Diagnostic accuracy of two dimensional speckle tracking echocardiography in prediction of coronary artery stenosis severity

Thesis

Submitted for partial fulfillment of MD degree in

Critical Care Medicine

By

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Summary

INTRODUCTION

Echocardiographic evaluation of segmental and global myocardialfunction plays a critical rolein the diagnosis and management of coronary arterydisease.Speckle-tracking echocardiography(STE) is a new noninvasive imaging technique that quantitatively analyzesglobal and regional myocardial function. It presents an objective, semiautomatic, and angle-independent analysis of longitudinal peak systolicstrain (LS) based on speckle tracking and provides a single bull's-eyesummary of the LV segmental wall strain.

Objectives

1- To assess the accuracy of global and segmental longitudinal strain (LS)using speckle tracking echocardiograghy (STE) to detect resting myocardialischemia compared with visual assessment by conventional 2-dimensional echocardiography (2DE) using coronary angiography as agold standard.

2- To evaluate the diagnostic accuracy of 2D global longitudinalstrain(GLS) obtained by 2D-STE speckle tracking echocardiography in prediction of severity of coronary artery disease (CAD) in correlation with coronary angiography results.

PATIENTS AND METHODS:

The study included 100 patients with ACS who were admitted to medical ICU and CCU with mean age of 58.3 years, 56 patients (56%) of them were males.patients were classified into groups according to angiographic results. We classified the patients according to the severity of the lesion into group with lesion more than 70% included 74 (74%) patients and group with lesion less than 70% included 26 (26%) patients and we also classified the patients by the number of vessels affected into three groups: one vessel group was 41 (41%) patients, two vessel group was 38 (38%) patients and three vessel group was 21(21%) patients.Patients with bundle branch block with QRS more than 120 ms,severe valvular disease, previous heart surgery, extensive comorbidity with short life expectancy, atrial fibrillation with heart rate more than 100 beat per minute, or anycondition interfering with the patient's ability to comply were excluded from this study.

All patients were examined and subjected to the following:

1- Clinical evaluation. Full history taking , full clinical examination asregarding body surface area ,heart rate , blood pressure (systolic anddiastolic),also including risk factors as regarding (age, sex, hypertention ,DM, dyslipidemia, smoking) , pharmacological therapy as regarding (ACEIs, ARBS, Beta blockers, Statins, Aspirin and Clopidogril) and laboratoryevaluations were done to all patients.
2- Electrocardiogram:The ECG was obtained at admission. Evidence of ischaemiadefined as STEMI [ST-elevation . 0.1 mV (0.2 mV in precordial leads V1–V3)] in two or more contiguous leads on any ECG during admission,any ST-deviation .0.5 mm or symmetric T-wave inversion 0.3 mm in two ormore contiguous leads. The sum of all ST-segment deviations exceeding 0.5mm was recorded.
3- Biochemical analyses:A diagnosis of MI was based on elevated CK MB and troponin I abovethe upper limit of normal defined by the laboratory at our hospital. Bloodsamples were drawn immediately after admission.
4- Echocardiography**:**Echocardiography was performedusing Philips Epic 7C immediately prior to coronaryangiography.Three consecutive cycles in three apical planes (four-chamber, two-chamber,and long axis) were obtained by conventional two-dimensionalechocardiography, using second harmonic imaging.LV ejectionfraction (LVEF) was calculated from four- and two chamber images,using the modified Simpson's rule. Wall motion score (WMS) was assessed in a 16-segment model. Segmental wall motion was judged byan experienced cardiologist as normal, 1; hypokinetic,2; akinetic, 3; anddyskinetic, 4. WMS index (WMSI) represents the average value of analysedsegments. Longitudinal strain was measured by speckletracking echocardiography (STE) using the 17-segmentmodel. Values of all segmentswere averaged to obtain global longitudinal strain (GLS).
5- Coronary angiography: Coronary angiography was performed on clinical indication by standard(Judkins) technique, using digital imaging acquisition and storage.

Results:

A correlation analysis was done between echocardiographic data including (EF and WMSI) and angiographic data regarding number of vessels affected showed good significant correlation (p value <0.0001). A correlation analysis also was done between segmental and global strain results and angiographic data regarding number of vessels affected showed good significant

correlation in most of segments (p value <0.001).And a good significant correlationbetween GLS and number of vessels affected (p value <0.0001)**.**According to angiographic results regarding the severity of lesion patients We found that the optimal cutoff value of GLS was 15.9 for predicting lesion more than 70%. The sensitivity, specificity of GLS versus WMSI were (88.1% &90.2%)vs(68.5% vs68.3%), respectively for predicting lesion more than 70%.

Conclusion:

Global longitudinal strain (GLS) has higher sensitivity, specificity and diagnostic accuracy for the detection of severity of lesion, number of vessel affected than WMSI. GLS can also predict culprit artery affected.