157

THE CARDIOVASCULAR EFFECT OF ISOMETRIC EXERCISE IN CHILDREN Richard M. Schieken, David E. Geller
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Isometric exercise (ISO) evokes profound changes in left ventricular dynamics. Scant data document the effect of ISO in children. The blood pressure (BP) heart rate (HR) and echocardiographic left ventricular (LV) diastolic dimension (LVDd), systolic dimension (LVDs) and LV% shortening (%Δ) were recorded in 10 healthy children (mean age 8.9 yr.) performing 30% handgrip (HG). The group mean observations from control; exercise and recovery periods are tabulated:

Exercise Period	Systolic BP mmHg	Diastolic BP mmHg	HR beats/min	LVDd cm	LVDs cm	%Δ
Baseline	95.7	56.8	72.9	3.93	3.53	0.36
Exercise	113.4*	78.6*	82.4*	4.04	2.62*	0.35
Recovery	102.0*	58.2	71.4	3.93	2.37*	0.40*

*$p<0.05$

During HG, BP and HR increase. The LVDd remains unchanged, consistent with quiet breathing without Valsalva maneuver. The LVDs increases, reflecting the inability of even the young heart to maintain a constant stroke volume. With sudden release of HG, %Δ increases markedly. Because this response occurs during a slowing of the pulse, without increasing the diastolic dimension, it appears dependent upon an inherent ventricular mechanism, ISO is a reproducible, noninvasive method to assess ventricular performance in children.

158

PAPILLARY MUSCLE NECROSIS (MN): A COMMON NEONATAL AUTOPSY FINDING. Emmalee Setzer, Rufino Ermocilla, and George Cassady, Division Perinatal Medicine, University of Alabama, Birmingham, Alabama.

136 consecutive neonatal autopsies, during a 16 month period, were re-examined for evidences of myocardial ischemia. New sections were cut from both right and left ventricular apices and anterior papillary muscles of tricuspid and mitral valves. Autopsies of patients with congenital heart disease(19), multiple congenital anomalies(3), or with cardiac tissue unavailable(30) were excluded. 22 of the remaining 84 (26%) had ischemic changes in papillary muscles. These included coagulation necrosis, contraction bands, and/or vacuolar degeneration. In 17 of 22 the lesions were more prominent or were found solely in the right ventricle: 10 were bilateral; 11 were in the right ventricle; and 1 was in the left ventricle.

Selection of the next-consecutive-neonatal autopsy after each case of MN yielded a control population of 22 cases. Race, sex, inborn/outborn ratio, and incidence of asphyxia as determined by fetal monitoring and/or Apgar score were similar in MN and control groups. Gestational age and birth weight more commonly exceeded 34 wk (13/22) and 3000 g (8/22) in the MN group than in the controls (6/22 and 2/22;$p<.05$). Meconium aspiration syndrome was also more common in MN (8/22) than in controls (2/22).

MN, especially involving the right ventricle, is a frequent neonatal autopsy finding. The lesion seems to be more common in dying neonates who are more mature, of greater birth weight and with meconium aspiration syndrome.

159

CLOSED VERSUS OPEN MITRAL COMMISSUROTOMY IN CHILDREN WITH RHEUMATIC MITRAL STENOSIS. Bijan Siassi, Iraq Aryanpour, Jami G. Shakibi. (Spon. by Joan E. Hodgman.) Univ. of So. Calif. Sch. of Med., Dept. of Peds. & Queen Pahlavi Cardiovascular Center, Tehran, Iran.

There has been controversy about the relative merits of closed mitral commissurotomy (CMC) versus open mitral commissurotomy (OMC) in younger patients with rheumatic mitral stenosis (RMS). In an attempt to resolve this uncertainty, 23 patients (pts) aged 10-15 years, consecutively admitted with RMS and pulmonary hypertension (PH) were randomly assigned to OMC (12 pts) and CMC (11 pts). All had cardiac catheterization and left ventricular angiography prior to surgery and again 3-73 wks ($\bar{X}$=18) after operation. All pts had RMS either alone or associated with insignificant mitral regurgitation (MR). All pts had PH [pulmonary artery systolic pressure (PASP) 92.5 ± 16.5 mmHg]. In CMC group, 3 pts (27%) had poor results: one died 3 days after surgery, 2 required mitral valve replacement shortly afterwards due to massive MR, whereas only 1 pt (8%) in OMC group developed severe MR. All remaining pts have had significant clinical improvement. Although decrease in PASP was similar in both groups (OMC=36%, CMC=37%), pts in OMC group had greater decrease in pulmonary wedge pressure (PWP) than CMC group (48% vs 33%, $p < 0.01$). After commissurotomy, only 2 of 10 pts (20%) in CMC group had normal PWP, (≤13 mm Hg) whereas 6 of 12 pts (50%) in OMC group had normal PWP, indicating residual MS in a large number of pts in CMC group. It is concluded that in a center where large numbers of OMC and CMC are performed routinely, OMC should be the preferred method in children with RMS.

160

THE DETECTION OF VENTRICULAR SEPTAL ANEURYSM BY TWO-DIMENSIONAL ECHOCARDIOGRAPHY Rebecca Snider, Norman H. Silverman, and Nelson B. Schiller (Spon. by Michael A. Heymann) University of California, Department of Pediatrics, San Francisco.

To evaluate the sensitivity of two-dimensional sector scan (2DSS) for detecting ventricular septal aneurysms (VSA) associated with ventricular septal defects, we studied thirteen patients, one week to thirteen years of age, with positive M-mode findings of VSA. The criteria for M-mode diagnosis of VSA were multiple echoes within the right ventricle resembling systolic anterior motion of the tricuspid valve (TV). On 2DSS the aneurysm could be seen in several tomographic planes, but most regularly in long axis and apical views; in systole, the aneurysm prolapsed into the right ventricle below the septal leaflet of the TV. We compared these noninvasive techniques to the cineangiographic findings in all thirteen patients. When compared to cineangiograms, 2DSS were in agreement in all cases; there were four false positive M-mode studies. M-mode is thus useful as a screening test (no false negatives), but needs confirmation from 2DSS which appears as specific as cineangiography in detecting VSA. The 2DSS should be a valuable method for diagnosing and following the course of VSA associated with VSD, without the need for cardiac catheterization.

161

PULMONARY ARTERY BANDING AS PRIMARY THERAPY FOR COMPLETE ATRIO-VENTRICULAR CANAL. Henry M. Sondheimer Rae-Ellen W. Kavey, Marie S. Blackman (Spon. by F.A. Oski) Dept. of Pediatrics, SUNY, Upstate Medical Center, Syracuse

Due to the high mortality of early primary correction twenty-five children with complete atrio-ventricular canal less than one year of age have had pulmonary artery (PA) banding during the last twelve years. All patients had congestive heart failure with PA pressure equal to systemic, and a large ventricular septal defect on angiography. Banding was performed at 7 weeks to 11 months of age. Nineteen were less than 6 months of age at surgery. Seventeen of 25 had Trisomy 21.

Early mortality (under 30 days) was 20% and total mortality 40% for the series. Three of the older survivors have had open correction, two successfully. Since 1973 there has been 92% early survival (11/12) and 83% total survival. During this period PA and aortic pressures have been measured post-banding in the operating room with PA pressure aimed at 50% of systemic. Banding has been performed without regard to the angiographic degree of mitral regurgitation (MR). Six of 9 patients without MR have survived, but 6 of 9 with moderate or severe MR have also survived. Degree of MR also failed to correlate with age of presentation.

Pulmonary artery banding is effective palliation for infants with congestive heart failure due to complete atrio-ventricular canal when a large ventricular component causes systemic PA pressure. Intraoperative pressure measurements are useful to determine the gradient from banding. Mitral regurgitation was not a factor in the success of banding.

162

FURAZOLIDONE-INDUCED CARDIOMYOPATHY IN TURKEYS: ASSOCIATION WITH A RELATIVE ALPHA-1-ANTITRYPSIN DEFICIENCY. Nancy A. Staley, George R. Noren, Calvin M. Bandt and Harvey L. Sharp. Veterans Administration Hospital, Hennepin County Medical Center, University of Minnesota, Departments of Pathology and Pediatrics, Minneapolis, Minnesota.

A naturally occurring cardiomyopathy (Round Heart Disease) which is potentiated by inbreeding and a cardiomyopathy produced by furazolidone, a nitrofuran derivative, were studied for an associated alpha-1-antitrypsin deficiency in two flocks of turkeys-one inbred for Round Heart Disease and a commerical flock. At age four weeks, the furazolidone fed birds of both flocks, demonstrated a significant increase in mortality and cardiac dilatation associated with disordered hepatic metabolism when compared to their controls. ($p<.01$) Although PAS positive, diastase-resistant globules were observed in the livers of both strains of turkeys fed furazolidone, these globules were present inlysosomes and not in the rough endoplasmic reticulum as in alpha-1-antitrypsin deficiency. The control inbred birds with Round Heart Disease did not demonstrate histologic or biochemical evidence of an alpha-1-antitrypsin deficiency. It is proposed that furazolidone in the turkey produces primary hepatic damage that is reflected in lowered total serum proteins including trypsin inhibitory capacity and that the alterations produced by furazolidone are superimposed on Round Heart Disease in the inbred flock.