Title: Left atrial volume changes during stress echocardiography

Background: An enlarged left atrial volume index (LAVI) at rest mirrors increased left atrial pressure and/or impairment of LA function. It is associated to adverse cardiovascular outcomes. A cardiovascular stress may acutely modify LAVI within minutes.

Purpose: To assess the feasibility of LAVI-stress echocardiography (SE)

Methods: SE was performed in 171 patients (age 58±15 yrs, 58 females) with known or suspected coronary artery disease (CAD, n = 48), hypertrophic cardiomyopathy (HCM, n=78) or heart failure (HF) with preserved (n=12) or reduced (n=33) ejection fraction. All had acceptable acoustic window at rest and were referred for clinically-driven SE (semi-supine exercise in 114, dobutamine in 30, dipyridamole in 26, adenosine in 1) in 9 quality-controlled laboratories of 5 countries. LAVI was measured with Simpson biplane method from 4- and 2-chamber views at rest and peak stress. The % LAVI changes were defined as: (stress-rest/rest)x100. Two independent observers measured a set of 20 clips (10 at rest and 10 at peak stress) and repeated the measurements after 1 month on the same images. In HF and HCM patients, systolic pulmonary arterial pressure (SPAP) was also measured from tricuspid regurgitant jet velocity (when present).
Results: A LAVI measurement was obtained in all patients (feasibility = 100%). The off-line analysis time measured by stop-clock in 40 patients was < 50 sec. The intra- and inter-rater variability were 6% and 8% respectively. LAVI was unchanged during SE (rest=37±16 vs stress=37±17 mL/m², p=ns). At individual patient analysis, 23 patients (13%) showed a stress-induced % LAVI increase ≥ 25% ("LAVI-dilators"); see figure, 126 patients (74%) a variation ± 25% ("LAVI-neutral"), and 22 patients (13%) a % LAVI decrease ≤ 25% ("LAVI-reducers"). "LAVI dilators" were equally prevalent in exercise (13/114,11%) or pharmacological stress (10/57,18%). LAVI-dilators were more frequent in CAD (12/48, 25%) than in HCM (8/78, 10%) or HF (3/45, 7%) groups. In 67 patients with SPAP measurement, there was a significant but weak correlation between stress SPAP and rest LAVI (R²=.118, p=0.004) and stress LAVI (R²=0.062, p=.04)

Conclusion: LAVI measurement is highly feasible during SE. It requires no extra-imaging and very limited extra-analysis time. LAVI is weakly correlated to SPAP values, but no single homogeneous LAVI response can be identified during stress. A spectrum of variations occur, from marked increase to marked decrease. They likely mirror underlying stress-induced variations in LA function and/or pressure of potential clinical relevance.

REST

![REST Image](image1)

STRESS

![STRESS Image](image2)

LAVI "Dilators"

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