as segmental hypokinesia or akinesia at maximal stress in any wall segments supplied by the LAD (anterior, apical-lateral and apical-inferior), other than the septum itself.

Results: 20 women and 12 men with mean age of 72±2 years were studied. 10 patients had a history of angioptasia (31%) and 4 patients had cardiac bypass surgery (12%) in 4 patients the LBBB was rate related. The sensitivity and specificity of DSE to identify significant (>70% narrowing) LAD lesions in patients with LBBB when then echocardiographic images at peak stress are interpreted employing all possible LAD territories but disregarding the septum.

204
Short and long stress-echo protocols compared to coronary angiography
P. Bisschops1; L.H.B. Baur2; T. Lenderink1; C. Lodewijks1
1‘Atrium Medical Center Parkstad, Cardiology Dept., Heerlen, Netherlands

Introduction: Dobutamine stress echocardiography (DSE) and SPECT imaging with exercise or pharmacologic stress are increasingly used to detect coronary artery disease in patients before vascular surgery, in diabetics, patients with heart failure and patients with angina pectoris, who are unable to exercise. The traditional DSE protocol consists after rest imagining, dobutamine in incremental doses starting at 5 microgram/kg/min [µg/kg/min] maintained by 10 µg/kg/min for 40 µg/kg/min. Additional atropine is given and recovery images are performed. This protocol is time consuming and therefore limits the number of examinations which can be performed during one day. We therefore introduced a short track dobutamine stress protocol to limit the stress time and increase the number of stress echo which can be performed during one day.

Methods: The short track protocol consisted of 5 steps: rest, 20 µg dobutamine, 40 µg dobutamine, 1 mg atropine and recovery. Each step took 3 minutes. Which reduced the examination time from 45 minutes to 25 minutes. The results of this protocol were compared to coronary angiography, a traditional stress echo protocol. Fifty nine pts, underwent DSE with the short track and 50 pts with the normal DSE protocol. In 37 pts additional atropine was given. In 17 pts the normal DSE protocol was used, in 10 of these pts the short-track protocol without using atropine. In 37 pts additional atropine was given and recovery images are performed. This protocol is time consuming and therefore limits the number of examinations which can be performed during one day. We therefore introduced a short track dobutamine stress protocol to limit the stress time and increase the number of stress echo which can be performed during one day.

Results: The short track protocol consisted of 5 steps: rest, 20 µg dobutamine, 40 µg dobutamine, 1 mg atropine and recovery. Each step took 3 minutes. Which reduced the examination time from 45 minutes to 25 minutes. The results of this protocol were compared to coronary angiography, a traditional stress echo protocol. Fifty nine pts, underwent DSE with the short track and 50 pts with the normal DSE protocol. In 37 pts additional atropine was given. In 17 pts the normal DSE protocol was used, in 10 of these pts the short-track protocol without using atropine. In 37 pts additional atropine was given and recovery images are performed. This protocol is time consuming and therefore limits the number of examinations which can be performed during one day. We therefore introduced a short track dobutamine stress protocol to limit the stress time and increase the number of stress echo which can be performed during one day.

Conclusion: A short track dobutamine stress echo protocol has a significantly lower reliability to detect cardiac ischemia than a traditional stress echo protocol even if atropine is given and should therefore not be used.

Table 1. Accuracy of stress protocols

<table>
<thead>
<tr>
<th>Stress Protocol</th>
<th>N</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short track DSE without atropine</td>
<td>59</td>
<td>47%*</td>
<td>75%</td>
</tr>
<tr>
<td>Short track DSE with atropine</td>
<td>37</td>
<td>76%*</td>
<td>61%</td>
</tr>
<tr>
<td>Normal DSE protocol without atropine</td>
<td>17</td>
<td>57%*</td>
<td>90%</td>
</tr>
<tr>
<td>Normal DSE protocol with atropine</td>
<td>10</td>
<td>100%**</td>
<td>83%</td>
</tr>
</tbody>
</table>

* p < 0.005 DSE without atropine versus atropine; ** p < 0.005 DSE short track versus normal protocol

205
Enhanced accuracy of dobutamine stress echocardiography with the acute administration of intravenous atenolol during the recovery phase
J. Lowenstein1; A. Lescano2; A. Panaro1; E. Forte1; A. Garcia3; G. Penalosa1; C. Quiriz4; O. Montana5
1Investigaciones Medicas, Buenos Aires, Argentina; 2Polimedic, La Pampa, Argentina; 3DIM Clinica Privada, Ramos Mejia, Argentina

Background: Dobutamine stress echocardiography (DSE) is a functional test used in the routine practice in order to detect CAD. It is frequent to administrate intravenously (IV) beta blockers at the end of the test for diminishing the recovery time and/or to revert ischemia. There is not much experience in the literature about the development of contractile abnormalities and its mechanism during acute beta blockers administration.

Purpose: To assess the additional diagnostic value using IV Atenolol during DSE recovery phase.

Methods: In this observational retrospective study we analyzed 455 DSE, performed during 2001-2006. Dobutamine was administrated intravenously beginning at a dose of 5 to 10 µg/kg/min and increased by 10 µg/kg/min every 3 minutes up to a maximum of 50 µg/kg/min. Atenolol was administered IV up to a maximum of 1.0 mg if a study end point was not achieved with dobutamine. The end points for the termination of dobutamine/atropine infusion included the development of new segmental wall motion abnormalities, the attainment of 85% of age-predicted maximum HR, or the development of significant adverse effects. Images were acquired at rest, low dose, peak dose, and during recovery phase. Patients received 1 or 2 mg IV Atenolol; the test was considered positive after beta blockers when developed new or worsening wall motion abnormalities during the recovering phase. In all patients beta blockers were withdrawn 24 hours before DSE was performed.

Results: In 192 patients the test was positive for ischemia in which in 96 IV atenolol was added during the recovery phase. 17.7% of the patients (17/96) new or worsening wall motion abnormalities were assessed after acute administration of beta blockers. Among the 12 patients with the feasibility of an angiography follow up study in 5 patients Atenolol increase the previous contractile wall abnormalities and in the other 7 patients the dyssynergies were absolutely new. A concordance was demonstrated between the localized of significative stenosis and the ischemic segments in 10 patients (83.3%). Multiple vessel disease was detected in 8 patients, one vessel disease in 2 patients and near normal coronary arteries in the other 2 patients.

Conclusions: Assessment of wall motion abnormalities during the recovery phase after acute atenolol administration improves accuracy of DSE.

206
The diagnostic accuracy of pharmacological stress echo: a meta-analysis
E. Pasanisi1; E. Pican1
1CNR, Institute of Clinical Physiology, Pisa, Italy

Background: Recent guidelines state that ‘dobutamine stress echo has substantially higher sensitivity than vasodilator stress echo for detection of coronary artery stenosis’ and - therefore - dobutamine should be the pharmacological test of choice. Aim: To evaluate if recent, concordant statements of US and European guidelines on stress testing reflect evidence-based approach.

Methods: From PubMed search, we identified all papers with head-to-head comparison of dobutamine stress echo (40 mcg/kg/min ± atropine) versus dipyridamole stress echo performed with state-of-the art protocols (either 0.84 mg/kg in 10’ plus atropine or 0.84 mg/kg in 6’ without atropine). A total of 5 papers were found: Salustri et al., from Holland (Eur Heart J 1992); Pingitore et al., from Italy (JACC 1996); San Roman et al., from Spain (Heart 1998); Loimaala et al., from Finland (Am J Cardiol 1999); Nedeljkovic et al., from Serbia (Cardiol Ultrasound 2006).

Results: the 5 analysed papers recruited 484 patients with angiographic verification, 344 with and 140 without angiographically assessed coronary artery disease. Dipyridamole and dobutamine showed similar accuracy (88% vs 85%, p=ns) and specificity (90% vs 86%, p=ns). The sensitivity was also similar: 86% vs 85% (see figure).

Conclusions: When state-of-the art protocols are considered, dipyridamole and dobutamine stress echo have similar accuracy, specificity and - most importantly - sensitivity for detection of CAD.

207
Stress echocardiography in the district hospital setting - A cost effective analysis
N. Weininke1; K. Greaves2
1Bournemouth, United Kingdom; 2Poole General Hospital, Cardiology Dept., Poole, United Kingdom

Introduction: The investigation of patients with chest pain represents 40% of all admissions in the district general hospital, yet only 30% are actually cardiac in aetiology. Several methods are available for the investigation of chest pain, yet there is little data on cost-effectiveness of each technique. This study compared the cost-effectiveness of stress echocardiography (SE), angiography, nuclear imaging and exercise treadmill test (ETT) in the investigation of chest pain.

Methods: The setting was a district general hospital in the UK. 200 consecutive patients referred for SE for investigation of chest pain were recruited. The mean age was 62 (range 36-86) years, 100 male (50%). The admitting physician was asked as part of the referral form, to choose an alternative investigation (coronary angiography, myoview, ETT or none) if SE had not been available. Cost-effectiveness was calculated as the difference in the cost of investigating 200 patients if SE had not been available versus the cost of investigating 200 patients if SE had been available.

Eur J Echocardiology Abstracts Supplement, December 2006
208
Long term mortality in patients undergoing dobutamine stress echocardiography
V. Danicek1; E. Kaluski1; M. Leitman1; E. Peleg1; N. Minulin1; R. Krakover1; Z. Vered1
1Assaf Harofeh Medical Center, Heart Institute, Cardiology Dept., Zerifin, Israel

Background and aim of study: Limited data exist regarding the mortality and prognostic significance of dobutamine stress echocardiography (DSE) in the modern medical era. Our study examines prognosis and mortality associated with positive and negative DSE.

Methods: The database of the echocardiography laboratory at a major academic medical center was searched from 1998 to 2005, identifying 6082 patients who underwent a diagnostic dobutamine stress echocardiogram. Complete data were collected in 4378 patients. All patients had been reviewed in real time before examination for medical history. Tests were defined as either positive - any ischemia present on DSE or negative - no ischemia. The patients received an average of 38±6 mcg/kg/min of dobutamine and 0.48±0.3 mg atropine as indicated, the target heart rate was achieved in 3413 (78%) of patients. Patients with viability only were defined as negative. Cardiac catheterization was performed based on standard clinical indications. All deaths were carefully recorded from the date of DSE until December 2005. No patient died immediately after test.

Results: In 1466 (33.5%) patients DSE was positive, vs 2912 (66.5%) negative. 43.6% were females, average age 65 years. Risk factors included smoking (11.3%) hyperlipidemia (35.5%), hypertension (44.5%), and diabetes mellitus (20.8%). Previous myocardial infarction had been present in 21.4% of patients and previous CABG or PCI in 12.9% and 15% respectively. The mortality in five years (60 month) was 4% in patients with negative DSE and 8% in positive DSE (p<0.001) (figure).

Conclusion: In a large cohort of high risk patient group, positive DSE was associated with significantly increased long term mortality. DSE is an important tool for assessing long term risk of these patients.

209
Significance of Severe Hypotension during Dobutamine Stress Echocardiography
M. Dunkelgrun1; S.E. Karagianiris1; A. Elhendy2; R. Vandomburg1; J. Bax1; H. Feringa1; O. Schouten1; D. Poldermans1
1Erasmus MC, Rotterdam, Netherlands; 2Nebraska University Hospital, Omaha, Ne, United States of America; 2Leiden University Medical Center, Leiden, Netherlands

Background: Dobutamine stress echocardiography (DSE) is used for the detection of coronary artery disease. Commonly, blood pressure remains unchanged.

Objective: To assess the prognostic value of hypotension during DSE and the beneficial effect of beta-blockers (BBB).

Methods: 3381 patients (68% male, age 61±13 years) underwent DSE. Blood pressure was measured at every dose-step. A hypotensive response was defined as mild (systolic blood pressure drop of >20 mm Hg), or severe (systolic blood pressure drop of >20 mm Hg). DSE results were scored for the presence of ischemia using a 16-segment, 5-point scale. During follow up cardiac death (CD) and myocardial infarction (MI) were noted. Multivariate Cox proportional hazard regression analysis was used to evaluate the prognostic value of mild and severe hypotension during DSE and the effect of BBB.

Results: Mild and severe hypotension during DSE occurred in 936 (28%) and 521 (15%) patients, respectively. During a mean follow up of 4.5 years (±3.3 SD), 555 patients experienced CD and 158 a MI. Kaplan-Meier survival curves showed a significantly decreased survival in those with severe hypotension and mild hypotension. After adjustment for clinical characteristics and DSE results only severe hypotension was associated with increased incidence of late CD and MI (HR: 1.3, 95% CI: 1.1-1.7). Importantly, in these patients BBB use was associated with an improved outcome (HR:0.7, 95% CI:0.5-0.9).

Conclusion: Severe hypotension during dobutamine stress echocardiography independantly predicts cardiac death and hard cardiac events and may improve the predictive value of cardiac testing. BBB use improved outcome in these patients.

210
Insights From Cardiac Torsion Into the Mechanism of Maintaining Cardiac Output Under Tachycardia During Dobutamine Stress Echocardiography
M. Kato1; S. Nakatani2; T. Yoshimuta1; H. Kanazaki1; M. Kitakaze1
1National Cardiovascular Centre, Cardiovascular Dept., Suita, Japan; 2National Cardiovascular Center, Cardiovascular Dept., Suita, Japan

Background and purpose: Even in the condition of fast heart rate (HR), cardiac output (CO) has been reported to be well maintained during dobutamine stress echocardiography (DSE) despite of decreased radial strain in the healthy heart. We sought to investigate the mechanisms of maintaining CO under tachycardia by a new method, speckle tracking echocardiography which has been reported to provide accurate and angle-independent measurements of left ventricular (LV) dimensions and strains.

Methods: During DSE, conventional echocardiographic parameters including LV end-diastolic volume (EDV) and end-systolic volume (ESV) by modified Simpson’s method, myocardial strains and cardiac torsion were measured by speckle tracking imaging (Echo PAC, GE) at control, 5, 10 and 20 µg/kg/min in patients who were referred for the investigation of suspected coronary artery disease. Cardiac torsion was defined as the difference of LV rotation at the basal and apical short-axis LV images. Patients were excluded from this study if they had evidence of impairment of LV function on DSE testing.

Results: Finally, 20 patients (57±13 years) were evaluable. HR linearly increased from 67±15 to 144±15 bpm with dobutamine infusion. Although radial strain reached a peak at 10 µg/kg/min and decreased at 20 µg/kg/min, CO was well maintained at least up to 20 µg/kg/min. Cardiac torsion and longitudinal strain increased progressively without reaching a plateau.

Conclusion: Although radial strain reached a plateau and decreased at fast HR, cardiac torsion was enhanced in a compensatory manner. This mechanism could help maintain CO under tachycardia during DSE.