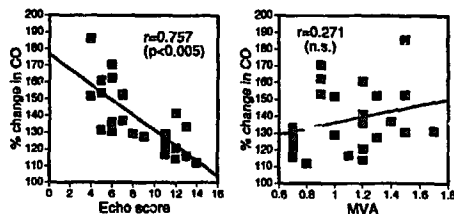


Results: Multiple regression analysis revealed that dobutamine-induced % change in CO significantly correlated with the echo score ($r = 0.757, p < 0.005$) but not with age, gender, rest heart rate, rest stroke volume and MVA.



Conclusion: The echo score that represents the mitral valve morphological changes is used to predict the success of balloon mitral valvotomy. In addition, this study demonstrated that the echo score might be a valuable predictive parameter to regulate the increase in CO during dobutamine infusion and the patient's ability to exercise.

980 Cardiac Surgery Poster IV: The Maze Procedure

Tuesday, March 26, 1996, 3:00 p.m.—5:00 p.m.
Orange County Convention Center, Hall E
Presentation Hour: 4:00 p.m.—5:00 p.m.

980-77 Restoration of Atrial Mechanical Function After Maze Operation: Is It Affected by the Same Factors as the Restoration of Sinus Rhythm?

Yong-Jin Kim, Dae-Won Sohn, Young-Bae Park, Yun-Shik Choi, Jung-Don Seo, Young-Woo Lee, Ki-Bong Kim, Joon-Ryang Rho. *Seoul National University Hospital, Seoul, Korea*

Maze operation is aimed for the restoration of sinus rhythm (RSR) and atrial mechanical function (RAF). But RAF has not been demonstrated in all patients (pts) with RSR. From Apr. 1994 to Mar. 1995, maze operations were performed in 19 pts (M:F = 6:13, mean age 47.1 ± 10.7 years) combined with mitral valve surgery ($n = 17$), aortic valve replacement ($n = 1$) or VSD patch closure ($n = 1$). Sinus rhythm was restored immediately after operation in 18/19 pts (95%) and was maintained by 6 month in 15/19 pts (80%). Four pts without RSR were older (58.0 ± 9.2 vs 44.1 ± 9.1 years, $p < 0.05$) and had larger LA size (61.6 ± 5.7 vs 51.0 ± 8.4 mm, $P < 0.05$). In 17 pts with available Af duration, all pts without RSR ($n = 4$) had Af duration of more than 5 years (pts with RSR: 5/13, $p < 0.05$). But there were no differences in the presence of f-wave by doppler echocardiography (df) and f-wave voltage in EKG(ef). RAF was demonstrated in 14/15 pts (93%) on the tricuspid inflow (TI) while only in 8/15 pts (53%) on the mitral inflow (MI). Peak A velocity and A/E ratio were 0.45 ± 0.15 m/s, 0.69, respectively on TI and 0.47 ± 0.07 m/s, 0.39, respectively on the MI. MI peak A velocity and A/E ratio were significantly lower than the 9 control postoperative pts (0.79 ± 0.14 m/s, 0.94 ± 0.27 ; $P < 0.01$, both). There were no significant differences in the duration of Af, LA size, df and ef between the pts with and without RAF.

Conclusions: While young age, short duration of Af and small LA size favorably affect the RSR, RAF could not be predicted by the same variables. Even in patients with RAF, RAF was incomplete.

980-78 Is the Maze Procedure Safely Combined With Mitral Valve Repair?

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To determine the operative risk of addition of maze procedure (Maze) to mitral repair, perioperative variables, mortality, and morbidity are retrospectively reviewed. From 1993 to 1994, 39 patients underwent a combined procedure (Maze + mitral repair) (Group 1; $n = 39$) in the same period, 36 patients with sinus rhythm and one patient with DDD pacemaker underwent mitral repair (Control; Group 2; $n = 37$). Mean age in Group 1 was 60.7 years and 55.4 in Group 2. Cardiopulmonary bypass time and aortic cross-clamp time in Group 1 were significantly longer. Intraoperative blood loss, intubation period, and duration of ICU stay were not different. No operative deaths occurred in both groups. Four patients required re-exploration in Group 1 and two in Group 2 (NS). Two patients required pacemaker implantation in Group 1 and none in Group 2 (NS). Thirteen of Group 1 patients (33%) developed atrial arrhythmias during hospitalization and seven of Group 2

patients (19%) developed atrial arrhythmias (NS). At hospital discharge, 28 patients in Group 1 (72%) were in sinus rhythm and 35 patients in Group 2 in sinus rhythm. Doppler echocardiography was performed in Group 1 to assess atrial transport function. Atrial transport function was confirmed in 21 patients (58%). The result suggests that Maze can be safely combined with mitral repair. Considering the benefits from addition of Maze, combined procedure may be advised for patients undergoing mitral repair, if indicated. The long-term results of this combination need to be defined.

980-79 The Influence of Perfusion Area and Graft Material on the Flow Velocity of Coronary Artery Bypass Graft

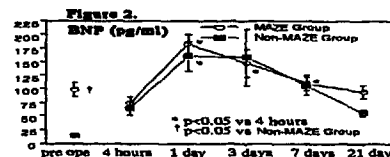
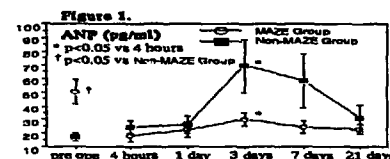
Hiroshi Sato, Masao Okamura, Keiji Kurogane, Yoshio Takeuchi, Takashi Kajiuira. *Takatsuki General Hospital, Osaka, Japan*

The purpose of this study is to evaluate hemodynamic effects of perfusion area and graft material on flow velocity of coronary artery bypass graft. Flow velocity was measured in 50 grafts using a Doppler guide wire in the graft and in the native coronary artery distal to the anastomosis. Coronary flow reserve (CFR) was also obtained in the native artery by infusion of papaverine into the graft. Grafts were divided into two groups according to the perfusion area. On angiography, 29 grafts perfused two or more branches (Group I: large perfusion area), and 21 grafts perfused only one branch (Group II, small perfusion area). Flow velocity data and CFR were compared between two Groups. Additionally, in each group, they were compared between the arterial graft (ITA) and the vein graft (SVG). In the graft, average peak velocity (APV) was significantly faster in Group I than that in Group II (18.2 ± 6.8 vs. 7.8 ± 3.9 cm/s, $p < 0.001$). In Group I, there was little difference in APV between SVG and ITA. However, in Group II, APV in SVG was significantly slower than that in ITA (6.3 ± 2.7 vs. 13.6 ± 0.5 cm/s, $p < 0.001$). In the native artery, APV in Group I was faster than that in Group II (23.9 ± 8.0 vs. 10.3 ± 3.6 cm/s, $p < 0.001$), but in each group there was no difference of APV between SVG and ITA. CFR value remained normal in both groups (Group I: 2.5 ± 0.7 vs. Group II: 2.6 ± 0.6 , NS). (Conclusions) SVG to the small perfusion area is disadvantageous to the late graft patency because of slower graft flow velocity, and in such cases the arterial graft should be used. However, there was little effect of the graft material in the case of grafting to the large perfusion area. The CFR was kept in normal value without any effects of perfusion area and graft material.

980-80 Influence of Appendectomy by Maze Procedure on the Atrial Natriuretic Peptide (ANP) Secretion and Body Fluid Retention

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The maze procedure including appendectomy, effectively restores atrial fibrillation to sinus rhythm. However, one of the problems of this procedure is significant fluid retention during the early postoperative period. To investigate the influence of appendectomy by maze procedure on ANP secretion and fluid retention, we measured plasma levels of ANP during the pre- and postoperative periods. We also measured plasma levels of brain natriuretic peptide (BNP) and total amount of furosemide and dopamine used during the postoperative periods. In cases with open heart surgery, 15 patients underwent the maze procedure (MAZE Group) and 9 patients did not (Non-MAZE Group). Blood samples were obtained before, 4 hours, 1, 3, 7 and 21 days after the operation. Plasma ANP levels at 3 days after the operation were significantly higher than at 4 hours after the operation in the both groups (Figure 1). However, plasma ANP levels were significantly lower in the MAZE group than in the Non-MAZE group. Total amount of furosemide



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and dopamine used in the postoperative periods were significantly larger in the MAZE group than in the Non-MAZE group (furosemide 144 ± 66 vs 23 ± 7 mg, $p < 0.05$; dopamine 263 ± 35 vs 130 ± 33 μ g/kg, $p < 0.05$). On the other hand, plasma BNP levels at 1 day after the operation were significantly higher than at 4 hours after the operation in the both groups (Figure 2). The time course of plasma BNP levels were similar in the two groups.

These findings suggest that appendectomy by maze procedure may attenuate the compensatory increase in ANP secretion after open heart surgery and that its decrease may be associated with fluid retention during the postoperative periods. BNP secretion increased after open heart surgery, even with appendectomy, suggesting that increased BNP after operation is secreted mainly from ventricle and may compensate the left ventricular dysfunction during the postoperative periods.

981 Pediatric Cardiology: Selected Topics

Tuesday, March 26, 1996, 3:00 p.m.—5:00 p.m.
Orange County Convention Center, Hall E
Presentation Hour: 4:00 p.m.—5:00 p.m.

981-81 Stress Echocardiography in Children With Homozygous Familial Hypercholesterolemia Predicts Severe Coronary Artery Disease

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Familial hypercholesterolemia (FH) is a congenital disorder of lipid metabolism that may present with advanced coronary atherosclerosis (CAD) in early childhood. Traditionally, serial radionuclide exercise testing and invasive catheterization (C) have been used for detection of CAD. However, these methods carry risks and radiation exposure in children. We proposed to evaluate exercise stress echocardiography (SE) as a screening method in this unique population of children with homozygous FH. Standard treadmill exercise protocols were followed. The LV was imaged by 2-D echo in the parasternal short axis, apical 4 chamber and apical long axis views. The images were obtained at baseline and then completed within 1 minute of termination of exercise and again after 5 minutes of recovery. Left ventricular function was analyzed using a 16 segment model as recommended by the American Society of Echocardiography by an interpreter blinded to all other information. A positive study was defined as the development of a new wall motion abnormality. We studied 16 children, ages 8–17, mean 12 yrs. There were 7 females and 9 males. 12 children had 1 SE, 4 children had 2 SE's. No complications occurred and adequate images were obtained in all. 16/20 of the SE were negative and 4/20 were positive. Ten of these SE's were done within 3 days of a C in 9 pts. Of these 10, both C and SE were negative in 5 pts. SE was markedly positive in 3 pts and C showed severe ostial stenoses in the artery supplying the abnormal wall in all 3. SE was negative in 2 pts with moderate CAD by C; 1 pt had a 50% left main lesion and the other had a 60% RCA lesion.

Conclusion: Stress echocardiography has not previously been reported in children with FH but is practical and effective in detecting ischemia. SE correlates with catheterization findings and may reduce the need for serial nuclear or invasive studies.

981-82 Gallium-67 and Indium-111-Antimyosin Scintigraphy in Rheumatic Fever: Is Rheumatic Myocarditis More of An Infiltrative Than A Degenerative Myocardial Disorder?

JUM Calegario, ERS Campos, M Medeiros, EF Gomes, H Mizziara, A Malhotra, RS Vasan, KS Reddy, R Tandon, BA Khaw, Jagat Narula. Fundação Hospitalar do Distrito Federal, Brasília, Brazil; All India Institute of Medical Sciences, Delhi, India; and Massachusetts General Hospital, Boston, MA

Diagnosis of Rheumatic Fever (RF) and Carditis (RC) is made by composite clinical standard based on the revised Jones' criteria. The application of these criteria is limited if RC is the sole manifestation of RF especially in a recurrence of RF with lack of knowledge of the previous cardiac findings. Diagnostic aids for demonstration of myocarditis may help early institution of antiinflammatory therapy to reduce cardiac morbidity and mortality.

To target two components of myocarditis — inflammatory cell infiltration and myocyte necrosis — Ga-67 (GS) or In-111-antimyosin (AMS) scintigraphy was performed in 54 patients (M:F 28:26; 7–39 years). Of the 40 patients undergoing GS (1–4 mCi i.v.; 48–72 H), 21 had RF + RC and 19 patients had chronic quiescent rheumatic heart disease (RHD). Eighteen of 21 patients with RF + RC had positive GS (sensitivity, 86%). GS was intensely positive

in 2 patients, moderate in 15, and mildly positive in the remaining patient. All 19 clinically inactive RHD patients had negative scans (specificity, 100%).

Of the 14 patients undergoing AMS (Fab, 250–500 mg; In-111, 1–2 mCi), 8/10 patients with clinically active RF and RC demonstrated positive scans (sensitivity, 80%). Although antimyosin uptake was only modest in most patients, intense uptake was seen if pericarditis or severe congestive heart failure were coexistent. Two patients with RHD and 2 of RF with no cardiac involvement demonstrated negative AMS (specificity, 100%).

The distinct difference in the intensities of radiopharmaceutical uptake reconfirms the belief that rheumatic myocarditis is an interstitial carditis and that myocardial damage is less prevalent. Lack of myocardial damage is also consistent with preserved LV systolic function during acute phase of illness.

981-83 Children With Heart Murmurs — Can Specific Defects Be Diagnosed Reliably Without An Echocardiogram?

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Purpose: to determine the defect-specific accuracy of the pediatric cardiologist's examination (exam) relative to echocardiography (echo) for heart disease among pediatric pts with heart murmur. **Methods:** 150 consecutive pts were enrolled who (1) were < 21 yrs old when seen for outpatient evaluation of murmur, (2) had no prior echo or cardiologist's exam, and (3) had echo after exam. The cardiologist prospectively recorded the working diagnosis (dx) (if certain), or a differential dx list (if uncertain), before the echo. Dx at various levels of examiner confidence was compared with echo, and a receiver operating characteristic (ROC) curve was generated for accuracy of dx. **Results:** 66/150 pts had innocent murmur. 84 pts had 95 dx, including ventricular septal defect (37, 29 small) pulmonary stenosis (17), aortic valve disease (10), atrial septal defect (10), and patent ductus arteriosus (8). ROC areas (1.0 = perfect discrimination, 0.5 = indiscriminate) were: small ventricular septal defect — 0.932*, innocent murmur — 0.894*, aortic valve disease — 0.879, pulmonary stenosis — 0.772, large ventricular septal defect — 0.769, atrial septal defect — 0.736, and patent ductus arteriosus — 0.671. Composite ROC area = 0.966* for pts > 5 yrs; area = 0.933* for pts 2–5 yrs; area = 0.905 for pts 0.5–2 yrs; area = 0.838 for pts 0.1–0.5; area = 0.842 for pts < 0.1 yr. ROC area = 0.892 for entire sample. **Conclusions:** Accuracy of clinical exam for murmur depends on lesion and pt age. The clinical exam identifies innocent murmur and small ventricular septal defect with few errors, but dx of other lesions by exam among pediatric pts with murmur (especially those < 2 yrs old) is imprecise compared to echo.

[1] * $p < 0.05$ versus composite of other subgroups of lower ROC area.

981-84 Assessment of Pulmonary Artery Stenosis Using the "Lesion Molding Catheter"

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A unique "lesion molding catheter" (LMC) (SCIMED) that once inflated in vivo, "remembers" the size and shape of the stenosis in a three dimensional (3D) form when reinflated after removal from the vessel has been developed. In branch pulmonary artery (PA) stenosis, particularly with multiple stenoses, angiography may over or underestimate the diameter and length of stenoses because of projection or unavoidable overlapping of the vessels. The aim of this study was to evaluate the effectiveness of LMC in evaluation of PA stenosis. **Methods:** We banded one branch PA in 9 lambs at 33 \pm 3 days (mean \pm SEM) of age to create a single discrete stenosis. At a follow-up of 37 \pm 5 days, the animals underwent assessment of the severity and shape of the stenosis using angiography, intravascular ultrasound (IVUS) pre- and post-LMC inflation, and measurements with the LMC in vivo and ex vivo, and at autopsy.

| Maximal Diameter | Angio | LMC In Vivo | LMC Ex Vivo | IVUS | p-value |
|------------------|---------------|---------------|---------------|---------------|---------|
| Mean [SEM (mm)] | 5.7 \pm 1.3 | 5.2 \pm 1.1 | 5.2 \pm 1.1 | 4.8 \pm 1.5 | n.s |

The relationship between the LMC size in vivo within the stenosis and then on withdrawal and reinflation was excellent with a Pearson's correlation of 0.996 ($p < 0.001$). IVUS before and after the LMC inflation showed no distortion of the lesion by the LMC. In addition, the LMC catheter clearly defined the exact morphology of the stenosis demonstrated at autopsy. **Conclusion:** In this study there was excellent correlation between the size and shape of LMC when reinflated ex vivo and the measurements made with the IVUS and angiography. Use of the LMC could be extremely helpful