

**Methods:** This was a retrospective study including twin pregnancies of known chorionicity from a large regional cohort. Routine biometry was recorded and estimated fetal weight (EFW) estimated using 33 different formulas. Only pregnancies which delivered within 48 hours of the ultrasound scan were considered for this analysis (4279 singleton and 586 twin fetuses). Differences between the EFW and actual birthweight (ABW) were assessed by percentage error, accuracy in predictions within  $\pm 10\%$  and  $\pm 15\%$  of error, and use of the Bland-Altman method. All formulas were assessed individually and clustered on the basis of the biometric parameters included. The accuracy of prediction of the different cut-offs of BWD was also assessed using the area under the ROC curve.

**Results:** The overall mean absolute percentage error was  $\leq 10\%$  for 25 formulas in singleton compared to three formulas in twin pregnancies. The overall predictions within  $\pm 10\%$  and  $\pm 15\%$  of the ABW were 62.2% and 81.5% in singleton; and 49.7% and 68.5% in twin pregnancies, respectively. The highest prediction within  $\pm 10\%$  of ABW was achieved by Hadlock 3 and Hadlock 2 formulas in singleton and twin pregnancies, respectively. When the formulas were categorized according to the biometric parameters included, formulas based on head-abdomen-femur measurements showed the lowest mean absolute percentage error, in both singleton and twin pregnancies. BWD  $\geq 10\%$  and  $\geq 25\%$  were best predicted using the Shinozuka's and Higginbottom's formulas, respectively.

**Conclusions:** Ultrasound estimation of birthweight is less accurate in twin compared to singleton pregnancies. Formulas that include head-abdomen-femur measurements perform best. The predictive accuracy depends on the formula and threshold chosen for BWD.

P13.15

#### Maternal diastolic function during twin pregnancies

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**Objectives:** To evaluate the longitudinal changes in maternal diastolic function in patients with twin pregnancies.

**Methods:** A series of women with twin pregnancy underwent standard M-mode, 2D color Doppler and tissue Doppler (TD) transthoracic echocardiography during the first (11–13 weeks), the second (20–24 weeks) and the third (28–32 weeks) trimester.

**Results:** Thirty women with a viable twin pregnancy and normal nuchal translucency at 1st trimester were recruited for the purpose of the study. All the pregnancies were diamniotic including 25 dichorionic and 5 monochorionic set. A complete maternal cardiac assessment and pregnancy follow up is available in 21 cases while 9 are still ongoing. In the former group 40 livebirths were observed with a mean GA at delivery of  $36 \pm 2$  weeks and a mean birthweight of  $2303 \pm 397$  gr. A miscarriage  $< 20$  weeks and a single intrauterine fetal death at 37 weeks were registered. Regarding diastolic function from 1st to 3rd trimester in the study population a significant reduction of the peak of early diastolic transmitral wave velocity (MVvelE) ( $80.57 \pm 11.17$  vs.  $68.96 \pm 17.78$  cm/sec,  $P=0.010$ ) and of the peak of early diastolic velocity at mitral valve annulus at TD (E1) were documented ( $11.20 \pm 2.25$  vs.  $8.70 \pm 1.89$  cm/sec,  $P=0.016$ ). On the other hand, the peak telediastolic velocity at mitral valve annulus at TD (A1) increased significantly from 1st to 2nd trimester ( $6.93 \pm 1.49$  vs.  $8.42 \pm 1.36$  cm/sec,  $P=0.027$ ).

**Conclusions:** In twin gestations significant changes in maternal diastolic function occur from 1st to 3rd trimester. The majority of these changes seem to take place in the first half of pregnancy, thus confirming how critical the early stages of pregnancy for maternal hemodynamic adaptation.

## P14: ULTRASOUND ASSESSMENT OF PRETERM AND TERM LABOUR

P14.01

### Cervical morphology in prediction of preterm birth

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**Objectives:** To study the cervical morphology in addition to measuring cervical length with transvaginal ultrasound, to predict the risk of preterm birth in singleton pregnancies.

**Methods:** A longitudinal observational study was carried out retrospectively, from April 2011 to April 2013. A total of 480 patients were studied. 35 cases were delivered before 37 weeks and 4 cases were delivered before 34 weeks. Morphological changes were observed in some of the preterm cases. They are classified into 4 main categories: 1. Cervical glandular area, 2. Present/absent of polyp seen in cervical canal, 3. Present/absent of cervical canal fluid and 4. Present/absent of slugde in the cervical canal.

**Results:** Last year, a validation study of endocervical length measurements at first trimester was carried out in our centre. The aim of the study is to validate that our technique of measuring the length of endocervix and isthmus of uterus is consistent with the more recent published data. The measurement of the endocervical length described in the literature is reproducible in our local population producing similar statistical values and distribution. In the same study, we discovered that it is technically more challenging to measure the endocervical length in women with hyperechoic endocervical mucosa and in multiparous woman. In many recent publications, cervical ripening has been proven to be associated with changes in the cervix structure. By taking a step further, cervical morphological changes had been observed in some of these preterm cases.

**Conclusions:** There are much more to investigate in the cervix than just monitoring the cervical length in managing preterm birth. Are we ready to just stop at cervical length?

P14.02

### Objective quantification of elastographic colours of the cervix and reliability of measurements between operators

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**Objectives:** Cervical screening, by measurement of cervical length, is proven to be valuable in screening for preterm labour. Assessment of the consistency of cervical tissue may improve the performance of this screening tool.

To determine inter-observer reliability in assessing the region of interest of cervical elastography.

**Methods:** Cervical length and consistency were prospectively assessed by transvaginal scan (Accuvix XG / VR5-9 Mhz probe; Samsung Medison, Seoul, Korea) in a series of women being screened for risk of spontaneous preterm delivery. The consistency of the cervix was assessed using the technique of elastography. This involved capturing two images defined passively, through movement generated by patient's breathing and two images defined actively, through manual compression of the cervix. Strain values of two regions of interest (ROI) were independently assessed by each operator using commercial offline analysis software (Stiffmetool, Samsung Medison, Seoul, Korea). The interobserver reliability of

strain measurements were evaluated using the interclass correlation coefficient (ICC).

**Results:** 76 images collected from 19 patients were examined. The mean and standard deviation strain values for the anterior and posterior cervical ROIs were 0.59 (SD: 0.13) for patients on progesterone and 0.49 (SD: 0.12) for patients not on progesterone ( $p = 0.09$ ). The mean and standard deviation strain values for the cervix less than 25mm and over 25mm were 0.49 (SD 0.10) and 0.56 (SD 1.51) with  $p = 0.42$ . There was good correlation in the assessments made between the two operators (ICC = 0.83).

**Conclusions:** Cervical elastography is both feasible and has high interobserver reliability. Its clinical value needs to be assessed in further studies.

P14.03

#### Efficacy of progesterone in women with a short cervix; can elastography provide an objective evaluation of treatment efficacy?

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**Objectives:** Women with a short cervix have an increased risk of preterm delivery. Treatment with progesterone reduces their risk of preterm birth. This may be due to its affect on cervical extracellular matrix, interfering in the remodelling process. In this study we examine the feasibility of using elastography to look at the consistency of the cervix before and after treatment with progesterone.

**Methods:** Nine patients who had a short cervix identified through screening for risk of preterm delivery had elastography assessment (Accuvix XG, Samsung Medison, Seoul, Korea) prior to and >1 week after treatment with progesterone. The image collected during elastography was divided into four regions of interest; anterior and posterior cervical lips, the endocervical mucous plug / cervical canal and the whole cervix. Strain values were assessed using offline analysis software (Stiffmetool, Samsung Medison, Seoul, Korea). Measurements before and after progesterone were compared using the Wilcoxon signed-rank test.

**Results:** Although not statistically significant, there was an increase in stiffness in all regions except the endocervical canal and mucous plug. For the whole cervix, there was a 16% increase in stiffness of ( $p = 0.26$ ). Progesterone appeared to the greatest effect on the posterior cervical lip, with a 50% increase in stiffness ( $p = 0.17$ ). A pre mean 0.56 (SD 0.94) and post mean 0.61 (SD 0.08). The anterior cervical lip increased in stiffness by 3%, with a pre mean 0.44 (SD 0.05) and post mean 0.48 (SD 0.11), ( $p = 0.37$ ). The stiffness in the endocervical canal and mucous plug decreased by 4% after progesterone treatment, mean pre 0.54 (SD 1.4), and mean post 0.50 (SD 0.06),  $p = 0.37$ .

**Conclusions:** These pilot data suggest that there may be a measurable effect of progesterone on the consistency of the cervix. A larger study is needed to confirm whether this is a statistically significant effect. If so, it may be possible to monitor the effectiveness of progesterone through elastography.

P14.04

#### Fetal adrenal gland volume and prediction of preterm birth

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**Objectives:** Given the importance of the fetal adrenal gland in the production of hormones critical to labor, we sought to evaluate whether sonographic 3-dimensional measurements of the fetal adrenal gland are a useful screening tool among asymptomatic women for spontaneous preterm birth (PTB).

**Methods:** We prospectively screened 128 non-anomalous singletons from 24–37 weeks' gestation with volumetric measurements of the fetal adrenal gland at their indicated antenatal sonogram. 3-dimensional images of the fetal adrenal were acquired, and volumes were calculated using Virtual Organ Computer-Aided Analysis (VOCAL) software. Labor and delivery outcomes were assessed and compared with respect to adrenal volume.

**Results:** There was a direct positive relationship between fetal gestational age and adrenal gland volume ( $p = 0.01$ ). When corrected for estimated fetal weight, the 11 women (9%) who delivered with spontaneous PTB had smaller adrenal glands than those who did not have a spontaneous PTB, 0.33 cm<sup>3</sup>/kg compared with 0.57 cm<sup>3</sup>/kg, respectively ( $p = 0.006$ ). There was no difference in volumes between those who delivered by spontaneous PTB within 7 days or greater than 14 days from sonographic adrenal measurement (0.34 cm<sup>3</sup>/kg vs 0.33 cm<sup>3</sup>/kg,  $p = 0.79$ ). Among women at increased risk of PTB (those with cerclage, short cervix during the index pregnancy, or prior PTB), those delivering after spontaneous PTB had smaller adrenal glands than those who did not: 0.32 cm<sup>3</sup>/kg compared to 0.53 cm<sup>3</sup>/kg,  $p = 0.06$ . The same was true among those without an increased risk: 0.34 cm<sup>3</sup>/kg among spontaneous preterm births compared to 0.58 cm<sup>3</sup>/kg for those without,  $p = 0.07$ .

**Conclusions:** When screening asymptomatic women, we expected to find enlarged fetal adrenal glands in pregnancies that would eventually deliver following spontaneous PTB. However, we found them to be significantly smaller. 3-dimensional evaluation of the fetal adrenal gland is not a useful screening tool for preterm birth among asymptomatic women before term.

P14.05

#### Preliminary report of 48-hours Atosiban administration in spontaneous preterm labor: Doppler blood flow assessment of placental and fetal circulation

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**Objectives:** To investigate whether any changes in placental and fetal circulation are observed in 21 pregnant women with spontaneous preterm labor within the first 48 hours of Atosiban therapy.

**Methods:** Detailed Doppler evaluation was performed prior to Atosiban administration and thereafter at 24 and 48 hours. Maternal heart rate and the pulsatility index (PI) in both uterine arteries were assessed. Fetal heart rate (FHR), the resistance (RI) and pulsatility index (PI) of umbilical (UA) and middle cerebral artery (MCA) were measured. Additionally cerebroplacental ratio was calculated. To determine changes over time in all study variables analysis of variance (ANOVA) for repeated measurements followed by Tukey-Kramer's post hoc test was used. The effects of additional clinical covariates were checked.

**Results:** Maternal heart rate and blood flow in (R-UtA/L-UtA) were not altered significantly during Atosiban administration. No significant changes in FHR as well as Doppler parameters (RI, PI, PSV) in UA and MCA were recorded after 24/48 hours of tocolytic treatment. The mean values of cerebroplacental ratio (CPR) remained unaltered during treatment.

**Conclusions:** 48-hours administration of Atosiban seems not to alter uterine nor fetal arterial blood flow pattern seriously. However, we cannot conclude definitely that there are absolutely no changes in