

results of those receiving vs. not receiving T3US are shown in table 1. 83% of first T3US had a definite medical indication, 10% a possible indication and 7% no indication. Women having T3US had more medical risks/complications, likely accounting for outcome differences including induction. SGA detection improved with T3US but still only detected 32% of SGA.

**Conclusions:** In a population with selective T3US, over half of women received T3US, with < 10% of these having no indication. SGA detection remains suboptimal, although improved with T3US vs. no T3US. Ideally, randomised trials of universal versus selective T3US to better inform modern practice would be undertaken.

P05.14

Abstract withdrawn

## P06: FETAL HEART FUNCTION

P06.01

**Placental related complications in women carrying a fetus with congenital heart disease**

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**Objectives:** Isolated fetal major heart defects maternal serum PlGF at 11–13 weeks of gestation is decreased, suggesting impaired placental angiogenesis.

Our aim was to assess whether pregnant women carrying a fetus with CHD are at greater risk of impaired placental related complications.

**Methods:** Retrospective study in women carrying a fetus with major CHD from 2003 to 2014, focusing in perinatal outcome and maternal complications. The incidence of impaired placental complications such as preeclampsia (PE), eclampsia, HELLP (hemolysis, elevated liver enzymes and low platelets) syndrome, stillbirth and intrauterine growth restriction (IUGR) was recorded. Multiple pregnancies and chromosomal abnormalities were excluded for the analysis.

**Results:** 279 pregnancies with a live born singleton fetus with normal karyotype and postnatally confirmed CHD were included. Patients were classified in 3 groups according their cardiac defect: 104 (37.3%) atrioventricular (A-V) defect, 102 (36.5%) conotruncal anomalies and 73 (26.2%) left ventricular outflow tract obstruction (LVOT). No differences in maternal characteristics were found among groups. Overall, PE occurred in 16 (5.7%) women carrying a CHD fetus. A significantly higher incidence of PE was observed in the CHD group compared with normal population (5.7% vs. 1.2%  $p < 0.001$ ). Rate of placental related complications according to cardiac defect groups are shown in table 1.

**Conclusions:** Women carrying a fetus with CHD have a higher risk of PE, especially in A-V and conotruncal anomalies. Our results suggest common angiogenic impairment in the placenta and heart development of certain CHD cases.

P06.01: Table 1.

	Congenital Heart Diseases			
	All Complications (n = 279)	A-V (n = 104)	Conotruncal (n = 102)	LVOT (n = 73)
PE / HELLP	16 (5.7%)*	8 (7.7%)*	6 (5.8%)*	2 (2.7%)
IUGR (p3)	27 (9.7%)*	7 (6.7%)	9 (8.8%)	11 (15%)
IUGR (p10)	59 (21.1%)	17 (16.3%)	21 (20.6%)	21 (28.8%)
Stillbirth	7 (2.5%)	4 (3.8%)	2 (1.9%)	1 (1.4%)

P06.02

**Is there a difference in the fetal right myocardial performance index (RMPI) measured from single and dual Doppler images?**

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**Objectives:** RMPI has been used to evaluate fetal cardiac function in normality and pathology. RMPI could be obtained using two Doppler images “Double-image” or one Doppler image “Single-image”. We aimed to compare the value of RMPI using both double-image and single-image methods in the same fetus.

**Methods:** RMPI was calculated in 138 normal fetuses at 16–28 weeks' gestation using both double and single image methods in each fetus. “Double-image” was taken using two separate waveforms from two different anatomical planes; at the tips of tricuspid valve (TV) in the apical four-chamber view (4CH) to measure the tricuspid inflow for the (“a”) time interval and at the pulmonary valve in the short-axis view or in the sagittal plane to measure the ventricular outflow for the (“b”) time interval. In “single-image”, the waveform was obtained by placement of Doppler gate at the tips or just below TV medially towards the ventricular septum in the 4CH aiming for including tricuspid inflow and pulmonary outflow in a single Doppler waveform. Machine settings were set for all waveforms at: Doppler sweep velocity at 15 cm/s; angle of insonation <150; minimal gain; Doppler gate 3–5 mm; wall motion filter 300Hz. Three cardiac cycles were evaluated for each fetus in each technique. The RMPI was calculated as (a-b/b).

**Results:** The mean and standard deviation of RMPI was  $0.46 \pm 0.09$  and  $0.49 \pm 0.07$ ; “a” was  $249.06 \pm 11.50$  and  $249.11 \pm 11.93$ ; “b” was  $170.85 \pm 8.95$  and  $167.62 \pm 8.39$  for “double-image” and “single-image” respectively. Agreement between methods showed a mean difference of 0.03 (95%LA, -0.13 to 0.18), 0.05 (95%LA, -15.48 to 15.58) and -3.23 (95%LA, -21.85 to 15.40) for RMPI, “a” and “b” intervals respectively.

**Conclusions:** The observed 95%LA of RMPI between the “double-image” and “single-image” is probably not clinically acceptable between the two methods. The difference in RMPI mean values should be kept in consideration in clinical settings if “single-image” only could be obtained and calculated.

P06.03

**Prediction of pregnancy complication occurrence using fetal cardiac output assessments made by ultrasonography at 20 to 24 weeks of gestation**

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**Objectives:** Prediction of pregnancy complication occurrence using fetal cardiac output assessments made by ultrasonography at 20 to 24 weeks of gestation.

**Methods:** We enrolled 65 mothers who visited us for fetal-targeted ultrasonography during gestational weeks 20 to 24. All gave birth at our hospital. Multiple pregnancies, cases with fetal anomaly or abnormal EFW (SGA or LGA) at the point of examination were excluded. Diameters (d) of the LV and RV outflow tract were measured just above the valves during systole. And systolic time-velocity integrals (TVI) were calculated. The left CO (LCO) and the right CO (RCO) were derived using the following equation:  $CO = TVI \times \pi \times d^2/4 \times HR$ . Pregnancy complications included gestational hypertensive disorders, FGR and PTB caused from PTL or PPRM.

**Results:** The mean GA at assessment was 22 weeks and the GA at delivery was 37 weeks. There were 23 cases with one more pregnancy complication (FGR: 9, gestational hypertensive disorders: 8, PTB caused from PTB or PPRM: 12). LCO was lower in complication group than in normal group (117 vs. 88,  $p = 0.03$ ). The RCO/LCO ratio is higher in complication group (1.42 vs. 2.43,  $p = 0.00$ ). Regression analysis demonstrated that RCO/LCO was a significant predictor of pregnancy complication; Odds ratio was 7.8. The area under the ROC curve for prediction of pregnancy complications from LCO was 0.71 ( $p = 0.01$ ). The diagnostic cut-off value of LCO was 80 ml/min. The area under the ROC curve from RCO/LCO was 0.68 ( $p = 0.02$ ) and cut-off value was 1.41.

**Conclusions:** This study demonstrated for the first time that pregnancy complications such as FGR, preeclampsia and PTB resulting from PTL or PPRM can be predicted based on fetal CO assessments made by ultrasonography at a GA of 20–24 weeks. The onset of pregnancy complication must be observed if fetal LCO is below 80 ml/min or RCO/LCO is over 1.41 at GA 20–24 weeks. There is the possibility that fetal hemodynamic changes have already begun before the occurrence of PTL or PPRM.

P06.04

#### Longitudinal myocardial function of the right ventricle and nuchal translucency

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**Objectives:** The aim of the study was to evaluate longitudinal myocardial function of the right ventricle (RV) in the fetuses with normal and increased nuchal translucency (NT) using anatomical M-mode.

**Methods:** Myocardial function of the RV was evaluated in 182 fetuses with NT measurement within normal limits and 68 fetuses with increased NT (over 95<sup>th</sup> percentile) between 11 + 0 and 13 + 6 weeks gestation. Cases of pregnancy termination were excluded. Tricuspid annular plane systolic excursion (TAPSE) was assessed using apical or basal 4-chamber view by placing the M-mode line at the lateral part of the tricuspid annulus. Longitudinal shortening fraction (SF) was calculated by dividing TAPSE by the end-diastolic ventricular length. All measurements were averaged at 3 consecutive cardiac cycles. Cardiothoracic area ratio was also calculated.

**Results:** In fetuses with NT within normal limits the mean longitudinal SF of the RV was  $32 \pm 3\%$  and did not change significantly between 11 + 0 and 13 + 6 weeks gestation. Although the majority of the fetuses with enlarged NT had normal longitudinal SF, they had significantly increased TAPSE and cardiac size (mean CPAR of 0.36) in comparison to normal controls, suggestive of

compensatory myocardial function. In 19/68 fetuses with enlarged NT, decreased longitudinal SF of the RV was identified. Eleven of those (11/19) resulted in intrauterine fetal demise before 20 weeks of gestation. In this subgroup, significant increase in cardiac size (mean CTAR of 0.43) and pseudo-normalisation of TAPSE was found, which may represent exhaustion of the protective mechanisms.

**Conclusions:** Evaluation of the longitudinal myocardial function of the right ventricle could provide useful information about loading changes and compensatory cardiovascular mechanisms occurring during the process of heart failure development in fetuses with enlarged NT.

P06.05

#### Correlation between the Delta-myocardial performance index and aortic isthmus systolic index as markers of unilateral cardiac strain

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**Objectives:** Fetal cardiac strain may manifest unilaterally in IUGR and TTTS, as the right ventricle is affected earlier and to a greater degree than the left. No gold standard exists for monitoring fetal differential hemodynamic compromise, though two such indices have been proposed: Delta-MPI (Right mod-MPI (RMPI)–Left mod-MPI (LMPI)) and aortic isthmus systolic index (ISI) (nadir systolic velocity/peak systolic velocity). We aimed to investigate the correlation between Delta-MPI and ISI.

**Methods:** Prospective cross-sectional study of 41 uncomplicated singleton fetuses, 16 singleton IUGR fetuses and 5 TTTS pregnancies between 17–38 weeks gestation. During a single examination, LMPI and RMPI were measured with three waveforms by the “peak” valve click technique to calculate Delta-MPI and additionally aortic isthmus Doppler was acquired for ISI calculation. Delta-MPI and ISI correlation was assessed in the combined cohort and pathological subgroups with Spearman's correlation. Delta-MPI, ISI, LMPI and RMPI were compared between uncomplicated versus TTTS donor, TTTS recipient and IUGR fetuses (Mann–Whitney U test).

**Results:** There was no significant correlation between Delta-MPI and ISI for total cohort or any subgroups (Spearman's  $\rho = -0.60$ ,  $p = 0.26$ ). There were no significance differences between ISI values in uncomplicated fetuses versus IUGR, TTTS Donor or TTTS recipient fetuses ( $p = 0.56$ ;  $0.22$ ;  $0.21$  respectively) and similarly for Delta-MPI ( $p = 0.32$ ;  $0.36$ ;  $0.19$  respectively). Statistical significance was found for LMPI in uncomplicated fetuses versus TTTS Donor or recipient fetuses ( $p < 0.01$ ,  $p < 0.01$ ) and similarly for RMPI ( $p < 0.01$ ,  $p = 0.03$ ).

**Conclusions:** No correlation was found between delta-MPI and ISI, indicating that delta-MPI and/or ISI are unlikely to both be solely measuring differential cardiac strain. Preload, peripheral resistance and cardiac contractility may impede their correlation. Further exploration into the interrelationships of these factors is underway.

P06.06

#### Relationship between the waves of venous ductus and congenital heart diseases

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