Systolic and diastolic function in patients with acute pulmonary edema and hypertension

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Background: Patients (pts) hospitalized with heart failure may later be noted to have normal systolic function, as evidenced by a normal left ventricular ejection fraction (LVEF). However, in this scenario, the etiology has been presumed to be due to isolated diastolic dysfunction. Pts with acute pulmonary edema (APE) often have marked systolic hypertension but, after reduction of the blood pressure, a normal left ventricular EF (>50%). How- ever, the left ventricular (LV) function is usually evaluated after the patient's clinical status has resolved. Thus it is possible that APE was not the result of diastolic dysfunction but instead was due to transient systolic dysfunction, acute mitral regurgitation (MR) or both.

Aim: To test the hypothesis that many pts with hypertensive APE have diastolic dysfunction.

Methods: We studied 48 pts (26 men and 22 women; median age 66±14 yrs) with APE and a systolic blood pressure >160 mmHg. Two dimensional transho- racic echocardiography with color Doppler imaging was performed in each patient at enrolling visit, and a second echocardiogram was obtained 24-48 hours after clinical stabilization had occurred, so that the patient was normoten- sive and pulmonary congestion resolved. We evaluated the EF (Simpson), the pressure annulus area of severity of any MR and the wall motion score index (WMSI) by a segment model.

Results: The mean systolic blood pressure was 197±48 mmHg during the initial transesophageal echocardiogram and was reduced to 132±16 mmHg (p=0.05) at the time of follow-up examination. The EF was similar during the acute episode (52±18%) and after treatment (51±15%). The EF after treatment correlated di- rectly with the EF during the acute episode (r=0.85, p<0.01). The left ventricular WMSI was also the same during the acute episode (1.5±0.5) and after treatment (1.5±0.5). The WMSI at follow up correlated directly with the index at presenta- tion (r=0.95, p<0.01). No patient had severe MR during the acute episode. 26 pts (54.1%) had normal EF (>50%) after treatment. In 20 (80.8%) of these 26 pts the EF was >50% during the acute episode.

Conclusions: In pts with hypertensive APE, the EF during the acute episode is similar to the EF after treatment, and when the blood pressure has been reduced and pulmonary congestion resolved. A normal EF after the treatment of a patient with hypertensive APE indicates a high probability that pulmonary con- gestion was due to isolated, transient diastolic dysfunction, since transient systolic dysfunction and/or severe MR are infrequent during acute episodes in these pts.

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Efficacy of coronary artery bypass graft (CABG) and surgical ventricular restoration (SVR) in two working hypothesis for restoring the left ventricle (LV) size and function in patients (pts) with ischemic dilated cardiomyopathy (IDC). In these pts an important issue is mitral regurgitation (MR) due to the changing in size and function in patient (pts) with ischaemic dilated cardiomyopathy (IDC).

Aim: To evaluate the LV and right ventricle (RV) function and the MR in pts with IDC and heart failure undergoing CABG and SVR.

Methods: In 31 pts; 17 men, 14 women; median age 62±9 years, 1 patient with previous anterior myocardial infarction, LV aneurysm and ejection fraction (EF) less than 35% a trans- thoracic echocardiography and a tissue Doppler study was performed before and six months after complete CABG combined with SVR. The systolic and diastolic myocardial velocities at the level of the anterior and septal mitral annulus and of the lateral tricuspid annulus have been evaluated. All pts had pre-surgery severe MR.

Results: EF increased from 25.9±5% to 42.6±8% (p<0.001) (as evaluated by Doppler trans-mitral flow) was 1.3±0.5 before and 1.3±2.0 after surgery (p>0.05). IVRT decreased from 117±41 ms to 110±35 ms (p>0.05). LV mean systolic velocities significantly improved from 0.06±0.1 ms (lateral wall) and 0.07±0.0 zero (anterior wall) to 0.12±0.0 mm/s (septum, p<0.001). For RV velocities increased from 1.0±0.02 ms to 1.7±0.03 ms after surgery (p<0.05). The E/A ratio significantly decreased from 1.4±1.6 to 1.2±0.6 in the interventricular septum and from 0.7±0.6 to 0.5±0.3 for the RV. Before surgery, the ratio E/C was between 8.1±5 in pts and more than 15 in 4 pts. After CABG and SVR E/C became less than 8 in 5 pts and between 8-15 in 5 pts. Eight pts had mild MR and two pts still had moderate MR after surgery. Mitral ring diam- eter decreased from 33±6 mm to 31±8 mm (p=0.05), prosthetic tenting area decreased from 5.3 m2 to 3.1 m2 (p=0.02) and end-systolic one from 2.3 m2 to 0.8 m2 (p=0.05).

Conclusion: In patients with systolic heart failure, changes in E/A during a exercise are highly variable from patient to patient and appear to be related to both the dynamic component of MR and reduced LV compliance.