



Correspondence

Significance of different ECG indices for left ventricle enlargement and systolic dysfunction assessment: A cardiac MRI study



Pierre-Yves Courand^{a,d,*}, Brahim Harbaoui^{a,d}, Adrien Grandjean^a, Paul Charles^a, Vinciane Paget^b,
Loïc Boussel^{c,d}, Pierre Lantelme^{a,d}

^a Cardiology Department, European Society of Hypertension Excellence Center, Hôpital de la Croix-Rousse, Hospices Civils de Lyon, F-69004 Lyon, France

^b Cardiology Department, Hôpital Nord-Ouest, F-69400 Villefranche-sur-Saône, France

^c Radiology Department, Hôpital de la Croix-Rousse, Hospices Civils de Lyon, F-69004 Lyon, France

^d Université de Lyon, CREATIS; CNRS UMR5220; Inserm U1044; INSA-Lyon; Université Claude Bernard Lyon 1; Hospices Civils de Lyon, France

ARTICLE INFO

Article history:

Received 31 January 2016

Received in revised form 29 March 2016

Accepted 20 April 2016

Available online 23 April 2016

Keywords:

ECG

Cardiac MRI

Left ventricle enlargement

Left ventricular ejection fraction

SV3

QRS duration

To the Editor,

Numerous ECG indices have been developed to diagnose left ventricular hypertrophy (LVH) and to stratify cardiovascular risk in hypertension [1]. Conversely, ECG indexes usable to assess left ventricular (LV) enlargement are still lacking. ECG is widely available, both for specialists and general practitioners. It can be used as a first tool for dyspnea work-up and also for the follow-up of patients with heart failure. In these clinical settings, simple ECG parameters are of great interest to identify patients with LV remodeling and to quantify reverse remodeling with medical treatment. LV volume can also be assessed by transthoracic echocardiography and cardiac MRI (CMR) using different methods [2]. Recently, we demonstrated using CMR that R wave in aVL lead (RaVL) and S wave in V3 lead (SV3) appeared as the 2 major players in terms of prediction of LV remodeling [3]. Yet some differences were noticed, RaVL being associated with LVH, SV3 and QRS duration with LV enlargement [3]. Transthoracic echocardiography study has also shown that LV remodeling is inversely associated with LV ejection fraction (LVEF) [4]. The aim of the present study was to address the diagnostic performance of these different ECG parameters (SV3, QRS

duration and SV3 $\times$ QRS duration) to predict LV enlargement and/or systolic dysfunction using CMR as a gold standard.

The study included 501 consecutive subjects referred to 2 cardiology departments (Croix-Rousse Hospital, Lyon, France and Nord Ouest Hospital, Villefranche-sur-Saône, France) between April 2007 to March 2014, for the evaluation and management of various cardiac diseases (aetiologies, LVEF or LVMI assessment, stress imaging testing). The inclusion criteria were an available CMR with an assessment of left ventricular end-diastolic volume indexed to the body surface area (LVEDVI) and of LVEF and a 12 lead-ECG performed within a 4-week-period. Median time between CMR and ECG was 5 days (35% patients had 2 exams within 2 days and 75% before within 2 weeks). The following electrical ECG parameters were recorded: SV1, SV3, RV5, RV6, RaVL, and QRS duration. SV3 $\times$ QRS duration was calculated as the product of SV3 (mm) with QRS duration (ms). As previously demonstrated, only SV3 and QRS duration were independently associated with LV enlargement [3]. As a consequence, the present study focuses only on parameters of Cornell voltage and product (RaVL, SV3 and QRS duration) but did not explore Sokolow-Lyon Index as it did not happen to be an independent predictor of LV enlargement [3]. Our CMR protocol has been previously described [5]. CMR was performed with a 1.5 T magnet (Magnetom Symphony Maestro Class, Siemens, Erlangen, Germany). ECG-gated breath-hold segmented cine true fast imaging (True-FISP) was performed in long-axis views (four- and two-chamber views) and finally in short-axis views. On each short-axis slice, the endocardial and epicardial contours were manually traced at end-diastole. LV enlargement was defined by a LVEDVI greater than 92 mL/m² [6,7]; decreased LVEF was defined as lower than 35%.

Quantitative variables were summarized as medians (boundaries of the interquartile ranges). Categorical variables were expressed as percentages. Student paired or unpaired t-tests and non-parametric ANOVA (Mann–Whitney test) were used to compare continuous variables between groups. χ^2 testing was used to compare dichotomous variables. The correlations between ECG parameters (RaVL, SV3, QRS duration and SV3 $\times$ QRS duration) and LVEDVI were assessed with a linear regression analysis (Pearson's coefficient of correlation "r"). To estimate the global accuracy of the same ECG parameters in diagnosing CMR LV enlargement, an empirical receiver-operating characteristic (ROC) curve was built. The area under the ROC curve (AUC) was estimated using the Mann–Whitney statistic and was compared to

* Corresponding author at: Cardiology Department, Hôpital de la Croix-Rousse, 103 Grande Rue de la Croix-Rousse, F-69004 Lyon, France.

E-mail address: pycourand@hotmail.com (P.-Y. Courand).

Table 1

Performance characteristics of ECG indices according to the diagnostic CMR LV enlargement or LVEF <35%.

Index	AUC [95% CI]	p	Optimal cut-off value	Specificity	Sensitivity
Detection of LV enlargement					
<i>All (N = 500)</i>					
SV3	0.701 [0.652–0.750]	<0.001	2.2 mV	96.9	19.1
RaVL	0.597 [0.545–0.650]	<0.001	0.6 mV	67.3	48.5
QRS duration	0.629 [0.579–0.680]	<0.001	144 ms	97.6	11.3
SV3 × QRS duration	0.712 [0.664–0.760]	<0.001	1944 mm·ms	95.7	24.4
<i>No MI (N = 300)</i>					
SV3	0.708 [0.640–0.777]	<0.001	2.1 mV	93.1	21.8
RaVL	0.655 [0.587–0.724]	<0.001	0.8 mV	80.5	40.3
QRS duration	0.667 [0.600–0.734]	<0.001	144 ms	97.3	18.0
SV3 × QRS duration	0.726 [0.659–0.793]	<0.001	2346 mm·ms	98.2	20.5
<i>Men with no MI (N = 174)</i>					
SV3	0.706 [0.624–0.787]	<0.001	2.1 mV	94.6	23.3
RaVL	0.650 [0.566–0.734]	<0.001	0.8 mV	81.2	40.3
QRS duration	0.611 [0.525–0.697]	0.017	144 ms	94.6	16.7
SV3 × QRS duration	0.721 [0.641–0.802]	<0.001	1974 mm·ms	94.6	25.0
<i>Women with no MI (N = 126)</i>					
SV3	0.673 [0.529–0.816]	0.019	2.0 mV	96.3	22.2
RaVL	0.690 [0.558–0.823]	0.010	0.9 mV	84.3	44.4
QRS duration	0.695 [0.567–0.823]	0.008	144 ms	100	22.2
SV3 × QRS duration	0.678 [0.532–0.823]	0.016	2340 mm·ms	98.1	27.8
<i>QRS duration ≥ 120 ms (N = 64)</i>					
SV3	0.787 [0.675–0.900]	<0.001	2.0 mV	90.9	45.2
RaVL	0.645 [0.508–0.782]	0.046	1.0 mV	84.8	38.7
QRS duration	0.650 [0.512–0.782]	0.040	144 ms	75.8	61.3
SV3 × QRS duration	0.794 [0.684–0.905]	<0.001	1512 mm·ms	81.8	67.7
<i>MI (N = 201)</i>					
SV3	0.681 [0.607–0.756]	<0.001	1.7 mV	93.5	27.8
RaVL	0.538 [0.458–0.619]	0.348	0.6 mV	70.0	44.0
QRS duration	0.562 [0.482–0.643]	0.132	96 ms	62.0	53.3
SV3 × QRS duration	0.682 [0.608–0.756]	<0.001	1616 mm·ms	90.7	31.1
<i>Left bundle branch block (N = 37)</i>					
SV3	0.727 [0.559–0.895]	0.020	2.2 mV	93.3	54.5
RaVL	0.542 [0.356–0.729]	0.665	1.0 mV	86.7	27.3
QRS duration	0.602 [0.418–0.785]	0.300	144 ms	86.7	50.0
SV3 × QRS duration	0.727 [0.561–0.894]	0.020	3090 mm·ms	93.3	50.0
<i>LVEF < 35% and QRS duration ≥ 120 ms (N = 30)</i>					
SV3	0.783 [0.604–0.961]	0.026	2.2 mV	100.0	47.8
RaVL	0.705 [0.442–0.967]	0.201	0.6 mV	75.0	77.3
QRS duration	0.752 [0.568–0.935]	0.047	144 ms	85.7	73.9
SV3 × QRS duration	0.801 [0.633–0.970]	0.017	2755 mm·ms	100.0	56.5
Detection of LVEF < 35%					
<i>All (N = 501)</i>					
SV3	0.703 [0.647–0.758]	<0.001	2.0 mV	95.4	23.4
RaVL	0.609 [0.545–0.672]	0.001	1.0 mV	90.4	20.8
QRS duration	0.651 [0.595–0.707]	<0.001	132 ms	95.9	14.8
SV3 × QRS duration	0.717 [0.662–0.771]	<0.001	2076 mm·ms	96.2	26.6
<i>No MI (N = 300)</i>					
SV3	0.687 [0.569–0.805]	<0.001	1.9 mV	92.0	39.4
RaVL	0.690 [0.595–0.786]	<0.001	1.0 mV	89.4	30.3
QRS duration	0.712 [0.610–0.814]	<0.001	140 ms	96.6	36.4
SV3 × QRS duration	0.705 [0.587–0.822]	<0.001	2180 mm·ms	96.6	39.4
<i>Men with no MI (N = 174)</i>					
SV3	0.727 [0.604–0.829]	0.001	2.1 mV	94.0	45.5
RaVL	0.647 [0.521–0.773]	0.026	1.0 mV	90.6	18.2
QRS duration	0.716 [0.604–0.829]	0.001	140 ms	94.6	36.4
SV3 × QRS duration	0.741 [0.613–0.870]	<0.001	2180 mm·ms	96.0	45.5
<i>Women with no MI (N = 126)</i>					
SV3	0.596 [0.362–0.831]	0.292	1.9 mV	94.7	27.3
RaVL	0.764 [0.631–0.896]	0.004	1.0 mV	87.6	54.5
QRS duration	0.660 [0.455–0.865]	0.081	107 ms	91.2	45.5
SV3 × QRS duration	0.608 [0.370–0.846]	0.238	2466 mm·ms	98.2	36.4
<i>QRS duration ≥ 120 ms (N = 64)</i>					
SV3	0.739 [0.611–0.868]	0.001	1.9 mV	89.5	50.0
RaVL	0.581 [0.437–0.725]	0.274	1.1 mV	86.8	23.1
QRS duration	0.684 [0.542–0.825]	0.013	156 ms	92.1	34.6

(continued on next page)

Download English Version:

<https://daneshyari.com/en/article/5963829>

Download Persian Version:

<https://daneshyari.com/article/5963829>

[Daneshyari.com](https://daneshyari.com)