Fragmented QRS Complex in Acute Anterior Myocardial Infarction and Coronary Sinus Blood Flow: Is There any Relevance?

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Abstract

Background- Patients with QRS fragmentation following myocardial infarction (MI) are at greater risk of cardiac death. Transthoracic echocardiography (TTE) can be used as a method for evaluating the coronary sinus blood flow (CSBF) and coronary sinus velocity time integral (CSVTI). The present study reports measurement of CSBF and CSVTI by TTE in 100 acute anterior MI cases, half of them with fragmented QRS.

Methods: Our study included 100 patients with acute anterior MI in whom CSBF and CSVTI were measured by the use of TTE. Fifty of all the patients had fragmented QRS complex and 50 patients were without fragmented QRS complex, while there was no difference in terms of LVEF in both groups of study.

Results- CSBF (303 ±126 ml/min vs. 258 ± 121 ml/min; p=0.001) and CSVTI (14.45 ± 2.85 ml vs.10.85 ±2.69 ml; p=0.003) were significantly lower in the acute anterior MI patients with fragmented QRS in comparison with the patients with acute anterior MI without fragmented QRS.

Conclusion- We conclude that CSBF and CSVTI can be measured by TTE in acute MI patients and these variables are reduced in acute anterior MI patients with fragmented QRS***(Iranian Heart Journal 2011; 12 (2):23-25).***

Keywords: Coronary Sinus Blood Flow■ Fragmented QRS■ Myocardial Infarction

Fragmented QRS (fQRS) complex is an important factor for the prediction of cardiac events in patients with ischemic heart disease. fQRS complex on the surface ECG is defined as RSR´ pattern with or without Q wave. RSR´ patterns can be in the form of one R wave (R´) added to QRS complex or notching of S wave, or more than one R´ (fragmented) in two contiguous leads and complete or incomplete right bundle branch block, or left bundle branch block, are excluded from the definition of fQRS.[1]

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Patients who develop QRS fragmentation following myocardial infarction may have increased risk of cardiac death and heart failure.[2] Transthoracic echocardiography (TTE) can be used as a method for evaluating coronary artery disease.[3] The coronary sinus blood flow (CSBF) can be used to evaluate cardiac perfusion. Although invasive methods via cardiac catheterism are standard method for the evaluation of cardiac perfusion, transesophageal echocardiography (TEE) can be used in determining CSBF.[4]

Coronary artery bypass graft surgery (CABG) can increase the peak velocity of CSBF and its VTI in post-cardiopulmonary bypass (CPB).[5] TTE prepares a non-invasive method for measuring CSBF.[4] The aim of this study was to measure coronary sinus velocity time integral (CSVTI) and also CSBF with TTE in patients who developed acute myocardial infarction (MI) with and without fragmented QRS.

Methods

Our study included 100 patients with acute anterior MI in whom CSBF and CSVTI were measured by the use of TTE. Fifty of all the patients had fragmented QRS complex and 50 were without fragmented QRS complex, while there were no differences in terms of LVEF in both groups of the study.

Statistical analysis was performed using SPSS® for Windows version 15.0. Quantitative variables were described as mean (±SD) and qualitative variables as frequency (relative frequency). Statistical significance was set as $p<0.05$. Means, standard deviations (SD), and standard error (SE) were calculated for each of the scale measurements. Non-parametric tests were used in the statistical analyses wherever data were not normally distributed.

Results

There was a significant decrease in CSBF (303 ±126 ml/min vs. 258 ±121 ml/min; p=0.001) and CSVTI (14.45 ±2.85 ml vs.10.85 ±2.69 ml; p=0.003) in the acute anterior MI patients with fragmented QRS in comparison to the acute anterior MI patients without fragmented QRS.

Discussion

The mechanism of fQRS can be due to a lack of homogeneous ventricular activation begotten by scar formation or ischemia. In fact, viable myocardium is mixed irregularly with fibrous tissue. Ischemic myocardium has slow activation due to the reduced velocity of action potential upstroke and this can result in a lack of homogeneous activation of the ventricle. Also, healing process can result in connective tissue, which intersperses among muscle bundles and results in the fragmentation of QRS. This phenomenon is more prominent at the periphery of necrotic area because connective tissue can enter the viable myocyte area and change the muscle fibers interconnection.[7]

Measuring CSBF by TTE is believed to be able to reduce the coronary artery flow and thus reduce CSBF and CSVTI in acute MI patients.[4] In our study, CSBF and CSVTI were reduced in the acute anterior MI patients with fragmented QRS.

Conclusion

We conclude that CSBF and CSVTI can be measured by TTE in acute MI patients and these variables are reduced in acute anterior MI patients with fragmented QRS. On the other hand, acute MI patients with bundle

branch block are at an increased risk of in-hospital and one-month mortality. Consequently, TTE, as a non-invasive measurement, can evaluate coronary perfusion in acute MI patients.

Conflict of interest

No conflicts of interest have been claimed by the authors.

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