Coronary blood flow and coronary flow reserve by contrast-enhanced transthoracic echocardiography predict long-term outcome in heart transplantation

Methods:

Background: Patency of the donor heart is an essential element of successful transplantation. Evaluation of cardiac function is essential to define the global and regional myocardial reserve.

Methods: To assess the regional myocardial reserve, we performed coronary blood flow and coronary flow reserve by contrast-enhanced transthoracic echocardiography (CE-TTE) during adenosine infusion as a marker of long-term outcome after heart transplantation (HT). Adenosine infusion data were measured in the left anterior descending coronary artery (LAD) by CE-TTE in 78 HT patients (pts) (65 male, aged 50±12 years at HT, at 8.1±4.3 years after HT). Coronary flow velocity in the LAD was detected at rest and during infusion of adenosine (0.14 mg/kg/min). CFR was obtained as the ratio of hyperemic diastolic mean velocity (DMV) to resting DMV. Angiographic data were analyzed using a qualitative grading system: grade 0, normal angiogram; grade 1, luminal irregularities, diameter reduction < 30%; grade II, diameter reduction < 50%; grade IV, diameter reduction >50% and/or diffuse narrowing of small vessels. CAV was defined as angiographic changes of grade II or greater. Follow-up was 18±5 months.

Clinical events were considered to be cardiac death, need for hospitalisation and stent implantation and heart failure at univariate analysis pts with higher CFR (p<0.000), higher AIC grade (p=0.003), a shorter DDT (p=0.06) and a lower CFR (p<0.000). A DDT cutoff of ≥840 ms, identified by ROC curve analysis (AUC 0.797, SE 0.075, 95% CI 0.649-0.945, p=0.01), was 74% specific and 85% sensitive for predicting events, with positive (PPV) and negative predictive value (NPV) of 31% and 97% respectively (p=0.003). A CFR cutoff of ≥2.6 (AUC 0.851, SE 0.006, 95% CI 0.732-0.971, p=0.002) was 66% specific and 91% sensitive for predicting clinical events. PPV=36%, NPV=97% (p<0.001). Pts of CFR <2.6 and pts with DDT ≥840 ms had a lower survival free from events (p=0.003/3 and p=0.01, respectively. By Cox regression analysis only a lower CFR predicts the risk of long-term cardiac events (OR 5.6, 95% CI 1.3-20.4, p=0.08). Noninvasive assessment by CE-TTE reveals that shorter DDT and lower CFR appear to be reliable surrogate markers for subsequent adverse events and that CFR is the main independent predictor of poor outcome in HT pts.

ATRIAL FUNCTION AND SOURCE OF EMBOLISM

Pericatheter closure of patent foramen ovale after cryptogenic stroke: absence of recurrence in a high risk subgroup

Methods:

Background: Pericatheter closure of patent foramen ovale (PFO) is being recognized as the treatment of choice for high risk young patients (pts) who suffered cerebrovascular accident was noted during clinical follow-up. We assessed the safety of pericatheter closure of PFO in the long-term follow-up period.

Methods: A prospective randomized study was conducted in the Department of Cardiology, University of Padova, Padova, Italy. Pts included in the study were 66 consecutive patients (pts) who underwent pericatheter closure of PFO at the University of Padova, Cardiac Department, Padova, Italy. They were divided into 2 groups: Group A - standard closure, Group B - closure with a device anchored on the infero-posterior wall of the atrial septum. All pts were maintained under Aspirin prophylaxis. The mean age of the pts was 46 years. 11 PFO-Star and 53 Starflex devices were implanted.

Results: The pericatheter closure was successful in all pts, with only 3 periprocedural complications (transient atrial fibrillation, asymptomatic coronary air embolism, regressive brachial plexopathy). Valsalva maneuver after percutaneous closure at 1, 3, 6 and 12 months of follow-up was successful in all pts, with only 3 periprocedural complications (transient atrial fibrillation, asymptomatic coronary air embolism, regressive brachial plexopathy). Examinations were performed at 12 months of follow-up.

Conclusion: The aim of this study was to evaluate the risk of clinically detectable pulmonary embolism, recurrent DVT and post-thrombotic syndrome in patients with UEDVT.

Methods:

Results: Thirty-two patients with upper limb DVT were studied. We identified risk factors for thrombosis in 29 patients: eleven patients had different types of primary thrombophilia (antithrombin III deficiency – 4 cases, protein S deficiency – 4 cases, antithrombin III deficiency – 2 cases, factor V Leiden mutation – 1 case). One patient had thoracic outlet syndrome. Eighteen patients developed secondary thrombosis, associated with central venous catheters (10 cases) and cancer (8 cases). In all the cases of malignancy, UEDVT was the first event who led to the diagnosis. Pulmonary embolism (PE) complicated the evolution of 8 patients (25%) and developed before thrombosis being treated. The average time between the onset of the thrombosis and the appearance of clinical PE was 14 days. Lower rates of PE were found in patients diagnosed and treated in the first 10 days of the onset of symptoms (16.6% vs. 50%). All patients received anticoagulant therapy. A complementary surgical procedure for thoracic outlet syndrome was performed (first rib resection). We didn't find any recurrent events. Post-thrombotic syndrome with moderate obstruction on ultrasonography was found on 6 patients (18%), but only one patient developed clinical manifestations.

Conclusion: Thrombosis of the brachiocephalic veins is a rare thromboembolic disease, but with potentially serious complications. Pulmonary embolism is the most common complication of UEDVT (25%). Early detection and treatment of the disease decrease the incidence of complications. We found lower rates of post-thrombotic syndrome in patients with UEDVT (18%).

Coronary blood flow and coronary flow reserve by contrast-enhanced transthoracic echocardiography predict long-term outcome in heart transplantation

Methods:

Background: Cardiac allograft vasculopathy (CAV) is a major obstacle to long-term graft survival.

Methods: We assessed the validity of coronary blood flow and coronary flow reserve by contrast-enhanced transthoracic echocardiography (CE-TTE) during adenosine infusion as a marker of long-term outcome after heart transplantation (HT). Adenosine infusion data were measured in the left anterior descending coronary artery (LAD) by CE-TTE in 78 HT patients (pts) (65 male, aged 50±12 years at HT, at 8.1±4.3 years after HT). Coronary flow velocity in the LAD was detected at rest and during infusion of adenosine (0.14 mg/kg/min). CFR was obtained as the ratio of hyperemic diastolic mean velocity (DMV) to resting DMV. Angiographic data were analyzed using a qualitative grading system: grade 0, normal angiogram; grade 1, luminal irregularities, diameter reduction < 30%; grade II, diameter reduction < 50%; grade IV, diameter reduction >50% and/or diffuse narrowing of small vessels. CAV was defined as angiographic changes of grade II or greater. Follow-up was 18±5 months.

Clinical events were considered to be cardiac death, need for hospitalisation and stent implantation and heart failure at univariate analysis pts with higher CFR (p<0.000), higher AIC grade (p=0.003), a shorter DDT (p=0.06) and a lower CFR (p<0.000). A DDT cutoff of ≥840 ms, identified by ROC curve analysis (AUC 0.797, SE 0.075, 95% CI 0.649-0.945, p=0.01), was 74% specific and 85% sensitive for predicting events, with positive (PPV) and negative predictive value (NPV) of 31% and 97% respectively (p=0.003). A CFR cutoff of ≥2.6 (AUC 0.851, SE 0.006, 95% CI 0.732-0.971, p=0.002) was 66% specific and 91% sensitive for predicting clinical events. PPV=36%, NPV=97% (p<0.001). Pts of CFR <2.6 and pts with DDT ≥840 ms had a lower survival free from events (p=0.003/3 and p=0.01, respectively. By Cox regression analysis only a lower CFR predicts the risk of long-term cardiac events (OR 5.6, 95% CI 1.3-20.4, p=0.08). Noninvasive assessment by CE-TTE reveals that shorter DDT and lower CFR appear to be reliable surrogate markers for subsequent adverse events and that CFR is the main independent predictor of poor outcome in HT pts.
Conclusion: The better reproducibility, the option to measure mass volume and the smaller compression of mitral valve apparatus that RTOSE may be the technique of choice for the non-invasive evaluation of ICM.

981 Ecographic parameters for prediction of embolic events in infective endocarditis

L. Lita"a, C. Serdecz1, H. Moldovan2, D.P. Ghirigorescu1, D. Filip1,2, C. Maciulei3,1, Institute of Cardiology Diseases "C. Călinescu", Cardiac Surgery I, Bucharest, Romania, 1Institute of Cardiovascular Diseases, Cardiac Surgery, Bucharest, Romania, 2Institute of Cardiovascular Diseases "C. Călinescu", Aaesesthesiology Dept, Bucharest, Romania, 3Institute of Cardiovascular Diseases "C. Călinescu", Cardiology Dept, Bucharest, Romania

Aim: To define the echographic parameters which can predict the high risk groups for embolic events in infective endocarditis (IE). 2. Evaluating the transesophageal echography (TEE) value in prediction of an embolic event in IE. 3. Establishing the incidence and the echographic predictors for a new embolic event during the antibiotic treatment.

Material and method: 226 patients (58% male, mean age 47.8±6.4) diagnosed with infective endocarditis on Duke criteria were followed-up during 3 years. The echographic parameters followed on the vegetation were: the maximum length, thickness, narrowed diameter, neck, mobility defined as measurement of the angle of displacement of long axis of vegetation through the cardiac cycle.

Results: 1. The incidence rate of the embolic events in these patients was 51.27%. 2. The univariate analysis has shown a significant correlation between the vegetation length and IE with significative differences in the length and mobility of the vegetation. The only independent predictors of the embolic events shown by the multivariate regression analysis were the maximum length (p=0.0001) and the increased mobility of the vegetation with the maximal angle >60° (p=0.0001). 3. The echographic differences between the patients with embolic events and the others are shown in Table 1.

Table 1. Ecographic differences between patients with IE who suffered or not an embolic events

<table>
<thead>
<tr>
<th>Embolic event</th>
<th>NO</th>
<th>YES</th>
<th>p-value</th>
</tr>
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<tbody>
<tr>
<td>Maximum length (mm)</td>
<td>6.2</td>
<td>12.6±0.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Maximum with thickness</td>
<td>1.2±0.2</td>
<td>2.7±0.02</td>
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</tr>
<tr>
<td>Neck/width fraction</td>
<td>0.78±0.2</td>
<td>0.42±0.02</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Maximal angle of displacement of vegetation</td>
<td>25.1±10</td>
<td>26.1±10</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Conclusions: 1. The vegetation dimensions and the mobility determined by TEE are important predictors for the unfavorable prognostic in IE and are correlated with the embolic risk. 2. Significant echographic predictors of the embolic events occurrence were vegetation length >15mm, neck/width fraction >0.69, maximal angle of displacement of vegetation throughout the cardiac cycle >60°. 3. During the antibiotic treatment the embolic risk depends only on the vegetation mobility and dimension. 4. Early TEE in IE can identify the patients with high risk for an embolic event.

982 Potential sources of embolisation in patients with mechanical prosthetic valves: An echocardiographic study in 297 patients

M.A. Maciulei1, K. Pieciwczkon1, K. Luczak3, J.H. Gobch1, Medical University of Lodz, Clinic of Cardiology, Lodz, Poland, 2Lodz, Poland

In pts with mechanical prosthetic valve (PV) thrombosis of PV (TPV) and systemic embolisation (SE) the most serious complications, the aim of the study was to assess the incidence of potential sources of embolisation (PSE) and stating the indications for the TEE on the grounds of the presence of the predisposing conditions (PC) for TPV/SE. The following PC were analyzed: inadequate analgesia, indications for the TEE on the grounds of the presence of the predisposing to assess the incidence of potential sources of embolisation (PSE) and stating valves - transeophageal echocardiographic study in 297 patients.

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983 Does transesophageal echocardiography influence the treatment of young patients with cryptogenetic TIA or ischemic CVA?

T.C. Retig1, B.J. Bouma2, R.R.A. van den Brink1, 1AMC, Cardiology, Amsterdam, Netherlands, 2Amsterdam, Netherlands

Background: Transesophageal echocardiography (TEE) is known to be superior for identifying potential cardiac-cerebral sources in patients with transient ischemic attack (TIA) or ischemic cerebral vascular accident (CVA). In our institution all patients with cryptogenic TIA or ischemic CVA aged 50 and less undergo transesophageal echocardiography (TEE) and if negative TEE search for a cardiac source of the embolism. Because the image quality of TEE technique has been improved over the years and patients consider TEE as very unpleasant, we determined the additional benefit of TEE over TTE by examining the influence of TEE findings on therapy. Patients and Method: Prospective study was conducted in young patients with TIA or ischemic CVA between January 1, 1996 through December 31, 2004. All patients underwent both TEE and TTE. Their medical records were reviewed for changes in therapy because of additional information obtained by TEE. At the end of follow-up April 2005 we collected data from their general practitioners about new TIA’s or ischemic CVA.

Results: Eighty-seven patients with TIA (23) and ischemic CVA (64) were enrolled. Of the 101 patients TEE detected one or more potential cardiac-cerebral source not found by TEE. In this group the standard treatment (aspirin 38 mg) was changed in 7% (6/87) of the patients because of findings of the TEE. The TEE findings were: atrial septal defect with patent foramen ovale (PFO) (n=1), atrial septal defect with atrial septal aneurysm (ASA) (n=1), patent foramen ovale with protruding thrombus in the aortic ascendens (n=1), spontaneous echocontrast in Left atrial appendage (n=1), abnormal structure on the mitral valve (n=1), left atrial appendage thrombus (n=1). New therapy included respectively: Sintrom (n=4), aspirin 100 mg (n=1) and aspirin 100 mg in combination with dipidamol (n=1). Complete follow up exceeded in 83% with an average of 5.6 years ± 2.73. 12% (10/91) of abnormalities seen on TEE had a new TIA or ischemic CVA. In the group where TEE did not reveal (new, or not seen by TEE) abnormalities, 15% (10/69) had a new TIA or ischemic CVA.

Conclusions: In patients with cryptogenic TIA or ischemic CVA TEE remains superior in finding a cardiac source of embolism. However, these findings hardly influenced the already initiated treatment.

984 Prevalence and echocardiographic features of PFO and ASA

V. Yotova, T. Kukova, V. Kostova, National Heart Hospital, Department of Non-invasive Cardiology, Sofia, Bulgaria

TEE is currently the reference standard allowing direct inspection of the interatrial septum (AS). Aim of the study was to define some morphological characteristics of the patent foramen ovale (PFO), atrial septal aneurysm (ASA) and their relation to cerebrovascular events (CVE). Materials and Methods: TEE was performed in 390 patients, referred to our laboratory between 2002-2004 for different reasons. In 20 of them we found PFO, in 4–combination PFO with ASA; in 16 – ASA. During the TEE we measured: 1. The separation between septum primum and septum secundum 2. The whole length of the septum primum membrane 3. Fossa ovalis length. Contrast study was performed in 24 pts. For this purpose we used 9 ml agitated saline mixed with 1 ml Gelofusin. Contrast injections were repeated 3 times during normal respiration and during Valsalva maneuver. Results: The summary is shown on the table. Among 390 pts 47 had a history of previous CVE (stroke or TIA). CVE were due to embolism or cryptogenic in 33 pts. PFO was found in 2 of them, a combined PFO and ASA were found in other 2. All four pts had a large size of the PFO (>2 mm) and R-L shunting at normal respiration or during Valsalva. The amount of contrast which pass into the LA was more than 20 microbubbles or like ‘cloud’ near the IAS. Small-size PFO presented with less than 3 microbubbles with no associated neurological events.

<table>
<thead>
<tr>
<th>n</th>
<th>SS-SP</th>
<th>mm</th>
<th>FO-mm</th>
<th>R-L shunt</th>
<th>R-L shunt</th>
<th>R-L shunt Valvula</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFO</td>
<td>20</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>large 6</td>
<td>1.7</td>
<td>15.8</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASA</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>large PFO</td>
<td>2</td>
<td>20.4</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASA</td>
<td>16</td>
<td>22.15</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
985 Feasibility of transcranial contrast-enhanced color-coded sonography for detection of intracardiac right to left shunt
M. Sorbo, M. Pfeifer, Padova, Italy

Patient foramen ovale (PFO) with right to left shunt (RLSH) has been suggested as a potential source of paradoxical embolism for ischemic stroke. Contrast material–enhanced transcranial contrast echocardiography (c-TCD) is gold standard for diagnosis, but is semi-invasive and depends on the patient's ability to swallow. Contrast-enhanced transcranial Doppler ultrasonography (c-TCD) has become an optimal method for detecting a transcardiac Shunt (TSh) and superior over c-TEE. The absence of temporal windows can represent an indisputable limitation of c-TCD (patient's age after 60 years and the seas).

Aim: Feasibility of c-TCD as a screening method for diagnosis of intracardiac right to left shunt in selected population.

Methods: Between February 2004 and May 2005, 86 patients admitted with stroke or transient ischemic attack, were studied in our department of Cardiology, with c-TCD method never performed before, for detection of intracardiac right to left shunt. The mean age was 57.5 years (age range, 24–82 years), 47 female and 38 male. All patients underwent a standardized stroke diagnostic work-up. C-TCD examination was carried out using a phased-array transducer (Philips Medical Systems). Contrast examination (glucose solution (9 mL) and air (1 mL), agitated between two 10-mL syringes) was made at right heart window. The injection was performed during normal breathing and during aValsalva maneuver. The appearance of air-embolism signals in the cerebral arteries within 7 seconds of the injection was considered positive for intracardiac shunt (hyperechoic audible signals in 1 cerebral artery).

Results: An optimal temporal acoustic window was found in 76 out of 86 patients (88.4%), in 42 out of 47 female (89.3%) in 31 out of 38 male (81.5%). Forty-seven subjects were older than sixty (55%); an optimal window was found in 37 (78%). The subjects younger than sixty were 38 (45%) and no one had unfavorable window (100%). The middle cerebral artery was sampled in 60 out of 85 patients (70%), anterior cerebral artery in 20 (23%), posterior cerebral artery in 26 (30%). More than one artery was sampled in 26 out of 85 patients (30%). Every examination lasted almost 10 minutes.

Discussion: The feasibility of c-TCD is high especially in subjects younger than sixty. Slity difference were found between female (more feasible) and male. The results of this study imply that c-TCD may be used as an alternative tool to detect cardiac right-to-left shunt and may be employed to complement c-TEE, because is feasible, fast, and valid non-invasive bedside method.

986 Detection of patient foramen ovale and atrial septal aneurysm by transesophageal echocardiography: Influence of acquired experience, adequate technique and patient selection

Background: Transesophageal echocardiography (TEE) is a very important tool in the evaluation of patients with embolic events, for detection of cardiac source of embolism. Patient foramen ovale (PFO) is an entity that relies mainly in TEE for the diagnosis.

Objectives: To evaluate the detection of PFO and atrial septal aneurysm (ASA) in different time periods since 1994, accompanying the learning curve and changes in method for detection (by administration of agitated saline in the first years immediately after Valvular maneuver and in the last years during Valvular examination).

Population: Retrospective study using our database of TEEs performed since 1994 through May 2005 in patients with an embolic event: stroke, transient ischemic attack (TIA) or other forms of peripheral embolism (PE). Since 2002, after the creation of cerebrovascular units, patients with stroke/TIA have been systematically referred for TEE to exclude cardiac source of embolism.

Results: We studied 1110 patients (P) admitted to TEE (23% of the total number of TEEs performed), 58±14 years, 52% males. Results are presented in Table 1.

<table>
<thead>
<tr>
<th>Age (%s)</th>
<th>1994-1999 (n=216)</th>
<th>1999-2002 (n=420)</th>
<th>2003-2005 (n=272)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Age (years)</td>
<td>56±14</td>
<td>64±14</td>
<td>64±14</td>
</tr>
<tr>
<td>2. Mass gender*</td>
<td>49</td>
<td>58</td>
<td>55</td>
</tr>
<tr>
<td>3. Stroke</td>
<td>71</td>
<td>57</td>
<td>74</td>
</tr>
<tr>
<td>4. PFO*</td>
<td>7</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>5. ASA</td>
<td>22</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>6. Aortic plaques*</td>
<td>9</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>7. Thrombus*</td>
<td>9</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8. Tumor</td>
<td>6</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>9. Venous prosthesis*</td>
<td>15</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>

*p<0.05

Conclusions: With the development of cerebrovascular units, with different P population and greater experience with this technique, we observed an increase in the detection of PFO and atrial septal aneurysm as causes of embolism. There has been a decrease of P referred with concomitant valvular heart disease.

987 Evidence for an influence of interval-strength relationship on beat-to-beat variations in active relaxation during atrial fibrillation

Introduction: Interval-strength relationship (IS), which causes beat-to-beat changes in isovolumic state, accounts in part for the varying myocardial contractility during atrial fibrillation (AF), but the effect of IS on active relaxation has not been studied yet. Therefore, we tested the hypothesis, that active relaxation of an individual irregularly arrhythmical beat is influenced by IS, that is, by the duration of the preceding cardiac cycles.

Methods: Six subjects (81±14 years, 2 men) with nonvalvular permanent AF, good right ventricular function and mild-moderate tricuspid regurgitation (TR) went through a complete echocardiographic examination. From study subjects, a total of 496 consecutive CW Doppler profiles of TR and RR intervals were recorded and digitally stored. The mean rate of LV pressure decay (a measure of negative (-dP/dt)) during early diastole was derived from the CW Doppler recordings as the rate of change of tricuspid regurgitant flow velocity between 1 and 2 ms. Thus, the time interval (dt) between velocities of 1 and 2 m/s was off-line measured and (-dP/dt) was calculated as: (-dP/dt) = 12/dt x 1,000. In each subject, (-dP/dt) was normalized by expressing data as a percentage of the maximum observed value. Next, those (-dP/dt) values with a short pre-preceding RR interval (group SPI; RR < 650 ms) and those with a long pre-preceding RR interval (group LPI, RR > 650 ms) were selected for further analysis. Data are expressed as means±SD, paired t-test was used for comparison.

Results: The mean cycle length was 781±186 ms, and the mean (-dP/dt) was 33±8.100 mmHg/s. The length of the preceding cycle length was not different between groups SPI and LPI (742±22 ms and 837±3 ms, ns), but in group SPI the mean normalized (−dP/dt) was significantly higher than in group LPI (0.60±0.02 vs. 0.51±0.01 mmHg/s, p<0.001).

Conclusion: Interval-dependent potentiation of active relaxation was observed in subjects with permanent AF. Our results show, that with similar preceding RR interval length, active relaxation is faster when the pre-preceding interval is shorter.

988 Intracardiac echocardiography in atrial fibrillation percutaneous ablation procedures
R. Couto, K. Rays-Santos, D. Cavaco, P. Atragao, D. Bonhorst, R. Seabra-Gomes. Hospital de St Cruz, Cardiology Dept., Camara, Portugal

Background: Pulmonary veins (PV) radiofrequency (RF) isolation is a potentially curative therapy for atrial fibrillation (AF) that demands a transseptal puncture of the interatrial septum (AS) and placement of mapping and ablation catheters in the left atrium (in the PV ostia). The potential risks associated with it’s performance are dual in origin- mechanical and embolic (due to the application of RF energy). Intracardiac echocardiography (ICE) has been used in the prevention of potential risks in other invasive cardiac interventions.

Objectives: To determine the usefulness of ICE in guiding the invasive manoeuvres of this procedure and detecting complications.

Methods: In a group of twelve patients (pt) undergoing percutaneous AF ablation under ultrasonic guidance (Cynaps/Acucard ultrasound machine,10 French septal catheters) were evaluated the information provided by the ICE and it’s contribution to the procedure.

Results: In all pts a good visualisation of the AS was possible which enabled a safe transseptal puncture. ICE was more effective showing the left PV (23 left PV vs 11 right PV, p<0.001); in all cases the left superior PV was identified and in 92% the left inferior PV was also identified.

In all the cases the left atrial appendage was observed and the absence of thrombus was documented.

ICE allowed good positioning of the mapping circular catheter (Lasso) in all the PV identified, within their ostia.

Conclusion: In this small series ICE enabled a greater accuracy and safety in the performance of this procedure, namely in the transseptal punctures and placement of mapping and ablation catheters. It also permitted the identification/correction of potential risks or complications as venous stenosis, paracardial effusion and high embolic risk situations.

Eur J Echocardiography Abstracts Supplement, December 2005

S157
The relative compliance of donor and recipient left atrial components in biventricular transplanted patients after more than 10 years of follow-up. A strain (rate) imaging study

C.F. Sirbu, J. P Clase, J. Dhooge, M.F. Maltse, J.P. Vagner, G.R. Sutherland, F.E. Hadioum, University Hospital Nancy-Bruce, Dept of Cardiac Surgery and Transplantation, Vandœuvres, Novy France, Brussels, Belgium

Background: Left atrial (LA) compliance is impaired after heart transplantation (HTX) with biventricular anastomosis and may contribute to the increase in LA size in long term survivors. Because LA pressure is constant, the difference between LA donor and recipient atrial waves lengthening during the recipient period may be a non-invasive indicator of the relative compliance of both components, but this has not yet been studied. Strain (rate) imaging is a new technique to quantify regional ventricular and atrial motion/information as an indicator of myocardial function.

The aim of this study was to assess the relative compliance of the 2 components of the LA wall in HTX patients after more than 10 years of follow-up.

Methods: In 20 recipients of biventricular (age of heart between 35 and 62 years) and normal left ventricular (LV) function, LA reservoir function was assessed by 3D color myocardial velocity imaging, 12.9±2.8 years after HTX (10 to 18 years). In 2 recipients, LA walls lengthening were significant during the recipient period may be a non-invasive indicator of the relative compliance of both components, but this has not yet been studied. Strain (rate) imaging is a new technique to quantify regional ventricular and atrial motion/information as an indicator of myocardial function.

The aim of this study was to assess the relative compliance of the 2 components of the LA wall in HTX patients after more than 10 years of follow-up.

Results: In donors, LA donor walls lengthening were significantly higher than in control group: LA Vmin: 83.1±15.4 ml vs 26±11.5 ml (p<0.001), LA Vmax: 124.8±26.55 ml vs 57.3±8.6 ml (p<0.001). The total e for the reservoir donor component was 48.5±15.16, significantly higher than for the recipient component 23.14±11.5% (p<0.001). The difference of lengthening during the recipient period between the 2 LA components was 21.5±12.1%. For both LA HTX components the total e was lower than in control group 58.8±16.3% (p<0.01).

Conclusion: In recipients of biventricular HTX with long term survival the LA reservoir function is impaired and LA size is increased. The strain (rate) imaging allows to quantify the reservoir function of both LA components and to assess their relative compliance.
Improvement of quality of life does not correspond to echocardiographic parameters after atrioventricular node ablation and right ventricular apical pacing
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Aim of the study: "Ablate and pace" therapy improves symptoms and quality of life (QoL) in patients with drug refractory atrial fibrillation. The aim of the study was to analyze the relationship between QoL and hemodynamic function of left ventricle (LV), left atrial (LA) and LV dimensions assessed by echocardiography.

Methods: We followed 23 consecutive patients (15 Female, 8 male), age 38-62 years (63±17 yrs), who underwent successful atrioventricular node (AVN) ablation and implantation of permanent pacemaker in our centre. Up follow up lasted from 8 to 60 months (25±18). Structural heart disease was present in 13 pts (57%). Indications for ablation were symptomatic and drug-refractory atrial fibrillation (chronic to 10 yrs, paroxysmal in 13 pts). PV pacing leads were placed in PV apex in all cases. We used the Bingequestionnaire to assess QoL.

Results: All parameters were compared at baseline (before ablation) and at long-term follow-up (>6 months). QoL improved from 37.5±10.6 to 13±3.5 (P <0.05).

Conclusions: Improvement of QoL was associated with reduction in LV volume and LV and LA dimensions or LV ejection fraction after AVN ablation. The following factors were also not associated with improvement of QoL: sex, age, time after ablation, presence of cardiac disease, discontinuation of antiarrhythmic medication.

Conclusion: Rhythm regularization after AVN ablation seems to be the only factor improving QoL. Lack of LV function improvement may be due to permanent RV apical pacing.

998 Can tissue Doppler imaging of the lateral mitral annulus, quantify left atrial contractile function in patients with severe mitral regurgitation due to mitral valve prolapse?

Objective: To establish the correlation between tissue Doppler myocardial velocities at atrial systole and other non-invasive indices of LA and LV function in a group of pts with severe MR due to mitral valve prolapse.

Methods: We prospectively studied 34 patients with pure severe MR due to mitral valve prolapse. All pts were in sinus rhythm, had an effective regurgitant area (EROA) > 0.4 cm² and LV ejection fraction (LVEF). Simpson’s rule > 60%. The following parameters of LA and LV performance were included in a stepwise forward fashion in the multivariate regression model to relate with Am lateral:

1. Peak A wave velocity
2. LA and LV end-diastolic diameters
3. LA and LV end-systolic diameters
4. LA and LV ejection fraction (LVEF)

Results: Mean LA and LV end-diastolic diameters were 43±5 vs 45±6 mm, P=0.1. We observed no correlation between QoL and LV dimensions or LV ejection fraction after AVN ablation. The following factors were also not associated with improvement of QoL: sex, age, time after ablation, presence of cardiac disease, discontinuation of antiarrhythmic medication.

Conclusion: Rhythm regularization after AVN ablation seems to be the only factor improving QoL. Lack of LV function improvement may be due to permanent RV apical pacing.

999 Left atrial function in two etiologies of chronic mitral regurgitation. An echocardiographic study

We studied 54 pts with pure severe MR due to rheumatic disease (RD) in comparison with 30 pts with chronic mitral regurgitation (CMR) due to non-rheumatic causes. Both groups were comparable in baseline characteristics. All pts were in sinus rhythm, had an effective regurgitant area (EROA)<0.4 cm² and LV ejection fraction (LVEF) >60%.

Methods: We prospectively studied 34 patients with pure severe MR due to mitral valve prolapse. All pts were in sinus rhythm, had an effective regurgitant area (EROA) > 0.4 cm² and LV ejection fraction (LVEF). Simpson’s rule > 60%. The following parameters of LA and LV performance were included in a stepwise forward fashion in the multivariate regression model to relate with Am lateral:

1. Peak A wave velocity
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Conclusion: Rhythm regularization after AVN ablation seems to be the only factor improving QoL. Lack of LV function improvement may be due to permanent RV apical pacing.

Conclusion: Tissue Doppler velocity of the lateral mitral annulus during atrial systol, may be an echocardiographic variable to estimate left atrial function, since it seems to have an adequate correlation with LA functional parameters in pts with severe MR due to mitral valve prolapse.

996 Improvement of quality of life does not correspond to echocardiographic parameters after atrioventricular node ablation and right ventricular apical pacing
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Aim of the study: "Ablate and pace" therapy improves symptoms and quality of life (QoL) in patients with drug refractory atrial fibrillation. The aim of the study was to analyze the relationship between QoL and hemodynamic function of left ventricle (LV), left atrial (LA) and LV dimensions assessed by echocardiography.

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Conclusions: Improvement of QoL was associated with reduction in LV volume and LV and LA dimensions or LV ejection fraction after AVN ablation. The following factors were also not associated with improvement of QoL: sex, age, time after ablation, presence of cardiac disease, discontinuation of antiarrhythmic medication.

Conclusion: Rhythm regularization after AVN ablation seems to be the only factor improving QoL. Lack of LV function improvement may be due to permanent RV apical pacing.
The LA maximal (Volmax), pre-atrial contraction (Volpre-a), and minimal (Volmin) volumes were calculated by Simpson's rule and its rate (LApreEF), LA area (LAAEF) and LA total (LAFE) emptying fractions were derived and used as a surrogate of LA conduit, LA contractile function and LA global performance. Peak E and A waves, and deceleration time were also obtained. A covariance model was used to assess the joint atrial and left ventricular determinants of LAFE and LAAEF, including gender, age and etiology.

Results: The peak E wave velocity (p=0.017) and LA diameter (LAD) (p=0.002) were dependently predicted of LAFE (R2=0.71) LAFE was detected by ERO (R2=0.54). The etiology (p=0.054), gender (p=0.09) and age (p=0.4), were not significant. See Table 1 (p<0.05).

Methods: 169 P (88 males and 81 females of mean age 70±10 years) with IS, which was diagnosed clinically and then confirmed by coronary angiography, were eligible for the study. TEE was performed with no complications. Statistical analysis was performed by the x² method and p<0.05 was considered statistically significant.

Results: 77 P (45.56%) had NVAF, while 92 P (54.44%) had sinus rhythm (SR). The following findings were detected by TEE: a) Thrombus in the left atrium, its appendage, around the left ventricular in 39 P with NVAF (50.65%) and in 3 P with SR (9.68%). b) Spontaneous echo contrast was detected in 63 P with NVAF (82.08%) and in 22 P with SR (23.91%). c) Low flow velocities in the left atrial appendage in 57 P with NVAF (74.02%) and in 37 P with SR (40.22%). d) statistical test revealed a significantly higher incidence of the three aforementioned abnormal findings in P with NVAF (p<0.001). Between P with NVAF, significantly more P with thrombus, compared to P without P, were found to have spontaneous echo contrast (SES) (96.7% versus 91.00%; p<0.05) and low flow velocities (98.74% versus 77.89% respectively, p<0.01) in TEE.

Conclusions: The embolic source appears to be detected by transesophageal echocardiography in almost half of the patients suffering from nonvalvular atrial fibrillation and ischemic stroke. Abnormal findings predisposing to thromboembolic events are also quite regularly observed in such patients.

1001 Left atrial appendage flow velocity correlates with pulmonary capillary wedge pressure

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Introduction: Left atrial appendage (LAA) flow velocity has been studied basically in patients with atrial arrhythmias because of its relationship with the presence of intracardial thrombi. The determinants of this flow are subject of investigation and controversy.

Objectives: We sought to analyse the relationship between LAA flow velocity and its filling pressure (pulmonary capillary wedge pressure, PCWP), in patients with atrial arrhythmias.

Patients and Methods: We analysed prospectively the left atrial appendage (LAA) flow velocity (V_LAA) in 16 consecutive patients (9 males, 7 females, mean age 72±10 years). Eleven patients had atrial fibrillation, 4 patients had common flutter and only one had uncommon flutter. Eight patients were women, mean age 66±13 years. All patients had mild or moderate cardiac disability except in four cases, a severe cardiac disability with atrioventricular dysfunction, two patients with atrioventricular block and a severe systolic dysfunction. All of them had the following measures: LAA flow velocity, mitral inflow velocity (E and A waves), and pulmonary veins flow velocity made by TEE. We also measured, the mitral inflow propagation velocity (Vp) in all patients using transesophageal echocardiography. We estimated de PCWP with the corroborated formula 5.27E (Vp velocity) 2 , and pulmonary veins flow velocity made by TEE

Results: We obtained a mean LAA flow velocity of 0.31±0.17, and a mean PCWP of 17±6±7.5. We obtained a good correlation between estimated PCWP and LAA

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flow velocity (Pearson's 0.601, \( p < 0.05 \)), so that, lower LAA flow velocities correspond to higher estimated PCWP.

**Conclusions:** In patients with atrial arrhythmias, LAA flow velocity correlates well with estimated PCWP. Since lower LAA flow velocity correlates with the presence of intratrial thrombi, these patients with higher estimated PCWP constitute a group of greater cardioembolic risk.

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**Correlation between pulsed Doppler flow velocities and tissue Doppler assessment of left atrial appendage**

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**Introduction:** Transesophageal echocardiography is the choice procedure for evaluating of the left atrial appendage (LAA) anatomy and function. Two dimensional Echocardiography shows information about LAA morphology and the presence of thrombi or spontaneous echo contrast. Doppler interrogation of LAA flow appears information about LAA function and predicts probability of thrombus formation and thromboembolism.

Tissue Doppler index (TDI), a new echo technique, allows quantification of myocardial velocities (recorded with color and pulsed Doppler) for evaluation of the timing and amplitudes of LAA wall velocities.

Therefore, we studied a series of patients who underwent transesophageal echocardiography. The aim of this study was to compare LAA wall pulsed Doppler velocities (TDI) with the related flow Doppler velocities.

**Background:** Pulsed Doppler (PW) of LA appendage (LAA) flow velocity is used for global assessment of LAA function by TEE. We evaluated wall contraction velocity of LAA by TDI for assessment of LAA function and its correlation with PW.

**Methods:** In 82 patients TEE was done, and PW and TDI studies was performed in all patients. Both studies were obtained in 70 degrees, for TDI sample volume was placed in proximal one third of medial and lateral LAA wall. We recorded early diastolic flow (D1), emptying velocity (D2) and filling velocity (D3) in both PW and TDI.

**Results:** There was good linear correlation between the TDI – medial D2 (R= 0.5, \( p < 0.001 \)), TDI – Lateral D2 (R= 0.65, \( p < 0.001 \)) with PW D2, and TDI – medial D3 (R= 0.45, \( p < 0.01 \)), TDI – Lateral D3 (R= 0.7, \( p < 0.001 \)) with PW D3. This correlation was better in lateral than medial wall. A TDI velocity of < 12 cm/s had sensitivity 81% and specificity 97% for PW velocity < 40 cm/s.

**Conclusion:** The TDI pattern of the LAA had significant correlation to PW emptying and filling velocities and it could be used for assessing LAA wall contractility.