Cardiac Syndrome X Electrocardiographic Profile using High-Resolution Signal-Averaged VCG

M Matveev, V Krasteva, S Tsonev, M Milanova, R Prokopova, I Christov*

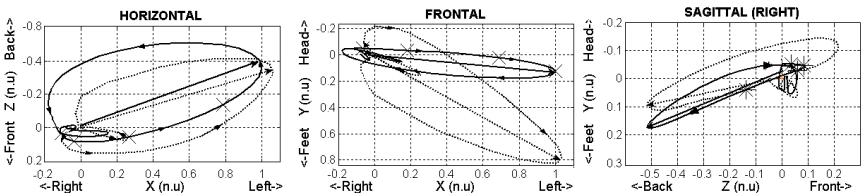
Institute of Biophysics and Biomedical Engineering, Sofia, Bulgaria

Cardiac syndrome X (CSX) is a clinical condition characterized by angina, positive stress test and negative coronary angiography. Due to the typical ischemic changes in ECG during stress test, myocardial ischemia has been suggested to play a role. The aim of this study is to obtain CSX patterns of the vectorcardiographic (VCG) loop in the horizontal (H), frontal (F) and right sagittal (RS) planes of the Frank corrected orthogonal leads (X,Y,Z) and to assess their similarity with the reference VCG loops of normal subjects. A possible significant difference might indicate further comparisons between VCG loops of CSX and ischemic heart disease (IHD).

This study used Frank X,Y,Z leads of 56 high-resolution ECG recordings at rest in patients with CSX. The mean duration of the records was 11.8±4.8 minutes. Synchronous averaging of the normal atrioventricular complexes in each record was applied for calculation of averaged P-QRS-T waveforms for X,Y,Z, and construction of the averaged spatial VCG loop. The VCG loops of all CSX recordings were synchronously superimposed to obtain a pattern of the spatial VCG loop, typical for CSX. The patterns of its three projections in H, F, RS- planes were used for calculation of the maximal QRS and T vectors (magnitudes, angles) and instant vectors (angles). The reference VCG data were adopted from a published study of 100 normal subjects.

The presented figure and table contain basic results found for CSX after synthesis of the VCG patterns and identification of the angles of the maximal QRS and T vectors in H, F and RS planes. These results suggest that CSX electrocardiographic profile could be considered as a variant of normal profile, without the typical VCG changes in IHD.

VCG indices	Horizontal plane		Frontal plane		Right Sagittal plane	
	Normal	CSX	Normal	CSX	Normal	CSX
Angle max QRS (Deg)	335±30	328±16	42.3±7.2	4.5±39	174.3±22.3	168±38
Angle max T (Deg)	52±12.5	20±57	36.2±10.1	27±48	33.7±30.2	35.5±70



VCG loops and max QRS vectors for CSX (⁻) and Normal (···) subjects.