1109-133 Is the Use of Modified Bernoulli Equation Valid in Estimating Pulmonary Artery Pressures in Patients With Severely Dilated Tricuspid Annulus?

H. Mehmet Sakachli, Atoz Hassanmanci, Roderry Say, Atil Raisinghani, Anthony N. DeMaria, UCSD Medical Center, San Diego, California.

Prior studies have shown that pulmonary artery systolic (PA) pressure can be measured by Doppler echocardiography using the tricuspid regurgitant (TR) jet using the Bernoulli equation. Although this technique has been validated comparing echo with direct catheter measurements, its accuracy has not been evaluated in pts with severely dilated annulus. We sought to compare the accuracy of measures of PA pressures using echo & cath data in chronic thromboembolic pulmonary hypertension (CTEPH) pts with varying degrees of tricuspid annular diameter (TAD) dilatation. We reviewed echos of 54 CTEPH pts and measured PA pressure and TR regurgitant index (RI, the planimetered ratio of TR with relation to the dilated right atrial area). PA, RA pressures, & PVR were recorded from RHC within 48 hrs of echo. Fifty-three of 54 pts (98%) had PA pressures >50 mmHg. Echo measures of PA pressure correlated more closely with cath in pts that had TAD <5 cm (n=42, r=0.72) compared to pts with TAD >5 cm (n=12, r=0.42, p=.04). Age, PA, RA pressures, & PVR were not different between the 2 groups; however, pts with larger TAD tended to have more severe TR in light of similar PA pressures. Severe TR (RI>3.25) was present in 21/42 (50%) & 6/12 (50%) in each group, respectively. CONCLUSIONS: In CTEPH pts, all of whom have markedly increased PA pressures, Doppler correlates less closely with catheter measurements of PA pressure than in prior reports. More importantly, PA pressures by Doppler correlate less closely with direct catheter measurements in CTEPH pts with severely dilated TAD than in those without severe enlargement. The mechanism for this finding may be that a "wide-open" conduit in setting of significantly dilated tricuspid annulus causes rapid equilibration and the distal velocity is NOT significantly higher than the velocity proximal to the valve.

1109-134 Reversal of Blood Flow in the Descending Aorta: Implications for Doppler Quantitation of Aortic Insufficiency

Edward J. Yoon, Jan Engvall, Tino Ebbers, Elmar Brandt, Lars Wigstrom, Bengt Wanne, Ann Bolger, University of California, San Francisco, San Francisco, California, Linkoping University, Linkoping, Sweden.

Background: Pulsed-wave Doppler echocardiography of the descending aorta is often used to assess the degree of aortic insufficiency (AI), but assumes that descending aortic flow is relatively uniform and antegrade. Three-dimensional (3D) magnetic resonance imaging (MRI) provides a highly sensitive method of studying regional variations in blood flow in vivo throughout the entire aorta.

Methods: Velocity vector fields were mapped with time-resolved 3D phase-contrast MRI, encompassing the heart and aorta in four healthy human subjects (24-61 yrs) without AI.

Results: Blood flows in the descending aorta were non-uniform and varied across subjects and throughout the cardiac cycle. Significant retrograde flow was demonstrated along the lesser curvature of the proximal descending aorta in all subjects, and was located within a discrete vortex in 3 subjects. Peak retrograde flow velocities ranged from 0.18-0.44 m/s. Retrograde flow was observed in both systole and diastole, persisting from 0.1-4.414 s during a single cardiac cycle.

Conclusion: Retrograde aortic flow is demonstrable in normal human subjects. Such flows appear in the area most often sampled by pulsed-wave Doppler studies, and may result in overestimation of AI severity. 3D phase-contrast MRI is a powerful tool for assessing complex regional flow patterns in vivo, and may elucidate the effect of vascular and vascular pathology on aortic blood flow.


Kazuo Tanaka, Eiji Chitaki, Hiroshi Kasagawa, Tatsuya Sumiyoshi, Sacchi Hosoda, Nakakubare Heart Institute, Tokyo, Japan.

(Objectives) Accompanying high success rate of surgical techniques, we have aggregated performed mitral valve repair at earlier timing for the patients of severe mitral regurgitation (MR). This is a retrospective study to report the impact of preoperative MR point (scored by clinical features and echocardiographic data) on postoperative cardiovascular events and reversibility of cardiac function.

(Methods and Results) 192 patients with isolated prolapsing grade 3 or 4 MR who underwent mitral valve repair (mean age:54.5yrs, median follow up period:3.5yrs, percentage of follow up:98%) were enrolled. A modification of the original Cleveland clinic MR point was used, which was scored by total points of 6 parameters associated with severity of the disease, i.e. history of congestive heart failure, atrial fibrillation, pulmonary hypertension, left ventricular and systolic dimension (LVDS), % fractional shortening (FS) and left atrial dimension (maximum of 6 points). Preoperative New York Heart Association (NYHA) classification was I=41, II=42, III=45 and IV=4 and preoperative MR points had wide distributions in each class. Patients were categorized into 3 groups according to MR points (group L <=2.5 120 cases, group H: >3.0 62 cases) irrespective of NYHA and long-term cardiovascular event (re-operation, CHF and cardiac embolism) free rate was analyzed by Cox regression model. Postoperative event-free rate of group H was significantly higher than that of group L (p<0.003) and adjusted risk ratio was 3.37 (95%CI 1.49-7.566). On the contrary, preoperative NYHA classification didn't correlate significantly with the event-free rate in this study(p=0.075). Postoperative echocardiography showed larger LVDS and lower FS in group H than those in group L. MR point could also predict postoperative LV systolic function in none or mild symptomatic MR patients.

(Conclusion) MR point is a simple scoring system to integrate the total status of patients of mitral regurgitation with or without subjective symptom. It may be useful to predict postoperative event and cardiac function. Surgical recommendation may be supported by these objective data.

1109-136 Computation of Regurgitant Effective Orifice Area (EOA) Using Digital 3-D Reconstruction of Multithreaded Velocities From the Flow Convergence Region: An In Vitro Study Using Dynamically Changing Orifices Mimicking Mitral Valve Prolapse

Xiaoli Li, Jun Li, Jiuhua Xu, Ghada M. El-Biegly, Jihi-Sheng Li, David J. Sahn, Oregon Health & Science University, Portland, Oregon, ATL Ultrasound, Bothell, Washington.

Background: We studied a multithreaded 3D Doppler flow convergence (FCR) method in a dynamic mitral valve prolapse model to determine dynamic changes in EOA. Methods: Latex orifices (lengths = 0.6mm) made to mimic different types of mitral valve prolapse (none leaflet and bileaflet) were used in our study. An ATL HDI 5000 ultrasound system and an MPT-7 TEE probe were used for 3D acquisition. The 3D datasets contained integral scintarine data with color Doppler velocities from the FCR were transferred to a Silicon Graphics computer. For all orifices, 9 pulsatile flows (15-55ml/beat) were studied. The 3D FC surface area was measured on parallel slices through the 3D dataset at selectable aliasing velocities (14-67.3cm/sec) chosen to maximize the regularity and minimize lateral drop out of the visualized 3D FC at 4 points in every cardiac cycle. All values of instantaneous FCR EOA during regurgitation (EOA = 3D flow rate/2D Doppler velocities) were compared to EOA determined using instantaneous flow rates from an ultrasonic flow meter and CW Doppler velocities. Results: FC EOA (range = 0.08-0.56cm) correlated well with reference EOA (r = 0.85, y = 1.07x + 0.03, mean difference = 0.05 ± 0.065cm) with a mean dynamic increase of 35% during each cycle. Conclusion: The digital 3D FC method can accurately predict flow rate and thus EOA in our dynamic in vitro mitral valve prolapse model, despite temporal variability of FC size and shape.

Poster Session 1132 Endocarditis

Monday, March 18, 2002, 3:00 p.m.-5:00 p.m.
Georgia World Congress Center, Hall G
Presentation Hour: 4:00 p.m.-5:00 p.m.

1132-131 Racial Differences in Endocarditis Treatment and Outcome


Background: Little data is available regarding racial differences in the treatment and outcome of endocarditis. Methods: We reviewed a 20% random sample of all Medicare discharges (age >=65 years) with a principal diagnosis of infective endocarditis from 1985 through 1999 (N=18,465). Comorbid conditions, length of stay, valve replacement, and survival were determined for each race group. Logistic regression was used to determine the association of black race with valve replacement and survival after adjustment for comorbidity conditions. Results: Compared with white patients, black patients were younger (74 +/- 8 vs. 76 +/-7 years, p<0.001), more likely to be female (57% vs. 49%, p<0.001) more likely have renal dysfunction (13% vs. 9%, p<0.001), staphylococcal infection (26% vs. 22%, p=0.001), and sepsis (39% vs. 32%, p<0.001), but were less likely to have heart failure (28% vs. 31%, p=0.008). Blacks were less likely to undergo
valve replacement, and had worse survival than whites (Table). After adjustment for covariates blacks remained less likely than whites to survive to 1 year (odds ratio (OR) 0.49, 0.39 - 0.61). Conclusions:

1132-132

Transthoracic Echocardiography Using Native Tissue Harmonic Imaging: Diagnostic Alternative to Transesophageal Echocardiography in Patients With Suspected Infective Endocarditis

Fabio Chilillo, Alessandra Pedrocchio, Andrea Brunii, Oscar Tosii, Alessandro De Lao, Roberto Zecchel, Paolo Sironiti, Ospedale Ca'Foscari, Treviso, Italy.

Background: Transesophageal echocardiography (TEE) has proven to be superior to transthoracic echocardiography (TTE) for the diagnosis of infective endocarditis (IE). Native tissue harmonic imaging (NTHI) is a new imaging modality that improves transthoracic image quality. We sought to evaluate if NTHI is a diagnostic alternative to TEE for the assessment of patients with suspected IE.

Methods: We considered 121 consecutive patients who had TEE, NTHI, and TEE for the evaluation of IE. Patients with mechanical prosthesis were excluded. Studies were performed with a commercially available Sonocardia 1.5 MHz transducer (model 77413). TTE was performed with a 1.5 MHz transducer on the upper transesophageal approach. The image quality was poor in 3 and echo characteristics of vegetation (classification by Sanfilippo et al) were assessed semiquantitatively. All studies were classified as positive (+), negative (-) or indeterminate (±) for IE. A cost-effectiveness analysis was performed.

Results: Vegetations were identified in 27 patients by TEE in 22 patients by NTHI, and in 12 patients by TEE (p<0.05 for TEE vs NTHI and TEE). Mean image quality improved significantly from TTE (1.8±0.7) to NTHI (2.1±0.6; p<0.001 vs TEE) and TEE (2.4±0.6; p<0.001 vs TEE). The number of (+) studies correlated with image quality and was greater on TEE (40/59 vs NTHI (15/15) (p<0.001). Considering all (+) and (-) TEE studies, TTE showed 58% sensitivity, 66% specificity, 80% negative predictive value, and 79% positive predictive value, NTHI showed 84% sensitivity, 81% specificity, 11% negative predictive value, and 76% positive predictive value. The echo-score for vegetations was higher on TEE (10.2±1.4) than on TEE (7.8±2.2) and TTE (8.1±1.8) (p=0.05 for TEE vs NTHI and TEE; pv ns for NTHI vs TEE). The strategy including NTHI as first step and TEE in patients with low quality NTHI dominated, whereas the strategy with TEE as first choice in all patients exhibited an incremental $1,000,000/life-year-gained and the strategy including TEE and subsequent TEE in patients with low quality echo had an incremental $1,000,000/life-year-gained. Conclusion: In presence of good image quality NTHI seems a valuable and cost-effective alternative to TEE to rule out IE.

1132-133

Disease Progression in Infective Endocarditis: Transesophageal Echocardiographic Study

Frances C. Colegrave, Krishnaswamy Chandrasekaran, Lawrence J. Sinak, Roger L. Click, Yousuf F. Malcolbf, Bijoy K. Khanderiah, Charles J. Mullany, Samantha C. Montgomery, James B. Seward, Mayo Clinic, Rochester, Minnesota.

Background: Infective endocarditis (IE) is a progressive disease, hence lesion morphologic changes can be determined by the time of diagnosis and a later date. This may depend on the infecting organism and the time interval between the examinations. Objectives: To evaluate changes in lesions of IE by transesophageal echocardiography (TEE) in pts who are undergoing surgery for IE by comparing the pre operative TEE (PETEE) with intra operative TEE (IOTEE). Methods: Medical records of 158 pts who had undergone surgery for IE between 1993 and 2001 were reviewed. Data of 88 pts (mean age 54 ± 16 yrs), with 90 episodes of endocarditis who had a PETEE and a subsequent IOTEE were analyzed. Results: 50 native valves (25 aortic, 24 mitral, 1 tricuspid) and 40 prosthetic valves (31 aortic and 9 mitral) were involved. Microorganism or infectious agents were Staphylococcus coagulase negative (30%), other (16%) and culture negative (10%). The mean duration between PETEE and IOTEE was 4.2 ± 3.8 days (range 1-24 days). Changes in lesion were seen in 25 of 88 (29%) pts. Lesion progression was seen in 14 pts (increase size vegetation 10 pts, increase size abscess cavity 4 pts). New lesions were seen in 11 pts (vegetation 5 pts, paraavalvular extension 4 pts, leaflet perforation 1 pt, fistula 1 pt). Staphylococcus and Streptococci were equally associated with lesion progression as well as development of new lesions. Longer duration as assessed by time to surgery (5.6 ± 0.68 vs 3.5 ± 0.48 days) was significantly associated with lesion changes, (p<0.01). Conclusion: Changes in the lesions and development of new lesions occurs frequently (29%) in IE. There was no difference between staphylococcal and streptococcal infection in lesion progression and development of new lesions. 3 Longer surgical waiting period was associated with significant disease progression.

1132-134

Infective Endocarditis in Elderly Patients: Results From the Large Multicenter FRIEND Study (FRench Italian ENDocarditis study)

Giovanni Di Valvo, Franco Thuny, Valerie Rosenberg, Valeria Fergola, Geneviève Derumeaux, Olivier Belliard, Jean-François Avierinos, D. Jarassu, Ariole Cohen, Gilbert H. Habib, University of Napoli, Napoli, Italy, La Timone Hospital, Paris and Marseille, France.

Background: Infective endocarditis (IE) is more and more frequent in elderly and has been associated with various features. Aim of the study: to define the clinical, echo, and prognostic characteristics of IE in a large population of elderly patients (family centers 2 french, 1 italian). Methods: Three hundred sixteen pts with definite IE underwent clinical evaluation, TTE, TEE, blood cultures, and follow-up. Pts were separated into 3 groups: gr A: 118 pts under 50 years, gr B: 120 pts 50-70 years, gr C: 78 pts over 70 years. Results: Elderly pts presented with a higher frequency with prosthetic valve (PVT) IE, Str. bovis IE, and CHF. Incidences of vegetations (veg), embolic events (EVT), and in hospital mortality [mort] were similar between groups. However, mortality was high (23%) in group C pts undergoing medical treatment, but very low (9%) among group C operated pts. By multivariate analysis, the only risk factors for mortality were prosthetic valve (p<0.01), and CHF (p<0.001). Conversely, surgery was associated with a low in hospital mortality (p<0.006).

Conclusions: In this largest series of elderly pts with IE, clinical features do not differ from that of younger pts with IE. Although these older pts presented more frequently than others with CHF and had a slightly worse prognosis, they underwent surgery as frequently as others with very low surgical mortality. Thus, elderly pts with IE may be considered for surgery as younger pts.

* p<0.05 vs group A, ** p<0.01 vs group A

Pv SB RF ETE veg mort

gr A 15% 2% 6% 29% 73% 8%
gr B 13% 23%** 13% 37% 77% 7%
gr C 27%* 23%** 15% 27% 68% 15%

1132-135

Role of Serial Transthoracic and Transesophageal Echocardiographic Examinations in Patients With Suspected Infective Endocarditis

Marcos C. Vieira, Max Ginzburg, Pablo M. Pomeranzfell, Alfredo J. Mansur, Heart Institute (InCor), Sao Paulo, Brazil.

Background: Repeated echocardiographic examinations are recommended for patients with suspected infective endocarditis to delineate echocardiographic findings. The impact of repetition of echocardiograms and their diagnostic yield is less well known. We evaluated frequency and diagnostic yield of repetitions of transthoracic and transesophageal echocardiograms in patients with suspected endocarditis. Methods: We prospectively studied 352 patients with 295 episodes of suspected infective endocarditis referred to the echocardiography laboratory over 3 years. Patients were aged 47±6 more or less 17.9 yrs; 139(52.2%) episodes occurred in men and 127(47.8%) in women; 147(53.5%) patients had prosthetic heart valves. According to Duke criteria, endocarditis was confirmed in 127(47.4%) episodes evaluated in 113(39.4%) and rejected in 51(17%) episodes. Statistical analysis was performed with the qui-square or Fisher exact test. Results: A mean of 2.4 transthoracic examinations and 1.2 transesophageal examinations were performed per episode. The first transesophageal echocardiogram was diagnostic in 27(21.5%) of the 122 episodes with a definite diagnosis by clinical criteria. The second transesophageal echocardiogram added diagnostic information in 26(15.3%) of 162 episodes; the third echocardiogram added diagnostic findings in 8(7.5%) of 106 episodes. The first transesophageal echocardiography was diagnostic in 87(77.9%) of the 112 episodes with a definite diagnosis by clinical criteria. The second transesophageal study added diagnostic findings in 23(46.4%) of 49 episodes; the third transesophageal examination added diagnostic findings in 22(20%) of 106 episodes. After the third transthoracic or transesophageal echocardiogram, no additional diagnostic information was obtained. Conclusion: Repeated echocardiographic examinations were common in practice. Diagnostic information was added up to the third transthoracic or transesophageal examination. After the third transthoracic or transesophageal echocardiogram no additional diagnostic findings were obtained.

1132-136

Valvular Aortic Stenosis: Risk of Cerebral Embolism in Patients Undergoing Retrograde Catheterization of the Aortic Valve—Prospective Randomized Study

Heidyr Omran, Harald Schmidt, Peter Bernhardt, Torsten Sommner, Hans Schredi, Berndt Luderitz, University of Bonn, Bonn, Germany.

Background: Although transthoracic echocardiography (TTE) allows non-invasive and reliable assessment of the severity of valvular aortic stenosis (AS) in most patients (pts), retrograde catheterization of the aortic valve (AV) is often performed to determine the pressure gradient over the AV. However, the latter procedure is associated with a risk of cerebral embolism. We performed a prospective and randomized study to determine the incidence of cerebral embolism in pts with AS undergoing retrograde catheterization of the AV.

Methods: Between 1998 and 2000 consecutive pts with AS were included in the study. All pts underwent TTE for determining the mean pressure gradient (mean) over the AV and aortic valvar area (AVA). The pts were randomized (2:1) to either coronary angiography plus retrograde catheterization of the AV (group 1) or to undergo coronary angiography without passage of the AV (group 2). To determine the presence of cerebral embolism all pts underwent cranial MRI including diffusion weighted imaging and neurological assessment before and within 48 hours after the procedure. As a con-