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Assessment of aortic elastic properties in patients with erectile dysfunction by conventional and colour tissue Doppler echocardiography

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Aim: It has been supposed that erectile dysfunction is a first clinical reflection of common vascular disease. The aim of our study was to evaluate the aortic stiffness and aortic elastic properties by conventional (CE) and colour tissue Doppler echocardiography (TDE) in patients with erectile dysfunction (ED) who had vascular origin.

Materials and methods: Thirty patients with ED (mean age 52±8 years) and thirty healthy subjects as control group (mean age 49±3 years) were enrolled in the study. To assess the elastic properties of aort, systolic (AoS) and diastolic (AoS) dimensions of aortic LVEF in control and ED groups were measured by an M-mode echocardiography. Colour tissue Doppler velocities (S, E, a, c, m/s) of aortic upper and inferior wall were measured by colour TDE. Aortic strain, aortic stiffness index and aortic elasticity were calculated by formulas as following: (Aortic strain%) = (100 x (AoS-AoS)/AoS, aortic stiffness index (ASI) = ln(SBP/DBP)/(AoS-AoS)/AoS-cm²/dyne-1, aortic elasticity = 2 x (AoS-AoS)/PPxAoS, where PP: pulse pressure.

Results: Aortic strain, ASI and S wave velocity of aortic upper wall were statistically different in ED group than control group (4.8±4.6 vs 8.7±3.6, p=0.002; 13.1±5.8 vs 8.2±7.0, p=0.007; 6.3±1.5 cm/s vs 4.8±1.3 cm/s, p=0.001, respectively). A statistically significant correlation between S wave velocity of aortic upper wall and ASI (r=–0.389, p=0.004), aortic strain (r=0.454, p=0.001) and elasticity (r=0.504, p=0.001) were found. On the other hand, significant correlation between mitral lateral annulus S wave velocity and ASI (r=–0.472, p=0.001), and aortic elasticity (r=0.533, p<0.001) were found.

Conclusion: Aortic stiffness index is higher, aortic distensibility and strain is lower in erectile dysfunction with vascular origin.

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A new function index to evaluate acute left ventricular remodelling following ligation of the anterior descending coronary artery

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Purpose: A new index is proposed [namely, 'function index' (FI)] to express acute left ventricular (LV) function following ligation of the left anterior descending coronary artery (LAD).

Methods: Ligation of the LAD was performed in 20 pigs for 75 min. LV long (LA)- and short (SA)-axis fractional shortening (FS) and ejection fraction (EF) were monitored before and after LAD ligation at 5, 15, 45, 75 min by the epicardial subxiphoid 4-chamber view. EF was specified as the ratio of LAFS%/SAFS%. Mean percentage changes from the pre LAD ligation (control) values in every post LAD ligation stage were calculated. In 9 out of the 20 PBO dobutamine (5 µg/min) was used immediately after ligation.

Results: In experiments without DOB infusion, LAFS% (26.4±14.6%, EF (29.6±16.0%) and LAFS% (55.9±5.9%) decreased significantly immediately after LAD ligation and remained reduced during the whole study period (LAFS% (35.14±18.70%, EF (24.84±11.67%, F=41.17±11.29% at 75 min, F=9.68, F=20.92 and 7.97, p<0.001 respectively). On the contrary, SAFS increased significantly at 45 min (±40.63±18.35%, p<0.01) during the post LAD ligation period. In animals with PBO infusion, LAFS% (3.3±3.1%-3.5% at 75 min, F=17.01, F=0.001, EF (3.67±3.85% at 75 min, F=15.78, p<0.001) and FI (2.08±9.46%, F=3.74 at 75 min, p<0.001) returned to the pre LAD ligation values after the initial reduction, while SAFS did not change significantly during the whole study period (p=ns). FI changes during DOB infusion were best bivariately correlated (r=0.72, p<0.001) and independently associated in multiple regression analysis (b=0.45, p<0.001) with EF changes.

Conclusions: FI appears to be a reliable and simple index to evaluate acute functional remodeling changes during DOB infusion after LAD ligation. Its significant correlation with EF permits the accurate evaluation of LV function, especially in cases with poor echogenicity.

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Echocardiographic phenotyping in a transgenic mouse model

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Background: With the advent of transgenic technology, genetically altered mice with remarkable cardiovascular phenotypes are available now. To benefit from the full potential of these genetically engineered mice, it is crucial to have approaches to an accurate and reproducible assessment of cardiac anatomy and performance. Cardiac ultrasound is a well established technique for non-invasive evaluation of left ventricular (LV) morphology and function in different species. In this particular study, we used transgenic echocardiography (TTE) for cardiac phenotyping in mice lacking adipose triglyceride lipase (ATGL). ATGL-deficient mice are supposed to die from lethal cardiomyopathy due to defective lipolysis.

Material and methods: TTE was performed in non-anesthetized mice (12 knock-out, 11 wild-type, age range 59-136 days) using an Acuson Sequoia 512 equipped with a 15 MHz linear transducer (15LH). The heart was imaged in the two-dimensional (2-D) mode in the parasternal long- and short-axis view. From short-axis view, motion-mode (M-mode) images were obtained for measurement of LV enddiastolic and end systolic diameter as well as interventricular septum (IVS) and left ventricular posterior wall (LVPW) thickness during diastole and systole. From these M-mode dimensions, LV fractional shortening (FS), LV ejection fraction (EF), IVS/LVPW ratio, and LV myocardial mass (LVM) were calculated.

Results: 2-D echocardiography revealed marked concentric LV hypertrophy with an abnormal myocardial texture in ATGL-deficient animals. LV hypertrophy, abnormal myocardial texture, and impaired LV systolic function with asynchronous contraction patterns developed progressively with age. Additionally, in one older animal a large circumferential pericardial effusion could be clearly detected. M-mode tracings confirmed pronounced LV hypertrophy in ATGL-deficient mice as indicated by increased diastolic wall thickness and LVM, while systolic wall thickness as well as chamber dimensions were not significantly different between the two groups. Systolic thickening of the IVS and LVPW was markedly reduced in ATGL-deficient mice, indicating a significantly reduced LV systolic function. This was also reflected by a significant reduction in LV FS and LV EF in ATGL-deficient mice compared to controls.

Conclusions: Echocardiography provides a powerful tool for studying cardiac morphology and function in mice. In this particular mouse model, TTE clearly allowed to discriminate knock-out animals from controls and to follow the development of heart failure in ATGL-deficient mice.

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A systematic review of the effectiveness of echocardiography as a diagnostic technique for the detection of coronary artery disease

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Purpose: Echocardiography is a diagnostic tool that is used together with other imaging techniques for the detection of coronary artery disease (CAD). Sensitivity and specificity of these diagnostic techniques has been established in clinical studies. Information on the cost-effectiveness of diagnostic

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