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Logistic EuroSCORE by longitudinal global strain in predicting outcome after cardiac surgery

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Aims: Longitudinal strain by speckle tracking appears more accurate than left ventricular ejection fraction (LVEF) to characterize myocardial dysfunction. We hypothesize that longitudinal global strain may be used in alternative to LVEF to compute EuroSCORE for better predicting outcome after cardiac surgery.

Methods: LVEF by Simpson biplane and longitudinal global strain by speckle tracking was computed in 306 patients (65±13 years, 75% of male, LVEF=48±15%) referred for cardiac surgery [104 CABG alone, 141 valve surgery alone, 54 combined surgery and 7 others]. To compute logistic EuroSCORE from strain and LVEF, LV function was graded as normal (LVEF >50%, global strain >–15%), moderately (LVEF between 30% to 50%, global strain between –7 and –15%) or severely impaired (LVEF<30%, global strain<–7%). The two logistic EuroSCORE models were compared to postoperative death.

Results: Despite a correlation between LVEF and global strain (r=–0.73, p<0.0001), reduced global strain (–5%) was observed in 30% (47/158) of patients with preserved LVEF and only 36% (n=13/36) of patients with LVEF<30% had a severe reduced global strain–7%. Importantly, patients with severe reduction in global strain >–7% were associated to postoperative death (n=28, 9.1%) (26% vs. 8%, p=0.007), while no correlation was observed between dead group and LVEF. In addition, in death group, EuroSCORE by strain (28±24%) was greater than EuroSCORE by LVEF (26±24%, p=0.02). Finally, Euroscore by strain (OR=1.035, p<0.0001, AUC=0.79) and not by strain (28±24%) was greater than EuroSCORE by LVEF (26±24%, p=0.02). In death group, EuroSCORE by strain (OR=1.035, p<0.0001, AUC=0.79) and not by LVEF remained independently associated to postoperative death by stepwise multivariate logistic regression.

Conclusion: EuroSCORE computed using longitudinal global strain by 2D speckle tracking better predicts postoperative outcome than conventional logistic EuroSCORE using 2D LVEF.

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Outcome of severe Isolated tricuspid regurgitation in patients without LV dysfunction

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Background: Limited data has been addressed to evaluate the clinical characteristics and outcome of patients with isolated tricuspid regurgitation and preserved left ventricular function.

Methods: From November 2008 to November 2010, 328 patients were referred to echocardiography laboratory for assessment of a severe tricuspid regurgitation. Patients with left ventricular dysfunction (LVEF<50%) or other significant valvular diseases or history of valvular surgery were excluded (n=189). Clinical and echocardiography baseline characteristics of the 143 remaining patients (77±13 years, 64 men) with isolated severe tricuspid regurgitation and preserved left ventricular function (57±6%, 50–70) were compared to primary outcome defined by death and recurrent heart failure (follow up period=31±222 days).

Results: Of the whole, 54% (77/143) of patients were in atrial fibrillation, 15% (n=21) had history of pulmonary diseases and 17% (n=24) had implanted pace-maker device. The majority of patients (52%, n=75) had moderate symptoms (NYHA II-III) and preserved right ventricular function (TAPSE>15 mm). However, 90% of patients had elevated NTpro-BNP level>500 pg/mL and 68% had inferior vena cava (IVC) dilatation (≥20mm). Death and recurrent heart failure occurs more in severely symptomatic patients (46% vs. 28%, p=0.05), in those with impaired RV function (53% vs. 28%, p=0.03) and dilated IVC (49% vs. 10%, p=0.002). In addition, elevated NT-proBNP level and RV dilatation was more observed in patients with adverse outcome. Finally, multivariate analysis demonstrated that only inferior vena cava dilatation (OR=11, p=0.02) and BNP levels (OR=1.4, p=0.05) remained associated to outcome.

Conclusion: In patients with a preserved left ventricular function, clinical symptoms and right ventricular function may underestimate the outcome of isolated severe tricuspid regurgitation. Inferior vena cava dilatation and BNP level appears more sensitive and accurate to identify high risk patients.

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Benefit of atrial septal defect closure in adults: right ventricular remodelling

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To study the effect of the atrial septal defect (ASD) closure in adults on right ventricular function and remodelling.

We studied in 45 consecutive patients older than 40 years undergoing transcatheter ASD closure. RV function was assessed by tricuspid annulus S-wave velocity (Tric-S) and tricuspid annular plane systolic excursion (TAPSE) and the RV remodelling were studied by the size and the systolic and diastolic volumes of the RV.

We have 36 females, mean age 50±8y. 71% in sinus rhythm and 67% patients were in class III of New York Heart Association (NYHA) functional class.

Defect size has a median of 19±6.5mm, the shunt ratio was 2.6, pulmonary arterial pressure (PAP) before intervention was 40±10mmhg, and the balloon-stretched defect diameter was 29±6.5mm. The closure was performed with success in all patients without complications.

6±3 months after the procedure, the clinical and echographic assessment of this patients referred a NYHA functional class improvement, 90% of patients were in class II. One patient developed atrial fibrillation with a rapid restoration of the sinus rhythm one month after ASD closure. We objective a significant decrease of the right ventricular (RV) size and volumes: telediastolic diameter pass from 30±6 mm to 25±4mm (p=0.03), and the telediastolic volume from 67±14 to 44±11ml (p=0.02). An increase of the RV function were noted with a statistically significant improvement of the RV ejection fraction (34±9% vs 43±10%, p=0.04), and of the TAPSE (14.4±4mm vs 18.3±3.4 mm, p=0.003). The Tric-S was better after the procedure but the difference isn’t significant statistically. The PAP did not significantly differ before and on the control (34±14mmhg). We observed a less marked improvement of the left ventricular (LV) function (LV ejection fraction pass from 50±8% to 57±7%).

Conclusion: In adults, the ASD closure is followed by symptomatic improvement, a regression of PAP, a rapid RV functional and remodeling improvement.

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Relationship of tricuspid annulus dimensions and right ventricular volumes in cardiac magnetic resonance

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Purpose: Cardiac Magnetic Resonance (CMR) is considered as the reference method to assess right ventricular volumes (RVV) but delineating the boundary of the RV remains time consuming and difficult. The tricuspid annulus (TA) is a component of the RV whose measurements are fast, simple and independent from anatomic variants of RV morphology. TA measurements could serve as potential surrogates of RV volume, but the relationship between RVV and TA diameters (TAD) has not been previously described in CMR.
Methods: We prospectively enrolled 85 healthy volunteers (42±16 years, 68% male) to perform a CMR exam at 1.5T. ECG-gated steady-state free precession (SSFP) cine images were acquired in short-axis, 4-chamber (4C) and 2-chamber (2C) views with complete coverage of both ventricles. QMass software was used to assess end-diastolic (ED) and end-systolic (ES) RVV and to measure the maximum diastolic and the minimum systolic TAD in both 4C and 2C views. Mean maximum and mean minimum TAD were subsequently calculated. Relationships between TAD and RVV were studied using linear regression analysis.

Results: ED and ES-RVV were 140±39 ml and 56±19 ml. Maximum diastolic 4C, 2C and mean maximum TAD were 35.8±5.4 mm, 45.8±6.3 mm and 40.8±4.3 mm. Minimum systolic 4C, 2C and mean minimum TAD were 28.7±4.3 mm, 40.1±6.2 mm and 34.4±3.9 mm.

Univariate and multivariate analyses showed that maximum diastolic 4C, 2C and mean maximum TAD were associated to ED-RVV (r=0.50; r=0.52; r=0.69, p<0.001) and that minimum systolic 4C, 2C and mean minimum TAD were also associated to ES-RVV (r=0.50; r=0.50; r=0.67, P<0.0001) independently of age, gender, weight, height and systolic blood pressure. Overall, mean TAD showed stronger correlations with RVV than 2C and 4C TAD.

Conclusions: Mean maximum and minimum diameters of TA are simple and readily available CMR measurements strongly associated with RV volumes in healthy volunteers independently from age, gender, body size and blood pressure.

Importance of right ventricular function in patient referred for cardiac surgery
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Purpose: Right ventricular function plays an important role in heart failure patients. Limited studies have investigated its impact on the prognosis of patients referred for cardiac surgery.

Methods: The study included 196 patients (65±13 years, 75% of male) referred for cardiac surgery [valvular surgery (n=126), isolated coronary artery graft bypass (n=50) and other (n=20)]. A comprehensive echocardiography before surgery was used to characterize right ventricular function using tricuspid annular plane excursion (TAPSE). Logistic EuroSCORE and TAPSE values were compared to the primary endpoint defined by one month mortality and the use of inotropic support after surgery.

Results: EuroSCORE value averaged 11.5±14% with death after surgery observed in 22 (11%) patients and inotropic support required in 102 patients. Mean TAPSE value averaged 21±6 mm and was lower among patients who died (17±7 vs. 21±6, p<0.001) and requiring inotropic support (19±6 vs. 23±5, p<0.001). By multivariate analysis both EuroSCORE and TAPSE (OR=0.9, p=0.008) value remained associated to death and the need for inotropic support.

Conclusion: Right ventricular dysfunction strongly impacts on outcome after cardiac surgery and should be appreciate in association to conventional Euroscore.

Should we still believe in TAPSE: a real life cardiovascular magnetic resonance and echocardiography prospective comparative study.
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Purpose: MRI Right Ventricle Ejection Fraction (mRVEF) is the gold standard for assessing the right ventricle (RV) systolic function which is a well-established prognosis determinant of cardiomyopathies but it is tedious work. We compared the classical, easier to obtain parameters such as echocardiographic TAPSE (eTAPSE), S wave, MRI TAPSE (mTAPSE) to mRVEF, in order to define if those parameters were reliable.

Methods: Forty three unselected patients aged 56±17 years that were referred for cardiac MRI in a University Hospital center underwent MRI and trans thoracic echocardiography (TTE, all measurements made following the American Society of Echocardiography’s recommendations) consecutively.

mRVEF and mLVEF by defining the contour of the endocardium, and mTAPSE were blindly measured.

Results: Most patients (47%) had coronary disease, others were mainly dilated or stress cardiomyopathies.

MRI stroke RV and LV volumes showed very strong correlations (r=0.87 p<0.0001), thus MRI RVEF was a reliable measurement.

Echographic findings revealed that S wave was strongly correlated with eTAPSE (r=0.80 p<0.0001), significantly correlated with mTAPSE (r=0.62 p<0.0001) and weakly with RVEF (r=0.33 p<0.005). eTAPSE was correlated with mTAPSE (r=0.54 p=0.0006) but was not correlated with MRI RVEF (r=0.27 p=0.11).

RVEF was weakly correlated with mTAPSE (r=0.42 p=0.013) and S wave, but was not correlated with eTAPSE.

Conclusions: mTAPSE, eTAPSE and S wave were significantly but weakly correlated with MRI RVEF. TTE allows an accessible but imperfect evaluation of the RV. MRI RV EF by defining the contour of the endocardium remains the most reliable parameter for assessing right ventricular systolic function, and should be performed each time a request is made for establishing the prognosis of cardiomyopathies, such as in case of therapeutic intensification.

Diagnosis of cardiac tumors: interest of non invasive cardiac imaging in everyday practice. A retrospective study of 59 consecutive patients.
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Objective: Cardiac tumor remains a rare disease. Interest of cardiac CT and MRI imaging in this area is demonstrated. However, few studies have evaluated, in everyday practice, the contribution of these methods in the care of patients. The main purpose of this study was to specify the exact contribution of cardiac CT and MRI in diagnosis and analysis of the characteristics of the tumor.

Design and methods: Consecutive and complete case of patients who had diagnosis of cardiac tumor between 1990 and 2009 after histological examination were analyzed retrospectively in our University Hospital.

Results: Fifty nine patients (32 males, age 12 to 86 years) were included in the analysis. Most cardiac tumors were malignant (34/59 cases, 58%); metastases were the most prevalent of malignant tumors (24/34 cases, 70%). Most primary cardiac tumors were benign (25/35 cases, 71%). Left atrium myxoma was the most frequent (22/25 cases, 88%) benign cardiac tumor whereas sarcoma was the most frequent primary malignant tumor (8% of cases). The combination of trans thoracic and transesophageal echocardiography provided correctly benign character in 84% of cases and gave the true etiological diagnosis in 80% of cases. For malignant tumors, the malignant character was mentioned correctly by both clinical context and ultrasound in only 13 out of 34 cases (39%). Additional data from cardiac CT and MRI were decisive in 18 cases (52%) with indicators of malignancy (invasive behavior, involvement of the right side of the heart or the pericardium, tissue unhomogeneity and enhancement after administration of contrast material).