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A NEW METHOD FOR ECHOCARDIOGRAPHIC ASSESSMENT OF RIGHT VENTRICLE IN CHILDREN. Lily George, Thomas A. Riemenschneider, James W. Mathewson, Anthony N. DeMaria, and Dean T. Mason. University of California Davis, School of Medicine, Davis, California 95616 (Spon. by Eli Gold)

Our preliminary study suggested the possibility of a reliable method of measurement of right ventricular outflow tract (RVOUT) for the assessment of RV size by echocardiography (E). We further examined 110 male (M) and 90 female (F), normal school children, 5-14 years of age, with body surface area (BSA) varying from 0.7 to 1.59 to establish normal standards. In the standard fashion, strip chart E recordings were obtained of the aortic root from the 3rd or 4th left intercostal space. Inner RVOUT at the onset of Q wave of the EKG, the distance from the endocardium of the anterior RV wall to the outer aspect of the anterior wall of the aorta was measured in millimeters for several cardiac cycles and averaged. The results were as follows for the mean and 1 standard deviation for the different BSA:

| | | | | |
|-----|------------|------------|------------|------------|
| BSA | 0.70-0.99 | 1.00-1.19 | 1.20-1.39 | 1.40-1.59 |
| M | 21.2 (3.1) | 25.1 (3.3) | 26.9 (2.6) | 28.0 (2.6) |
| F | 20.5 (2.4) | 23.8 (3.1) | 25.8 (3.2) | 28.3 (1.4) |

Our study demonstrates increase in RVOUT diameter with larger BSA in keeping with the other cardiac chambers. The difference in the RVOUT sizes at any BSA between M and F children was not statistically significant. Our study establishes normal standards for RVOUT diameter for these normal school children.

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ECHOCARDIOGRAPHIC LEFT VENTRICULAR SIZE IN GROWING MALE AND FEMALE CHILDREN. Lily George, Thomas A. Riemenschneider, James W. Mathewson, Alex Newman, Anthony N. DeMaria, and Dean T. Mason. University of California, Davis, School of Medicine, Davis, California 95616 (Spon. by Eli Gold)

Left ventricular end-diastolic dimension (LVD) in the echocardiogram (E) is widely used to assess the LV size. There is no study available where difference in male (M) and female (F) growing children were examined. Therefore, we studied 110 M and 90 F normal school children, 5-14 years of age and with body surface area (BSA) varying from 0.7 to 1.59. Strip chart E recordings of the LV at its midcavity sector containing mitral echos were obtained by means of a 2.25 M Hz transducer in the standard fashion. Internal LVD was measured in millimeters at the onset of the Q wave of the EKG for several cardiac cycles and averaged. Our results for the mean and 1 standard deviation in M and F children with the different BSA were as follows:

| | | | | |
|-----|------------|------------|------------|------------|
| BSA | 0.70-0.99 | 1.00-1.19 | 1.20-1.39 | 1.40-1.59 |
| M | 36.6 (3.2) | 41.8 (2.8) | 43.1 (2.5) | 46.8 (2.4) |
| F | 37.0 (4.1) | 41.8 (2.8) | 43.1 (2.3) | 45.1 (3.5) |

This study shows increase in LVD with larger BSA as in other studies in both M and F children. However, there was no statistically significant difference in LVD between M and F growing children at any BSA.

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ECHOCARDIOGRAPHIC SIGNIFICANCE OF THE AORTIC ROOT MOTION IN CHILDREN. Lily George, Thomas A. Riemenschneider, James W. Mathewson, Lynn C. Weinert, Anthony N. DeMaria, and Dean T. Mason. University of California, Davis, School of Medicine, Davis, California 95616 (Spon. by Eli Gold)

During ventricular systole the aortic root (Ao) moves anteriorly and inferiorly. There is no study available to detect a possible relationship between the Ao anterior motion and left ventricular contractile state (LVC) by echocardiography (E). Thus, we studied 100 normal children with body surface area ranging from 0.7 to 1.2 by E to compare the anterior Ao motion (AoA) with shortening fraction (SF) of the LV and the systolic thickening amplitude of the posterior LV wall (LVWA). Standard E were obtained of the Ao and LV from the 3rd and 4th left intercostal space on strip chart recordings. AoA was measured as the vertical distance in millimeters between end-diastole and end-systole for the posterior wall. Also vertical LVWA was measured in millimeters at the point of maximum systolic excursion. SF was calculated by previously described methods. Our results for the mean and 1 standard deviation were as follows:

| | | | |
|---|-----------|-----------|------------|
| | (a) AoA | (b) LVWA | (c) SF |
| M | 7.5 (1.2) | 9.6 (1.1) | 37.2 (4.0) |
| F | 7.7 (1.2) | 9.4 (0.9) | 37.3 (5.2) |

The r value was <0.4 for the comparison between (a) and (b) as well as (a) and (c). From this we feel that although Ao anterior motion occurs during LV systole, it is not directly related to LVC by E.

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INCREASED OXYGENATION IN INFANTS WITH CYANOTIC CONGENITAL HEART DISEASE DURING EXPOSURE TO 100% O₂. Tilo Gerhardt, Eduardo Bancalari, University of Miami School of Medicine, Department of Pediatrics, Miami, Florida

Oxygen therapy is seldom recommended in infants with cyanotic congenital heart disease (CCHD) because of the small change in PaO₂ that occurs with increased inspired oxygen concentrations. Arterial PO₂ was measured in 25 infants with CCHD and CO₂ production (VCO₂) in 17 of them while breathing 21 and 100% O₂. PaO₂ increased from 31±7.9 to 41.4±17.3 mmHg within 3 minutes of breathing 100% O₂. (P<0.001) This determined an increase in O₂ content of 12 to 20%, depending on the initial PaO₂ and the position of the Hb-O₂ dissociation curve. Although the change in PaO₂ was small, the increase in O₂ content was considerable because it occurred in the steep part of the Hb-O₂ dissociation curve.

The increase in PaO₂ cannot be explained solely by an increase in dissolved O₂ in the blood perfusing the lungs but must be related to either an increase in pulmonary blood flow or to an increase in O₂ saturation of the pulmonary venous blood. The latter would occur in case of an increased A/aO₂ gradient due to co-existing pulmonary pathology. VCO₂ increased from 7.6 before to 8.5 ml/min/kg 30 minutes after breathing 100% O₂ (P<0.005). This increase indicates that the basal metabolic rate may be depressed in infants with severe chronic hypoxemia and this can be at least partially reversed by a small increase in PaO₂. These results suggest that O₂ therapy may improve tissue oxygenation in some infants with CCHD.

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THE ROLE OF ECHOCARDIOGRAPHY IN POSTOPERATIVE AORTIC STENOSIS. Michael H. Gewitz, John C. Werner, Charles S. Kleinman, William E. Hellenbrand, and Norman S. Palmer*. Yale Univ. Sch. of Med., Dept. of Peds., New Haven, CT.

Echocardiography (echo) has been used in the preoperative evaluation of patients with aortic stenosis. To assess its role as a postoperative index of left ventricular peak systolic pressure (LVSP) in surgically relieved LV outflow obstruction, 13 patients were evaluated by both echo and cardiac catheterization (cath). Average postoperative period was 37 months (range 10 to 122 mos.). Of several variables assessed including LV volumes, LV mass/volume ratio, posterior wall thickness/LV cavity size ratio (Ws/Ds), and mean wall thickness/LV cavity radius ratio (W̄/r), only systolic wall thickness on echo correlated with LV pressure at cath (r=0.70, p=N.S.). No correlation was found between LVSP at cath and that predicted by echo using any of the published regression formulae that have been applied in the preoperative period (mean cath LVSP=139mm, range 100mm to 180mm; mean echo LVSP per Glanz, et.al.=173mm, range 113mm to 225mm; mean echo LVSP per Aziz, et.al.=187mm, range 136mm to 241mm.). In 12 cases echo overestimated LVSP measured at cath and it predicted abnormal LVSP in 11 patients though at cath LV pressure was normal in 10 of these. Percentage fiber shortening was found to be more than 2 standard deviations above established normals in 9 patients. These data indicate that currently applied formulae, while of value for preoperative assessment of LV pressure, are not reliable for use in the postoperative period and raise questions concerning the reversibility of preoperative myocardial changes.

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RENAL CIRCULATORY EFFECTS OF DIRECT STIMULATION OF CENTRAL AUTONOMIC NERVOUS SYSTEM IN PIGLETS. Phyllis M. Gootman, Norman Gootman and Barbara J. Buckley.

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The role of the cardiovascular regulatory system in controlling renal circulation was assessed by renal responses to stimulation of vasoactive sites within the central nervous system. Piglets aged 1-25 days were anesthetized with 0.25-0.5% halothane in N₂O-O₂, paralyzed, ventilated to maintain normal arterial blood gases and pH and placed in a stereotaxic apparatus. Stimuli (0.1msec pulses, 0.1-1.0mA, 1-100Hz) were delivered through enamel-coated nichrome wire (0.3mm tip diameter). Renal arterial flow (RF) was recorded continuously (electromagnetic transducers) with aortic pressure (AoP) and heart rate (HR). Resistance (R) was calculated as mean AoP/mean flow. In 7 piglets less than one week old, medullary pressor point area stimulation (AoP increase without HR change) significantly increased RF without consistently changing R. Lateral hypothalamic stimulation by high frequencies significantly increased both AoP and R in 10 piglets of all ages. Active renal circulatory responses (R changes) to lateral hypothalamic stimulation were obtained at an earlier age than to medullary stimulation. (Supported by Nassau Heart Assoc.)