205

DIAGNOSIS OF CONGENITAL CARDIAC DEFECTS IN THE NEWBORN PERIOD: THE ROLE OF CARDIAC CATHETERIZATION.

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In 30,000 consecutive deliveries from July, 1981 to July 1983, 65 infants with symptomatic congenital heart defects (CHD) and 138 infants with Nonstructural Heart Disease (Ischemic Myocardial Dysfunction, Persistent Fetal Circulation, Hypertrophic Cardiomyopathy) were encountered during the immediate newborn period (<2 wks of age). In addition to routine evaluation (physical exam, ECG, and chest x-ray), two-dimensional and M-mode echocardiograms, transcutaneous oxygen monitoring, and single film aortograms indicated the correct diagnosis in all except one infant with CHD and in all infants with Nonstructural Heart Disease (NSHD). Cardiac Catheterization (CC) during the newborn period was required only in 9 with CHD (14%) and in none with NSHD for correct diagnosis. CC was performed in 3 infants with transposition of the great vessels mainly for balloon atrial septostomy and in 6 infants for better definition of their intracardiac defects. Of 65 infants with CHD, 19 underwent palliative or corrective cardiac surgery. In only 5 infants (26%) was CC judged necessary prior to their initial surgery. In summary, noninvasive or semi-invasive bedside procedures are both sensitive and specific for making the correct diagnosis of CHD during the newborn period. Only in a small number of cases is CC required prior to initial cardiac surgery. In light of this and other similar studies, the indications for CC in symptomatic neonates with CHD should be reevaluated.

206

ATRIOVENTRICULAR VALVE INSUFFICIENCY ASSOCIATED WITH CONGENITAL HEART DISEASE DETECTED IN UTERO USING COMBINED 2D ECHO/DOPPLER ULTRASOUND. Norman H. Silverman,

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Little is known about the effects of atrioventricular valve insufficiency (AVVI) in utero in association with congenital heart disease. Using an ATL ultrasound system with a 3 MHz range-gated pulsed Doppler (PD) transducer we found 3 of 114 fetuses had AVVI. The atria were insonated using the 2D echocardiographic image as a guide for position. The mother of one fetus, gestational age (GA) of 20 weeks, had received high dosage lithium during early pregnancy. Tricuspid insufficiency was associated with Ebstein's anomaly of the tricuspid valve. Serial studies showed nonimmune fetal hydrops (NIH) developed at 34 weeks GA. Labor was induced but the fetus died from low cardiac output and blood pressure after delivery. At postmortem the diagnosis was confirmed. A second fetus, 36 weeks GA, was referred for examination because of bradycardia. The 2D echocardiogram showed an atrioventricular canal defect. NIH was present. PD showed insufficiency of the common atrioventricular valve. Following induction of labor and delivery, low cardiac output and blood pressure persisted despite medication and the infant died. In a 23 week twin pregnancy, one fetus had NIH. 2D echo showed this fetus to have pulmonary atresia with a normally developed right ventricle. Tricuspid insufficiency was found by PD. The pregnancy terminated spontaneously. AVVI in the presence of congenital heart disease has a poor prognosis. Associated NIH may make the prognosis even worse and reflect in utero cardiac failure.

207

AORTIC CONTRAST ECHOCARDIOGRAM AND LA/AO RATIO IN THE DIAGNOSIS OF PATENT DUCTUS ARTERIOSUS. Edwin Soto, Nakul Chandra, I. Mark Hiatt, Thomas Hegyi.

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We examined the aortic contrast echocardiogram (ACE) and LA/Ao ratio obtained by M-mode echocardiography in the diagnosis of PDA in very low birthweight infants. Eighteen infants below 1500g were evaluated 24 times during the first week of life. Six infants under 1000g had 9 studies and 12 between 1000g and 1500g had 15 studies. Each study consisted of an LA/Ao ratio followed by injection of 1 to 2cc of saline through an umbilical arterial catheter positioned above the diaphragm. The ACE was determined to be positive if echogenicity was noted in the pulmonary artery following the aortic echo.

The results are presented in the following table:

LA/Ao	Positive		Negative	
	≤ 1	> 1	≤ 1	> 1
≤ 1	4	8	10	2

Among infants below 1000g 3 or 6 studies showed an LA/Ao ≤ 1 and a positive ACE. In this group, all with LA/Ao > 1 had positive ACE. In the larger group one of eight had a positive ACE with a low LA/Ao ratio, and eight of ten with a high LA/Ao.

Thirty three percent of all studies that demonstrated a PDA via the ACE had an LA/Ao ≤ 1. In searching for the PDA the LA/Ao ratio should not be the only echocardiographic study performed.

208

CARDIOVASCULAR RESPONSES TO INSULIN INFUSIONS IN THE OVINE FETUS. B.S.Stonestreet, G.J. Piasecki, W.Oh, B.T.Jackson. Brown Univ. Dept. Ped. & Surg.,

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Effects of fetal hyperinsulinemia were examined in six chronically catheterized ovine fetus (F), receiving 0.2 U/kg/hr of insulin (I) continuously for 24 hours, followed by 0.4 U/kg/hr of I for an additional 24 hours. Hemodynamic changes (microsphere method), fetal arterial levels of I, glucose (G), norepinephrine (NE) and O₂ content were determined at 2 and 24 hours of each infusion period. Data (M±SD) are shown below:

Insulin Dose	0	0.2U/Kg/hr	0.4U/Kg/hr
Hrs of Infusion	0	2	24
I (U/ml)	28±14	947±887	484±168
G(mg/dl)	19±5	12±5*	10±5*
FVO, #	8.8±3.7	15.3±8.3*	12.0±6.6
NE(pg/ml)	329±194	648±322	1076±588
CO	541±113	564±293	624±166
Q Fetus+	56±5	66±10	62±5
Q Placenta+	44±5	33±12	38±5

*mlO₂·min⁻¹·kg⁻¹, CO:cardiac output, ml·min⁻¹·kg⁻¹, %CO, *p<0.05 vs baseline (0)

Fetal hyperinsulinemia resulted in increased fetal O₂ consumption (FVO), which in turn produced a surge in catecholamine (NE) release. The latter mediated an increase in CO, with a redistribution of CO providing a greater proportion distributed to the fetus at the expense of the placenta. We speculate that hemodynamic adjustments with a decrease in placental blood flow may occur in pregnancies complicated by fetal hyperinsulinemia.

209

HEMOSTATIC DISORDERS IN CHILDREN WITH CYANOTIC CONGENITAL HEART DISEASE(CCHD). Carlos R. Suarez, Andrew Griffin, Philip Ow, Cesar Menendez, Jeanine Walenga,

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Bleeding and coagulation disorders in CCHD have been described, the precise mechanisms are not well defined. We utilized newer sensitive methods to study the hemostatic system in 10 cases of CCHD at the time of routine cardiac evaluation. Besides CBC the evaluation included PT,PTT, fibrinogen(Fbgn), fibrinogenolysis (FPA), plasminogen(Plg), α₂-antiplasmin(α₂-AP), Bβ1542 related peptide(BβRP) a sensitive indicator of fibrinolysis, thromboxane B₂(TxB₂), antithrombin III(AT-III), α₂-macroglobulin(α₂-Mac), and factors II,X,XI,XII. Results are shown in the following table:

	FPA(ng/ml)	BβRP(pg/ml)	Plg(%)	α ₂ -AP(%)
CCHD	12.3±11.7	9.6±4.4	97±24	107±38
Normal	2.4±0.7	27±7	100	72-137
	TxB ₂ (pg/ml)	AT-III(%)	α ₂ -Mac(%)	
CCHD	43.6±43.4	78±12	102±32	
Normal	0-10	100	100	

The elevated FPA levels reflect activation of the hemostatic system leading to thrombin generation and Fbgn cleavage. This activation is not detected if routine coagulation tests are used. Fibrinolysis is not activated as reflected by the normal levels of BβRP, Plg, α₂-AP. Fbgn, factors II and X are normal but the contact factors XI, XII are low(54%, 40%). There is marked platelet activation indicated by elevated TxB₂. These parameters did not correlate with hematocrit, PT or PTT. Therefore marked activation of the hemostatic system(humoral, platelet) is present in CCHD.

210

EFFECT OF CONTRAST MEDIUM INFUSION ON COLLOID OSMOTIC PRESSURE (COP) AND OSMOLARITY IN THE NEWBORN DURING CARDIAC CATHETERIZATION. Shyan Sun, Anita

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The injection of extremely high osmolar contrast medium into a newborn infant undergoing angiographic study has been a concern. We studied the effect of contrast medium on COP and osmolality changes in the newborns during a six month period in 1983. Twenty-two infants underwent cardiac catheterization and angiography during this period. The average gestational age was 39.6 weeks and the mean birthweight 3266 gms. Ages ranged from one to 28 days of life. Diatrizoate sodium 50% solution (MD-50) was used at a dose of 3.3 ml/kg. Direct measurement of MD-50 revealed COP of 7.0 mmHg and osmolality of 1497 mOsm/L. Blood samples were obtained before and at one hour and 4 hours after injection of MD-50. COP was determined by Wescor 4100 Colloid Osmometer. Serum osmolality was measured by Wescor 5100 C Vapor pressure Osmometer.

	Samples	Pre-infusion	1 hour	4 hours	Variance
COP	22	19.06±2.7	18.55±2.9	18.05±2.9	NS
Osmolality	22	283±12	277±15	274±14	p=0.0021

There was no significant change in COP before and after injection. However, there was significant although small overall change in osmolality before and after infusion of MD-50 (one way analysis of variance p=0.0021). This small alteration in osmolality probably does little harm in our cases but larger doses may cause osmolar imbalance.