

PS-014 MEASUREMENT OF TISSUE-DOPPLER-DERIVED STRAIN AND STRAIN RATE IN VERY LOW BIRTH WEIGHT PRETERM INFANTS WITHIN THE FIRST 28 DAYS OF LIFE

¹S Helfer, ¹L Schmitz, ²C Bührer, ²C Czernik. ¹Department of Pediatric Cardiology, Charité University Medical Centre, Berlin, Germany; ²Department of Neonatology, Charité University Medical Centre, Berlin, Germany

10.1136/archdischild-2014-307384.310

Background Preterm infants and especially very low birth weight (VLBW) preterms are prone to suffer from cardiac stress due to bronchopulmonary dysplasia (BPD) or hemodynamically significant patent ductus arteriosus (hsPDA). Tissue-Doppler-imaging (TDI) based strain and strain rate measurements are ultrasound techniques that so far have not been used to assess cardiac function in this population.

Aim of this study was to assess TDI based strain and strain rate by in VLBW infants and their correlations with the infants' clinical courses within the first 28 days of life.

Methods We conducted ultrasonic measurements on days 1, 7, 14 and 28 of life in 119 preterm infants with a birth weight below 1500 g. We assessed peak systolic strain (PSS) and strain rate (PSSR) and compared these parameters depending on birth weight, weight at examination and heart rate as well as the presence of a PDA or development of BPD.

Results PSS and PSSR of only the right ventricle increased during the first 28 days of life. Infants with hsPDA showed significantly lower values for left wall PSS on days 14 that only increased insignificantly after closure of the PDA. Incipient BPD was associated with significantly lower PSS in the right wall on days 14 and 28 of life.

Discussion Although BPD and hsPDA are highly intercorrelated in VLBW preterms, we were able to show that increased afterload due to BPD and increased preload due to PDA are associated with decreased PSS. Benefits of clinical applications, however, remain to be assessed.

PS-015 TISSUE DOPPLER ASSESSMENT OF MYOCARDIAL FUNCTION IN HYPOTENSIVE PRETERM INFANTS

A Singh, SV Rasiash, RJS Negrine, AK Ewer. Neonatal Unit, Birmingham Women's NHS Foundation Trust, Birmingham, UK

10.1136/archdischild-2014-307384.311

Background Sick preterm neonates may have significant cardiac dysfunction. Blood pressure (BP) may be a surrogate marker however mean BP alone does not indicate the nature of myocardial dysfunction.

Aim To analyse biventricular myocardial velocities and myocardial performance indices (MPI) using tissue Doppler imaging (TDI) in preterm neonates <30 weeks gestation, with and without hypotension, in the first 24 h of life.

Methods 25 preterm neonates were recruited: 15 were normotensive and 10 were hypotensive. The hypotensive group (HT) received between 1 and 5 interventions (fluid and inotropes) till they were normotensive. Peak systolic (S'), early diastolic (E'), late diastolic (A) myocardial velocities and MPIs from the lateral annulus of the left and right atrio-ventricular valves were measured. Scans were performed after each intervention.

Results The left ventricular (LV) MPI was significantly higher in the hypotensive group compared to the normotensive group ($p = 0.01$) suggesting left ventricular dysfunction. Biventricular

MPIs decreased significantly when hypotension was corrected, indicating an improvement in myocardial function (RV $p = 0.01$, LV $p = 0.05$). Trans-mitral E' also showed an improvement following intervention for HT suggesting improvement in left ventricular relaxation ($p = 0.02$).

Conclusion Although our study is small we have demonstrated that hypotensive preterms have impaired left ventricular function. Myocardial function improved after intervention in the hypotensive group. More studies are needed to investigate the application of TDI as an adjunct in clinical decision making when managing preterm babies with hypotension.

PS-016 EXCESSIVE LEFT VENTRICULAR MYOCARDIAL GROWTH DIRECTLY AFTER PRETERM BIRTH

U Schubert. Neonatology, Karolinska Institute, Stockholm, Sweden

10.1136/archdischild-2014-307384.312

Background and aims Early cardiac re-modelling in preterm animals and increased left ventricular mass (LVM) in young adults born preterm have been reported. We investigated LVM in infants for early adaptational myocardial changes during 6 months after preterm birth.

Method Longitudinal echocardiographic study measuring LVM in 25 preterm infants (GA 26–30) directly after birth, at term and 3 months post-term, and comparison to 30 age-matched term children after correction for body surface area (m^2).

Results LVM/ m^2 increased with 78% during the first three months after preterm birth (37.43 to 66.73 g/m^2) compared to 13% in controls (49.39 to 55.70 g/m^2). At term, LVM/ m^2 was significantly higher in the preterm group (66.73 vs 49.39 g/m^2 , $p < 0.001$). Preterm infants developed even more absolute LVM (12.79 vs 10.79 g, $p = 0.02$) although they were slightly lighter (3.18 vs 3.45 kg).

At three months of corrected age, relative LVM decreased, and no significant differences could be shown between the groups.

Conclusion Preterm infants develop an immediate but transient increase in LVM. Premature myocardial maturation, increased afterload and a narrower vascular tree might be responsible for left ventricular hypertrophy. The impact on short and long term left ventricular function is still unclear and has to be explored.

PS-017 CHANGES IN TROPONIN-T AFTER EXTREMELY PRETERM BIRTH

¹A Gudmundsdottir, ¹M Bartocci, ²G Printz, ³C Attner, ⁴K Bohlin, ¹J Ekström, ⁵M Karlsson, ¹AK Bonamy. ¹Department of Women's and Children's Health, Karolinska Institutet, Stockholm, Sweden; ²Neonatal Department, Karolinska University Hospital, Stockholm, Sweden; ³Sachs' Children's Hospital, Neonatal Department, Stockholm, Sweden; ⁴Clinical Science Intervention and Technology, Karolinska Institutet, Stockholm, Sweden; ⁵SÖS, Karolinska Institutet, Stockholm, Sweden

10.1136/archdischild-2014-307384.313

Background Cardiac Troponin-T (cTnT) has been proposed as a useful marker of PDA-severity in preterm infants. Longitudinal data on cTnT in extremely preterm infants is scarce.

Methods We included 60 infants born before 28 weeks of gestation at the Karolinska University Hospital in Stockholm Sweden and measured cTnT at 3 days (range 2–4) and 7 days (range 5–9) of age. Forty-two infants had cTnT measured at two weeks

of life (range 11–18 days). Wilcoxon signed rank-test was used to test for differences in cTnT between the different time-points.

Results Mean gestational age was 26.1 weeks (range 23.0–27.9) and mean birth weight 838 g (438–1287 g). At postnatal day 3, median cTnT was 148 ng/l (range 82–386). cTnT decreased between day 3 and day 7 to 96 ng/l (68–214) ($p < 0.001$). Between one and two weeks of age, cTnT again increased to 144 ng/l (95–338) ($p = 0.001$). Thirty-four infants (57%) were treated for a hemodynamically significant PDA (hsPDA) at a mean age of 8 days (SD 3.3). Twenty-three received only pharmacological treatment, 9 had surgery after pharmacological treatment and 2 had primary surgery. cTnT did not differ at any of the three time points between infants treated for hsPDA and infants not treated. Five infants who later died had significantly higher cTnT at 7 days of age than the 55 survivors (median 175 ng/l, compared to 94 ng/l) ($p = 0.01$).

Conclusion cTnT levels in extremely preterm infants are tenfold higher than reference values in adults. We did not find any relation between cTnT and need for PDA-treatment in this study.

PS-018

EVOLUTION OF SPECKLE TRACKING DERIVED 2-D STRAIN PARAMETERS IN VERY LOW BIRTH WEIGHT INFANTS WITH AND WITHOUT BRONCHOPULMONARY DYSPLASIA DURING THE NEONATAL PERIOD

¹C Czernik, ¹S Rhode, ²S Helfer, ¹G Schmalisch, ¹C Bührer, ²L Schmitz. ¹Department of Neonatology, Charité University Berlin, Berlin, Germany; ²Department of Pediatric Cardiology, Charité University Berlin, Berlin, Germany

10.1136/archdischild-2014-307384.314

Background and aims In preterm infants, postnatal myocardial adaptation may be influenced by bronchopulmonary dysplasia (BPD). We aimed to describe the development of left ventricular function by serial 2D-Doppler, and speckle tracking echocardiography (2D-STE) in infants with and without BPD during the neonatal period in comparison to anthropometric and conventional haemodynamic parameters.

Methods Prospective echocardiography on day of life (DOL) 1, 7, 14, and 28 in 119 preterm infants <1500 g birth weight, of whom 36 developed BPD (oxygen supplementation at 36 gestational weeks). Non-BPD and BPD infants differed significantly in median[IQR] gestational age (25.5[24–26.5] weeks vs. 29[27–30]weeks, $p < 0.001$) and birth weight (661[552–871]g vs. 1100 [890–1290]g, $p < 0.001$).

Results The rapid growth of length and body weight during the first 4 weeks of life was not matched by increased speckle tracking parameters. Infants with BPD differed significantly ($p < 0.001$) from those without BPD firstly, for all anthropometric parameters and conventional haemodynamic parameters except heart rate and secondly, for 2D-STE parameters global longitudinal systolic strain rate (GLSSR) and longitudinal systolic strain (LSSR) at the left free midwall segment. In infants with BPD, GLSSR ($p < 0.001$) and LSSR ($p < 0.01$) were significantly higher during the first week of life after which the differences disappeared. Low intra- and inter-observer variability was seen for longitudinal systolic strain and strain rate mid septum with a median coefficient of variation <4.6%.

Conclusions Reproducible 2D-STE measurements are possible in preterm infants <1500 g. There are early (DOL 1 and 7) ventricular changes (GLSSR and LSSR) in very low birth weight infants who develop BPD.

PS-019

CHILDHOOD CARDIAC OUTCOME OF TWIN-TWIN TRANSFUSION SYNDROME AFTER INTRAUTERINE LASER TREATMENT: AN ECHOCARDIOGRAPHIC STUDY OF VENTRICULAR FUNCTION

¹C Pegelow Halvorsen, ²LA Mohlkert, ²M Norman, ³SE Sonesson. ¹Clinical Science and Education, Karolinska Institutet, Stockholm, Sweden; ²Clinical Science Intervention and Technology, Karolinska Institutet, Stockholm, Sweden; ³Women's and Children's Health, Karolinska Institutet, Stockholm, Sweden

10.1136/archdischild-2014-307384.315

Background and aim Intrauterine laser treatment of placental vessels is used to alleviate abnormal circulatory load and cardiac morbidity affecting fetuses with twin-twin transfusion syndrome (TTTS). As the final cardiac outcome after such intervention is not known, we conducted this childhood follow-up study of cardiac function in twins treated with intrauterine laser for TTTS.

Methods and results Nineteen TTTS pairs (11 male, 8 female) with a mean age of 4.5 (range 1.1–9.9) years were assessed with echocardiography 2D, Doppler, DTI, 3D and speckle tracking, and compared with nineteen age- and gender-matched singletons.

Recipients had a lower left ventricular E/A ratio compared with their donor twins [1.48(0.35) vs. 1.66(0.28), $p < 0.05$] but not compared with singleton controls, and all but one observation were within normal reference limits. There was no significant difference in the right ventricular E/A ratio [1.26(0.28) vs. 1.41(0.28), $p = 0.06$], but recipients showed a slightly lower right ventricular e'a' ratio when DTI was used. TTTS twins had smaller longitudinal left and right ventricular dimensions than controls. Besides a marginally lower ventricular strain in donors compared with controls, speckle tracking could not demonstrate any group differences in systolic ventricular function.

Conclusion Despite significantly different fetal cardiac loading conditions, survivors of laser-treated TTTS show only minor within-pair differences in diastolic cardiac function at follow-up. Cardiac function in TTTS twins compare well to singleton controls, suggesting a favourable long-term outcome.

PS-020

CARDIAC FUNCTION IN NEWBORNS WITH FETAL GROWTH RESTRICTION: MORPHOLOGICAL AND FUNCTIONAL CHANGES

¹L Rodriguez Guerineau, ²M Perez Cruz, ¹FJ Cambra, ²O Gómez, ³J Carretero, ²MD Gomez Roig, ²F Crispi, ³J Bartrons. ¹Pediatric Intensive Care Unit, Hospital Sant Joan de Déu, Esplugues de Llobregat, Spain; ²Department of Obstetrics and Gynecology, Barcelona Center for Maternal Fetal and Neonatal Medicine Hospital Clínic and Hospital Sant Joan de Déu, Barcelona, Spain; ³Pediatric Cardiology, Hospital Sant Joan de Déu, Esplugues de Llobregat, Spain

10.1136/archdischild-2014-307384.316

Abstract PS-020 Table 1

Characteristics (n = 50)	FGR [#]	Controls [#]	p
Gestational age at birth (w = weeks + d = days)	37w + 6d (34w–40w)	39w + 4d (34w–41w)	0,001
Weight (kg)	2,23 (1,58–2,73)	3,24 (1,99–4,00)	<0,001
Right sphericity index	1,56 (1,11–2,28)	1,90 (1,53–2,46)	<0,001
Left sphericity index	1,63 (1,32–2,32)	1,98 (1,61–2,63)	<0,001

[#]Mean (Range).