TRICUSPID VALVE TISSUE AS A SITE OF ECTOPIC IMPULSE FORMATION. Henry Gelband, Andrew L. Wit*, John J. Fenoglio*, Robert J. Myerburg*, and Arthur L. Bassett*, Dept. of Ped., Univ. of Miami, Miami and Dept. of Pharm., Columbia Univ., New York.

Many patients following cardiac surgery have supraventricular arrhythmias. Because the tricuspid valve is subjected to surgical manipulation and the canine mitral valve has been shown to be a site of ectopic impulse formation we studied isolated preparations of canine tricuspid valve (TV) and contiguous right atrial (RA) muscle by micro-electrode techniques to determine if this tissue has the potential to generate arrhythmias. Unlike the action potentials (AP) recorded from ordinary atrial muscle, AP's recorded from TV-RA demonstrated low maximum diastolic potential, slow upstroke velocity, a prominent plateau phase, and a diastolic afterpotential. All preparations showed spontaneous phase 4 depolarization initially or during superfusion with catecholamines. Impulses originating in the TV conducted to RA. Acetylcholine abolished automaticity and decreased AP amplitude in spontaneously depolarizing TV cells but had minimal effect on ordinary RA cells. This data indicates that ectopic impulses can arise from cells in either TV or contiguous RA. These cells respond to autonomic agents in a similar fashion as other supraventricular pacemaker cells and perhaps may be the site of origin of some of the supraventricular arrhythmias observed post-operatively in the clinical situation.

CONSTRUCTIVE PERICARDITIS (CP) IN CHILDHOOD DUE TO MEDIASTINAL IRRADIATION (I), Ronald D. Greenwood, Amnon Rosenthal, Robert Cassady, Norman Jaffe, and Alexander S. Nadas, Harvard Med. Sch. and Children's Hosp. Med. Ctr., Boston, Mass.

The course and prognosis of patients (pts) with CP following I was reviewed. Between 1955 and 1973, 8 pts aged 3 to 18 yrs developed CP after mediastinal I for intrathoracic malignancy. Six of these followed I for Hodgkin's Disease (HD) and represented 7% of 85 pts receiving I for HD. CP did not occur among the 44 pts radiated by supravoltage technique but occurred in 6/41 (15%) of those treated by orthovoltage technique. Among pts receiving <4000 rad 2/34 (6%) developed CP and in those receiving >4000 rad, 4/7 (57%) (P<0.001) developed CP. Symptoms of CP occurred an average of 1 3/12 yrs (4/12 to 3 2/12) after I and were preceded in 5/8 by acute pericarditis. Catheterizations in 5 pts revealed a mean cardiac index of 2.8 L/min/m² (1.8 - 4.2) and increased pulmonary capillary wedge pressure which was greater than right atrial pressure in each pt. Seven pericardiectomies were performed in 6 pts with immediate but transient symptomatic relief. Death occurred in 6/8 pts (1 5/12 - 6 6/12 yrs after I) due to cardiac disease in 3, progression of the malignancy in 2 and infection in 1. In addition to CP extensive myocardial fibrosis was demonstrated at necropsy in 4 pts and involvement of the anterolateral papillary muscle and chordae tendinae of the mitral valve in 3 pts. Our findings suggest that post-I CP is related to technique and dosage used and that myocardial damage may explain the clinical deterioration despite initial improvement after pericardiectomy.

THE RESPONSE OF THE SINO-ATRIAL NODE TO RAPID ATRIAL STIMULATION

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It was the purpose of this study to determine normal values for sino-atrial (SA) node recovery time in 54 subjects age 4 months to 23 years (mean 7 years) undergoing cardiac catheterization. Each had normal sinus rhythm by ECG. Recovery time of the SA node was measured after 3 minutes of rapid atrial stimulation at a rate of twice the resting rate but not exceeding 200 per minute. The corrected sinus node recovery time (CSNRT) measured in each case ranged from 0 to 500 msec. (mean 135 msec., SD 116 msec). Statistical analysis of the data revealed no significant correlation between age or resting heart rate and the CSNRT (r=0.05 and -0.16, respectively). There was also no significant difference between patients who were taking digitalis prior to study and those who were not (P>0.3). Comparison of this data with that from patients in whom the ECG suggested SA node dysfunction revealed a significant difference in CSNRT (P<0.05). This study demonstrates that the CSNRT is a useful and safe test of SA node function and provides normal values for children.

NON-INVASIVE RIGHT AND LEFT SYSTOLIC TIME INTERVALS BY ECHOCARDIOGRAPHY Stephen Hirschfeld, Richard A. Meyer, Samuel Kaplan, Col. of Med., Univ. of Cincinnati, Children's Hosp., Dept. of Ped., Cincinnati, Ohio

Evaluation of left ventricular performance has been possible by the measurement of systolic time intervals (STI's). However non-invasive assessment of right ventricular performance has been difficult because it has not been possible to determine the timing of pulmonary valve closure. Twenty-five children, ages 2 weeks to 14 years, have been studied using the electrocardiogram, phonocardiogram, carotid pulse and echocardiogram. Left ventricular ejection time (LVET) was obtained from echocardiogram by measuring the opening and closure of the aortic cusps. Pre-ejection period was measured from the onset of the "q" wave to the opening of the aortic cusps. Excellent correlation of left ventricular STI's from carotid pulse and those determined from echocardiogram was demonstrated. STI's of the right ventricle were determined in a similar fashion from an examination of the pulmonary valve echo. In normal patients right ventricular ejection time (RVET) was 25-30% longer than LVET. Right ventricular pre-ejection period was shorter than left ventricular pre-ejection period. In complete transposition of the great vessels the situation is reversed. RVET shortens with contraction against systemic pressure. Left ventricular ejection into a low pressure pulmonary circuit is longer than established values for normal patients. Accurate assessment of both right and left ventricular STI's is now possible with the added use of echocardiography.

RISK FACTORS IN PROGENY OF PARENTS WITH PREMATURE MYOCARDIAL INFARCTION.

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This case-control study, whose index cases are fathers who have had a documented myocardial infarction prior to the age of 50 yrs., tests the hypothesis that premature coronary disease is associated with an identifiable pattern of risk factors in the progeny of affected individuals. Fifty four families have been studied, (27 case families, 27 control families 108 parents, age 30-50 yrs., 137 children, age 2-18 yrs.) Significantly higher values were found among progeny of cases than controls for standardized weight (p=.03), cholesterol (p<.01) and hyperlipidemia (p<.0004). These findings suggest that the increased risk of premature coronary heart disease among relatives of cases may be mediated by familial resemblances in levels of cholesterol. Among progeny, cholesterol levels rose during early childhood, peaked at 10.0-11.9 yrs., fell to levels of lower than those found during early childhood at 14.0-15.9 yrs., and rose subsequently.

These findings suggest an association between onset of sexual maturity and level of cholesterol, raise questions of predictive values of cholesterol for future levels, and imply the need for age-specific means and confidence limits for cholesterol during childhood.

ECHOCARDIOGRAPHIC (ECHO) ASSESSMENT OF COR-PULMONALE IN PATIENTS (PTS) WITH CYSTIC FIBROSIS (CF). David H. Johnson, Charles R. Tucker, Amnon Rosenthal, Roberta G. Williams, Kon Taik Khaw, Harry Shwachman and Alexander S. Nadas, Children's Hosp. Med. Ctr., Depts. of Card. and Ped., Boston, Mass.

The early clinical recognition and assessment of cor-pulmonale in CF pts is frequently difficult. Echo measurement of right ventricular characteristics may offer a noninvasive, portable means of quantifying cardiovascular changes in CF. Thirty CF pts aged 8 to 26 yrs. (mean 16.7; body surface area >1M²) from the out-patient and ward service were studied. Clinical score (Shwachman and Kulczyki), standard pulmonary function tests, arterial blood gases and Echo were performed. The mean clinical score for the group was 54 (range 15-100), vital capacity (VC) 62% of predicted (25-108), residual volume (RV) 268% of predicted (55-520), functional residual capacity (FRC) 159% of predicted (72-269), forced expiratory volume (FEV₁) 41% of predicted (8-105), mid-maximum expiratory flow rate (MMEFR) 21% of predicted (4-95) and PaO₂ 57 mmHg (30-83). There was a significant relationship between increase in Echo right ventricular diastolic dimension (RVDD), and (a) decreasing clinical score (p<.01), FEV₁ (p<.01) and MMEFR (p<.01) and (b) increasing RV and FRC (p<.01). No significant correlation was noted between RVDD and PaO₂. Interventricular septal reversal was present only in pts with severe lung disease. We conclude that changes in RVDD are related to the severity of the lung disease and reflect right heart involvement in CF.