

## Cardiology

### G122 TELE-ECHOCARDIOGRAPHY—ACCESS TO SPECIALIST SERVICES IN PAEDIATRIC CARDIOLOGY

D.C. Mabin<sup>1</sup>, R.M.R. Tulloh<sup>2</sup>. <sup>1</sup>Paediatric Department, West Suffolk Hospital, UK; <sup>2</sup>Department of Congenital Heart Disease, Guy's and St Thomas' Hospital NHS Trust, UK

**Background:** Real time telemedicine systems are used in paediatric cardiology but are expensive. For video conferencing, the cost is around £7,000 per year and more for television or optical fibre. They require simultaneous attention of specialists in separated centres.

**Aims:** To undertake a pilot study of a digital tele-echo system and to determine its clinical use.

**Methods:** Digital video clips were captured during echocardiography by a trained consultant paediatrician (DM) onto an optical disc. These were sent in a commercially available programme (Medarchive), using the NHS net and a paged message, to a paediatric cardiologist (RT). Clinical data was sent by attached email, with faxed ECG.

**Results:** The system was bought for £5,800 with no running costs and 32 patients referred over 15 months, from 2 days to 17 years old. All clinical and echocardiographic data was successfully transferred. In 4, additional data were required for complete diagnosis. 18 patients avoided emergency transfer being seen in the next joint clinic. 6 were admitted for elective interventional cardiac catheter, without prior consultation, 5 were transferred acutely, advice was given, ensuring safe transfer. 3 children required semi-urgent surgery and were transferred the day before an elective and appropriate surgical list. The cost saving was £408,000.

**Conclusions:** The advantages are 1) Allowing echoes to be performed locally and reviewed by the specialist at a convenient time 2) It is inexpensive and 3) It uses widely available resources. It aids the diagnosis and management of acutely ill patients with congenital heart disease and reduces need for urgent transfer. Elective procedures can be planned and waiting times reduced.

### G123 CONGENITAL CARDIOVASCULAR MALFORMATIONS IN INFANTS OF DIABETIC MOTHERS—A 6 YEAR PROSPECTIVE STUDY

G. Birrell, G. Hawthorne, C. Wren. Dept of Paediatric Cardiology, Freeman Hospital, Newcastle upon Tyne Northern Diabetic Pregnancy Survey, Newcastle upon Tyne, UK

**Objective:** To examine the prevalence at live birth and spectrum of structural cardiovascular defects in infants of diabetic mothers.

**Methods:** Data on the numbers and types of cardiovascular malformation diagnosed in infancy in babies born to diabetic mothers in 1995–2000 were collected prospectively from the northern diabetic pregnancy survey. Similar data on offspring of non-diabetic pregnancies were obtained from the regional paediatric cardiology database.

**Results:** During the 6 years of the study there were 192 618 live births. 609 babies were born to diabetic mothers and 22 (3.6%) of them had cardiac malformations. 1417 (0.7%) babies from non-diabetic mothers had a cardiac malformation. The odds ratio for congenital heart disease in the offspring of diabetic mothers was 5.0 (95% CI 3.3–7.8). Combining our findings with the few small published studies and comparing them with the spectrum of defects in non-diabetic pregnancies shows a substantial excess of transposition of the great arteries, truncus arteriosus and tricuspid atresia.

**Conclusions:** This first population based prospective study of babies of diabetic mothers shows a five-fold excess of cardiovascular malformations in general and an even greater excess of some specific diagnoses.

### G124 OUTCOME OF NEONATAL PATENT DUCTUS ARTERIOSUS LIGATION, A THREE CENTRE STUDY

L. Lee<sup>1</sup>, R.Yates<sup>1</sup>, A.Tillet<sup>2</sup>, R. Tulloh<sup>2</sup>, W.Kelsall<sup>3</sup>. <sup>2</sup>Department of Cardiology, Great Ormond Street Hospital, London; <sup>2</sup>Department of Paediatric Cardiology, Guy's and St Thomas' Hospital London; <sup>3</sup>Neonatal Intensive Care Unit, Addenbrookes Hospital, Cambridge, UK

**Aim:** Patent ductus arteriosus (PDA) is a common problem in the ventilated premature neonates. Despite different medical strategies a

small number of infants require surgical PDA ligation. The aim of this study was to determine the short and long term outcome of neonates undergoing this procedure in a regional neonatal intensive care unit and two cardio-thoracic centres.

**Methods:** Premature infants undergoing isolated PDA ligation were identified from each unit's surgical database. A retrospective case note review was performed. Local paediatricians were contacted to provide long term follow up details. The study periods in the three centres overlapped but were not identical due to database limitations and availability of research personnel.

**Results:** A total of 85 infants were identified. The number of cases and period of study were: Centre A (1995–2000) n = 21; B (1995–1999) n = 42 and C (1999–2000) n = 22. All results are expressed as median (range). Birth gestation was 26(22–35) weeks, and birth-weight 828 (501–2100)g. PDA ligation was performed at 28(19–93)days at a weight of 1036(550–2700)g. There were no peri-operative deaths. Day 7 post-operative survival (POS) was 98% and day 30 POS was 94%. Overall 70 (82%) infants have survived long term. The interval between surgery and death was 47(6–124) days, most deaths result from respiratory complications.

**Conclusion:** Survival following surgical PDA ligation is initially high. Late deaths need to be taken in to account when counselling parents about the long-term outlook. Communication between professionals is essential to provide accurate information for parents.

### G125 ARE INNOCENT MURMURS INNOCENT ?

G.C. Clements, D.S. Crossland, M. Abu-Harb. Sunderland Royal Hospital, Sunderland, UK

**Aim:** To establish the significance of cardiac murmurs referred from primary care.

**Subjects:** All children referred to a paediatric cardiology interest clinic with a murmur heard by a primary care physician beyond the 6 week check between January 1999 and August 2001.

**Method:** All children underwent cardiovascular examination and then detailed echocardiography. The notes were analysed retrospectively.

**Results:** There were 106 referrals of whom 57 were male. Eight children had no audible murmur when examined, 88 had a soft systolic murmur at the left sternal edge (thought to be functional). The remaining 10 had murmurs with characteristics that differentiated them from an innocent murmur. Of the 106, five (95% CI 2–11) had structural heart disease which would require antibiotic prophylaxis for bacteraemic situations. Of these 4 had murmurs which were non innocent in nature (2 had valvular pulmonary stenosis and 2 had VSDs). The fifth patient was thought to have an innocent sounding murmur. This 4 month old male, had an ASD and pulmonary hypertension. He went on to have cardiac catheterisation and transoesophageal echo and was found to have multiple peripheral pulmonary artery stenoses. He may need catheter or surgical intervention in the future. No other patients required intervention.

**Conclusions:** Though many feel that careful clinical examination can confidently exclude most structural heart disease in children referred from primary care, rarely a child with significant structural heart disease may present with an innocent sounding murmur. Echocardiographic examination remains the gold standard.

### G126 NON-INVASIVE PREDICTION OF MECHANISM OF SUPRAVENTRICULAR TACHYCARDIA: A DIAGNOSTIC DILEMMA

K.M. Eastham<sup>1</sup>, C. Wren<sup>1,2</sup>. <sup>1</sup>Departments of Paediatric Cardiology, Freeman Hospital, Newcastle upon Tyne; <sup>2</sup>Great Ormond Street Hospital for Children NHS Trust, London

**Background:** A non-invasive evaluation of the likely mechanism of arrhythmia is important in the planning of management of an undiagnosed supraventricular tachycardia (SVT). The two commonest mechanisms are atrioventricular re-entry tachycardia using an accessory pathway (AVRT) and atrioventricular nodal re-entry tachycardia (AVNRT).

**Aim:** To investigate the role of clinical parameters as predictors of AVRT and AVNRT.

**Method:** A retrospective review of case notes was performed of 59 consecutive cases, with a diagnosis of AVRT or AVNRT, undergoing electrophysiological study (EPS) and catheter ablation over a 10 year period.

**Results:** 53% had a diagnosis of AVRT and 47% of AVNRT. The median age of onset of symptoms was 8 years (-0.05–14.75). The

median age of onset of symptoms in AVRT was 5.5 years (0.03–14.75) and of AVNRT 9 years (-0.05–14). The odds of a child with onset of symptoms before the age of 5 years having a diagnosis of AVRT was 4.3 ( $p=0.01$ ). The median age of ECG confirmation of SVT is 9.04 years (0–15.41) and of EPS 12.83 years (4.33–18.91). There was no difference in the delay in time to ECG or EPS diagnosis for either group. 61% of cases were male: 15/31 with AVRT; 8/28 with AVNRT. Female sex was 2.3 times more likely to be associated with a diagnosis of AVNRT than AVRT ( $p=0.12$ ). There was no difference in frequency of symptoms or their average duration: 15 seconds–72 hours (median 60 minutes). Congenital heart disease was not present in any case.

**Conclusion:** Age of onset of symptoms is the best predictor of mechanism of undiagnosed SVT. Onset at less than 5 years of age is significantly associated with a diagnosis of AVRT. This has implications for planning of radiofrequency catheter ablation and for counselling of parents, as AVNRT carries a higher risk of heart block complicating the procedure.

### G127 A ONE-STOP ECHOCARDIOGRAPHY CLINIC AS AN EFFICIENT MEANS OF INVESTIGATING CHILDHOOD HEART MURMURS

A. Prendergast, G. Thompson, L. Cormack, W. Kelsall. *Department of Paediatrics, Addenbrooke's Hospital, Cambridge, UK*

**Background:** Congenital heart disease may be suspected following the detection of a heart murmur on routine examination. Traditionally children have been referred to general paediatricians for initial assessment and investigation with a chest X-ray (CXR) and electrocardiogram (ECG). Some children with heart murmurs may have no specific diagnosis and regularly return to the clinic for further assessment. There may be no clear recommendations regarding antibiotic prophylaxis. Since 1996 children with suspected heart problems have been referred to a one-stop clinic where echocardiograms could be performed. CXR and ECG are no longer routinely performed. The aim of this study was to review the outcome of children referred to the clinic for assessment of a heart murmur.

**Methods:** Patients attending the clinic between 1997–2000 were identified from the outpatient database. A retrospective case note review was performed. Patients with known cardiac defects were excluded. Infants less than 3 months of age were usually seen elsewhere in a neonatal echocardiography clinic.

**Results:** 344 children were seen, at a mean age of 4.6 years (range 10 days to 17.5 years). The echocardiogram was abnormal in 29(8.4%). Structural anomalies detected were: atrial septal defect  $n=5$ ; ventricular septal defect  $n=4$ ; patent ductus arteriosus  $n=2$ ; coarctation aorta  $n=2$ ; pulmonary valve pathology  $n=2$ ; mitral valve pathology  $n=3$  and one child had multiple defects. Only 6 (1.7%) children attending the clinic required surgical intervention. Children with normal hearts 315(91.6%) were immediately discharged from the clinic and their parents reassured. Recommendations regarding the need for antibiotic prophylaxis were given to the parents and in the general practitioner's letter.

**Conclusions:** Only a small number of patients attending paediatric clinics with heart murmurs will have confirmed structural anomalies and few will require surgery. Echocardiographic investigation allows healthy children to be efficiently discharged from the clinic with appropriate reassurance and information.

### G128 EARLY DETECTION OF LEFT VENTRICULAR DYSFUNCTION IN PATIENTS WITH B-THALASSEMIA BY DOBUTAMINE STRESS ECHOCARDIOGRAPHY

L. Hui, M.P. Leung, S.Y. Ha, A.K.T. Chau, Y.F. Cheung. *Department of Paediatrics, The University of Hong Kong, Pokfulam, Hong Kong*

**Aims:** To refine the prediction of left ventricular dysfunction in patients with  $\beta$ -thalassaemia using the index of myocardial contractility under dobutamine stress echocardiography.

**Methods:** Twenty-six patients with  $\beta$ -thalassaemia and 20 normal subjects were initially examined by echocardiogram at rest and under stress (dobutamine 5 $\mu$ g/min/kg). All were rated class I according to the New York Heart Association (NYHA) functional classification. The reference myocardial contractility index, which is the relationship between rate-corrected velocity of circumferential left ventricular fiber shortening and wall stress derived from normal subjects, was used as normal standard linear regressions in the conditions of rest and stress.

**Results:** Results showed that there was no significant difference in fractional shortening (FS) and ejection fraction (EF) between controls and thalassaemia patients (FS=0.41 $\pm$ 0.05 v 0.38 $\pm$ 0.05,  $p=0.08$ ; EF=0.80 $\pm$ 0.06 v 0.76 $\pm$ 0.06,  $p=0.054$ ) at rest. Based on dobutamine stress echocardiographic findings, the patients were divided into two subsets: "normal" (above or within the linear regression line  $\pm$  2SD) and "abnormal" (below - 2SD). Eleven patients were found to have "abnormal" contractility under stress, while only 3 were noted to be abnormal at rest. At follow up studies two years later, using the same measures, all patients in the "abnormal" subset under stress were found to have reduced myocardial contractility even at rest. Of these 11 patients, 1 died of congestive heart failure, 7 were rated NYHA class II, and 1 NYHA class III, although all of them were in NYHA class I two years previous. Their FS ( $p=0.00$ ) and EF ( $p=0.00$ ) were significantly decreased as compared with the data obtained two years previous, while the "normal" subset revealed no significant change ( $p>0.05$ ).

**Conclusions:** This study shows that the myocardial contractility index under dobutamine stress echocardiography is a sensitive technique for early detection of preclinical myocardial dysfunction in  $\beta$ -thalassaemia patients two years before the development of clinical symptoms.

### G129 TEN-YEAR SECULAR BLOOD PRESSURE TRENDS IN ADOLESCENCE: THE N.I. YOUNG HEARTS PROJECT

D.C. Watkins, L.J. Murray, I.S. Young, C.A.G. Boreham, G. Cran, P.J. Robson, J.M. Savage. *Dept. of Child Health, Queens University of Belfast, Institute of Clinical Science, Belfast BT12 6JB*

**Introduction:** A trend to decreasing blood pressure (BP) has been reported across a number of adult populations worldwide during the last two decades. In 1989–90, the first NI Young Hearts Project (YH1) measured resting BP in 1015 12 and 15 year-olds as part of an epidemiological study of cardiovascular risk factor prevalence. We report secular trends in BP from a 10-year cross-sectional follow up study (YH2000) of an equivalent cohort of Northern Irish schoolchildren.

**Methods:** A randomly selected demographically representative 3.6% province population sample of 1152 children aged 12 and 15 years was studied in 1999–2000. YH1 methodology was replicated exactly; BP was measured by a single observer throughout each study, using a Hawksley random-zero sphygmomanometer on each subject's right arm, after a period of sitting quietly at rest.

**Results:** Both systolic and diastolic BP's have demonstrated a substantial and consistent fall between YH1 and YH2000 across all four age-sex groups measured ( $p<0.0001$ ). Mean BP in 12 year-old boys decreased from 111/68 to 103/58; in 12 year-old girls from 112/71 to 105/61; in 15 year-old boys from 123/73 to 113/62; and in 15 year-old girls from 118/74 to 110/64. These changes have occurred despite significant secular increases in mean height, weight and some indices of fatness over the same period. Using currently accepted thresholds for hypertension in these age groups, the prevalence of "high" systolic and/or diastolic BP has decreased from 21.9–37.7% in YH1 to 4.0–9.7% in YH2000 ( $p<0.001$  for each age-sex group).

**Conclusions:** We report a marked decrease in both absolute BP levels and prevalence of high BP in the N.I. adolescent population. The reasons for these secular trends are unclear from our data. Further follow up studies would clearly be of benefit, but there is a substantial potential public health benefit if these decreases are sustained through the adult life of this population.