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## Intraventricular fluid patterns during dobutamine stress echo in patients with significant coronary stenosis

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**Background:** Dobutamine stress echo (DSE) is a useful tool for the evaluation of patients with suspected stable coronary artery disease (CAD). There has been no detailed investigation about the effects of exercise or pharmacological stress on intraventricular fluid dynamics. The possible association between significant CAD and abnormal fluid patterns has not been studied yet.

Purpose: Aim of the study was to evaluate the intraventricular vortices during dobutamine stress and to find fluid-dynamic patterns associated with the presence of significant CAD.

Methods: 36 patients scheduled for coronary angiography (CA) and with clinical indication for DSE for suspected CAD were enrolled. Each patient underwent 2D, 3D and contrast echocardiography for Echo-PIV analysis and vortex quantification, both at rest and at peak stress. Vortex geometric and energetic parameters were evaluated using a post- processional software. Intraventricular pressure gradients were evaluated as well. Positive CA for significant CAD was defined as the presence of at least one epicardial coronary stenosis with ≥70% luminal narrowing.

**Result:** CA was positive in 58% of patients while DSE in 33%. In the whole population, at peak stress a reduction in vortex area (from  $0.36 \pm 0.01$  to  $0.21 \pm 0.02$ ; p= 0.001) and in absolute value of vortex intensity (from  $0.36 \pm 0.1$  to  $0.26 \pm 0.12$ ; p= 0.001) were detected. Vorticity fluctuation and kinetic energy (KE) fluctuation showed a significant increment at peak stress (respectively  $0.84 \pm 0.17$  to  $0.93 \pm 0.07$ ; p= 0.005; from  $1.76 \pm 0.37$  to  $2.47 \pm 0.82$ ; p= 0.001), as well as a deviation of flow force momentum angle ( $\phi$ : from  $36 \pm 8$  to  $44 \pm 9$ ; p= 0.001). Patients with positive CA showed during DSE an higher decrease of the absolute value of vortex intensity ( $\Delta\%$  |vortex intensity| -1.7 ± 0.39 vs -1.3 \pm 0.56 vs; p= 0.021), and higher increase of flow force angle ( $\Delta\% \phi 0.48 \pm 0.6$  vs  $0.1 \pm 0.27$ ; p= 0.042). A reversal in the main direction of the vortical flow occurred in 9 patients (25%) at peak stress and 7 of them (64%) were found to have significant right coronary stenosis. This unexpected change in the vortical flow and the presence of right coronary artery stenosis were found significantly associated (X2 p= 0,02). Moreover, patients with circumflex artery stenosis were less likely to have a decrease of vortex length at peak stress ( $\Delta\%$  Vortex length - 0,06 ± 0, 36 vs - 0,34 ± 0,28, p= 0,034).

**Conclusion:** Significant changes in intraventricular vortices occur during DSE. The presence of significant CAD evaluated with CA was associated with different behavior of fluid dynamics during DSE. Further studies are needed to assess normal and pathological intraventricular flow patterns evaluated during DSE.

Abstract P795 Figure. Vortex reversal at peak stress

