

#### OP21.04 Prognostic factors in fetal blood and on ultrasound examination in fetuses infected with CMV

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**Objectives:** To evaluate the prognostic value of hematological, biochemical and ultrasound abnormalities in fetuses infected with CMV.

**Methods:** We reviewed 55 cases of fetuses infected with CMV (CMV-PCR positive in amniotic fluid). Fetal blood sampling was performed for evaluation of platelet count, aminotransferases and gammaglutamyltransferase levels, presence of viremia and presence of specific IgM. Ultrasound examinations were performed every fortnight. The primary outcome measure was a combination of histological findings after termination of pregnancy and evidence of cytomegalic inclusion disease at birth when pregnancies were continued. Statistical analysis was conducted to determine the individual value of each parameter by univariate analysis, and the relevant model combining several parameters by multivariate analysis by logistic regression.  $P < 0.05$  was considered significant.

**Results:** Both thrombocytopenia and the presence of any ultrasound abnormality were associated with a poor outcome in a univariate analysis ( $P = 0.003$  and  $P < 10e3$  respectively). None of the other parameters was independently associated with a poor outcome. In the multivariate analysis, both thrombocytopenia and the presence of any ultrasound abnormality remained significant, independent predictors of a poor outcome: OR 17.35 CI (3.8; 79.0);  $P < 10^{-4}$  and OR = 1.08(1.03; 1.20);  $P < 0.002$ , for the presence of ultrasound abnormality and for each 10 000/mL decrease in platelet count, respectively.

**Conclusions:** The prognosis of CMV infected fetuses could be assessed by ultrasound examination and fetal blood sampling. The presence of any ultrasound abnormality and/or decreased platelet count are associated with a poor prognosis.

#### OP21.05 Pelviccal dilatation in maternal kidneys during normal pregnancy – an uncommon finding?

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**Objectives:** Physiological dilatation of the urinary collecting system has been reported to be a common finding in pregnancy. The aim of this study was to determine the incidence and degree of pelviccal dilatation detectable on ultrasound in asymptomatic pregnant women.

**Methods:** Renal ultrasound was performed on 120 asymptomatic pregnant women (age 20–30 years, mean 31 years) attending for a routine obstetric ultrasound scan. A cohort of 32 premenopausal women (age 19–45 years, mean 33 years) with no urinary symptoms presenting for gynecological ultrasound examination were used as controls. The ultrasound examinations were performed without pre-hydration or filling of the bladder. Hydronephrosis was defined as Grade 1 if renal pelvis measurement was 10–15 mm and Grade 2 if it was > 15 mm.

**Results:** Renal pelvis dilatation was detected in 11 of 120 (9%) asymptomatic pregnant women and none in controls. All kidneys were morphologically normal otherwise. Eight of 47 patients (17%) had hydronephrosis detected on the second-trimester scan and of these two had renal pelvis dilatation without calyceal dilatation. Three of 13 patients on the third-trimester scan (23%) had pelviccal dilatation and of these one had renal pelvis dilatation only. There was no hydronephrosis observed in the 60 patients having first-trimester scans. Unilateral hydronephrosis was observed in nine patients (eight right side, one left side) and bilateral

hydronephrosis in two patients. Grade 1 dilatation was found in eight patients. Grade 2 dilatation was found in three patients and involved the right kidney.

**Conclusions:** Although there is good physiological evidence to support dilatation of the pelviccalyceal system in pregnant women, this is not a common finding on ultrasonography and presents in the second or third trimester (18%). The right kidney is affected more commonly (90%) and bilateral hydronephrosis is uncommon.

#### OP21.06 Fetal renal pelvis volume assessed by three-dimensional ultrasonography and neonatal outcome: initial experience

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**Objectives:** The aim of this study was to evaluate fetal renal pelvis volume measurements in hydronephrotic kidneys using three-dimensional (3D) ultrasonography as a predictor of neonatal urological malformations and the need for surgery.

**Methods:** In this prospective study the fetal renal pelvis volume was measured using 3D ultrasonography in 88 kidneys of 49 fetuses with hydronephrosis (anteroposterior diameter > 4 mm) in the third trimester of pregnancy. After volume acquisition, volume calculation with manual delineation of the fetal renal pelvis was assessed using the Virtual Organ Computer-aided AnaLysis (VOCAL™) program. Two postnatal groups were defined: (1) no surgery required or no significant uropathies, (2) significant uropathies and/or surgery required. Positive predictive values on the risk of surgical intervention or uropathies were calculated.

**Results:** In 36 neonates (73%) the diagnosis of hydronephrosis was excluded postnatally or no significant uropathies were diagnosed. Eight (16%) neonates had significant uropathies and surgical intervention was needed in five (10%) of the infants. Fetal renal pelvis volume measurement > 5.0 cc demonstrates a positive predictive value of 100% of cases in need of surgery and allows identification of 63% of the cases with significant uropathies.

**Conclusions:** These preliminary data on 3D fetal renal pelvis volume measurements using the VOCAL™ program are the first presented to our knowledge and indicate that it is potentially an accurate method for the assessment of fetal renal pelvis volume as a predictor for the risk of surgical treatment or significant uropathies postnatally. It seems that postnatal follow-up is warranted if fetal renal pelvis volume is > 5.0 cc in the third trimester of pregnancy. An additional (already planned) control group can identify the best cut-off value to further optimize these novel data.

#### OP21.07 Persistent right umbilical vein: experience in a screening center

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**Objectives:** To study the ultrasonographic findings and outcomes of fetuses with persistent right umbilical vein diagnosed in a screening center between January 2005 and January 2006.

**Methods:** An observational study of eight fetuses diagnosed with PRUV in our center between January 2005 and January 2006.

**Results:** During the described period a total of 5640 fetuses from a low-risk population were scanned in our center. Eight fetuses were diagnosed as PRUV, which makes an incidence of 1:705. All cases presented with an intrahepatic umbilical vein with normal connection to the inferior vena cava via the ductus venosus. 75% of the cases were female. Only two (25%) cases had associated anomalies (one case of bilateral hydronephrosis and borderline ventriculomegaly; one case of a small muscular ventricular septal

defect). All cases were diagnosed between 18 and 21 weeks of gestation. No chromosomal anomalies were found. In all fetuses the diagnosis was confirmed after birth and all were doing well.

**Conclusions:** Persistent right umbilical vein as an isolated finding should be considered a benign anatomic variant.

#### OP21.08

##### Relationship between umbilical vein constriction, intra-abdominal dilatation and perinatal outcome

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**Objectives:** Intra-abdominal umbilical vein (UV) distension is sometimes seen in cases of fetal demise. We hypothesize that such a UV distension may be a post-stenotic dilatation due to an umbilical ring constriction. Here we explore whether a stricture of the UV is related to UV distension and to adverse outcome.

**Methods:** Referred high-risk pregnancies underwent Doppler assessment that included assessment of the UV at the umbilical ring. UV blood velocity > 90<sup>th</sup> percentile at this site and gestational age (GA) was defined as a UV constriction. An intra-abdominal UV diameter > 90<sup>th</sup> percentile was defined as distension. Pregnancies were followed up with repeat observations. Placental weight and fetal outcome were noted.

**Results:** Thirteen fetuses (11 singletons and two twins) that had UV-stricture but no major anomalies were included. Median GA at first examination for 10 survivors was 27 (19–36) weeks and for three fetal deaths 24 (19–24) weeks. There was a median of 5 (range, 2–9) observations in each fetus (total 66). Nine of 13 fetuses had both UV constriction and dilatation at first examination. UV constriction > 97.5<sup>th</sup> percentile and GA < 24 weeks were related to birth weight < 5<sup>th</sup> percentile ( $P < 0.05$ ) and fetal death ( $P < 0.05$ ). In subsequent observations UV constriction varied to values < 90<sup>th</sup> percentile in seven of 13 fetuses. In the rest (6/13) the UV constriction resolved for the rest of pregnancy. In all cases a relatively large placental weight was seen. Furthermore, a UV distension that extended from the abdominal wall to the ductus venosus was related to increased placental weight ( $P < 0.05$ ).

**Conclusions:** UV stricture at the umbilical ring seems to be commonly linked to intra-abdominal UV distension. This supports the assumption that the UV distension is often a post-stenotic dilatation. We speculate that it is the venous constriction that restricts hemodynamic responsiveness and carries the risk of complications (rather than the distention).

#### OP21.09

##### Abnormal umbilical venous drainage bypassing the fetal liver is associated with impaired fetal growth

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**Objectives:** Umbilical vein blood flow to the liver tissue has been suggested to be an important signal for determining fetal growth. We tested the hypothesis that an abnormal umbilical venous drainage bypassing the fetal liver leads to impaired growth.

**Methods:** Fetuses with ductus venosus agenesis combined with abnormal drainage of the umbilical vein were included. Intra-uterine death, hydrops, structural anomalies and chromosomal aberrations were excluded. Cardiomegaly was not considered an exclusion criterion but as an adaptive response to hyperkinetic circulation, unless there were signs of cardiomyopathy or structural defects. We noted the type of umbilical vein connection, gender, birth-weight and gestational age at birth. Individual standard deviation scores

(SD-scores) were calculated and compared with reference birth weight charts using the *t*-test.

**Results:** In the 15 eligible fetuses the umbilical vein was connected either to the right atrium (eight), inferior vena cava (four), or iliac vein (three). There were nine female and six male neonates with a median gestational age of 37 (range 29–40) weeks at birth with a median birth weight of 2240 (range 1400–3700) g. Birth weights were distributed 4 above mean and 11 below according to gestational age, gender and nationality. SD-score for the entire group was mean  $-0.9945$  (95% CI  $-1.824$ ;  $-0.1674$ ).

**Conclusions:** The significantly lower birth weight in fetuses with an abnormal low-resistance umbilicocaval shunt or corresponding bypass of the fetal liver supports the concept that umbilical liver perfusion is a determinant for fetal growth. Such fetuses tend to establish a hyperkinetic circulation in an effort to raise umbilical pressure and improve liver perfusion, but the wide shunt seems to prevent full compensation, as shown in the present study.

#### OP21.10

##### Three-dimensional sonographic fetal spleen volume measurement

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**Objectives:** The objective of this longitudinal study was to evaluate the growth of the fetal spleen in normal pregnancies, using three-dimensional ultrasound.

**Methods:** Three-dimensional sonographic examinations were performed on 14 appropriate-for-gestational-age fetuses. Fetal spleen volume was measured every 2 to 3 weeks after 20 weeks of gestational age until delivery.

**Results:** A curvilinear relationship was found between the gestational age and spleen volume ( $r^2 = 80.2\%$ ,  $P < 0.0001$ ), and ranges of spleen volume measurements for estimating the growth of the fetal spleen during normal pregnancy were generated. We found that the spleen volume calculation based on the equation for the volume of the ellipsoid by conventional two-dimensional ultrasound in previous investigations is nearly twice as large as that using three-dimensional ultrasound in our study, whereas the data described in this study are quite comparable with previous data from autopsy series.

**Conclusions:** Our findings suggest that the standard curve for the fetal spleen volume using three-dimensional ultrasound provides a superior means for evaluating normal spleen growth in the fetus and for identifying spleen abnormalities *in utero*. However, the data and their interpretation in our study should be taken with some degree of caution because of the small number of subjects studied. Further studies involving a larger sample size would be needed to confirm these findings.

#### OP21.11

##### Sonographic nomograms of the fetal calf between 15–42 weeks' gestation: use of a combination of two- and three-dimensional sonography

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**Objectives:** To establish a new reference growth chart of muscle calf biometry throughout gestation in normal singleton pregnancies.