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CARDIAC RHYTHM IN TRANSPOSITION OF THE GREAT ARTERIES PRIOR TO INTRA-ATRIAL SURGICAL CORRECTION. Rae-Ellen Webb Kavey, Henry M. Sondheimer, Marie S. Blackman.

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Atrial dysrhythmias and conduction abnormalities are well described after intra-atrial corrective procedures for transposition of the great arteries (TGA). To assess the incidence of such dysrhythmias in children with TGA prior to open heart surgery (OHS), 16 consecutive patients (pts) with this diagnosis underwent 24 hr. ECG monitoring (EM). All 16 pts underwent balloon atrial septostomy (BAS); 3 pts required subsequent surgical atrial septectomy. The initial EM's were performed at a median age of 7 days (Range: 2 days-18 mos.) following clinical stabilization. In 8 pts, EM's were performed both in the newborn period and just prior to OHS. All 24 EM's demonstrated exclusively sinus rhythm with no evidence of atrial dysrhythmias or conduction abnormalities; a single pt manifested occasional unifocal ventricular premature contractions on newborn EM. No change was demonstrated on the serial EM's obtained in the newborn period and prior to OHS. Four pts have undergone a Mustard procedure and 2 a Senning procedure. ECG's obtained 2 mos. to 1 yr. post-operatively now demonstrate low amplitude P waves in 3; a single pt with supra-ventricular tachycardia has frequent atrial premature contractions on EM. In this group of pts with TGA evaluated by EM after BAS and atrial septectomy, cardiac rhythm was normal; dysrhythmias seen after intra-atrial correction appear to be exclusively surgically acquired.

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EFFECTS OF ACUTE VOLUME EXPANSION IN HYPOXIC NEWBORN DOGS. Uma R. Kotagal, (Spon. by Paul H. Perlstein), U. of Cincinnati College of Medicine, Department of Pediatrics

Volume expansion is used frequently in hypoxic newborn infants. The effect on cardiac output (CO) of hypoxia alone (n=7) and hypoxia plus volume expansion (n=7) was studied in newborn dogs (age 1-12 days), using radioactive microspheres. Both groups of animals were made hypoxic by breathing 12% O<sub>2</sub> throughout the experiment (P<sub>O<sub>2</sub></sub> < 40 torr). In both groups period I was baseline and periods II and III were measurements made 20' and 40' post hypoxia. In the hypoxic group period III consisted of hypoxia alone, while the animals in the hypoxia plus volume expansion group received in addition a volume expansion of 30ml/kg of adult dog plasma. In the hypoxic group CO was 264.7±29.2ml/kg/min (SEM) and 198.3±15.7ml/kg/min during periods I and II respectively. In the hypoxia plus volume expansion group CO was 262.2±35.0ml/kg/min and 233.6±39.9ml/kg/min during periods I and II respectively. During period III CO decreased further from baseline in hypoxic group to 214.3±19.5 ml/kg/min (p<0.05) and vascular resistance (R) increased from .276±.06mmHg/ml/kg/min during period I to .326±.02mmHg/ml/kg/min (p<0.05) during period III. On the other hand in the hypoxia plus volume expansion group CO increased to 295.8±36.1ml/kg/min (p<0.05) and R decreased from .193±.02 mmHg/ml/kg/min during period I to .147±.02mmHg/ml/kg/min during period III (p<0.05). Thus acute volume expansion prevents the fall in CO seen in hypoxic newborn animals.

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LEFT VENTRICULAR PRESSURE-DIAMETER RELATIONS FOLLOWING ANGIOCARDIOGRAPHY IN CHILDREN

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The LV pressure-diameter (P-D) relations of 8 children (3 - abnormal LV, 5 - normal LV) were evaluated before and 5 minutes after right heart angiography (preA, postA) using Millar catheter transducer and M-mode echocardiogram. A digitizer interfaced to H-P computer obtained sequential LV diameter, wall thickness and pressure of 4 cardiac cycles. Circumferential wall force (F), meridional wall stress (S), D/P and P/D ratios, dD/dt, dd/dt/D, dF/dt and dS/dt were obtained q 10 msec. Systolic and diastolic segments of P-D, P-S and P-F loops were analyzed. Paired t-test of preA vs postA showed no change in heart rates and endsystolic diameters. However, significant changes were observed postA: LVEDP (+67%, p < .005), LVEDD (+6.6%, p < .01), ejection period (+9.9%, p < .02), peak systolic pressure (+11.5%, p < .01), peak S (+23%, p < .005) and total systolic S (+34%, p < .005). S/unit pressure rise during isovolumic contraction did not change postA. The increase in peak S postA was accompanied by drop in peak dD/dt/D (-31%, p < .05) suggesting decreased pump function despite increased sarcomere length. The diastolic segment of P-F loop characterized early relaxation (E) and later ventricular filling (L). Although diastolic F was higher postA during E and L, the P-D-F relations did not change significantly suggesting unaltered ventricular compliance. The change in LV performance following angiography is related to increased preload plus some reduction of pump function.

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DYNAMIC EXERCISE TRAINING IN HYPERTENSIVE ADOLESCENTS

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The relationship of physical conditioning and resting blood pressure (BP) levels in hypertensive subjects has received only sparse attention in the medical literature. The purpose of our study was to assess the effects of a dynamic fitness program on the resting BP in adolescents with persistently elevated BP. Seven hypertensive adolescents completed a 6 month program. Subjects jogged 2 miles 3 times a week at a pace sufficient to maintain a training heart rate. This group showed a significant increase in Max V<sub>O<sub>2</sub></sub>. Another group of 6 hypertensive adolescents served as controls. They had no change in Max V<sub>O<sub>2</sub></sub>. The results in each group showed no significant changes between pre and post exercise BP levels:

	Systolic BP		Diastolic BP	
	Pre	Post	Pre	Post
Exercise Group (7)	134 ± 14	125 ± 11	80 ± 5	80 ± 9
Controls (6)	137 ± 11	130 ± 12	89 ± 10	83 ± 8
	(Mean ± S.D.)			

These data suggest that adolescents participating in a dynamic exercise program of moderate intensity show no greater fall in resting BP levels than do controls.

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EARLY ASSESSMENT OF HEMODYNAMIC STATUS FOLLOWING REPAIR OF TETRALOGY OF FALLOT: A COMPARISON OF INTENSIVE CARE UNIT AND ONE-YEAR POSTOPERATIVE DATA IN 98 PATIENTS. Peter Lang, Carl W. Chipman, Harold Siden, Roberta G. Williams, William I. Norwood, Aldo R. Castaneda, (Spon. by Alexander S. Nadas), Harvard Medical School, Children's Hospital Medical Center, Department of Cardiology, Boston, Ma.

Hemodynamic data obtained in the intensive care unit (ICU) immediately following repair of tetralogy of Fallot (TOF) were compared with measurements obtained at one-year postoperative catheterization (C) in 98 infants and children (pts). Eight of twelve pts who had pulmonary artery O<sub>2</sub> saturation (PAO<sub>2</sub>S) ≥ 80% in the ICU had Q<sub>p</sub>/Q<sub>s</sub> > 1.5 at C. All 79 pts who had PAO<sub>2</sub>S < 80% in the ICU had Q<sub>p</sub>/Q<sub>s</sub> ≤ 1.5 at C. (Sensitivity 100%, specificity 95%, predictive value 67%, predictive value 100%). Five of six pts who had right ventricular outflow tract pressure gradients (ΔRVOT) > 40 mmHg in the ICU had ΔRVOT > 40 mmHg at C. Fifty four of 61 pts. who had ΔRVOT ≤ 40 mmHg in the ICU had ΔRVOT ≤ 40mmHg at C. (Sensitivity 42%, specificity 98%, predictive value 83% predictive value 89%). The addition of measurements of RV and RV/arterial pressures in the ICU did not improve the sensitivity of identifying ΔRVOT > 40 mmHg at C.

ICU measurement of PAO<sub>2</sub>S is valuable for determining the presence or absence of significant left to right shunts following repair of TOF and should be considered an adjunct to patient management. ICU measurement of ΔRVOT identifies patients with significant ΔRVOT but is not highly sensitive.

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SEVERE SYMPTOMATIC HYPERTENSION IN THE NEWBORN

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The ability to accurately and non-invasively monitor blood pressure has focused attention on severe symptomatic hypertension (HBP) occurring in the neonatal period. In 1980, 19 of 880 admissions (2.2%) were identified as hypertensive (mean arterial pressure >70 mm. Hg. on 3 occasions). They included neonates with BW's from 0.63kg. to 4.6kg., GA 26-41 weeks, and multiple primary diagnoses, predominantly pulmonary disorders. Asphyxia occurred in only 4/19. Infants with HBP presented at a mean age of 11 days, range 1-52, and manifested congestive heart failure 8/19 and retinopathy 8/19. Renal findings included elevated BUN and creatinine 7/19, new appearance or increased severity of hematuria and proteinuria 6/19, elevated peripheral plasma renin 8/8, and varying abnormalities of IVP, abdominal ultrasound or renal scan 7/10. Strikingly, 14/19 (74%) of these infants had umbilical arterial catheters (UAC) all above the diaphragm. Onset of HBP occurred at a mean of 13 days after catheter placement, range 1-52. HBP was identified only following removal of the catheter in 6/14, mean 15 days, range 5-45. The response to a variety of antihypertensive agents has been satisfactory; no infant has required nephrectomy and only 7 needed therapy for >1 month. The possible association between HBP and high UAC necessitates reevaluation of the optimal site for catheter placement and suggests that some HBP may be the result of thromboembolic complications of UAC. Other identifiable causes of HBP included asphyxia, renal anomalies and endocrine disorders.