

103 CARDIOVASCULAR RESPONSES OF THE NEONATAL CANINE TO DOPAMINE, DOBUTAMINE AND ISOPROTERENOL. David J. Driscoll, Paul C. Gillette, Robert Lewis, Craig

Hartley, and Arnold Schwartz, Baylor College of Medicine, Depts of Pediatrics (Cardiology) and Cell Biophysics, Houston.

To determine if there are age-related differences of the cardiovascular (CV) responses to dopamine (Dp), Dobutamine (Db) and isoproterenol (I), we recorded cardiac output (CO), renal blood flow (RBF), central aortic blood pressure (CAP) and heart rate (HR) in 24 anesthetized puppies 1 - 65 days old and 3 adult dogs during incremental infusion of Dp, Db, (2-50 µg/kg/min) and I (0.05-1 µg/kg/min).

Relatively high doses (20-50 µg/kg/min) of Dp produced a greater increase in CO and CAP in adult dogs than in puppies but RBF and HR were increased equally in both groups at all doses. In puppies, CO was reduced at low doses of Db (2-10 µg/kg/min) but increased at high doses (20-50 µg/kg/min). In adult dogs, CO was increased by all doses of Db. RBF was decreased in puppies but was increased in adult dogs by all doses of Db, but CAP and HR increased equally in both groups. There was no difference between adult dogs and puppies in their CV responses to I.

ABF, RBF, and CAP were increased more by Dp than by Db or I at all ages. HR was increased more by I than by Dp or Db. RBF and CAP were decreased from control at all doses of I.

This study demonstrates age-related differences in the response of the CV system to Dp and Db but not to I. In anesthetized canines, Dp is more effective in increasing ABF, RBF, and CAP than Db or I.

104 THE ECHOCARDIOGRAPHIC FEATURES OF CONGENITAL MITRAL STENOSIS. David J. Driscoll, Howard P. Gutgesell, Dan G. McNamara, Baylor College of Medicine & Texas Children's Hospital, Department of Pediatrics, Houston.

To determine the echocardiographic features of congenital mitral valve stenosis (MS), echocardiograms were performed on 24 children with this defect. The pattern of mitral valve (MV) motion, the excursion of the anterior leaflet and the rate of early diastolic closure (E-F slope) were determined and compared to similar data from 145 normal children.

Diastolic vibration of both MV leaflets was present in 15 of 24 patients with MS. In 9, the posterior leaflet moved anteriorly in early diastole, parallel to the anterior leaflet. Four patients had diastolic anterior motion of the posterior leaflet in the absence of vibration. In normal patients with a heart rate less than 120 beats/min there was MV reopening ("A" wave) following atrial contraction. The "A" wave was absent in 14 of 18 patients with MS in whom the heart rate was less than 120 beats/min.

Patients with severe MS tended to have a greater decrease in E-F slope and more frequently exhibited anterior diastolic movement of the posterior MV leaflet and absence of the "A" wave than patients with mild or moderate MS.

The reduced E-F slope and abnormal motion of the posterior MV leaflet are similar to the echocardiographic appearance of acquired MS. However, diastolic vibration of the MV leaflets appears to be unique to the congenital forms of MS.

105 THE CHRONICALLY INSTRUMENTED PUPPY: A NEW RESEARCH TECHNIQUE. David J. Driscoll, Robert L. Lewis, Craig J. Hartley, Paul C. Gillette, and Arnold Schwartz, Baylor College of Medicine, Departments of Pediatrics (Cardiology) and Cell Biophysics, Houston, Texas.

Since both maturity and anesthesia are known to produce variations in the response of the cardiovascular (CV) system to drugs, we developed a chronically instrumented puppy model to study the effects of drugs on conscious, developing canines.

Eight puppies 10 to 82 days old were used. Five were less than 17 days old and not yet weaned. Through a median sternotomy and left flank incision, pulsed doppler flow probes (1-8 mm) were placed around the ascending aorta and left renal artery and the wires exteriorized. An infusion of 20% glucose (100cc/kg) was maintained during the operation and the early postoperative period. Puppies not weaned were returned to their mothers after operation.

Three puppies died within 24 hours of operation; 2 died with a ruptured aorta 7 days postoperatively, and 3 are alive 2-3 months after operation. Reproducible blood flow tracings were obtained from flow meters implanted as long as 3 months. In preliminary drug studies (without anesthesia), heart rate (HR) and aortic blood flow were increased more with isoproterenol (I) than with dopamine (D) or dobutamine (Db). In contrast, aortic and renal blood flow were increased more by D and Db than by I and HR was increased equally by all 3 drugs in anesthetized open chest preparations.

This technique permits the study of the CV response of conscious immature animals to drugs and changes of these responses with age.

106 THROMBOCYTOPENIA IN CHILDREN WITH CONGENITAL HEART DISEASE UNDERGOING CORRECTIVE SURGERY USING CARDIO-PULMONARY BYPASS. Jonathan M. Ducore*, Cajsa J. Schumacher*, Robert L. McGrath*, Robert R. Wolfe*, and William E. Hathaway, Univ. of Colo. Med. Ctr., Dept. of Ped., Denver, Colo.

Children with congenital heart disease undergoing surgical correction using cardiopulmonary bypass (CPB) had differences in pre- and post-operative thrombocytopenia. A chart review was performed to document these differences and identify etiologic factors in 40 consecutive patients admitted to a pediatric intensive care unit following corrective surgery for all types of congenital heart lesions. Eleven patients not on CPB had normal (mean 375,000/mm³) platelet counts and showed no intraoperative platelet loss or postoperative thrombocytopenia compared to 29 patients on CPB with transposition of the great vessels (TGV), Tetralogy of Fallot (TOF), ventricular septal defects (VSD), and atrial septal defects (ASD). Patients with TGV had lower pre-operative platelet counts compared to the group with TOF, VSD, and ASD (means 148,000/mm³ and 320,000/mm³ for the groups respectively). Intraoperative platelet loss was similar in the 4 groups (TGV, TOF, VSD, ASD). TGV patients had lower platelet counts on postoperative days 2-7 and the duration of thrombocytopenia (platelets <150,000/mm³) was prolonged, resolving by day 8, compared to those with TOF, VSD, and ASD who resolved by day 3. There was no difference in the duration of CPB among the groups. In this study, differences in preoperative platelet counts suggest marrow impairment as a factor in the failure of patients with TGV to respond to intraoperative platelet loss.

107 EFFECT OF EXCHANGE TRANSFUSION WITH BLOOD OF HIGH HEMATOCRIT ON THE REGIONAL DISTRIBUTION OF BLOOD FLOW IN NEWBORN LAMBS. James D. Ferguson, Sunthorn Horpapan, Robert E. Forster II and Maria Dellivoria-Papadopoulos, Univ. of Pa. Sch. of Med., Depts. of Physiology & Pediatrics, Phila., PA

Acute changes in the distribution of blood flow to different organs of newborn lambs following exchange transfusion which increased blood P₅₀ from 19.8±0.7 to 31.4±0.8 mm Hg (p<0.0005) and increased Hct from 35.3±4.1 to 40.7±2.9 (p<0.10) were studied by the microsphere method. Six lambs, 4 days old, were injected through a chronic catheter in the left ventricle with 15µ plastic spheres labelled with either ¹⁴¹Ce or ⁸⁵Sr for baseline blood flow. Following exchange transfusion with maternal settled blood, a second injection of microspheres labelled with the other isotope was given 2 hrs later. Mean values for blood flow ±SD in ml/min/100g tissue before and after exchange transfusion respectively were: adrenal - from 158±25 to 144±30 (p<0.4); kidney - from 295±54 to 178±32 (p<0.02); heart - from 132±28 to 78±17 (p<0.05); brain - from 86±11 to 52±8 (p<0.05); cardiac output - from 303±37 to 176±16 ml/min/Kg (p<0.0025); total O₂ consumption - from 78±20 to 76±12 ml O₂/min. In five control animals there were no significant changes in any parameters. In previous experiments using whole blood for exchange transfusion the effect of increased P₅₀ and decreased Hct was an unchanged cardiac output and a decreased blood flow to all organs except brain and heart. In the present studies an increased P₅₀ and a slightly increased Hct at constant oxygen consumption produced a uniform decrease in cardiac output and blood flow to all organs, reflecting a reduction in circulatory demands and a readjustment in cardiovascular economy.

108 NON-INVASIVE DIAGNOSIS OF ANOMALOUS LEFT CORONARY ARTERY IN THE YOUNG WITH THALLIUM - 201 MYOCARDIAL IMAGING. Pedro L. Ferrer, Stuart Gottlieb, Otto L. Garcia and August Miale. (Introduction by William W. Cleveland.) Dept. of Pediatrics (Cardiology) and Radiology (Nuclear Medicine), University of Miami School of Medicine, Florida.

The diagnosis of anomalous left coronary artery (ALCA) requires documentation by cardiac catheterization (CC) and angiography (A). The electrocardiographic pattern of myocardial infarction may be atypical or absent; and other cardiomyopathies may have a similar clinical profile. This study was undertaken to assess the value of myocardial perfusion imaging in the diagnosis of ALCA.

Three patients (pts.) with proven diagnosis of ALCA by CC and A, aged 0.7, 1 and 2 years respectively, received Thallium-201 I.V. ranging from 0.7 to 1.3 mCi. Scintigraphy revealed a defect in perfusion of the anterior wall (3/3 pts.) and apical region (2/3 pts.) of the left ventricle. Myocardial imaging in 2 children, ages 1.5 and 8 yrs., with severe cardiomyopathy of unknown origin with similar clinical profile to pts. with ALCA, had no abnormalities or diffuse and poorly defined distribution of the radionuclide in the myocardium.

Thus, Thallium-201 myocardial imaging appears to be a promising non-invasive technique in the diagnosis of ALCA in the young and may prove of value in cases of high risk cardiac catheterization due to severe left ventricular dysfunction.