163 AGE EFFECT ON TREADMILL BLOOD PRESSURE RESPONSES IN AORTIC STENOSIS. Donald A. Riopel, Arno R. Hohn (Spon. by Mitchell I. Rubin) Medical University of South Carolina, Dept. of Pediatrics, Charleston, South Carolina.

Noninvasive exercise evaluation of cardiac reserve in children with aortic stenosis (AS) has focused on EKG changes. Blood pressure (BP) responses during exercise have not previously been emphasized. Thirty two children, age 4 to 15 yrs. with AS were exercised on a treadmill using a modified Balke protocol. Peak heart rates averaged ~180/min. suggesting that maximal O_2 consumption was attained. Systolic and diastolic BP were obtained every minute of exercise. Results were compared to established normal values from 750 children exercised in this laboratory:

Age Group(yrs)	n	Average Cath peak Syst. Ao. Gradient	Max. exercise syst. BP response (mm Hg.) AS		Normals
I (4-7)	9	52 ± 24 mm Hg.	126 ± 15	$p < 0.02$	142 ± 14
II (8-11)	11	55 ± 26 mm Hg.	136 ± 13	$p < 0.01$	150 ± 15
III (12-17)	12	36 ± 19 mm Hg.	140 ± 12	$p < 0.001$	163 ± 20

Pathologic EKG changes were not observed in these AS children. Most children with AS had less than normal increase in BP response to exercise. This disparity was most marked in the older children despite fairly low Ao-LV pressure gradients. The results appear to indicate increasing compromise of hemodynamics with age in non-operated AS. BP responses may add significant additional information in the treadmill exercise evaluation of AS. This method of following cardiac reserve offers aid in determining operability.

164 DETECTION OF ARRHYTHMIAS IN CHILDHOOD: USE OF TREADMILL AND DYNAMIC ECG. Albert Rocchini, Michael Freed, and Amnon Rosenthal. Harvard Medical School, Childrens Hospital Medical Center, Department of Cardiology, Boston, Mass.

Graded treadmill exercise testing (GTET) to elicit and manage arrhythmias in children with structural heart disease (SHD) was evaluated and compared with dynamic ECG recording (24 hour Holter Monitor (HM). Using the Bruce Protocol, 200 children with SHD and 150 without SHD were exercised with leads II, AVF and V6 monitored.

Arrhythmias were present in 58 of 200 patients (pts) with SHD studied by GTET: Ventricular ectopy (VE) in 48, atrial ectopy (AE) or sick sinus syndrome (SSS) in 7, and complete heart block (CHB) in 3. Among the 30 pts with VE at rest, GTET suppressed the ectopy in 15, had no effect in 7 and exacerbated the ectopy in 8 (episodes of ventricular tachycardia (VT) in 3). Three of 7 pts with AE or SSS developed short runs of atrial tachycardia and 1 pt with CHB developed three seconds of asystole. Ectopy not suspected before GTET was elicited in 10% (20/200) of pts with SHD, but only 2% (3/150) of those without SHD ($X^2=7.82; P<.01$). Serial GTET (N=14) performed in 5 pts with life threatening arrhythmias on therapy demonstrated a reduction in ectopy in 3. HM was obtained within 72 hours of GTET in 21 pts with SHD. Significant arrhythmias were identified by GTET in 4/21 pts (short runs of VT in 3 and 3 second asystole in 1) that were not demonstrated on HM. No significant arrhythmias were found on HM that were missed by GTET.

We conclude that GTET is an excellent method for detecting and inducing arrhythmias in children with SHD and may be useful in evaluating the response to antiarrhythmic therapy. GTET may also reveal serious arrhythmias that are not apparent during HM.

165 CROSS SECTIONAL ECHOCARDIOGRAPHY IN CONGENITAL HEART DISEASE WITH A PHASED ARRAY 80° SECTOR SCANNER. Claude Roge, Charles Kleinman, Edward A. Lebowitz, Nelson B. Schiller, and Norman H. Silverman, Introduced by Michael A. Heymann, Spon. by University of California, San Francisco.

We have evaluated a new 80° cross sectional scanner in 110 children with heart disease. The transducer is applied to the chest at the lower left sternal edge and is oriented in the major diameter of the left ventricle (View I). A transverse view in the plane of the minor diameter of the left ventricle may be used to demonstrate relationships of cardiac structures from the apex to the great arteries (View II). With the transducer applied over the apex beat the beam transects the interventricular and interatrial septa and atrioventricular valves so that all four chambers are seen (View III). View I defines mitral valve disease, left ventricular outflow abnormalities, the presence of aortic override of the interventricular septum, and mitral-aortic continuity. View II defines mitral and tricuspid valves, relative ventricular sizes, and the relative size and position of the great arteries. View III allows study of ventricular size and function, ventricular and atrial septal defects, differentiation between partial and complete forms of atrioventricular canal defect, and deformities of the atrioventricular valves (such as Ebstein's anomaly and mitral stenosis). The presence of cor triatriatum and the interatrial baffle of Mustard's operation can be shown. The 80° sector scan provides a new dimension in ultrasonic investigation of congenital heart disease.

166 EVALUATION OF ARRHYTHMIAS IN CHILDREN. EXERCISE TESTING VS. AMBULATORY MONITORING. John J. Rozanski, Joel Kupersmith, Michael V. Herman, Ivan Dimich, and Leonard Steinfeld, (Spon. by Kurt Hirschhorn), Mount Sinai School of Medicine, Depts. of Medicine and Pediatrics, New York, NY.

We previously demonstrated the high degree of reproducibility of exercise testing in detecting and evaluating childhood arrhythmias. We now assess the value of 24 hr. ambulatory monitoring (AMB) as compared to maximal treadmill exercise testing (EX). Sixteen children aged 5 to 16 years (mean 11) with known arrhythmias, but without underlying heart disease were studied by AMB and 2 separate EX. The occurrence, frequency, and severity of arrhythmias and their relationship to heart rate were noted and compared. Of 11 children with known ventricular arrhythmias (VA) [8 with ventricular premature depolarizations (VPD), 2 with ventricular tachycardia (VT), 1 parasystole], 9 were detected during both AMB and EX, while 2 (1 with VPD's and 1 with VT) were detected only during EX. Suppression of VA was observed at similar heart rates during both AMB and EX in 4, while 7 who suppressed during EX did not suppress during AMB due to insufficiently rapid heart rate. Of 5 children with supraventricular arrhythmias [3 with atrial premature depolarizations (APD) and 2 with sinus bradycardia], 1 with APD's unexpectedly demonstrated marked bradycardia only during AMB.

In conclusion, in children: 1) EX is more sensitive than AMB in the detection of serious ventricular arrhythmias, 2) AMB is more sensitive than EX in detecting and evaluating bradycardias, 3) AMB and EX each provide specific and unique information. Thus both are useful and complementary in evaluation of arrhythmias.

167 A PROSPECTIVE ANALYSIS OF ARRHYTHMIAS DURING CARDIAC CATHETERIZATION (CATH) David J. Sahn, Hugh D. Allen, Stanley J. Goldberg, Dept. of Peds., Univ. of Az. Health Sciences Center, Tucson, Az.

Arrhythmias (AR's) occurring during cath have not been systematically studied. Accordingly we prospectively analyzed 131 caths (23% emergency) in infants and children aged 3 hrs-14 yrs, mean 3±.26 (SE) yrs. VSD (22%), coarctations (13%) and tetralogy (9%) were the most common lesions. Seventy patients (53%) had AR's (149 episodes) and 19% had >3 AR's. Multiple PVC's (>4 consecutive) accounted for 48% of AR and were benign, occurring with catheters in the right ventricle (RV) (63%) or left ventricle (LV) (25%). PVC runs ceased spontaneously or upon moving the catheter (99%). Similarly brady-AR's (sinus bradycardia N=15, 2° AV block N=3, complete AV block N=5) occurred with catheters in RV (9), LV (5) or right atrium (RA) (4). All atrial tachy-AR's, SVT (9), flutter (4), fibrillation (1) occurred with catheters in the RV, and 10 episodes of nodal rhythm occurred with catheters in RV (5) or RA (5). Excluding PVC's, i.e. for 79 AR's, moving the catheter or observation alone terminated 70% whereas atropine was effective in 18% (sinus bradycardia (11), complete AV block (3)). Cardioversion was used for one angio related episode of ventricular fibrillation. AR, especially sinus bradycardia, occurred more frequently in patients on digoxin (chi square $p<.05$). Nodal rhythm was less frequent with thorazine premedication ($p<.05$) but was more frequent in patients with VSD ($p<.05$). As such, AR was most common with catheters in RV>LV>RA, and in patients receiving digoxin. AR's were benign and easily treated.

168 A NEW APPROACH FOR PERFUSION-FIXATION OF THE HEART AND ITS CONDUCTION SYSTEM FOR HISTOLOGIC AND ULTRASTRUCTURAL STUDIES. Shyamal K. Sanyal, Mohinder K. Thapar, and Warren W. Johnson, Cardiopulmonary Diseases Service, St. Jude Children's Research Hospital, Memphis, TN.

In 9 patients dying from non-cardiac causes, hearts were perfused with 2.5% glutaraldehyde (4°C) within 1–3 hrs of death. A modified perfusion pump was screwed tightly on a glass container filled with perfusion fluid, one plastic tube was connected to the pump outlet and another one to the inlet; both were filled with perfusion fluid and clamped. Tube from pump outlet was canulated into proximal aorta. An angiocath canula was inserted into this tube with its tip at level of coronary ostia; the other end was connected to a mercury manometer. Free end of the second tube was placed under perfusion fluid surrounding the heart. Clamps were removed from both tubes and pump motor was activated forcing perfusion fluid into aorta and coronary arteries and draining into a container in which heart was suspended. The second tube returned this fluid back to the pump. Continuous perfusion was maintained for 4 hrs at 100 mmHg and 4°C.

Comparison of histologic and ultrastructural findings in these perfused hearts with those of other investigators using standard techniques shows that the present method provides a simple but effective means of preserving the fine structures of the heart and its conduction system. These include transverse tubular system with triad characteristic of ventricular myocardium, Purkinje cells with absence of "T" system and characterized by large clear perinuclear zone and transitional cells in A-V node and pale (P) cells of S.A. node. In addition, this technique permits satisfactory gross examination and facillitates preparation of adequate tissue blocks from specific areas such as S.A. and A.V. node for subsequent histologic and ultrastructural study of the heart and its conduction system.