OP15.15
Evaluation of human cervical microstructure with quantitative ultrasound

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Objectives: Evaluation of microstructure is critical to understanding tissue dysfunction like cervical insufficiency. Collagen is primarily responsible for cervical strength. In animals, collagen disorganizes long before labor. Lack of noninvasive technology sophisticated enough to detect microstructural changes has compromised evaluation in pregnant women. We used quantitative ultrasound methods developed in our lab to detect changes.
Methods: Hysterectomy specimens ($n = 5$) were scanned with 2 linear array transducers (Siemens Antares). Radiofrequency (RF) echo data were acquired (plane parallel to endocervical canal). The angle between the acoustic beam and tissue was used to assess anisotropic acoustic propagation by electronic control of transmit/receive angles from -14 to $+14°$. A region of interest (ROI) was selected (locations varied to assure result consistency) and the power spectrum of the RF signals computed for each angle.
Results: The power spectra (frequency content) of the backscattered RF signals was different for normal incidence (beams perpendicular to tissue) than those steered $+/-14°$ regardless of ROI position. With spectra normalized across frequencies, there was no attenuation effect (ie findings are not noise or artifact). Incident v steered beam differences are too large to be diffraction ($P < 0.01$) and suggest the effective scatterer size (diameter of the interrogated component) is less than 40 μ.
Conclusions: This novel approach identifies a component that is aligned (anisotropic) and too small to be muscle. Thus it is likely collagen. Our data suggest it is reliably assessable. Ongoing studies will definitively identify, then quantify and track it in pregnancy; if the cervix behaves as predicted, it will convert from an aligned to a random (isotropic) scattering well before labor. Detecting early structural changes prior to gross changes (such as cervical shortening) may give rise to earlier, more specific interventions for cervical insufficiency.

OP16: TWINS

OP16.01
First-trimester sonographic screening for aneuploidy in multiple pregnancies

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Objectives: To review our experience with first-trimester screening of chromosomal abnormalities in multiple pregnancies using nuchal translucency thickness measurement and nasal bone assessment.
Methods: Cases of multiple pregnancy presenting for first-trimester sonographic evaluation and with viable fetuses measuring between 45 to 84 mm were prospectively recruited for this study. Crown-rump lengths, nuchal translucency thickness measurements, the presence or absence of the nasal bone, and chorionicity were determined and the information collected in a dedicated database.
Results: There were 206 twin pregnancies, eight sets of triplets, and 1 set of quadruplets, for a total of 440 fetuses screened. Information on perinatal outcome was available in all cases. The nuchal translucency was measured in all cases and was found to be greater than the 95th percentile in six (8.6%) of the 70 monochorionic fetuses and in 10 (2.7%) of the 370 dichorionic fetuses ($P < 0.05$, Fisher's exact test). The nasal bone was successfully assessed in 421 of the 440 (95.7%) fetuses and found to be absent in only four cases, three of which were found to have aneuploidy. Chromosomal abnormalities were diagnosed in six fetuses from one monochorionic and four dichorionic twin pregnancies. Five of the six affected cases were associated with increased nuchal translucency thickness (sensitivity 83.3%), whereas the nasal bone was absent in only three of the aneuploid fetuses (sensitivity 50%).
Conclusions: Sonographic screening for chromosomal abnormalities using nuchal translucency thickness in first-trimester multiple pregnancies is highly sensitive. However, nasal bone assessment is not only limited in sensitivity but also more challenging in multiple than in singleton pregnancies due to difficulties in obtaining adequate views of the fetal face(s).

OP16.02
First-trimester nuchal translucency screening for fetal aneuploidies in multiple pregnancies

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Objectives: The aim of this study was to evaluate if NT has the same value in multiples and single pregnancies being an early ultrasound marker for chromosomal abnormalities.
Methods: We have prospectively evaluated 14.437 fetuses (13.137 single pregnancies fetuses and 1.300 multiple pregnancies fetuses) at 11–14 weeks' gestation, between January 2000 and December 2006. The exploration was performed transvaginal or combined tansvaginally/transabdominally, when necessary. We followed Fetal Medicine Foundation Guidelines for the NT measurement. The follow up was performed with pediatric neonatal exploration or phone poll, in case of delivery in another hospital. Increased NT was analyzed according to its association with chromosomal anomalies. X^2 Pearson or Fisher's exact tests (depending on the requirements of each test) were used for statistical analysis. When we found a significant probability value we present the OR with its 95% confidence interval.
Results: We have diagnosed 22 chromosomal abnormalities in the multiple pregnancies group (1.7%) and 174 chromosomal anomalies (1.3%) in the single pregnancies group. Detection Rate for Trisomy 13, Trisomy 18 and Trisomy 21 has been 90.9% in multiple pregnancies and 79.6% in single pregnancies. We have found a Positive Predictive Value of 18.2% in the group of multiple pregnancies and of 11.6% in single pregnancies for Trisomy 13, Trisomy 18 and Trisomy 21. False Positive Rate has been 3.5% in multiple pregnancies and 4.8% in single pregnancies for Trisomy 13, Trisomy 18 and Trisomy 21. Patients older than 35 years old, the Negative Predictive Value has been of 100% in multiple and single pregnancies and the Positive Predictive Value of 24% in multiple pregnancies and 21.4% in single pregnancies for Trisomy 13, Trisomy 18 and Trisomy 21.
Conclusions: Prevalence of chromosomal anomalies is slightly higher in multiple pregnancies. NT screening has a similar effectiveness in singles and multiple pregnancies.

OP16.03
First-trimester ductus venosus screening for fetal aneuploidies in multiple pregnancies

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Objectives: The aim of this study was to evaluate if Ductus Venosus (DV) has the same value in multiples and single pregnancies being an early ultrasound marker for chromosomal abnormalities.

Methods: We have prospectively evaluated 12.006 fetuses (10.789 single pregnancies fetuses and 1.217 multiple pregnancies fetuses) at 11–14 weeks' gestation, between January 2000 and December 2006. The exploration was performed transvaginal or combined transvaginal/transabdominal, when necessary. We follow Fetal Medicine Foundation Guidelines for the measurement of DV. Reversed DV was analyzed according to its association with chromosomal anomalies. X^2 Pearson or Fishers exact test (depending on the requirements of each test) were used for statistical analysis. When we found a significant probability value we present the OR with its 95% confidence interval. The follow up was performed with pediatric neonatal exploration or phone poll, in case of delivery in another hospital.
Results: We have diagnosed 17 chromosomal abnormalities in the multiple pregnancies group (1.4%) and 135 chromosomal anomalies (1.3%) in the single pregnancies group. Detection Rate for Trisomy 13, Trisomy 18 and Trisomy 21 has been 44.4% in multiple pregnancies and 79.2% in single pregnancies. We have found a Positive Prective Value of 3.7% in the group of multiple pregnancies and of 7.7% in single pregnancies for Trisomy 13, Trisomy 18 and Trisomy 21. False Positive Rate has been 8.7% in multiple pregnancies and 6.8% in single pregnancies for Trisomy 13, Trisomy 18 and Trisomy 21. In patients older than 35 years old, the Negative Predictive Value has been of 99.3% in multiple and 99.1% in single pregnancies and the Positive Predictive Value of 4% in multiple pregnancies and 14.8% in single pregnancies for Trisomy 13, Trisomy 18 and Trisomy 21.
Conclusions: DV screening has not a similar effectiveness in singles and multiple pregnancies as an early ultrasound marker for 13, 18 and 21 Trisomy.

OP16.04
Integrated second trimester risk assessment in twin gestations previously screened in the first trimester

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Objectives: To evaluate the performance of second trimester biochemistry risk assessment in twin pregnancies that had previously been screened in the first trimester.
Study Design: Independent sequential testing had been found to have a high false positive rate (17%). To evaluate the role of independent sequential testing in twins, we conducted a retrospective cohort study of 71 twin pregnancies from December 2002 to May 2007 in a single center that had been screened in the first trimester and who on chart review were found to have had a second trimester screen.
Results: The maternal age ranged from 25 to 51, with an average of 36 + 5 years. Of these twin pairs, 93% dichorionic and 7% monochorionic. IVF was used in 49% (21/71 ICSI, 13/71 donor ovum) of the pregnancies. Screen positive rate = 26.8% (19/71). Only 8.4% (6/71) had amniocentesis. The fetal loss rate per amniocentesis was 0/6. There were 12/71 pregnancies that had complications (structural = 4 (trisomy 21, Treacher - Collins, skeletal dysplasia, imperforate anus), metabolic = 1 (Opitz C), obstetrical = 5 (PPROM, PTL, incompetant cervix), TTTS = 2).
One fetus was affected by trisomy 21 and was detected by biochemistry in the 2nd trimester (not in the first trimester). For trisomy 21, false positive rate = 26% (11.5% per fetus), specificity = 74%, sensitivity = 100%.

1st trimester screen	*2nd trimester screen*	*% of pregnancies*
+	+	2.8
+	−	5.6
−	+	21.1
−	−	70.4

Conclusions: There is a paucity of data regarding independent sequential screening in twin gestations. Our data further characterizes biochemical screening findings with twins. Given the rarity of twin gestations, the overall effectiveness of sequential or combined screening will likely need to be established by meta-analysis.

OP16.05
Diamniotic twin pregnancies with a single placental mass; prediction of chorionicity at 11–14 weeks of gestation

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Purpose: To assess the accuracy of transvaginal US in the prediction of the chorionicity of diamniotic twin pregnancies with a single placental mass at 11–14 weeks of gestation.
Materials and Methods: From June 2006 to April 2007 we determined chorionicities by depiction of the amnion and chorion at the membrane-to-placental interface using transvaginal US. Pregnancies were classified as monochorionic when two layers of the amnion were identified and as dichorionic when either one layer of the chorion and two layers of the amnion or one layer of the chorion and one layer of the amnion were seen. The chorionicity predictions were compared with the ultimate chorionicity obtained by histologic evaluation of the intertwin membranes after delivery. Our institutional review board approved the study, and informed consent was obtained from all participants.
Results: In 65 out of 70 (92.9%) diamniotic twin pregnancies with a single placental mass, we were able to determine the chorionicity by depiction of the amnion and chorion at the membrane-to-placental interface using transvaginal US. The predictive accuracy was 100% (95% confidence interval: 92% to 100%) for 52 twin pregnancies considered to be dichorionic by transvaginal US and 100% (95% CI: 73% to 100%) for 13 twin pregnancies considered to be monochorionic.
Conclusions: The chorionicity of diamniotic twin pregnancies with a single placental mass can be reliably predicted by transvaginal US depiction of the amnion and chorion at the membrane-to-placental interface at 11–14 weeks of gestation.

OP16.06
Strategies and implications of modelling longitudinal prenatal growth in twin pregnancies

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Objectives: In twin pregnancies, biometry and growth is serially assessed throughout gestation on multiple occasions. Reference intervals derived from cross-sectional data may thus be unfit for repeated measurements in these closely monitored pregnancies. Besides offering appropriate estimations of population normal ranges with correlated measures in nested data, specific statistical methods for longitudinal measurements also allow individual prediction of growth paths.
Methods: In a retrospective study over a 5-year period, the biometric parameters (DBP, CC, AC, FL) of serially monitored