.00%(91/100),ECG 的检出率明显低于 VCG($X^2=36.326, P=0.000$),同时 VCG 在诊断慢性肺源性心脏病右心室肥厚与扩张方面的敏感性明显高于 ECG ($P<0.05$),出现这种现象的主要原因是心室处于正常状态时,左室壁的厚度是右室壁的三倍,当右心室出现轻度的肥厚时,左心室的除极电势仍然占据优势,综合心向量并不会出现明显变化,然而只有当右心室的明显增厚时,心电综合向量才会出现显著变化^[18],ECG 主要是通过检测两点之间的电位差改变,但是对于右心室轻度肥厚的检出率并不高,另外,慢性肺源性心脏病患者合并其他肺部疾病也会对检测造成一定的影响,而 VCG 可以在不同的平面上立体完整的立体投影,从三维角度反映心脏的电活动,受其他的病变及其他因素影响较小,因此右心室出现肥厚与扩张可以在 VCG 上明显表现,此外还可以根据横切面的 QRS 环的转向确定其肥大的程度与类型,给临床检测带来方便^[3,4,19]。但是两种检测方法的特异度、假阳性预测值及假阴性预测值之间的差异无统计学意义 ($P>0.05$),这与 Ikeda K 等^[20]的研究结果并不完全一致,可能是由于研究中所选病例过少,或者是病例缺少特征性,后期需要进一步研究。

综上所述,ECG 和 VCG 对于慢性肺源性心脏病右心室肥厚与扩张均有一定的诊断意义,而 VCG 的诊断效果明显优于 ECG,虽然均有一定的假阳性和假阴性,因此需要将两种检测方法有效结合起来,避免对慢性肺源性心脏病右心室肥厚与扩张造成误诊,相互补充,为临床诊断提供权威数据。

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