

169 ACUTE RENAL INSUFFICIENCY (ARI) FOLLOWING OPEN HEART SURGERY (OHS). Robert G. Schacht, Patricia Egan and Eugenie F. Doyle, New York University

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ARI, a doubling of the basal preoperative or an absolute increase of serum creatinine to levels >1.2 mg/dl, was observed in 75 of 236 children undergoing OHS. It developed in 13 of 21 pts following OHS under profound hypothermia (Gp A) and in 62 of 215 following customary mild hypothermic OHS (Gp B).

Oliguria occurred in 10 of 13 pts with ARI in Gp A and in only 25 of 62 in Gp B. Despite dialysis 17 pts with ARI (7 in Gp A; 10 in Gp B) expired from sepsis or intractable cardiac failure. Transient increases in serum creatinine occurred in those 58 pts with ARI who survived OHS, exceeding 1.6 mg/dl in only 10. Although all 58 were characterized by oliguria, or hypercalcemia or hyperkalemia and acidosis during the intra operative period renal function returned to normal in all by the 6th post operative day.

The development of ARI correlated with A) intraoperative events: bypass time >90 min, post perfusion low output syndrome or hemoglobinemia >100 mg/dl and B) post operative low output syndrome from poor cardiac performance or excessive bleeding.

Awareness of the frequency of and the predisposing factors for development of ARI is important in guiding post operative therapy.

170 SYSTOLIC TIME INTERVALS IN ATRIAL SEPTAL DEFECT.

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Diminished pulmonary vascular compliance (PVC) is believed to be a major determinant of the widened splitting of the second heart sound (S_2) in atrial septal defect (ASD). However in association with the decreased PVC in ASD, the right ventricular ejection time (RVET) is prolonged. We tested the thesis that RVET shortens in the immediate post-op ASD period and that this shortening is directly associated with narrowed splitting of S_2 . Right and left pre-ejection periods (RPEP, LPEP) and ejection times (RVET, LVET) were measured pre-op both at cardiac catheterization (cath) and by echocardiographic semilunar valve recordings (echo) in 14 children with ASD. Repeat echo systolic time intervals (STI) were measured on the seventh post-op day. Pre-op and post-op phonocardiograms (phono) were recorded at the second left intercostal space. The maximum expiratory interval between the two high frequency components of S_2 were recorded as A_2-P_2 . All pre-op echo STI correlated highly with cath STI ($r=0.87$). RPEP changed from $0.073 \pm .01$ S.D. (seconds) pre-op to $0.065 \pm .01$ post-op; LPEP $0.073 \pm .01$ pre-op to $0.071 \pm .01$ post-op; and LVET $0.26 \pm .01$ pre-op to $0.27 \pm .04$ post-op. The RVET changed from $0.29 \pm .04$ pre-op to $0.24 \pm .02$ post-op.* The A_2-P_2 changed from $0.060 \pm .007$ pre-op to $0.014 \pm .005$ post-op.* Conclusions: We have demonstrated that RVET shortens in the early post-op period after ASD closure. Because PVC changes demand anatomic alterations, immediate shortening of A_2-P_2 suggests that RVET may be the major determinant of the width of splitting of S_2 . * $p < 0.001$

171 TRUNCAL VALVE ECHOES IN THE DIFFERENTIATION OF TRUNCUS ARTERIOSUS FROM TETRALOGY OF FALLOT

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It has not been possible to distinguish tetralogy of Fallot (TF) from truncus arteriosus (TA) by echocardiography (E) when the pulmonary valve is not identified. E from 18 patients with catheterization proven diagnosis of TA were compared to 16 patients with TF with and without pulmonary atresia. Features in common to the 2 groups included a single enlarged great vessel (83% TA, 75% TF) with overriding of the interventricular septum (78% TA, 88% TF). Differential signs included left atrial size and semilunar valve abnormalities. Left atrial enlargement was common in TA (78%) and unusual in TF (25%), reflecting differences in pulmonary blood flow. Multiple systolic and diastolic linear duplications of the semilunar valve were recorded in 67% of TA, but were not seen in a single TF patient. These reflect either abnormal numbers of cusps, cusp asymmetries or thickenings which are extremely common in TA and rare in TF specimens. The differential diagnosis of TA can be made by E when the following criteria are met: a single enlarged great vessel, overriding the interventricular septum, left atrial enlargement, and most importantly, semilunar valve duplications.

172 RANGE-GATED PULSED DOPPLER ECHOCARDIOGRAPHY: ITS ROLE IN DETECTING DUCTAL SHUNTING IN PREMATURE INFANTS.

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To evaluate the effectiveness of the range-gated pulsed doppler system in detecting the presence of ductal shunting in small pre-term infants on assisted ventilation for respiratory insufficiency, 21 infants with BW under 1500 grams were studied with a 5MHz system developed by Advanced Technology Laboratories, Inc. In each, an umbilical or radial artery catheter was used to obtain a contrast aortogram. Also, a two year old child with a documented aortopulmonary (AP) window was studied. Nine of the infants had no doppler evidence of patent ductus arteriosus (PDA), 8 had negative aortograms. In 13 there was an audible continuous turbulence superior to the pulmonary valve approximately 2 cm below the transducer. Each had a positive aortogram. Auscultation revealed a systolic or continuous murmur at the UL5B in 9 of the 13 infants; in 3, no murmur was appreciated. In the child with an AP window, there was a continuous turbulence at the level of the pulmonary valve. This noninvasive bedside technique appears to be very sensitive and specific for detecting the presence of ductal shunting, even in the absence of an audible precordial murmur. Its use permits the expedient identification of a PDA in the patients who cannot be weaned from the ventilator and it facilitates appropriate timely therapy, such as the pharmacologic manipulation or surgical ligation of the ductus, as a means of preventing the complications of protracted ventilation.

173 EVALUATING INDIRECT BLOOD PRESSURE TECHNIQUES--A COMPARATIVE STUDY.

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An accurate systolic blood pressure (SBP) can now be measured indirectly in all infants & children with an ultrasonic flow detector (UFD) and an inflatable cuff of appropriate size & design. Two semi-automatic blood pressure devices, Arteriosonde 1010 (A) & Infrasonde (I), are purported to accurately measure both SBP and diastolic blood pressure (DBP). A two-pronged study was designed to evaluate the accuracy of indirect blood pressure obtained with A, I, & a new plastic (Pedishyng) cuff (PC). In part one, with the cuff of either A, I, or PC systems applied to the upper arm in random and sequential fashion & with a catheter in the ipsilateral subclavian artery, simultaneous direct & indirect pressures were recorded & compared. In part two, A, I, & PC systolic BP values alone were compared by performing simultaneous measurements on both upper arms of selected infants previously shown to have identical SPP in both arms. Comparisons were made by random application of A, I, & PC to each arm. In this two-pronged study, 125 comparisons revealed that (1) with a properly sized plastic cuff and an ultrasonic flow detector, systolic BP can be measured accurately but not diastolic BP, (2) A & I frequently fail to sound a distinct signal to mark SBP accurately, & even with a relatively good signal the plastic cuff & UFD system is more accurate than A or I, (3) neither A nor I accurately marks DBP and should not be relied upon for this measurement.

174 DIFFERENTIATION OF APICAL VENTRICULAR SEPTAL DEFECTS (VSD) FROM MITRAL REGURGITATION (MR) BY PULSED DOPPLER ECHOCARDIOGRAPHY (PDE).

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Thirty-six youngsters with apical systolic murmurs, whose clinical evaluations did not allow conclusive differentiation between VSD and MR were studied by PDE. The PDE technique, which supplements M-mode echocardiography with Doppler flow detection, allowed determination of the site of turbulent blood flow in 35/36, 97%. Twenty-one had PDE findings of VSD but no MR, and all 10 who underwent cardiac catheterization had VSD demonstrated. Fourteen youngsters had PDE findings of MR but no VSD, and all 5 who underwent catheterization were found to have MR but no VSD. One youngster had both VSD and MR demonstrated by PDE and catheterization, and one had no abnormalities detected by PDE or invasive study. The sensitivity and specificity of PDE for determining the origin of troublesome apical murmurs has obvious clinical utility.