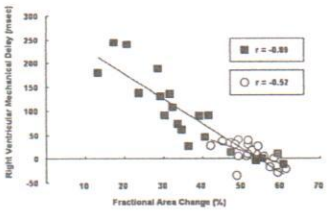
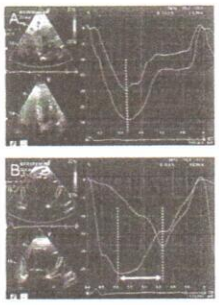
Cardiology: Diagnosis of Cardiovascular Disease, continued

CLINICAL IMPLICATIONS: This novel echocardiographic technique has the potential for identifying patients with subclinical RV dysfunction.





DISCLOSURE: Angel Lopez-Candales, None.

SCREENING FOR ATHEROSCLEROSIS: INITIATING SECONDARY PREVENTION FOR HIGH-RISK YOUNG TO MIDDLE-AGED ADULTS

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PURPOSE: The Framingham risk score is recommended for identifying individuals at high risk for a future event. However, the burden of cardiovascular disease resides in patients stratified as low and intermediate risk simply because of the large number of people receiving this classification. We propose the need to move beyond risk stratification for cardiovascular disease to identifying the presence of atherosclerosis in young to middle-aged adults who are truly at risk. The purpose of this analysis is to compare and contrast the role of Framingham risk stratification in the identification of atherosclerosis and risk for future events in a young to middle-aged population.

METHODS: Men (≤ 55 years) and women (≤65 years) without prior coronary heart disease scheduled for elective cardiac catheterization were studied. Subjects underwent coronary angiogram, carotid ultrasound and fasting lipid testing on the same day. Framingham risk scores were calculated. Endpoints included the presences of atherosclerosis (carotid or coronary disease) and one-year outcomes (hard events and future revascularization).

RESULTS: Men (n=110) and women (n=136) were studied. Atherosclerosis was present in 170 subjects (carotid disease n=149, coronary disease n=124). Per Framingham risk classification, 73%, 8%, 19% of subjects presented as low, intermediate and high risk, respectively. Median follow-up was 19 months. 25 subjects developed 35 events that included death (n=2), stroke (n=5), MI (n=5), and revascularization (n=23). Neither lipid testing nor Framingham risk scores predicted the presence of atherosclerosis or future events. Overall, 16% of subjects with atherosclerosis who were classified as low or intermediate risk had events compared to 14% of those at high risk. No future events occurred in subjects without documented atherosclerosis.

CONCLUSION: Many young to middle-aged adults classified as low or intermediate-risk have atherosclerosis and develop cardiovascular events. Framingham risk scores were not predictive of either.

CLINICAL IMPLICATIONS: By shifting to a focus on identifying and aggressively treating atherosclerosis, screening can easily be accomplished using non-invasive strategies, such as carotid ultrasound to reduce the overall burden of disease.

DISCLOSURE: Ana Schaper, None.

THE EIGENVALUES OF THE ELECTROCARDIOGRAM: A NEW ELECTRICAL CARDIAC MARKER FOR ACUTE MYOCARDIAL INFARCTION

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PURPOSE: To derive a 12-lead standard ECG from 3 measured leads using a universal patient coefficient matrix and to detect the presence of acute MI from an EV index calculated for both the measured and derived ECGs.

METHODS: Twenty training ECGs of varying pathology were acquired and digitized resulting in a 300x12 voltage-time data array for mathematical processing. The simplex optimization (SOP) technique was used to derive a 12x3 universal patient coefficient matrix from the 20 case ECG training set. A different set of 55 test cases, including 37 normal and 18 acute infarction ECGs, were similarly acquired and digitized, from which leads I, aVF, and V2 were chosen as the measured 3 lead-vector basis factor space. The SOP coefficient 12x3 matrix was then multiplied by the {I, aVF, V2} measured lead-vector 3x300 matrix yielding the derived 12-lead ECG 300x12 matrix. The 55 measured and derived test case ECGs were graphically compared for diagnostic and morphologic correlation.

RESULTS: All 55 test case ECGs were predicted correctly. No significant morphologic or diagnostic changes were noted in the derived ECGs. Significant differences between normal and acute MI were detected at EV3% ($p < 0.05$) for both measured and derived ECGs and the EV index predicted pathology in all cases correctly. The reduction of the measured 12-lead ECG data set to 3 leads allowed the display of a vector plot of the movement of the electrical forces resulting in a 3-dimensioanl spatial ECG curve.

CONCLUSION: A universal patient coefficient matrix has been derived to allow 12-lead standard ECG derivations from 3 measured leads acquired using the SOP technique. This study also demonstrated that an EV index may differentiate normal from acute MI pathology.

CLINICAL IMPLICATIONS: Using this new technology, it is now possible to perform instantaneous, real-time, point of service, cost-efficient 3-lead rhythm processing using bed-side cardiac monitoring systems to produce a derived 12-lead ECG. Continuous monitoring of the EV index provides a dynamic electrical marker for acute MI.

DISCLOSURE: David Schreck, None.

TYPE II DIABETES MELLITUS IS INDEPENDENTLY ASSOCIATED WITH NON-RHEUMATIC AORTIC VALVE STENOSIS OR REGURGITATION

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PURPOSE: Diabetes mellitus (DM) is a major risk for cardiovascular disease and mortality. There is a recent study that found DM was associated with aortic stenosis in univariate but not in multivariate analysis. The goal of this study was to evaluate any association between DM and non-rheumatic aortic valve stenosis or regurgitation using ICD-9 codes in a very large database.

METHODS: We used PTF documents containing discharge diagnoses using ICD-9 codes of inpatient treatment from all Veterans Health Administration hospitals. The data were stratified using ICD-9 code for DM (n=293,124), and a control group with hypertension (HTN) but no DM (n=552,623), and the ICD-9 code for non-rheumatic aortic valve disorder(424.1). We performed multivariate analysis adjusting for coronary artery disease, congestive heart failure, smoking and hyperlipidemia. Continuous and binary variables were analyzed using c2 and Fisher's Exact tests.

RESULTS: Non-rheumatic aortic valve disease diagnosis was present in 7,322 (2.5%) of DM patients vs. 10906 (2.0%) in the control group. Using multivariate analysis, DM remained strongly associated with non-rheumatic aortic valve disease: (odds ratio (OR): 2.23, 95%; confidential interval (CI): 2.16 to 2.30 p<0. 000).

CONCLUSION: Type II diabetes mellitus is independently associated with non-rheumatic aortic valve disorders (regurgitation and stenosis) suggesting the direct negative effect of DM on aortic valve structure.