Cardiography and pulsed wave TD interrogation of the tricuspid annulus at the RV tamponade challenge at a maximum dose of 20 mcg/kg/min. Conventional 2D echocardiography could be used to estimate PCWP non-invasively in mitral stenosis.

Aim: To prospectively evaluate the influence of upright dynamic exercise in Doppler derived echocardiographic variables used to assess aortic stenosis severity.

Methods: From a total of 30 patients (pts) we acquired quality imaging in 26 (86%), mean aged 70±4 years (age range, 53 to 81 years), 16 were men. Pts had a mean valvular area of 0.93±0.20 cm² (0.54 to 1.69 cm²). We calculated maxG, MG, VR and DVI in the upright position (UP), while already in the treadmill and at rest. Stress treadmill testing was then started using the modified Bruce protocol and the same measurements. (maxG, MG, VR and DVI), were measured and registered at peak workload, before exercise testing termination. All echocardiograms were recorded in video and partially in optic disc.

Results: 4 pts (13%) developed significant end-systolic intraventricular gradient without hypotension. The maxG in UP was 44.2±19 mmHg and 70±31 mmHg at peak workload (p<0.01), the MG in UP was 25±13 mmHg and 40±18 mmHg at peak workload (p<0.01); the VR in UP was 181±93 dynes/s cm⁻⁵ and 213±97 dynes/s cm⁻⁵ at peak workload (p<0.01); the DVI in UP was 0.31±0.10 and 0.32±0.10 at peak workload (p=NS).

Conclusions: 1. some pts with aortic stenosis develop significant intraventricular gradients without hypotension. 2. Upright dynamic exercise significantly influences all variables used in aortic stenosis severity evaluation besides DVI (indirect measure of effective valve area). 3. The results of our study suggest that, in order to understand its pathophysiology, comprehensive assessment of valvular disease might be further improved with the acquisition of dynamic variables during treadmill upright exercise.

845
Right ventricular contractile and diastolic reserve in patients with mitral stenosis: is stress echocardiography necessary to evaluate the hemodynamic burden? A tissue Doppler study

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Clinical manifestations are subjective and may be misleading in mitral stenosis. Pulmonary capillary wedge pressure (PCWP) is an important decision making criteria in the management of patients with mitral stenosis. Echocardiographically derived maximal aortic gradient (maxG), mean aortic gradient (MG) and aortic valve area estimates, at rest and in left lateral decubitus, provide a reasonable estimate of aortic stenosis severity. More recently, aortic valve resistance (VR) and Doppler velocity index (DVI) have gained worldwide acceptance in the evaluation of patients with aortic stenosis. Stress echocardiography has also proven useful as a tool in the assessment of aortic stenosis severity.

Purpose: To study the relations between SV changes and the hemodynamic parameters during exercise Doppler echocardiography (ED) in patients with severe MS and few or no symptoms.

Methods: 30 patients (22 females, aged 50±13 yrs, in sinus rhythm: 26) with severe MS (MVA=1.24±0.17 cm²) and few or no symptoms (NYHA I-II, 822), were prospectively studied during symptom limited ED (20 Watts increase every 3 minutes). SV, mean MG and sPAP were measured at each level of exercise.

Results: During exercise, SV increased from 57±11 ml/m² at rest to 64±13 ml/m² at peak exercise (p<0.001) at peak exercise mean increase 12±6%. SPPAP increased from 34±6 mmHg at rest to 60±11 mmHg (p<0.0001). MG increased from 7.2±2.9 mmHg at rest to 25±7 mmHg at peak exercise (p<0.0001). Exercise was stopped in 10 pts because of dyspnea and in 20 pts because of fatigue. Patients were classified in 2 groups according to SV changes during exercise. SV increased by >or=12% in 12 pts (Gp 1) and by <12% in 18 pts (Gp 2). At rest, no difference was observed between the 2 groups as regards MVA, sPAP and MG. Peak heart rate and blood pressure at peak stress did not differ in the 2 groups. Gp 2 showed higher rates of
increase of MG and sPAP during exercise (Table 1). Patients who stopped exer-
cise due to dyspnea (n=10) had a significantly lower increase in SV during exercise
(4±4% vs 16±3%, p<0.01).

### Table 1

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<th>MG</th>
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### Conclusion
In patients with severe MS and no or few symptoms, changes in SV and CO were higher in patients with severe mitral stenosis during exercise and (2) to limiting symptoms at peak exercise. Absence of increase in SV during EE is associated with a higher increase in MG and sPAP during exercise.

### 847
Pulmonary artery systolic pressure during exercise in mitral
stenosis. Clinical implications

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### Introduction
Pulmonary artery systolic pressure (PASP) is a fundamental expression of the severity of mitral stenosis (MS) and of utmost importance in the hemodynamic assessment of MS patients (pts). The European Society of Cardiology established indication for treatment (percutaneous valvotomy, surgical valvuloplasty or valve replacement) when PASP rises above 60 mmHg on exertion.

### Purpose
To evaluate the hemodynamic response of PASP in mildly symptomatic pts with MS using Doppler echocardiography during treadmill stress testing (TTE).

### Methods
From a group of 43 pts referred to our echo lab we studied 41 pts mean aged 50±9,3 years (age range, 35 to 70 years), 34 were women. All pts were in normal sinus rhythm. All pts underwent complete standard echocardiogram in left lateral decubitus (LLD) including calculation of functional mitral area using pressure half-time (MA), mitral mean gradient (MMG) and pressure gradient between the right ventricle and the right atrium (RV/RAg) in pts with tricuspid regurgitation (TR) (figure 1). We also calculated stroke volume (SV) and cardiac output (CO).

### Results
MMG and RV/RAg were again evaluated after pts were placed in upright position. Stress treadmill testing was then started using the modified Bruce protocol and the same measurement were performed through out the test and for analysis purpose they were measured and registered at peak workload (PW) (before treadmill exercise testing termination). In 4 pts the tricuspid regurgi-
tant signals were not quantifiable.

### Results
For analysis and follow-up purpose we divided MS pts in two groups: pts whose RV/RAg at peak workload was below 60mmHg (group A, 17 pts; mean pRV/RAg 48±5,2 mmHg) and pts whose RV/RAg at peak workload was above 60mmHg (group B, 20 pts; mean pRV/RAg 72±20 mmHg) with significant differences in relation to MVA, SV and functional capacity. The mean follow up period of 3 years revealed that from 20 pts in group B, 12 underwent valvuloplasty, 6 underwent mitral valve replacement for a mechanical prosthetic valve and 2 were maintained on medical therapy. From the 17 pts in group A, 4 were referred for mitral valve replacement and the remaining was maintained on medical therapy.

### Conclusions
1. MV leaflet anatomy correlated moderately well with the severity of stress-induced ischemic MR. 2. The findings support the role of leaflet tethering as a cause of ischemic MR. 3. The clinical utility of MV anatomy in predicting stress-induced MR may, however, be limited to extreme cases of leaflet concavity. In other cases intra-operative TEE with optimal loading may be necessary.

### 848
Can mitral valve anatomy predict ischemic mitral regurgitation?

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### Background
Ischemic mitral regurgitation (MR) results from left ventricular remodeling, leaflet tethering and annular dilatation. We have previously shown un-
derestimation of ischemic MR by preoperative transesophageal echocardiography (TEE) and worsening of ischemic MR with fluid and vasopressor challenge during intra-operative transesophageal echocardiography (TEE). This can be viewed as a "stress test" for the mitral valve (MV). The aim of this study was to deter-
mine whether pre-operative resting MV anatomy can predict the severity of stress-
induced ischemic MR.

### Methods
MV anatomy on preoperative TTE was correlated with MR severity dur-
ing intra-operative TEE in 50 pts with varying degrees of ischemic MR undergoing coronary bypass with or without MV surgery. Intra-operative TEE was performed after fluid infusion (if pulmonary wedge pressure <15mmHg) and phenylephrine aiming at systolic BP of 160 mmHg. Measurements of MV anatomy included anterior leaflet concavity area towards the left atrium (CA), tenting area (between MV leaflets and annulus) and annulus diameter determined from the long axis view (usually parasternal). MR severity was quantified using the TEE model and the effective regurgitant orifice area (EROA) and the regurgitant volume (VR).

### Results
CA, tenting area and MV annulus diameter correlated moderately with
EROA and VR at peak stress (Table). Concomitantly area >0.15 cm² had 56% - 54%
sensitivity and 43-41% specificity for clinically significant peak stress MR (EROA >0.2 cm² and VR >300). Concordance area >0.4 cm² detected 46 pts with severe MR (EROA ≥0.6 cm² or VR ≥600) with 100% (24/24) specificity.

<table>
<thead>
<tr>
<th>Table</th>
<th>Pre-operative TTE</th>
<th>Peak stress EROA</th>
<th>Peak stress VR</th>
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<tbody>
<tr>
<td>Concomitancy area (CA)</td>
<td>r=0.55, p=0.002</td>
<td>r=0.60, p&lt;0.0006</td>
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<tr>
<td>Tenting area</td>
<td>r=0.51, p=0.004</td>
<td>r=0.47, p=0.005</td>
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<td>Annulus diameter</td>
<td>r=0.48, p=0.007</td>
<td>r=0.46, p=0.01</td>
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</tbody>
</table>

### Conclusions
1. MV leaflet anatomy correlated moderately well with the severity of stress-induced ischemic MR. 2. The findings support the role of leaflet tethering as a cause of ischemic MR. 3. The clinical utility of MV anatomy in predicting stress-
induced MR may, however, be limited to extreme cases of leaflet concavity. In other cases intra-operative TEE with optimal loading may be necessary.

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