Hubungan antara rasio initial dan terminal ventricular activation velocity pada EKG 12 sadapan dengan keberadaan jaringan parut miokardium = Association of initial and terminal ventricular activation velocity ratio on 12 leads ECG with myocardial scar presence

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Abstrak

ABSTRAK
Latar Belakang. Jaringan parut fibrosis pasca infark berpotensi menyebabkan aritmia fatal, iskemia berulang, gagal jantung, dan kematian jantung mendadak. Deteksi jaringan parut akan menentukan strategi tatalaksana selanjutnya yang menguntungkan setiap pasien. Resonansi magnetik jantung (RMJ) merupakan alat diagnostik baku emas yang tidak dapat diterapkan pada semua pasien. EKG 12 sadapan dapat menjadi pilihan alternatif. Rasio initial dan terminal ventricular activation velocity (vi/vt) pada EKG membandingkan kecepatan impuls listrik pada awal (vi) dan akhir (vt) kompleks QRS. Jaringan parut akan mempunyai vi/vt yang berbeda dari jaringan normal karena kondisi iskemia mengubah aktivitas elektrik dan penjalaran impuls listrik akibat remodeling kanal ion dan proses transport ion.

Metode. Penelitian ini merupakan studi potong lintang, mengikutsertakan subyek yang menjalani RMJ di Pusat Jantung Nasional Harapan Kita selama Januari 2013-Agustus 2014 yang diambil secara konsekutif. Penilaian jaringan parut miokardium pada RMJ dilakukan dengan teknik late gadolinium enhancement yang dinilai secara kualitatif. Vi/vt diukur secara manual pada EKG 12 sadapan kemudian diambil reratanya pada tiap sadapan bersuaian.

Hasil. Sebanyak 113 subyek laki-laki dengan rerata umur 55.7±9.7 tahun diikutsertakan dalam analisis. Mayoritas subyek mempunyai jaringan parut 1 teritori dan melibatkan teritori yang diperdarahi arteri left anterior descending (LAD). Analisis vi/vt secara umum di tiap sadapan menunjukkan nilai vi/vt yang lebih kecil secara signifikan terhadap keberadaan jaringan parut miokardium dengan nilai p<0.001 untuk sadapan V1-V5, p=0.006 untuk sadapan I, aVL, V6 dan p=0.004 untuk sadapan II, III, aVF. Analisis secara spesifik nilai vi/vt sadapan V1-V5 bermakna terhadap teritori LAD yang isolated maupun mixed, sedangkan sadapan I, aVL, V6 dan sadapan II, III, aVF hanya bermakna terhadap jaringan parut yang mixed. Dari analisis ROC didapatkan nilai ambang batas vi/vt 1.35 mV di sadapan V1-V5 dengan sensitivitas 71.4% dan spesifisitas 75%. Nilai ambang batas vi/vt di sadapan II, III, aVF adalah 1.20 mV dengan sensitivitas 69.4% dan spesifisitas 66.7%.

Kesimpulan. Vi/vt pada EKG 12 sadapan memiliki hubungan dengan lokasi dan keberadaan jaringan parut miokardium. Nilai vi/vt 1.20-1.35 mV berhubungan dengan keberadaan jaringan parut miokardium di teritori LAD dan RCA dengan sensitivitas 69.4-71.4% dan spesifisitas 66.7-75%.
<hr><i>ABSTRACT
Background. Fibrotic scar tissue post infarction may potentially lead to fatal arrhythmias, recurrent ischaemia, heart failure, and sudden cardiac death (SCD). Detecting myocardial scar will guide further

treatment which has the most advantages for each patient. Cardiac magnetic resonance (CMR) is still a gold standard which cannot be applied to every patient. A 12-leads ECG might be an alternative. Initial and terminal ventricular activation velocity ratio on surface ECG is comparing elecrical conduction at the beginning (vi) and at the end (vt) of the QRS complex. Myocardial scar tissue will have a different vi/vt than a normal tissue because ischaemia change cellular electrical activity and impulse propagation due to remodelling of intracellular ion channels and transport processes.

Methods. This is a cross-sectional study. A consecutive subjects who underwent CMR in National Cardiac Centre Harapan Kita during January 2013 and August 2014 were included. Myocardial scar were analyzed visually using late gadolinium enhancement CMR. Vi/vt on 12-leads ECG were measured manually on each lead and mean of each contiguous leads were included into analysis.

Results. A total of 113 male subjects with average age of 55.7±9.7 years old were enrolled. Myocardial scar were located in 1 territory or more in most of subjects and left anterior descending (LAD) territory as the most common territory. General analysis of vi/vt in each contiguous leads shows significantly smaller vi/vt value in myocardial scar presence with p value <0.001 in V1-V5 leads, p=0.006 in I, aVL, V6 leads, and p=0.004 in II, III, aVF leads. Specific analysis of vi/vt in V1-V5 leads show significant difference of vi/vt in isolated and mixed scar in LAD territory, meanwhile vi/vt in I, aVL, V6 and II, III, aVF leads show significant difference of vi/vt only in mixed scar in each territory according to contiguous leads. A cut-off value 1.35 mV of vi/vt in V1-V5 leads with 71.4% sensitivity and 75% specificity and a cut-off value 1.20 mV of vi/vt in II, III, aVF leads with 69.4% sensitivity and 66.7% specificity were obtained by ROC analysis.

Conclusion. Vi/vt on 12-leads ECG associated with myocardial scar presence and location. A value of vi/vt 1.20-1.35 mV associated with myocardial scar presence in LAD territory and RCA territory with 69.4-71.4% sensitivity and 66.7-75% specificity.</i>