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GROWTH FAILURE (GF) IN A PEDIATRIC CARDIOLOGY PRACTICE—Marjorie E. Tripp and Jay M. Levy (Spons. by Russell Chesney) Dept. of Pediatrics, University of Wisconsin, Madison.

Changing medical and surgical practices alter the incidence and persistence of GF in congenital heart disease. Clinic records of 900 pediatric cardiac pts. were reviewed to determine incidence of past and present GF. Pts. with functional murmurs, primary arrhythmias, and bicuspid aortic valves were excluded. GF was defined as height, weight, or weight for height more than 2 SD below mean. 300 pts. had a history of GF. Of these, 133 had resolved GF, 21% of whom had had a probable non-cardiac cause (prematurity, neurologic abnormality, etc.). In 105 others, 41% had had closure of a ventricular septal defect (VSD), 14% repair of tetralogy, 11% of atrial septal defect (ASD), 9% of transposition (TGV). Of 167 pts. with persistent GF, 51% (86 pts.) had probable non-cardiac causes: 41 with chromosomal abnormality, 8 with rubella, 6 with major neurologic deficits. Of 81 pts. remaining, 18 had VSD's (4 pre-op, 2 post-op, 12 considered small). 14 had had tetralogy or double outlet right ventricle; all had undergone definitive repair. 18 patients had persistent GF despite palliation for complex cyanotic heart disease.

Although GF is common in congenital heart disease, it may be caused by non-cardiac conditions—which preclude growth despite cardiac surgery. Excluding non-cardiac GF, poor growth persists in less than 10% of pts. after repair of VSD, ASD, coarctation and transposition. It persists in 25% of pts. after repair of conotruncal abnormalities and in 75% of pts. palliated for complex cyanotic heart disease.

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ECHOCARDIOGRAPHIC FINDINGS IN CHILDREN WITH RHEUMATIC MITRAL REGURGITATION VERSUS PROLAPSED MITRAL VALVE SYNDROME

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The differential diagnosis between rheumatic mitral regurgitation (MR) and mitral valve prolapse (MVP) is important both in respect of management and requirements of prophylaxis. It has been suggested, that MR of rheumatic origin (RF) is often associated with echocardiographic (Echo) findings of MVP. Furthermore, septal/posterior left ventricular (LV) wall ratio is reportedly increased in patients (pts) with MVP.

Twenty echos from pts with MR with proven RF (median age-12.5y) and 20 echos of pts with clinical findings of MVP (median age-13y) were studied. MVP was observed in 4 of 20pts with RF. Of these four, 2pts had evidence of increased left atrial (LA) and left ventricular end-diastolic (LVED) dimension. LA size (M±SD) in pts with RF was 2.99±0.66 and for pts with MVP 2.23±0.49 (p<0.001). The LVED dimension (M±SD) was 4.58±0.88 for pts with RF and 4.12±0.67 for pts with MVP (p<0.01). Whereas 7 of 20 pts with rheumatic MR had both increased LA and LVED dimensions, this did not occur in MVP. Septal/posterior LV wall ratio was normal in both rheumatic and MVP groups.

It is concluded, that isolated MVP without increased LA and LV dimension is a rare finding in pts with acute or chronic rheumatic mitral valve disease. Non-rheumatic MVP in children is most often an isolated echo manifestation without significant incidence of severe MR or asymmetric septal hypertrophy.

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PRE- AND POSTOPERATIVE PULMONARY VASCULAR RESPONSE TO BREATHING 15% O₂. J. Deane Waldman, John J. Lamberti, Stanley E. Kirkpatrick, Stanley J. Pappelbaum, Searle W. Turner, Lily George. Pediatric Cardiology Medical Group and the Cardiac Center, Children's/Sharp Complex, San Diego, CA.

The effect of surgical correction of congenital heart disease (CHD) on pulmonary vasoreactivity was evaluated in children with pulmonary artery hypertension (PAH) at sea level. During cardiac catheterization in 15 children (ages 4 mo to 9 yr, median=12 mo) with CHD and PAH, hemodynamic studies were performed in 21% and 15% O₂ (equivalent to cabin pO₂ during airline travel). Eight children were restudied 1-2 years after surgery. Arterial oxygen tension (pO₂) decreased (p<0.001) with 15% O₂ breathing (see Table below). A small increase in the main pulmonary artery/aortic pressure ratio (MPA/Ao) was seen both pre- and postoperatively during hypoxia. The ratio of pulmonary-to-systemic vascular resistance (Rp/Rs) increased with hypoxia before surgery (p<0.025), but after surgery the Rp/Rs was normal in both 21% and 15% O₂. In 2/15 children, clinical deterioration occurred in 15% O₂ before surgery; these two children were normal postoperatively.

	Before Surgery			After Surgery		
	pO ₂	MPA/Ao	Rp/Rs	pO ₂	MPA/Ao	Rp/Rs
21% O ₂	77	.69	.32	90	.26	.19
15% O ₂	47	.73	.44	53	.31	.22

At sea level, when children with CHD and PAH breath 15% O₂, pulmonary vascular resistance increases. After surgical correction of CHD and restoration of normal pulmonary artery pressure, pulmonary vascular resistance remains normal during hypoxia.

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POSTOPERATIVE JUNCTIONAL TACHYCARDIA IN PEDIATRIC PATIENTS Christine Walsh, David Valacer, James Malm, Michael Rosen, (Spon. Welton M. Gersony), Columbia

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We determined the incidence of cardiac arrhythmias in children post cardiac surgery, the cardiac malformations associated with specific arrhythmias and the ECG characteristics of the arrhythmias. Continuous 2-lead ECG's were recorded in 26 consecutive patients (ages 2 mos-13 yrs) during the first 24 hours after open heart surgery. The most frequent non-sinus arrhythmia was atrio-ventricular junctional tachycardia (JT) which occurred in 9 patients (39%). Ventricular, junctional and atrial premature depolarizations were infrequent (<5 beats/hr in 16 patients) and atrial tachycardia occurred in 1 patient. JT occurred mainly in patients with tetralogy of Fallot (4 of 5) and endocardial cushion defects (3 of 3). Two types of onset of JT were seen, often in the same patient: the first occurred following sinus pauses > the duration of the basic cardiac cycle (i.e., occurring as accelerated junctional escape); the second occurred when sinus tachycardia supplanting normal sinus rhythm and then was overridden by an accelerated junctional focus. The second type of onset is consistent with reentry or triggered activity; the first, with an automatic focus. Both JT had similar QRS morphologies and axes and appeared unrelated to perioperative medication and acid-base and electrolyte status. The high incidence of JT after open heart surgery is of interest because of its infrequency in the general pediatric population. It may result from surgical manipulation of the AV junction and it appears that more than one mechanism is responsible for its initiation.

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EVALUATION OF A SINGLE DAILY MAINTENANCE DIGOXIN DOSE IN INFANTS AND CHILDREN, Dirk S Wesseliuss, Burton W Fink, Sharen Kato (Spon. Benjamin M Kagan) UCLA

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Pediatric patients requiring digitalis therapy generally are acutely digitalized with digoxin and then placed on a twice daily maintenance regimen. The published half life of digoxin raised the question of using a once daily maintenance schedule. Between January and December 1980, 26 patients, 10 days to 20 years of age, were digitalized and maintained on a single daily dose. Four had supraventricular tachycardia, 5 congestive heart failure (CHF) with congenital heart disease, and 17 CHF following surgery. All patients had normal renal function. Serum digoxin levels were drawn at 7, 11 and 23 hours after the single daily oral dose. No patient had a return of symptoms and one had clinical signs of toxicity with a level of 5.1 ng. at 7 hours. In the 20 non-toxic patients whose 7-hour level was greater than 0.7 ng. (range 0.8-4.0 ng.), the 23-hour level (range 0.6-2.3 ng.) remained within the published therapeutic range (0.5-3.0 ng.). In 5 patients whose 7-hour value was 0.7 ng. or less (range 0.5-0.7 ng.), the 23-hour level was sub-therapeutic.

These data suggest that a patient receiving an adequate digoxin dose whose 7-hour serum level is above 0.7 ng. will maintain a therapeutic level for 24 hours and thus a single daily dose could be utilized.

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EFFECT OF HYPOXEMIA ON TISSUE OXYGEN DELIVERY IN LAMBS Douglas N. Weismann and James Herring (Spon. by Jean E. Robillard), University of Iowa College of Medicine,

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Tissue oxygen delivery (TOD) during normoxemia and hypoxemia (H) was studied in 23 chronically catheterized, unanesthetized lambs grouped according to age: Group I (2-8 days, n=10) and Group II (13 days-3 mos, n=13). Animals were administered a low oxygen gas mixture (F_{IO2} 0.11) which produced significant (p<0.01) declines in p_aO₂ (89±8 to 34±4 Torr) and arterial oxyhemoglobin saturation (96.1±2.2 to 50.0±14.3%) without changes in p_aCO₂ (34±4 to 35±6 Torr) or pH (7.37±10 to 7.33±16 Torr). H was associated with significantly decreased (p<0.01) TOD (ml O₂/min/gm) to spleen (38±16.1 to 5.3±5.2), ileum (9.9±3.9 to 4.2±3.2), jejunum (23.9±9.7 to 9.1±5.9), meninges (5.0±4.5 to 1.8±1.3) and kidney (43.5±14.9 to 18.8±12.1). TOD was unchanged (p>0.05) in response to H to liver (2.2±2.5 to 1.5±1.2), heart (38.3±11.3 to 33.5±17), adrenal (21.8±6.5 to 28.2±16) and cerebral cortex (17.9±10.2 to 18.8±9.7). A greater increase (p<0.02) in oxygen capacity (ml O₂) in response to H was seen in older relative to younger animals (Gp.I: 12.7±3.1 to 12.6±3.4; Gp.II: 11.2±2.4 to 12.4±2.7), with similar responses in hematocrit (Gp.I: 28±6 to 28±6%; Gp.II: 24±6-28±6%) and hemoglobin (Gp.I: 9.3±2.3 to 9.3±2.5 gm/dl; Gp.II: 8.3±1.7 to 9.1±2.0 gm/dl). No differences were noted between the groups in the response of arterial O₂ content (ml O₂) to H (Gp.I: 12.1±3.0 to 6.6±2.1; Gp.II: 10.9±2.3 to 5.6±1.8) which declined significantly (p<0.01). Thus, older lambs appear to have greater fluid shift out of the intravascular compartment in response to H but the response to TOD is not different in older relative to younger lambs.