

Objectives: The aim of this study was to evaluate efficacy of cervical elastography associated with cervical ripening and to compare the predictive value of elastographic parameters and sonographic cervical length for delivery time.

Methods: This was a prospective observational study performed in Seoul St. Mary's Hospital between January 2016 and December 2016. All singleton pregnant women underwent ultrasonography including cervical length and elastography in the third trimester of pregnancy. Exclusion criteria were those scheduled to undergo a Caesarean section or labour induction.

Cervical elastography was obtained from the same sagittal plane of transvaginal cervical length without compression on the cervix using E-cervix (WS80A, Samsung Medicine, Seoul, Korea). The quantification of cervical elastography was measured by E-cervix which is semi-automatic program for calculating strain value of concerning cervical area. Strain was calculated by a data analysis system that directly analyses raw data from the ROI. We analysed the association between the time to delivery and ultrasonographic elastographic parameters.

Results: A total of 33 women were evaluated. 13 women started labour within 1 week after ultrasonography (Group 1) and 20 women did for more than 1 week (Group 2).

Transvaginal cervical length was shorter in Group 1 than Group 2. But it was not statistically significant. (2.79 ± 0.96 vs 3.54 ± 1.29 ; $p=0.084$). Elastographic contrast index which means the heterogeneity of elasticity within obtained image was significantly higher in Group 1 compared to Group 2 (5.85 ± 1.55 vs 4.31 ± 1.36 ; $p=0.005$). There was no significant difference in the values of other elastographic parameters between the two groups.

Conclusions: Cervical elastography can be used as a more useful parameter than transvaginal cervical ultrasound for predicting the time to delivery.

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Assessment of Caesarean section scar stiffness by ultrasound elastography

A. Kiener¹, L. Galli¹, A. Commare¹, L. Sabbioni^{1,3}, A. Dall'Asta¹, T. Frusca⁴, T. Ghi²

¹University of Parma, Parma, Italy; ²UC Ostetricia e Ginecologia, University of Parma, Bologna, Italy; ³University of Siena, Siena, Italy; ⁴University of Parma, Parma, Italy

Objectives: To evaluate lower-segment uterine Caesarean section scar stiffness through ultrasound-derived elastography.

Methods: A non consecutive series of non-pregnant women para 1 with a history of a single transverse lower-segment Caesarean section at term were submitted to transvaginal ultrasound elastography between 12 and 15 months after delivery. Patients with myometrial anomalies such as fibroids were excluded. The tissue strain was assessed by means of a quantitative colour score on the mid-sagittal plane of the uterus at the level of the Caesarean scar and of the surrounding intact myometrial tissue. The score was obtained applying a perpendicular pressure through rhythmic movements of the ultrasound transvaginal probe. Stiffness ratio between the uterine scar and the surrounding myometrium was automatically computed and compared between patients submitted to prelabour vs intrapartum Caesarean section.

Results: In all strain estimations were performed in 45 women at 14.1 ± 1.1 months from the Caesarean delivery. We found an increased stiffness in the uterine scar compared with the intact myometrial wall ($p < 0.001$), while the stiffness ratio between the uterine scar and the myometrium was 1.88 ± 0.72 . The strain rate of the uterine scar was comparable between women submitted to prelabour vs intrapartum Caesarean delivery (1.91 ± 0.72 vs 1.86 ± 0.73 , $p = 0.857$).

Conclusions: Lower-segment uterine scars seem to have an increased stiffness compared to normal myometrium. The strain

of the Caesarean scar does not seem to be different if Caesarean was performed before or during active labour.

Supporting information can be found in the online version of this abstract

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Abstract withdrawn

EP22.06

Morphology of maternal structures in fetal MRI: a retrospective, clinical-anatomical data analysis

A. Bahrami², D. Prayer², M. Weber², G.M. Gruber¹

¹Department of Anatomy, Medical University of Vienna, Vienna, Austria; ²Department of Radiology, Medical University of Vienna, Vienna, Austria

Objectives: Fetal MRI has become an important tool in prenatal diagnostics and is also capable of evaluating extrafetal and maternal structures. They are of significant relevance when it comes to obstetrical outcome. This study aims to investigate values for maternal cervical length and width (in case of depiction of a cervical mucus plug (CMP)) and width of the urinary tract in fetal MRI examinations. Correlation analysis between those values and gestational age (GA) was performed. Furthermore, filling degree of maternal urinary bladder and visually captured abnormalities of maternal structures were evaluated.

Methods: 453 Fetal MRI examinations (1.5 Tesla and 3 Tesla) of singleton pregnancies performed in 2014 at Vienna General Hospital were evaluated. Subjects with unknown GA, cervical insufficiency or maternal kidney disease were excluded, resulting in a total of 348 included cases. Cervical length and width were measured on sagittal T₂ sequences, width of renal pelvis and ureters were measured on axial T₂ sequences and filling degree of the urinary bladder was scored using T₂ sequences.

Results: Mean cervical length was 41.5 millimetres (mm) ± 8.8 , 36.7 mm ± 9.4 and 34.2 mm ± 8.7 for GA 18-21, 22-35 and 36-42 respectively. Statistical analysis showed significant ($p < 10^{-2}$) correlation between GA and cervical length, latter decreasing along gestation. Although correlation between width of urinary tract structures and GA was not significant, trends of positive correlation between them were observed.

Conclusions: Regarding the values of uterine cervix in MRI are in line with ultrasound-based studies while assessment of the urinary tract is often complicated by restricted field of view. Other parameters influencing cervical morphology (e.g. maternal age, height, ethnicity) have not been taken into account and should be subject of ongoing studies. Hence, the efficacy of fetal MRI when it comes to depicting maternal structures requires further investigation.

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Blood flow calculated in the uterine arteries based on the PixelFlux technique

T. Andersen², H. Arneberg², T. Scholbach³, H. Torp⁴, L. Loraas¹, T.M. Eggebo¹

¹National Centre for Fetal Medicine, St Olavs Hospital, Trondheim, Norway; ²Department of Laboratory Medicine, Children's and Women's Health, Norwegian University of Science and Technology, Trondheim, Norway; ³Leipzig Ultrasound Institute, Leipzig, Germany; ⁴Department of Circulation and Medical Imaging, Norwegian University of Science and Technology, Trondheim, Norway

Objectives: The aim of the study was to compare associations between blood flow volumes measured by the PixelFlux-Technique with measurements from time-averaged maximum velocity (TAMax).

Methods: We conducted a prospective cohort study in 47 women with single pregnancies in week 24. Blood flow volume (ml/minute) in the uterine arteries was first calculated as $0.5 \cdot \text{TAMax} \cdot \text{cross section area of the vessel (cm}^2) \cdot 60$. CSA was calculated as $\pi \cdot (\text{diameter}/2)^2$ assuming that the uterine vessels were circular. Thereafter the blood flow was calculated using the PixelFlux method. PixelFlux is a new method based on pixelwise calculation of spatially angle-corrected velocities and areas of all pixels inside a vessel. Velocity is coded by colour, and by comparing the colour of each pixel in the cross-sectional area with the preset colour bar, it is possible to measure blood flow velocities directly. Then, all pixels' flow volumes inside a vessels section are added to calculate the flow volume of the vessel during a heart cycle. Figure 1 illustrates a uterine artery in the systole and the diastole. All the calculations and measurements are done automatically by the PixelFlux program.

Results: The mean flow calculated from PixelFlux was 811ml/minute vs. 777ml calculated from TAMax. The mean difference was 24 ml/minute (95% CI -45; 94 ml/minute) and we did not observe any significant difference between the two methods due to the fact that the CI intervals were crossing zero. The intra class correlation coefficient was 0.83 (95% CI 0.72-0.90) and limits of agreement were -441 ml/minute to 489 ml/minute.

Conclusions: The PixelFlux method might be an easy and promising tool in calculating blood flow volumes in the uterine arteries directly.

Supporting information can be found in the online version of this abstract

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Discrepancy in fetal head biometry between ultrasound and MRI in suspected microcephalic fetuses

E. Katorza^{2,3}, G. Yaniv^{2,3}, R. Achiron^{1,3}, C. Hoffman^{2,3}

¹Obstetrics and Gynecology Department, Sheba Medical Centre, Tel Aviv, Israel; ²Chaim Sheba Medical Centre, Ramat-Gan, Israel; ³Tel Aviv University, Tel Aviv, Israel

Objectives: Microcephaly is one of the most common fetal structural abnormalities, and prenatal microcephaly is considered a group I malformation of cortical development diagnosed according to ultrasonographic (US) skull measurements.

The purpose of this study is to evaluate the agreement between fetal head US and MRI biometric measurements of suspected microcephalic fetuses.

Methods: This institutional review board-approved retrospective study with waived informed consent included 180 pregnant women and was conducted at our medical centre from March 2011 to April 2013. Biparietal and occipitofrontal diameter results of fetal head US normograms were compared to normograms for MRI. We used Pearson and Spearman rho non-parametric correlation coefficients to assess the association between two quantitative variables, paired t-test for paired quantitative variables, and McNemar test for paired qualitative variables.

Results: The average biparietal diameter but not the average occipitofrontal diameter percentiles in fetal head US differed significantly from the MRI results ($P < 0.0001$). When looking at the accepted microcephaly threshold, both biparietal diameter and occipitofrontal diameter percentiles differed significantly from MRI ($P < 0.0001$ and $P < 0.004$, respectively). There was no correlation between US-measured skull biometry and MRI-measured brain biometry. Estimated CSF volumes were significantly lower in the study group compared to 120 fetuses with normal findings in

prenatal head US and MRI. Also, we have created a MRI-based normogram of fetal head circumference and gestational age.

Conclusions: The diagnosis of microcephaly by US alone may be insufficient and ideally should be validated by MRI before a final diagnosis is established.

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Handheld ultrasound device: transverse section of uterus as a plane of choice for postpartum period

F. Mujezinović¹, A. Porović¹, M. Rosič²

¹University Clinical Centre Maribor, Maribor, Slovenia;

²Department of Gynecology and Obstetrics, General Hospital Ptuj, Ptuj, Slovenia

Objectives: We wanted to know which traditional sections of uterus in postpartum period are most easily and reliably obtained using VSCAN ultrasound device.

Methods: Handheld ultrasound device was used in bedside manner during the clinical evaluation of patients in days following delivery. Evaluation of the endometrium thickness was made using sagittal and transverse sections of the uterus. Images were recorded during the examination and compared in terms of good, average or poor. For each examination, quality of images of sagittal and transverse section was compared to each other.

Results: Visualisation of whole uterus in sagittal plane in a single image was possible in 89,7 % of 214 examinations.

Endometrium in a sagittal plane was visible 177 (82,7 %) cases with good, average or poor image quality in 108 (50,5 %), 84 (39,3 %), 22 (10,2 %) examinations, respectively.

In comparison to sagittal view, transverse section of uterus was obtained in all examinations. Outline of a whole uterus was captured in the image in 212 (99,1 %) examinations and endometrium was visualised in almost all examinations (99,5 %). Quality of the images was appraised as good, average, poor in 131 (61,2 %), 68 (31,8 %), 15 (7,0 %) examinations, respectively.

Visualisation of endometrium was better in transverse section than in sagittal section in 169 (79,0 %) examinations.

Conclusions: Evaluation of endometrium thickness in postpartum period using handheld US devices were easier, more reliable and of better quality in transverse section of the uterus in comparison to sagittal section of the uterus.

Supporting information can be found in the online version of this abstract

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A novel semi-automated technique for measuring carotid intima-media thickness in pregnant women

S. Santhirakumaran¹, J. Tay², C. Lees²

¹Imperial College Healthcare NHS Trust, Outwell, United Kingdom; ²Queen Charlotte's and Chelsea Hospital, Imperial College London, London, United Kingdom

Objectives: Carotid intima-media thickness (CIMT) is used to assess cardiovascular risk and has been found to be increased in pre-eclamptic pregnancies compared to normotensive pregnancies. There is increasing interest in automated software to obtain CIMT measurements, however few are available for a clinical setting. The aims of this study were to evaluate the use of a novel semi-automated technique for measuring maternal CIMT in pregnancy and investigate the relationship between maternal CIMT and gestational age.